

Pantheon Report

Generated at 2019-01-03 09:17:47 (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 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:

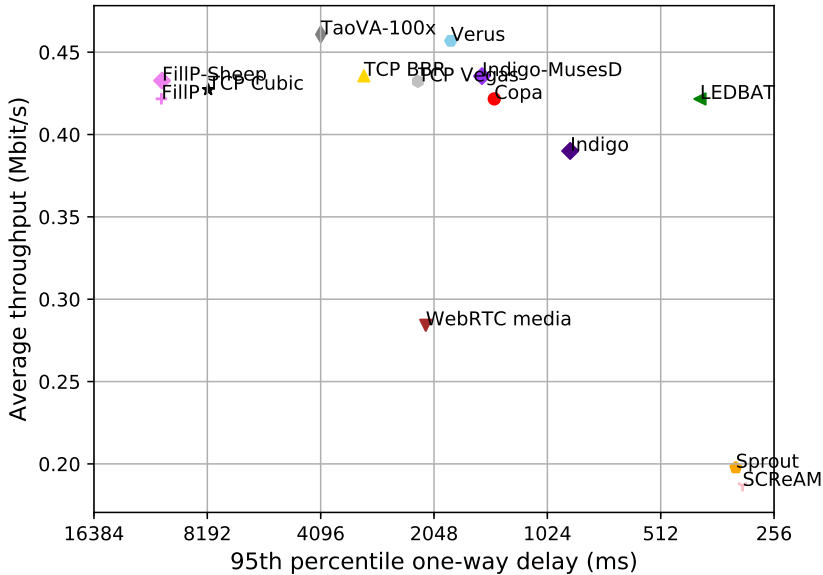
```
Linux 4.15.0-1029-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

Git summary:

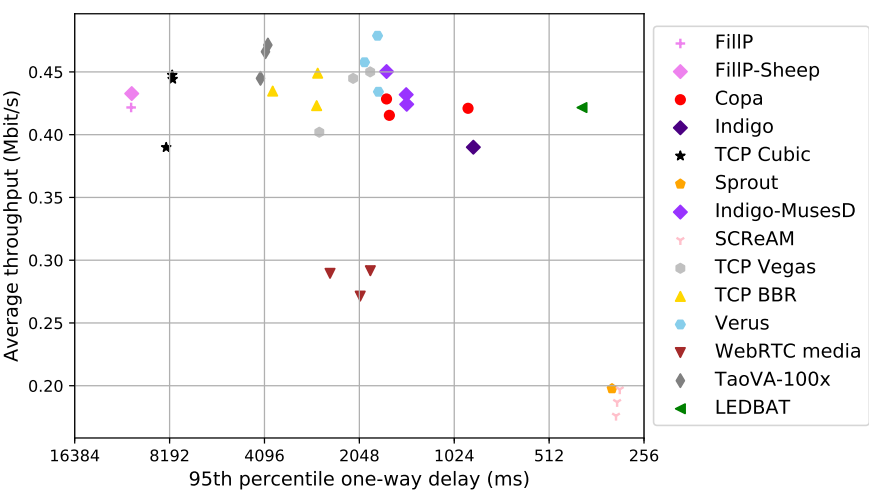
```
branch: muses @ c654af0b7d59d4ef4b914cfac404e1fc2e96dc68
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
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
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	3	0.29	0.22	0.06	3165.38	3075.93	2760.02	5.54	16.87	53.84
Copa	3	0.26	0.19	0.10	1398.57	1484.06	1444.41	4.45	7.96	11.86
TCP Cubic	3	0.42	0.02	0.00	8150.83	7363.89	8333.63	31.90	53.66	90.68
FillP	1	0.33	0.21	0.00	11081.58	8880.55	8320.50	32.92	93.70	94.57
FillP-Sheep	1	0.32	0.24	0.00	11030.25	8257.59	8601.71	30.59	88.30	90.40
Indigo	1	0.25	0.14	0.15	636.50	940.64	1081.06	0.64	1.32	1.65
Indigo-MusesD	3	0.22	0.21	0.22	1798.46	1410.03	1375.18	1.67	2.77	6.13
Indigo-MusesT	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEDBAT	1	0.19	0.23	0.27	371.43	430.08	412.79	0.22	0.52	4.70
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	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCReAM	3	0.08	0.10	0.12	292.40	309.45	322.43	0.84	1.12	1.73
Sprout	1	0.10	0.10	0.10	296.02	323.49	401.84	0.78	1.18	2.34
TaoVA-100x	3	0.28	0.20	0.19	3424.13	3794.87	4517.46	11.38	22.71	37.98
TCP Vegas	3	0.29	0.17	0.11	2141.26	2288.78	2317.39	4.69	9.30	36.62
Verus	3	0.45	0.01	0.01	1849.87	1772.17	1802.56	5.26	7.72	12.42
PCC-Vivace	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WebRTC media	3	0.12	0.11	0.06	2034.64	2175.21	2197.18	0.74	0.76	10.52

Run 1: Statistics of TCP BBR

Start at: 2019-01-03 08:25:11

End at: 2019-01-03 08:25:41

Local clock offset: -0.692 ms

Remote clock offset: 1.121 ms

Below is generated by plot.py at 2019-01-03 09:17:16

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.42 Mbit/s

95th percentile per-packet one-way delay: 2798.406 ms

Loss rate: 13.45%

-- Flow 1:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 2807.068 ms

Loss rate: 4.45%

-- Flow 2:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 2798.525 ms

Loss rate: 19.03%

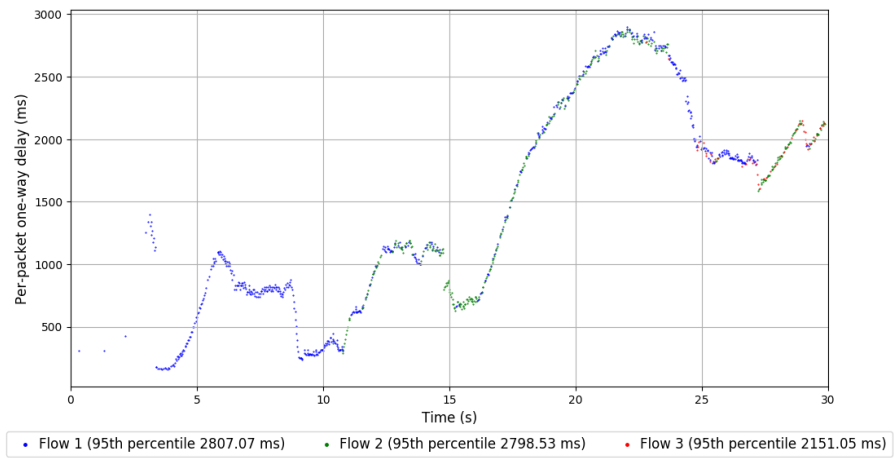
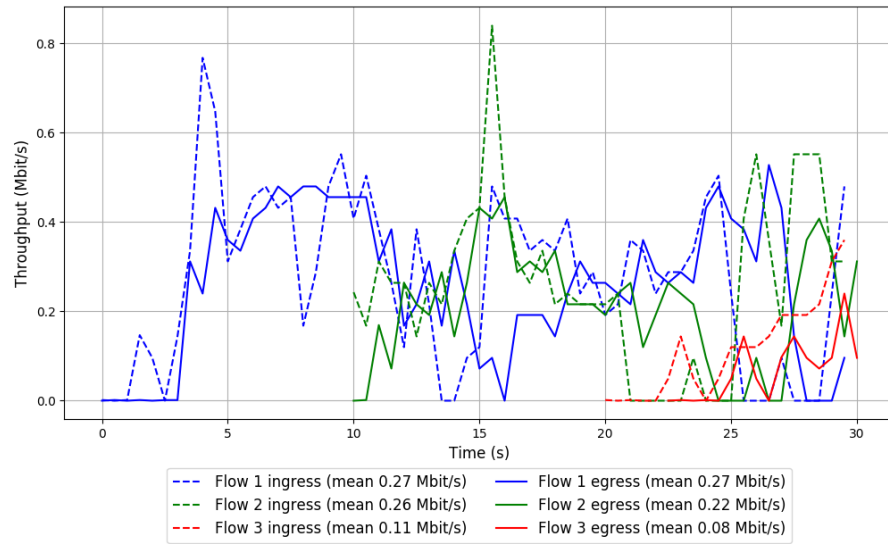
-- Flow 3:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 2151.047 ms

Loss rate: 51.96%

Run 1: Report of TCP BBR — Data Link

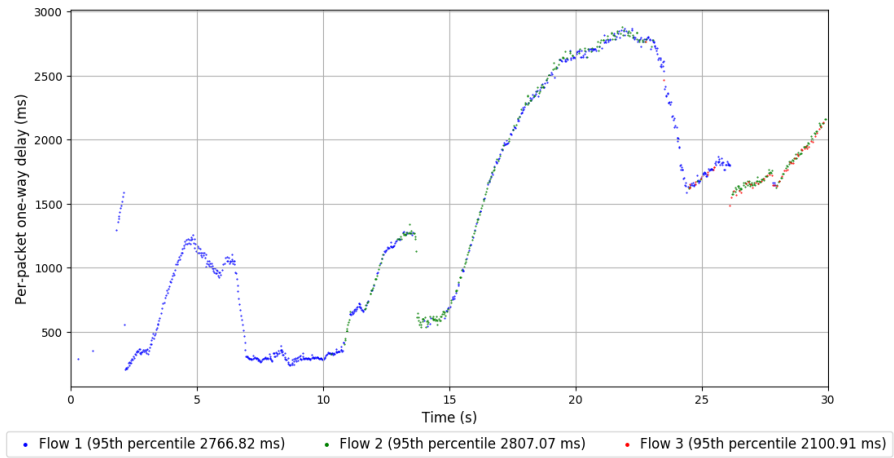
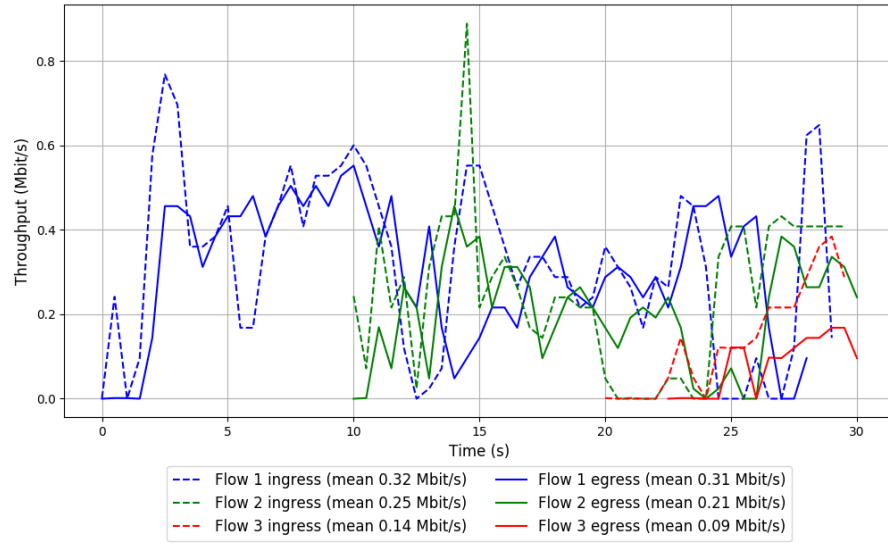


Run 2: Statistics of TCP BBR

Start at: 2019-01-03 08:49:40
End at: 2019-01-03 08:50:10
Local clock offset: -7.421 ms
Remote clock offset: -4.494 ms

Below is generated by plot.py at 2019-01-03 09:17:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 2777.112 ms
Loss rate: 15.36%
-- Flow 1:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 2766.821 ms
Loss rate: 8.24%
-- Flow 2:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 2807.067 ms
Loss rate: 18.42%
-- Flow 3:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 2100.908 ms
Loss rate: 52.95%

Run 2: Report of TCP BBR — Data Link

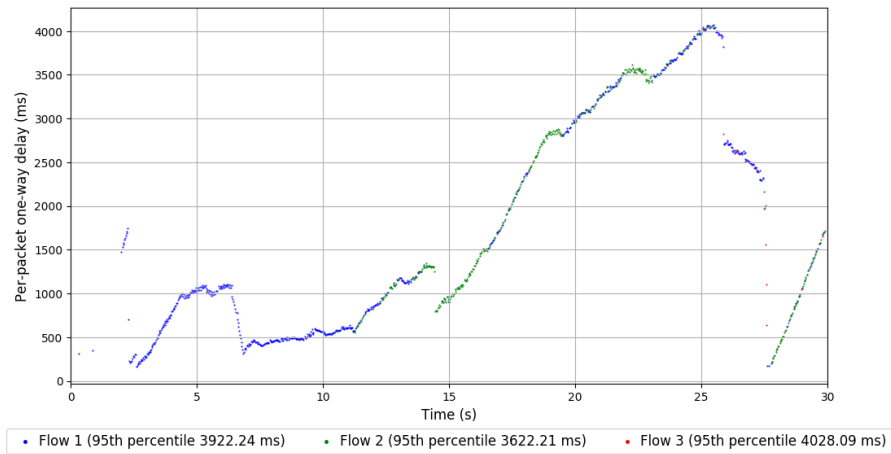
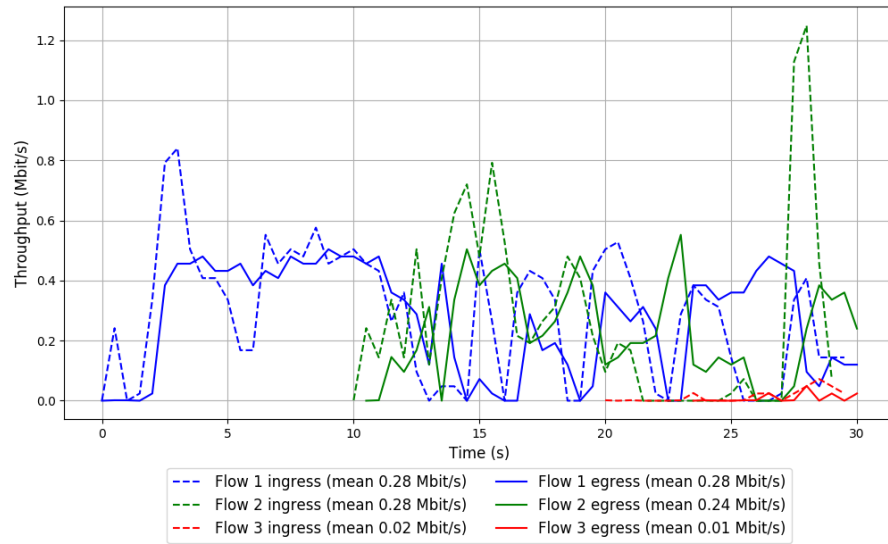


Run 3: Statistics of TCP BBR

Start at: 2019-01-03 09:14:00
End at: 2019-01-03 09:14:30
Local clock offset: -1.768 ms
Remote clock offset: -2.339 ms

Below is generated by plot.py at 2019-01-03 09:17:17
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 3857.713 ms
Loss rate: 7.99%
-- Flow 1:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 3922.239 ms
Loss rate: 3.94%
-- Flow 2:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 3622.208 ms
Loss rate: 13.15%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 4028.091 ms
Loss rate: 56.60%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

Start at: 2019-01-03 08:06:59

End at: 2019-01-03 08:07:29

Local clock offset: -1.933 ms

Remote clock offset: 6.053 ms

Below is generated by plot.py at 2019-01-03 09:17:17

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.42 Mbit/s

95th percentile per-packet one-way delay: 1644.895 ms

Loss rate: 6.29%

-- Flow 1:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 1579.470 ms

Loss rate: 4.60%

-- Flow 2:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 1845.745 ms

Loss rate: 8.30%

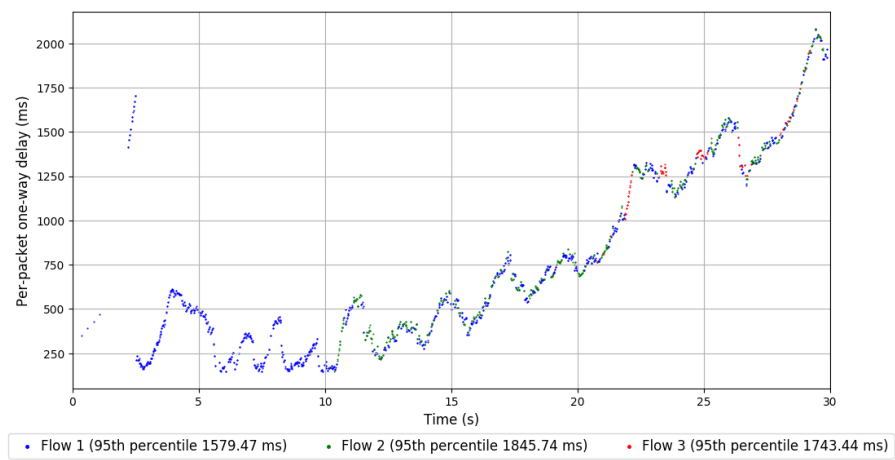
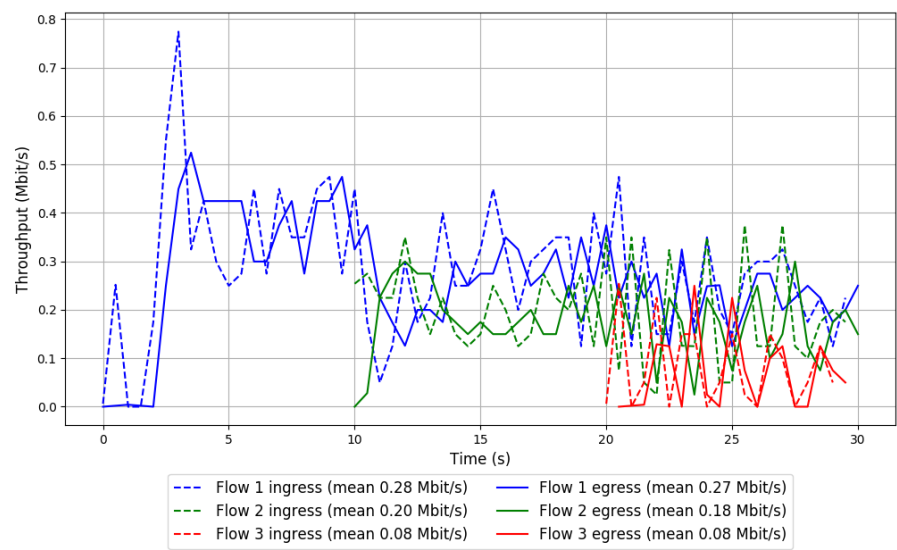
-- Flow 3:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 1743.444 ms

Loss rate: 14.66%

Run 1: Report of Copa — Data Link

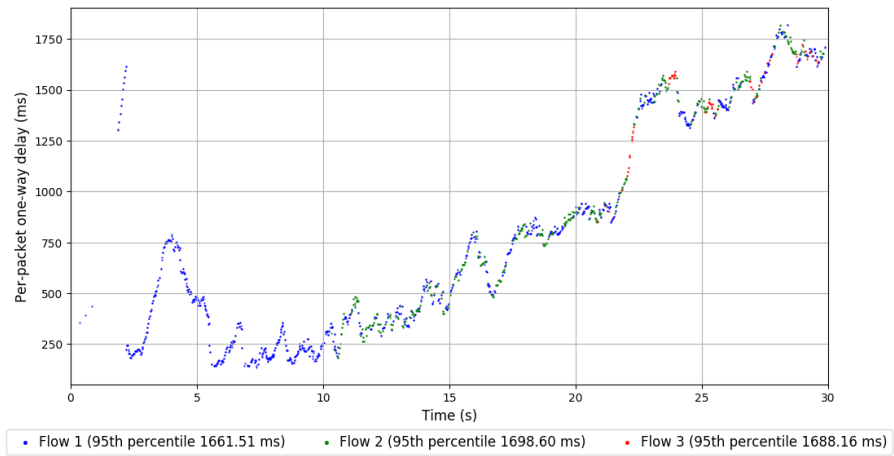
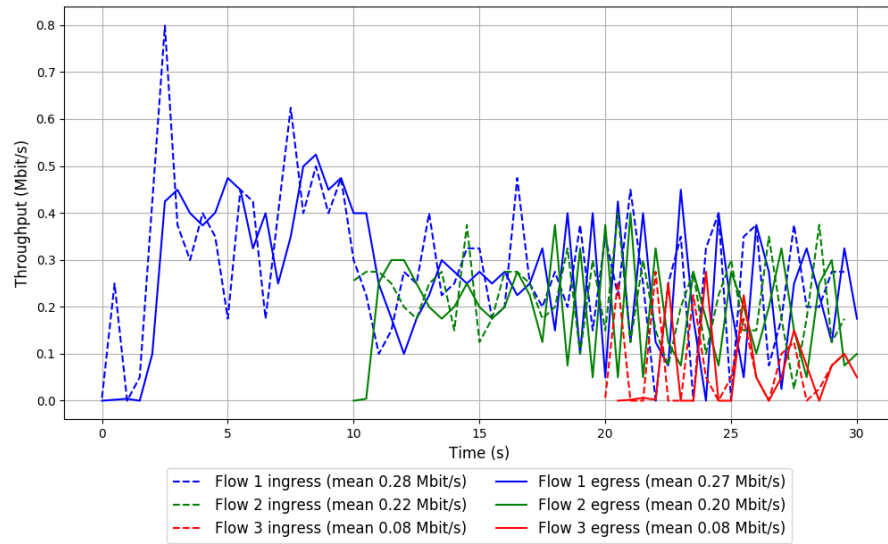


Run 2: Statistics of Copa

Start at: 2019-01-03 08:31:25
End at: 2019-01-03 08:31:55
Local clock offset: -4.062 ms
Remote clock offset: -0.471 ms

Below is generated by plot.py at 2019-01-03 09:17:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 1679.332 ms
Loss rate: 6.80%
-- Flow 1:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 1661.508 ms
Loss rate: 5.15%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 1698.599 ms
Loss rate: 8.93%
-- Flow 3:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 1688.161 ms
Loss rate: 13.24%

Run 2: Report of Copa — Data Link

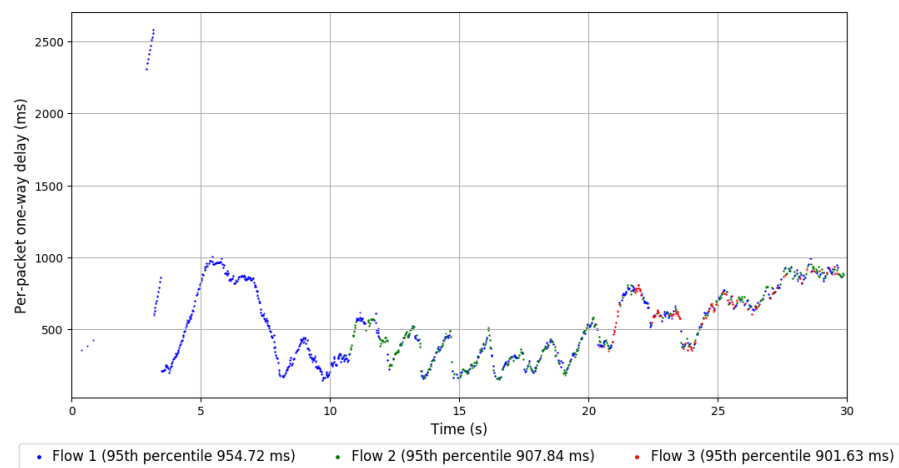
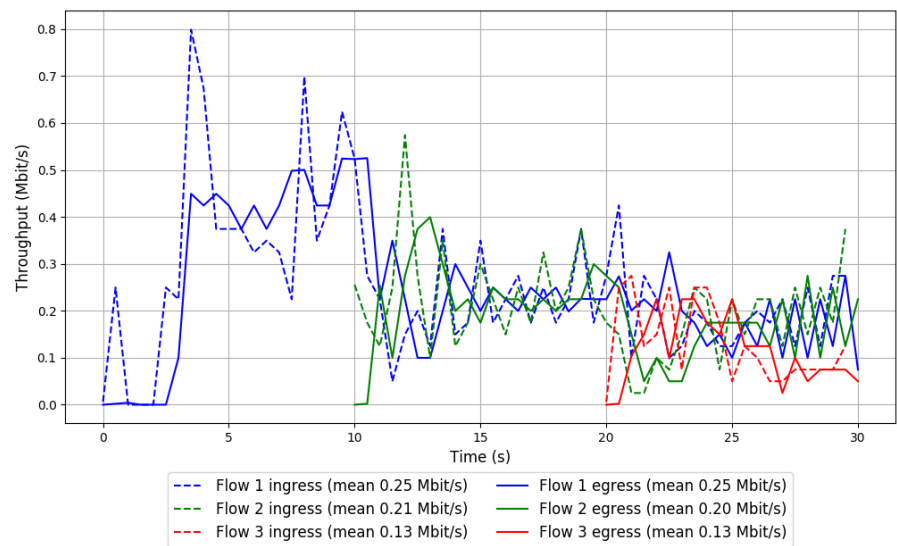


Run 3: Statistics of Copa

Start at: 2019-01-03 08:55:51
End at: 2019-01-03 08:56:21
Local clock offset: -6.815 ms
Remote clock offset: -5.444 ms

Below is generated by plot.py at 2019-01-03 09:17:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 925.857 ms
Loss rate: 4.97%
-- Flow 1:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 954.718 ms
Loss rate: 3.60%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 907.838 ms
Loss rate: 6.64%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 901.633 ms
Loss rate: 7.67%

Run 3: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

Start at: 2019-01-03 08:08:13

End at: 2019-01-03 08:08:43

Local clock offset: -2.559 ms

Remote clock offset: 4.993 ms

Below is generated by plot.py at 2019-01-03 09:17:18

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.44 Mbit/s

95th percentile per-packet one-way delay: 8010.915 ms

Loss rate: 32.82%

-- Flow 1:

Average throughput: 0.43 Mbit/s

95th percentile per-packet one-way delay: 8020.338 ms

Loss rate: 31.95%

-- Flow 2:

Average throughput: 0.03 Mbit/s

95th percentile per-packet one-way delay: 7190.870 ms

Loss rate: 52.83%

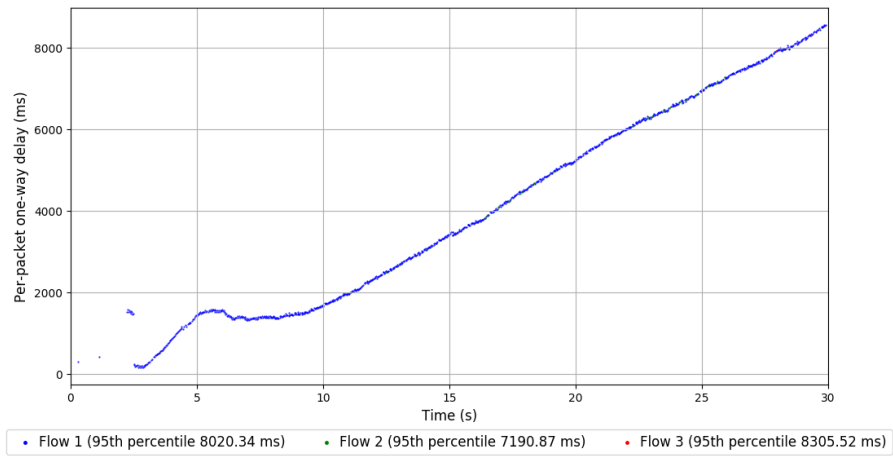
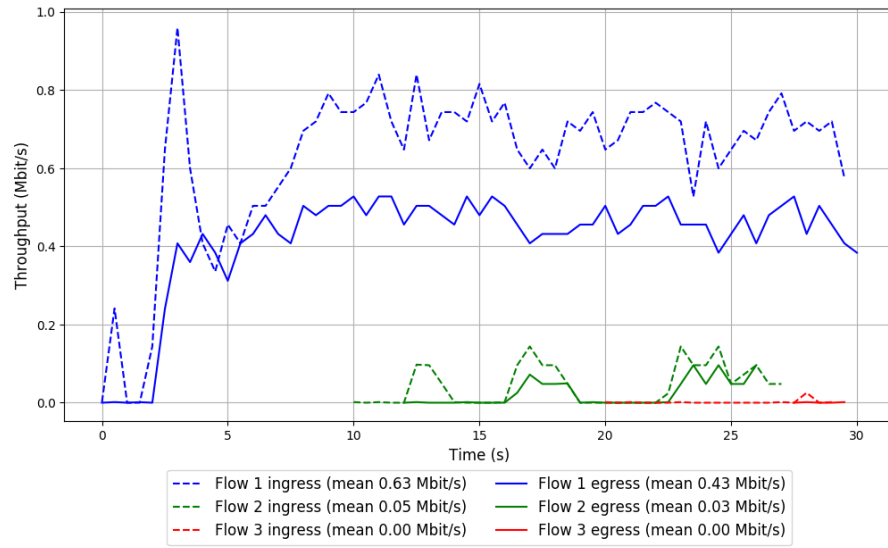
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 8305.521 ms

Loss rate: 90.68%

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

Start at: 2019-01-03 08:32:39

End at: 2019-01-03 08:33:09

Local clock offset: -5.44 ms

Remote clock offset: -0.87 ms

Below is generated by plot.py at 2019-01-03 09:17:18

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.39 Mbit/s

95th percentile per-packet one-way delay: 8397.632 ms

Loss rate: 32.89%

-- Flow 1:

Average throughput: 0.38 Mbit/s

95th percentile per-packet one-way delay: 8397.632 ms

Loss rate: 31.79%

-- Flow 2:

Average throughput: 0.02 Mbit/s

95th percentile per-packet one-way delay: 8309.026 ms

Loss rate: 54.30%

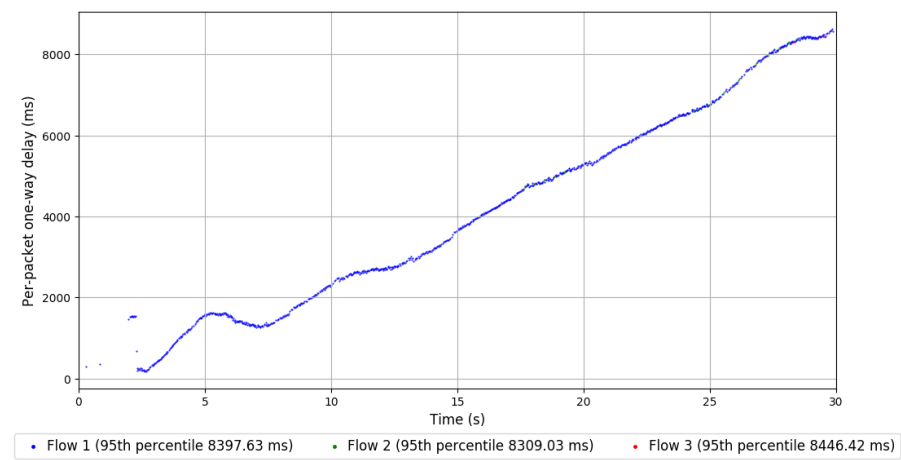
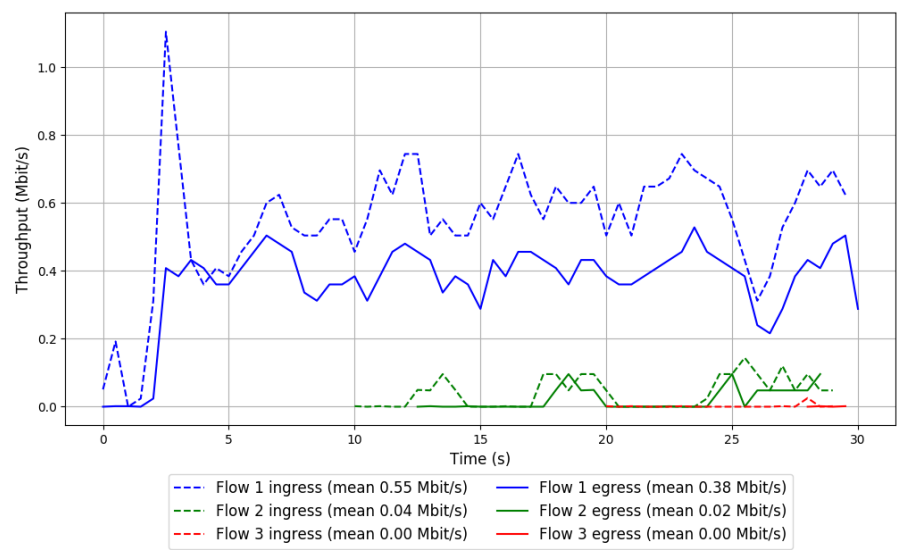
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 8446.421 ms

Loss rate: 90.68%

Run 2: Report of TCP Cubic — Data Link

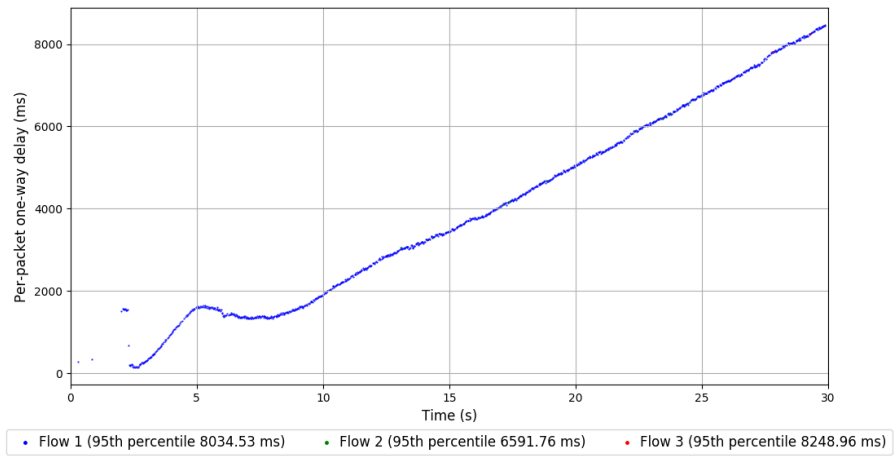
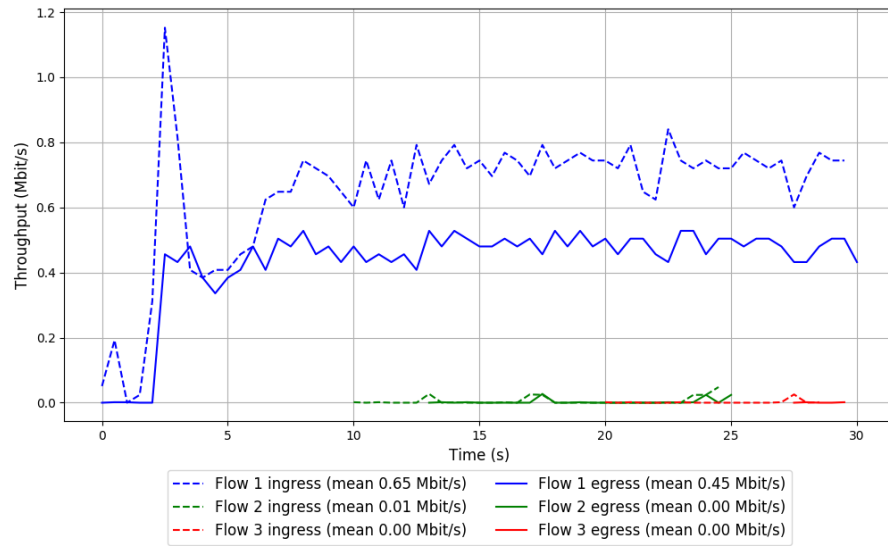


Run 3: Statistics of TCP Cubic

Start at: 2019-01-03 08:57:05
End at: 2019-01-03 08:57:35
Local clock offset: -6.931 ms
Remote clock offset: -9.693 ms

Below is generated by plot.py at 2019-01-03 09:17:19
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 8034.528 ms
Loss rate: 32.12%
-- Flow 1:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 8034.528 ms
Loss rate: 31.97%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 6591.761 ms
Loss rate: 53.86%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8248.959 ms
Loss rate: 90.68%

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

Start at: 2019-01-03 08:10:41

End at: 2019-01-03 08:11:11

Local clock offset: -1.398 ms

Remote clock offset: 7.014 ms

Below is generated by plot.py at 2019-01-03 09:17:23

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.42 Mbit/s

95th percentile per-packet one-way delay: 10849.829 ms

Loss rate: 79.07%

-- Flow 1:

Average throughput: 0.33 Mbit/s

95th percentile per-packet one-way delay: 11081.583 ms

Loss rate: 32.92%

-- Flow 2:

Average throughput: 0.21 Mbit/s

95th percentile per-packet one-way delay: 8880.548 ms

Loss rate: 93.70%

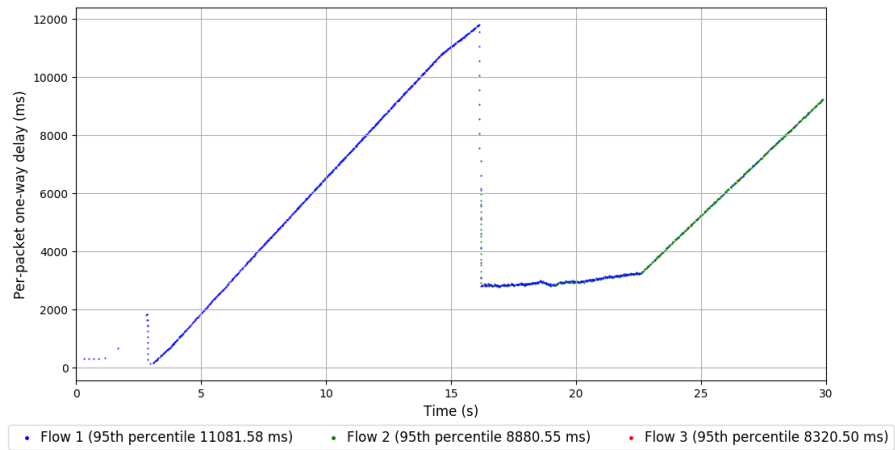
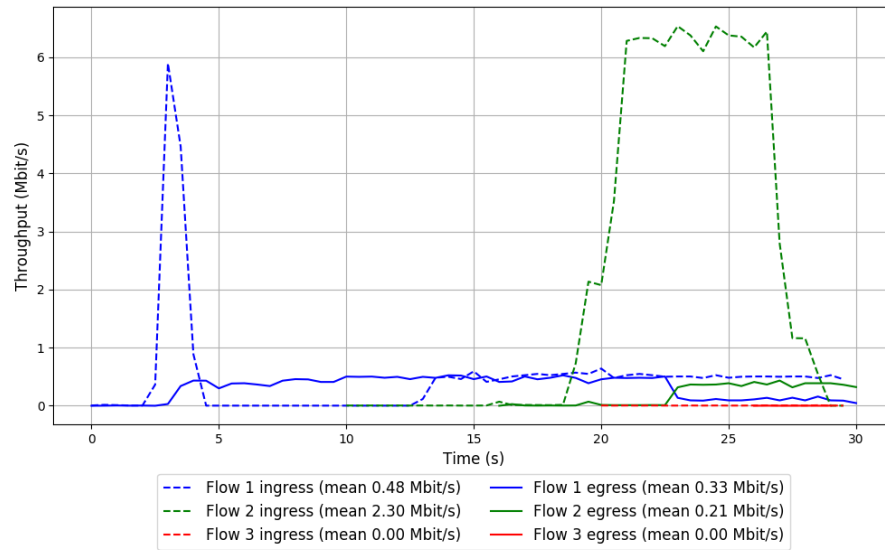
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 8320.498 ms

Loss rate: 94.57%

Run 1: Report of FillP — Data Link



Run 2: Statistics of FillP

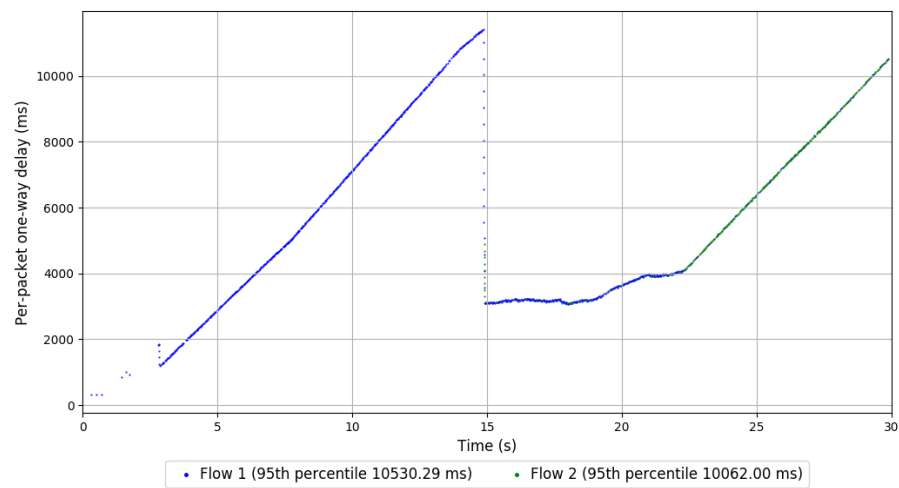
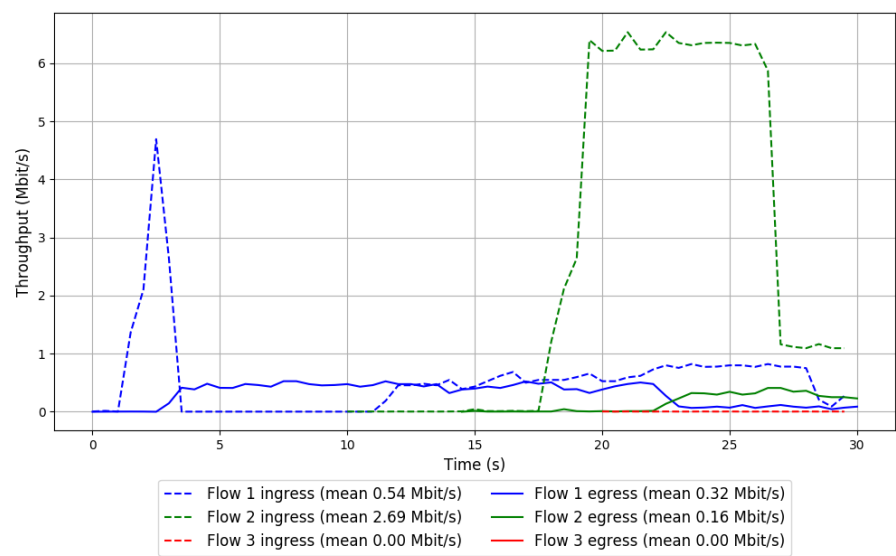
Start at: 2019-01-03 08:35:06

End at: 2019-01-03 08:35:36

Local clock offset: -6.137 ms

Remote clock offset: -1.364 ms

Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

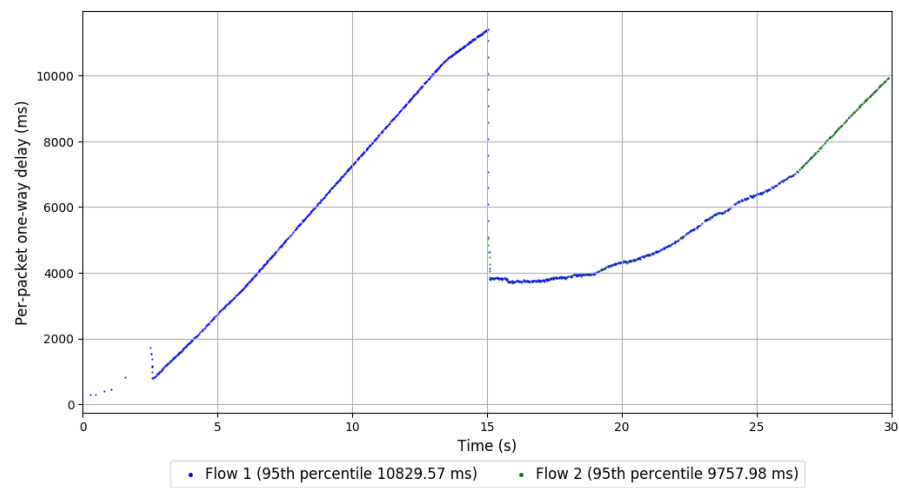
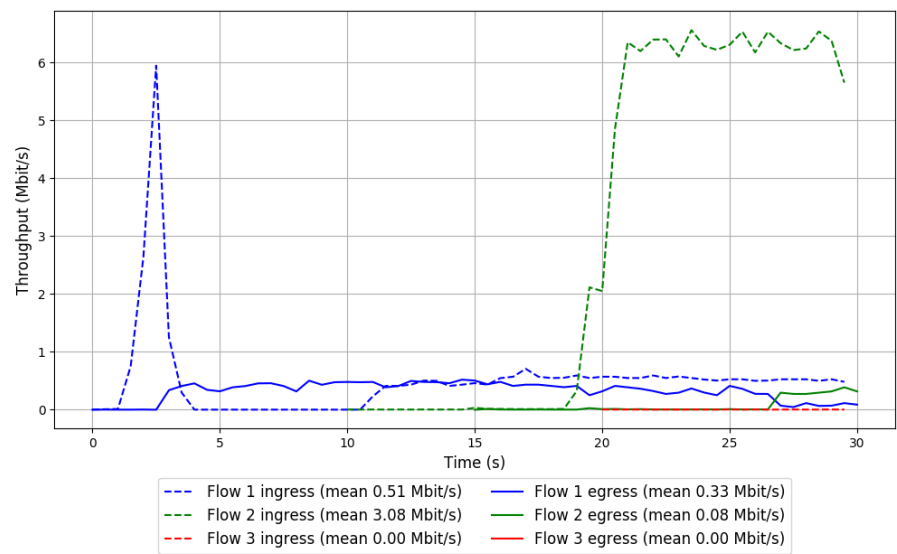
Start at: 2019-01-03 08:59:31

End at: 2019-01-03 09:00:01

Local clock offset: -4.849 ms

Remote clock offset: -9.978 ms

Run 3: Report of FillP — Data Link



Run 1: Statistics of FillP-Sheep

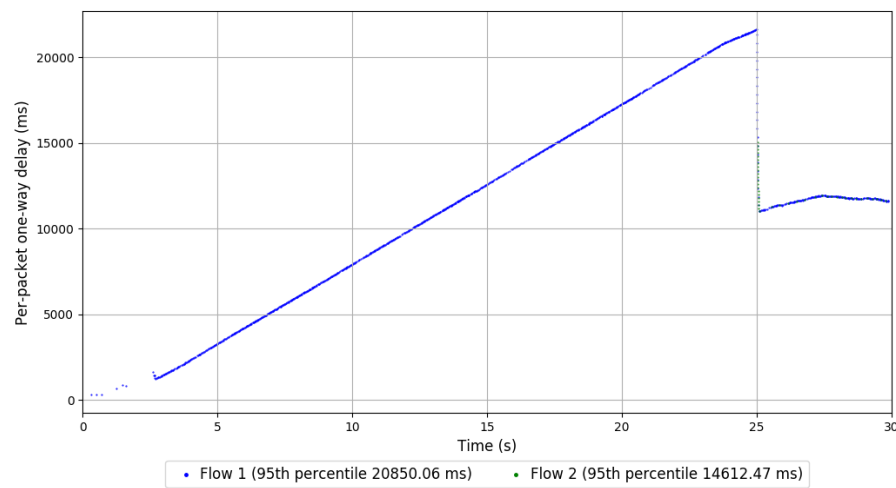
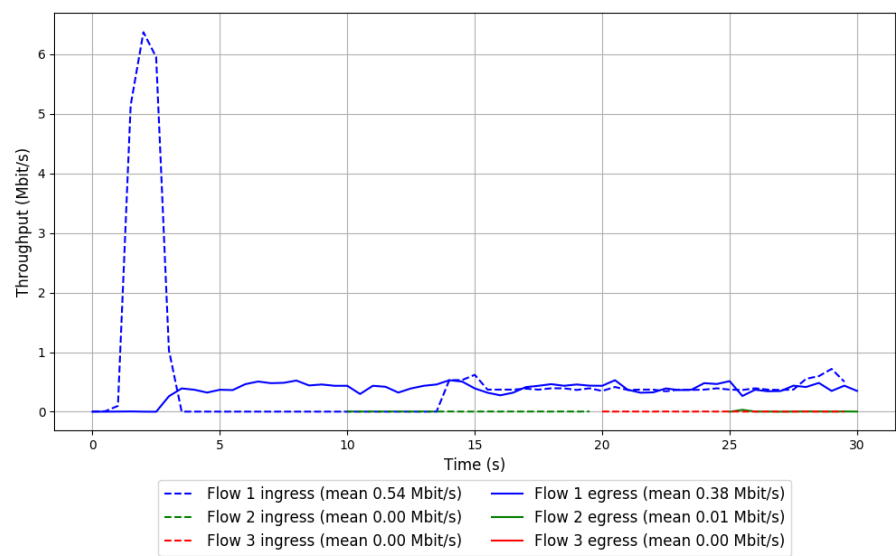
Start at: 2019-01-03 08:26:25

End at: 2019-01-03 08:26:55

Local clock offset: -2.486 ms

Remote clock offset: 0.76 ms

Run 1: Report of FillP-Sheep — Data Link

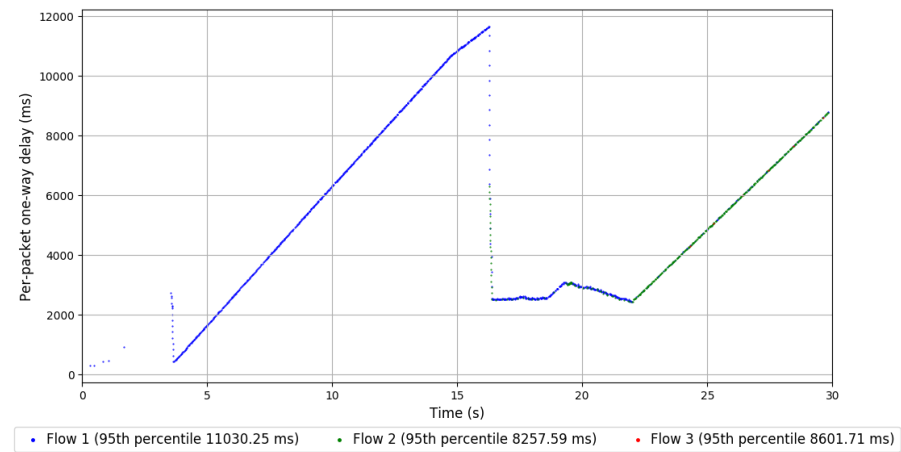
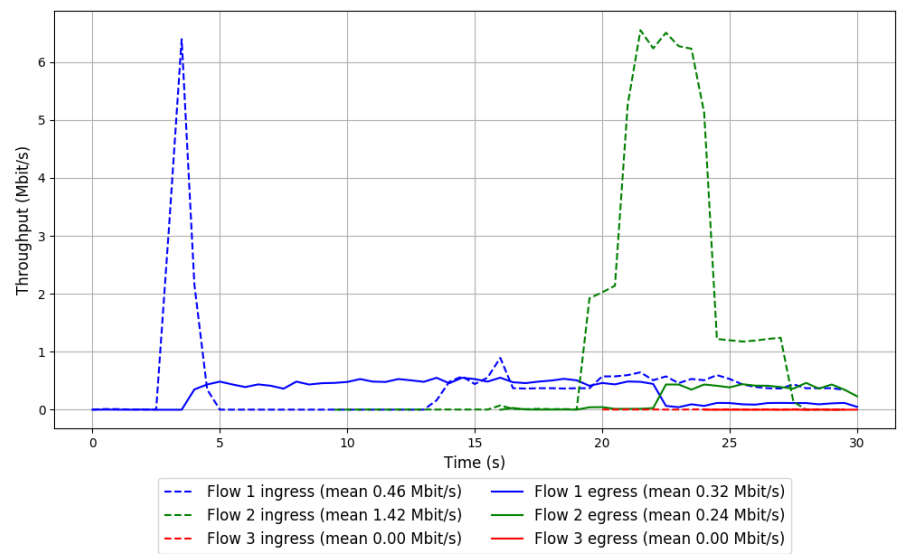


Run 2: Statistics of FillP-Sheep

Start at: 2019-01-03 08:50:53
End at: 2019-01-03 08:51:23
Local clock offset: -7.533 ms
Remote clock offset: -8.457 ms

Below is generated by plot.py at 2019-01-03 09:17:24
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 10802.762 ms
Loss rate: 69.34%
-- Flow 1:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 11030.248 ms
Loss rate: 30.59%
-- Flow 2:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 8257.595 ms
Loss rate: 88.30%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8601.710 ms
Loss rate: 90.40%

Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

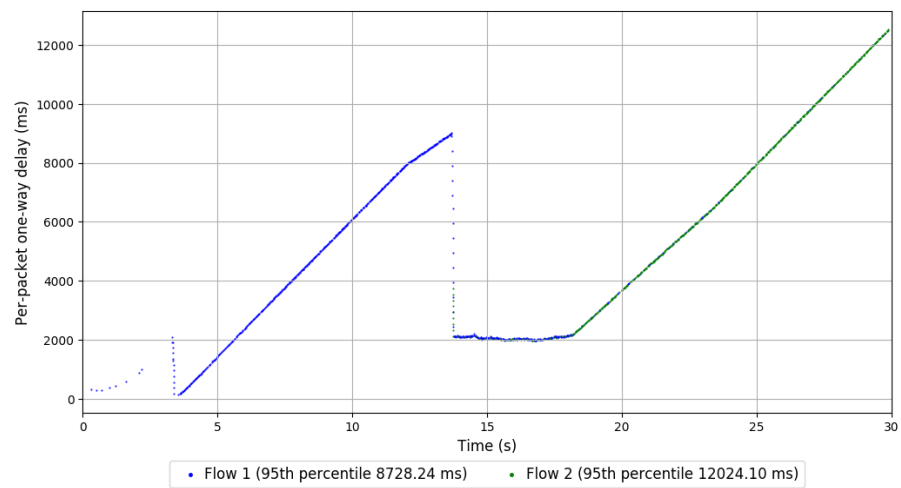
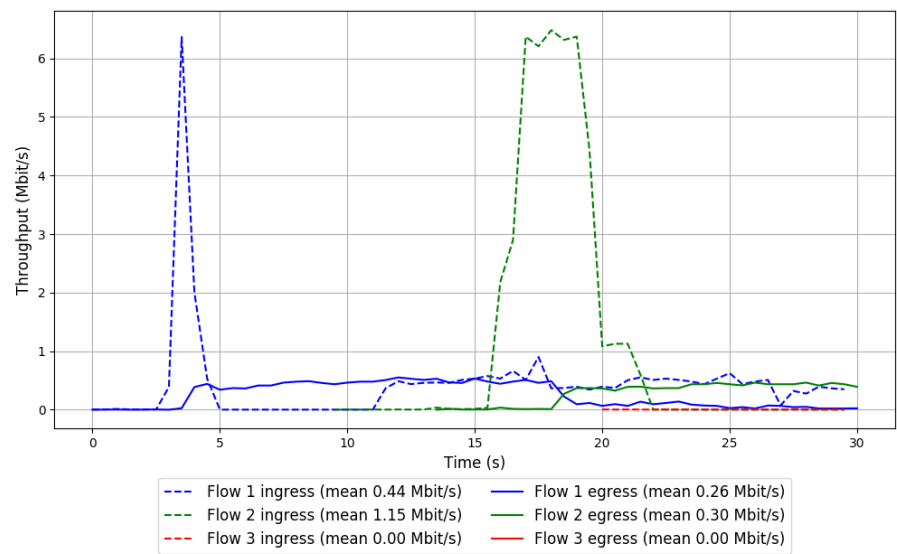
Start at: 2019-01-03 09:15:17

End at: 2019-01-03 09:15:47

Local clock offset: -2.347 ms

Remote clock offset: -0.514 ms

Run 3: Report of FillP-Sheep — Data Link

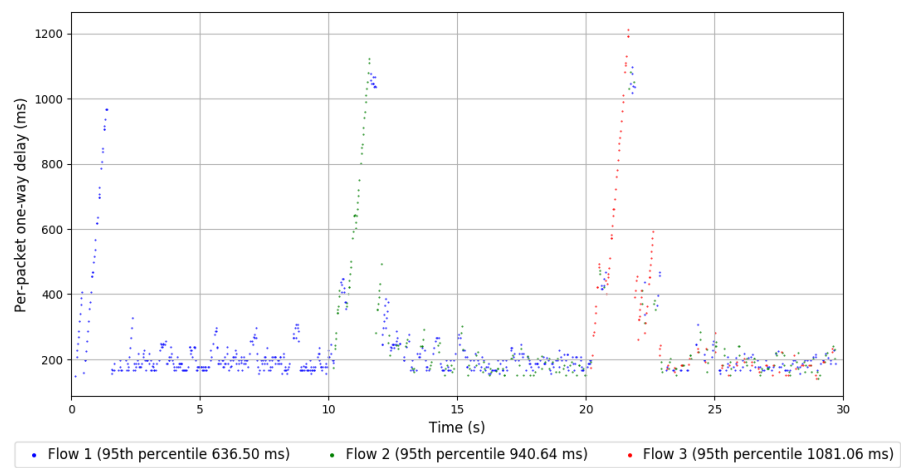
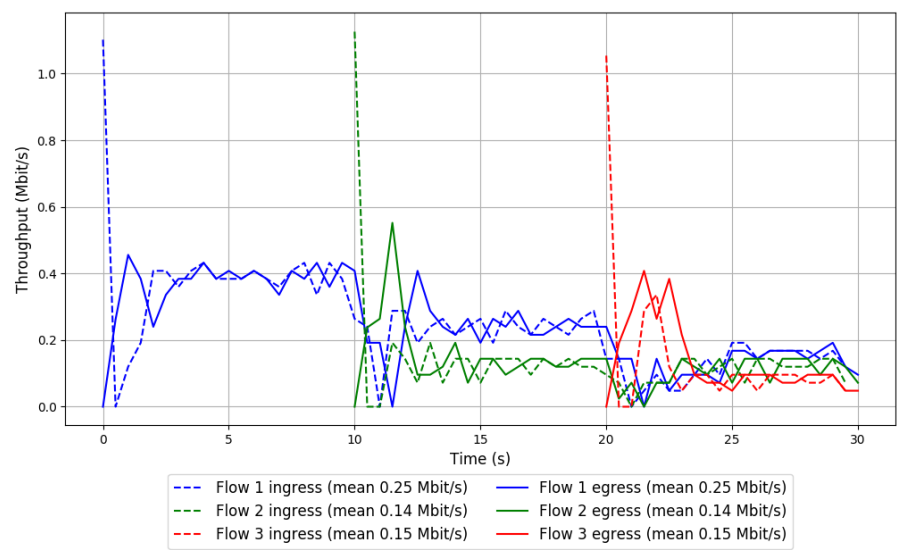


```
Run 1: Statistics of Indigo

Start at: 2019-01-03 08:11:57
End at: 2019-01-03 08:12:27
Local clock offset: -2.008 ms
Remote clock offset: 2.405 ms

# Below is generated by plot.py at 2019-01-03 09:17:24
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 890.609 ms
Loss rate: 0.93%
-- Flow 1:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 636.505 ms
Loss rate: 0.64%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 940.645 ms
Loss rate: 1.32%
-- Flow 3:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 1081.059 ms
Loss rate: 1.65%
```

Run 1: Report of Indigo — Data Link



Run 2: Statistics of Indigo

/home/ubuntu/pantheon/data/2019-01-03T08-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 2: Report of Indigo — Data Link

Figure is missing

Figure is missing

Run 3: Statistics of Indigo

/home/ubuntu/pantheon/data/2019-01-03T08-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 3: Report of Indigo — Data Link

Figure is missing

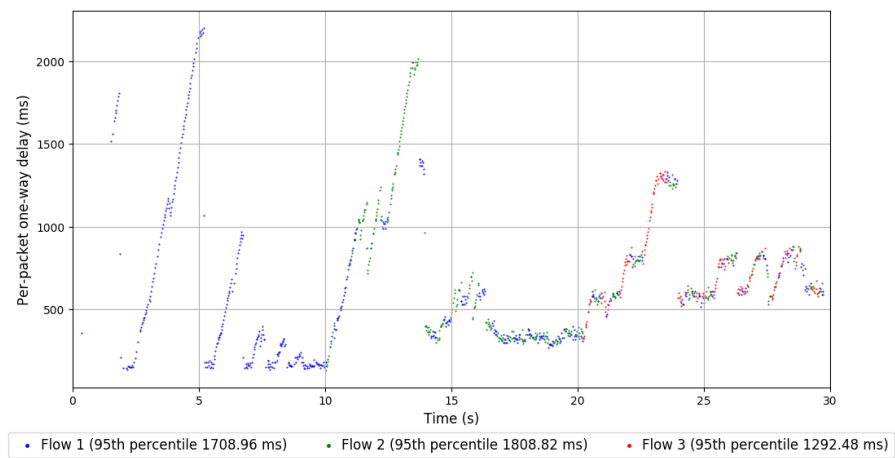
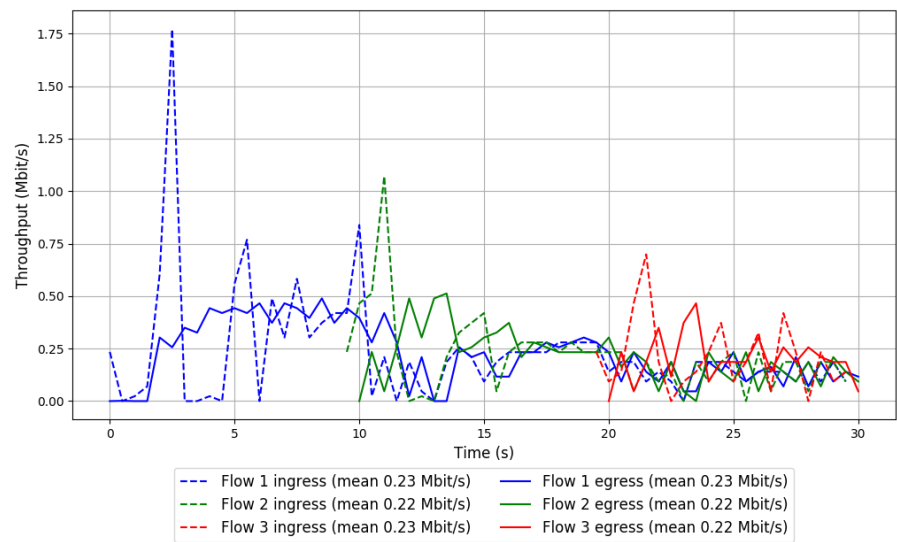
Figure is missing

Run 1: Statistics of Indigo-MusesD

Start at: 2019-01-03 08:17:12
End at: 2019-01-03 08:17:42
Local clock offset: -1.516 ms
Remote clock offset: -0.063 ms

Below is generated by plot.py at 2019-01-03 09:17:24
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 1678.959 ms
Loss rate: 2.49%
-- Flow 1:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 1708.959 ms
Loss rate: 1.50%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 1808.819 ms
Loss rate: 2.66%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 1292.479 ms
Loss rate: 5.26%

Run 1: Report of Indigo-MusesD — Data Link

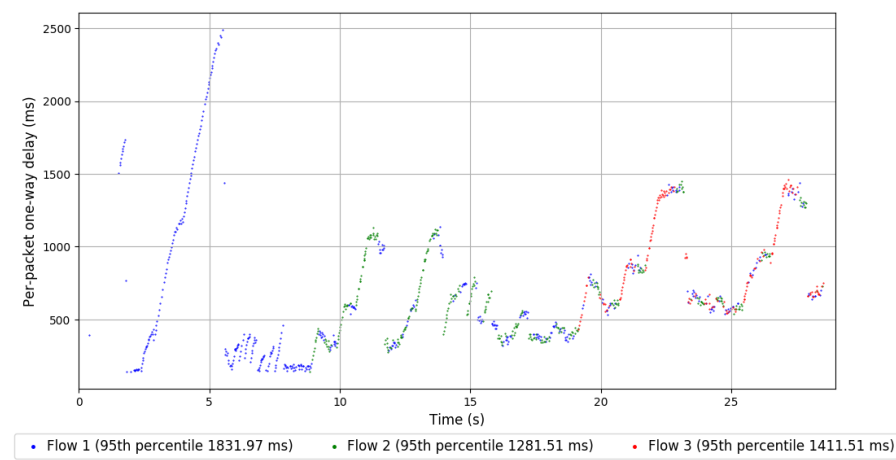
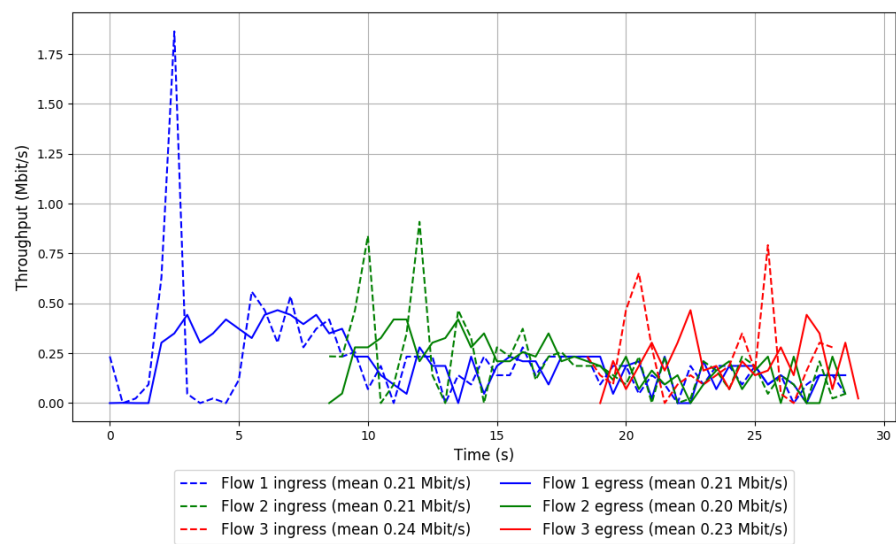


Run 2: Statistics of Indigo-MusesD

Start at: 2019-01-03 08:41:54
End at: 2019-01-03 08:42:24
Local clock offset: -7.326 ms
Remote clock offset: -2.368 ms

Below is generated by plot.py at 2019-01-03 09:17:25
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 1449.107 ms
Loss rate: 3.40%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 1831.966 ms
Loss rate: 1.97%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 1281.514 ms
Loss rate: 2.82%
-- Flow 3:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 1411.514 ms
Loss rate: 8.08%

Run 2: Report of Indigo-MusesD — Data Link

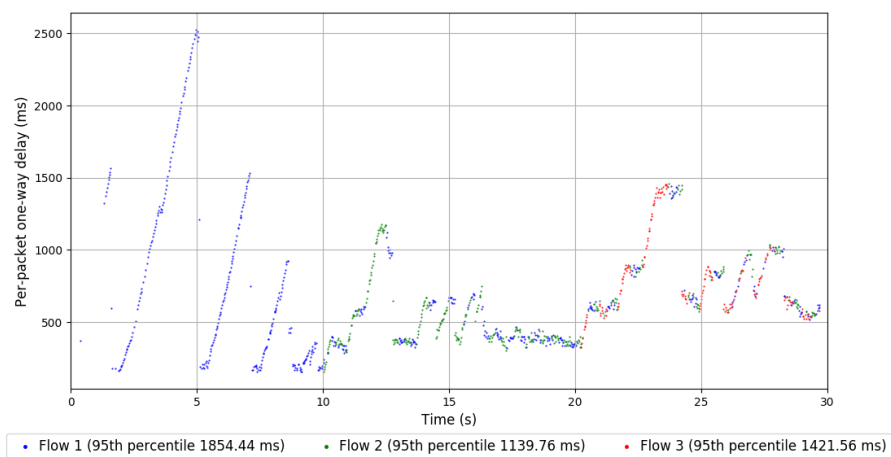
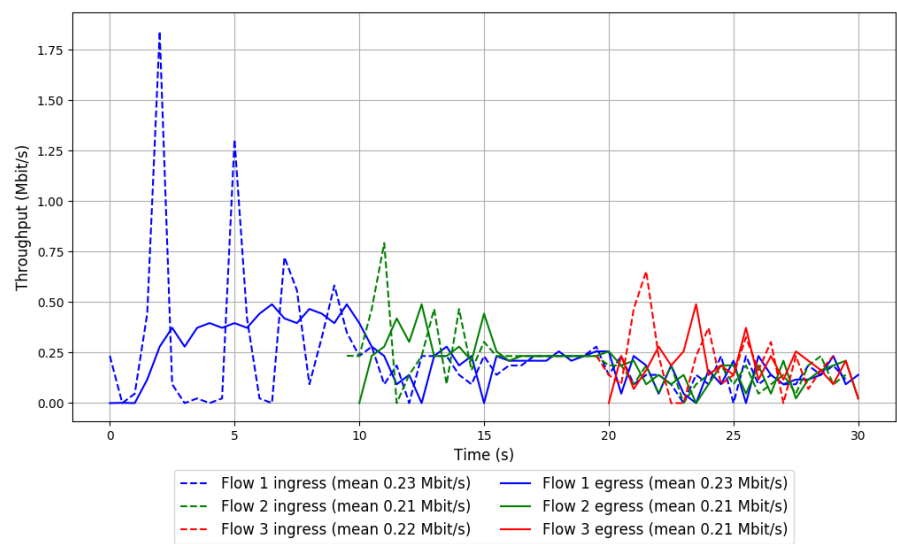


Run 3: Statistics of Indigo-MusesD

Start at: 2019-01-03 09:06:00
End at: 2019-01-03 09:06:30
Local clock offset: -2.981 ms
Remote clock offset: -11.348 ms

Below is generated by plot.py at 2019-01-03 09:17:26
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 1454.480 ms
Loss rate: 2.51%
-- Flow 1:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 1854.445 ms
Loss rate: 1.54%
-- Flow 2:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 1139.763 ms
Loss rate: 2.82%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 1421.558 ms
Loss rate: 5.05%

Run 3: Report of Indigo-MusesD — Data Link



Run 1: Statistics of Indigo-MusesT

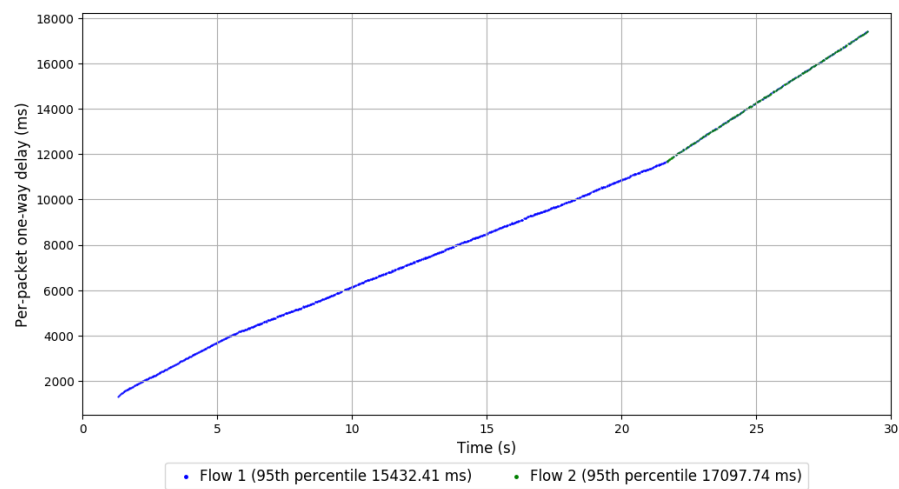
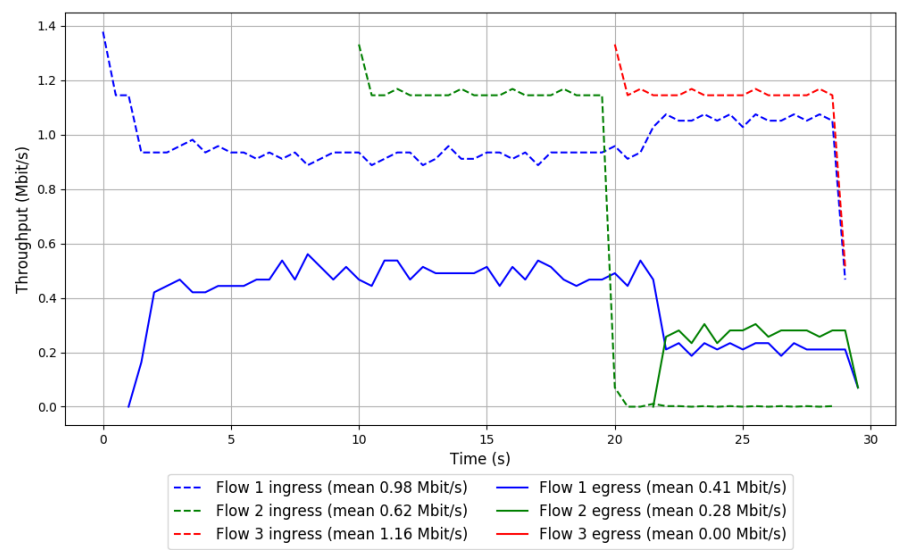
Start at: 2019-01-03 08:22:27

End at: 2019-01-03 08:22:57

Local clock offset: -0.283 ms

Remote clock offset: 1.909 ms

Run 1: Report of Indigo-MusesT — Data Link



Run 2: Statistics of Indigo-MusesT

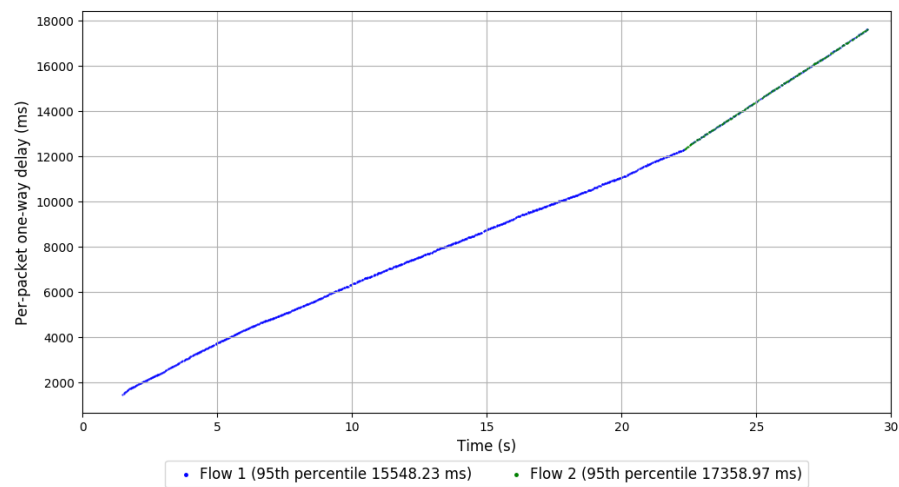
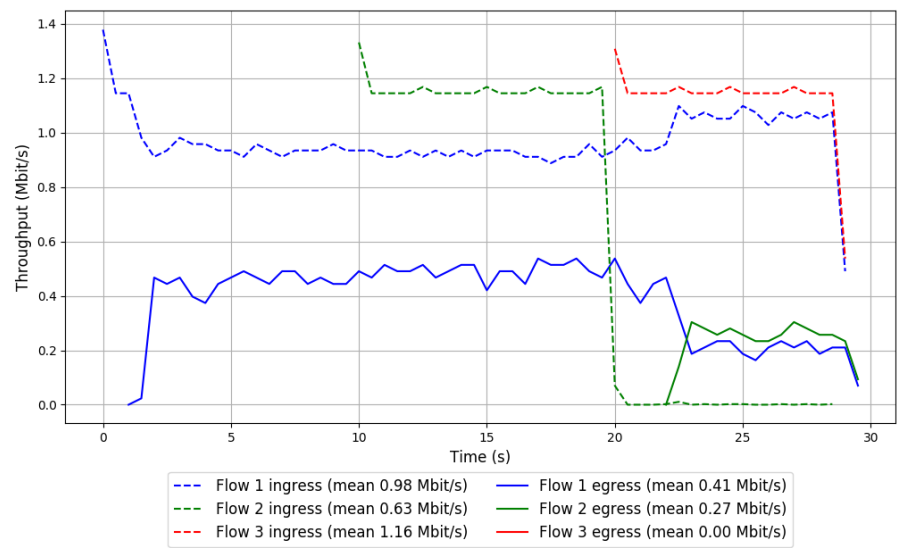
Start at: 2019-01-03 08:46:55

End at: 2019-01-03 08:47:25

Local clock offset: -7.184 ms

Remote clock offset: -7.481 ms

Run 2: Report of Indigo-MusesT — Data Link



Run 3: Statistics of Indigo-MusesT

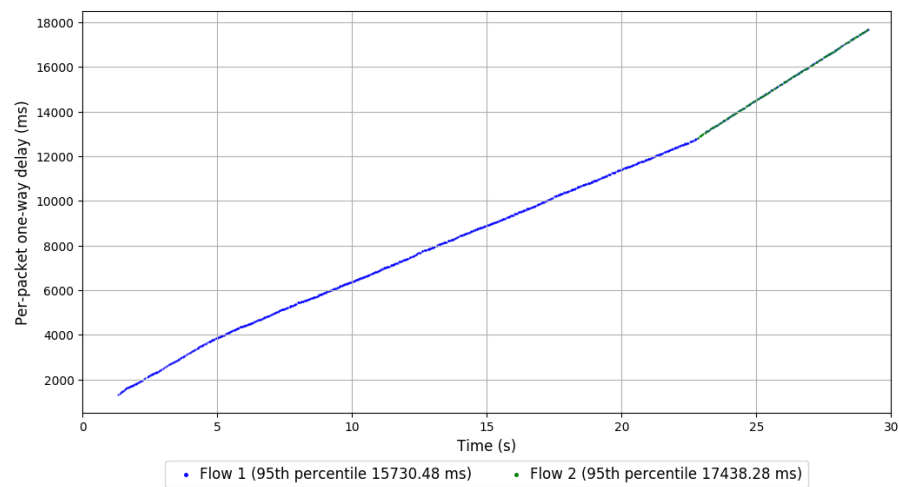
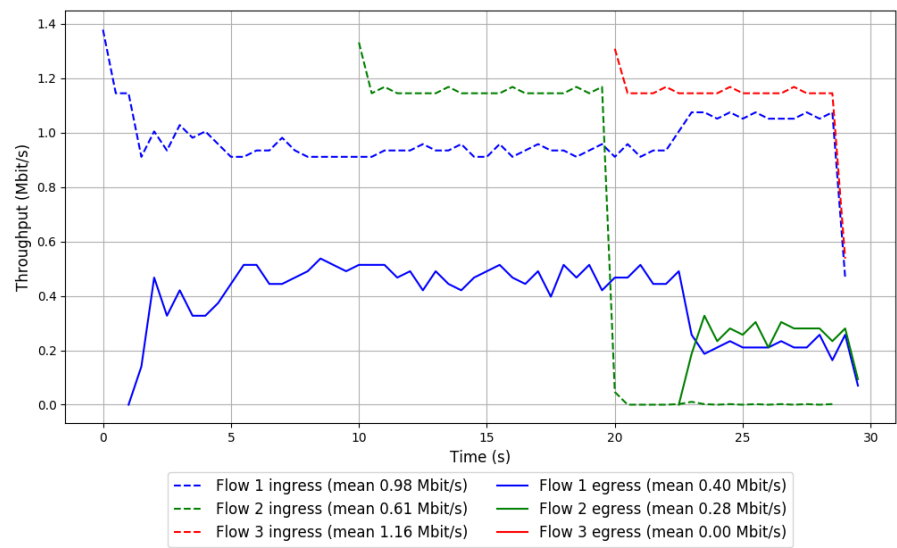
Start at: 2019-01-03 09:11:14

End at: 2019-01-03 09:11:44

Local clock offset: -2.816 ms

Remote clock offset: -7.387 ms

Run 3: Report of Indigo-MusesT — Data Link



Run 1: Statistics of LEDBAT

/home/ubuntu/pantheon/data/2019-01-03T08-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of LEDBAT — Data Link

Figure is missing

Figure is missing

Run 2: Statistics of LEDBAT

/home/ubuntu/pantheon/data/2019-01-03T08-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 2: Report of LEDBAT — Data Link

Figure is missing

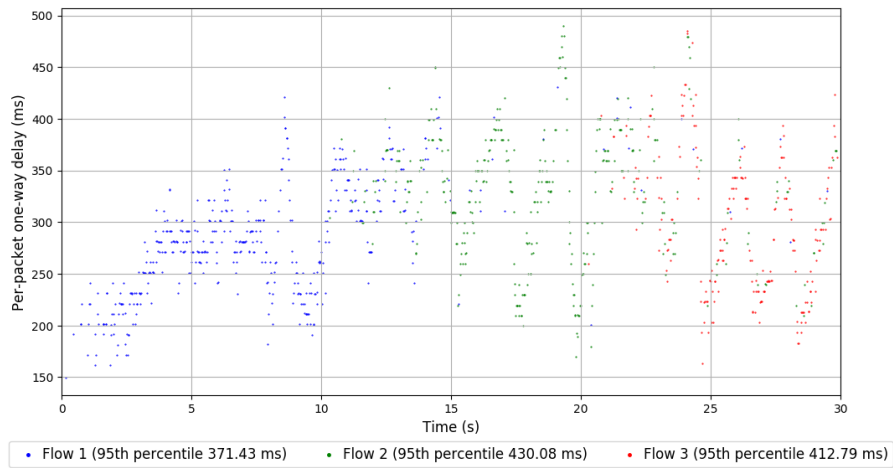
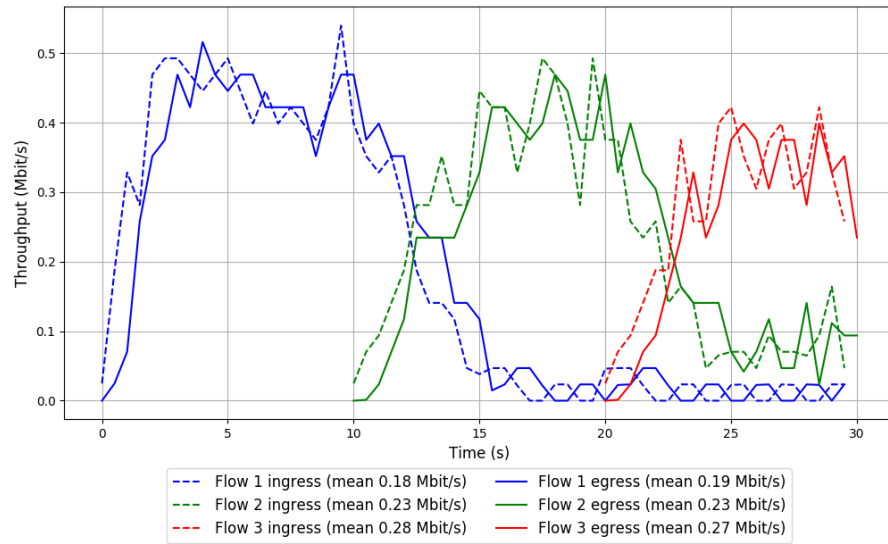
Figure is missing

Run 3: Statistics of LEDBAT

Start at: 2019-01-03 09:04:46
End at: 2019-01-03 09:05:16
Local clock offset: -4.01 ms
Remote clock offset: -11.044 ms

Below is generated by plot.py at 2019-01-03 09:17:28
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 402.809 ms
Loss rate: 1.29%
-- Flow 1:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 371.425 ms
Loss rate: 0.22%
-- Flow 2:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 430.082 ms
Loss rate: 0.52%
-- Flow 3:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 412.785 ms
Loss rate: 4.70%

Run 3: Report of LEDBAT — Data Link



Run 1: Statistics of PCC-Allegro

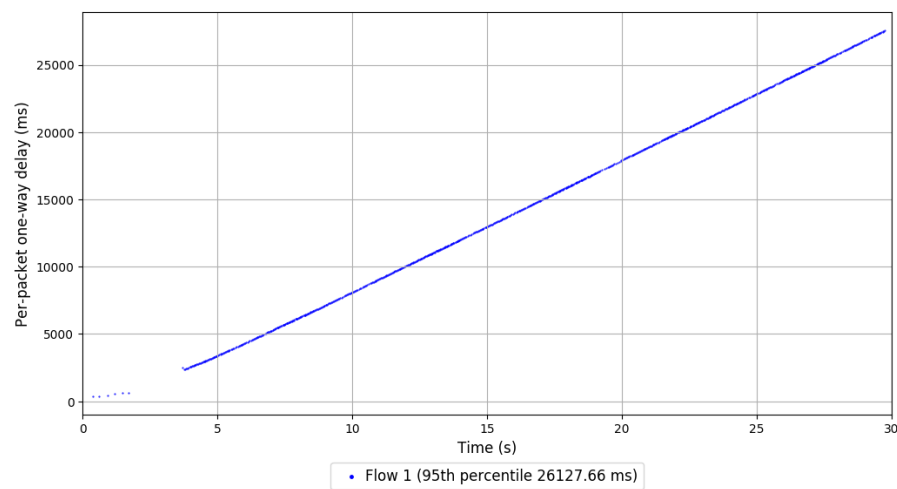
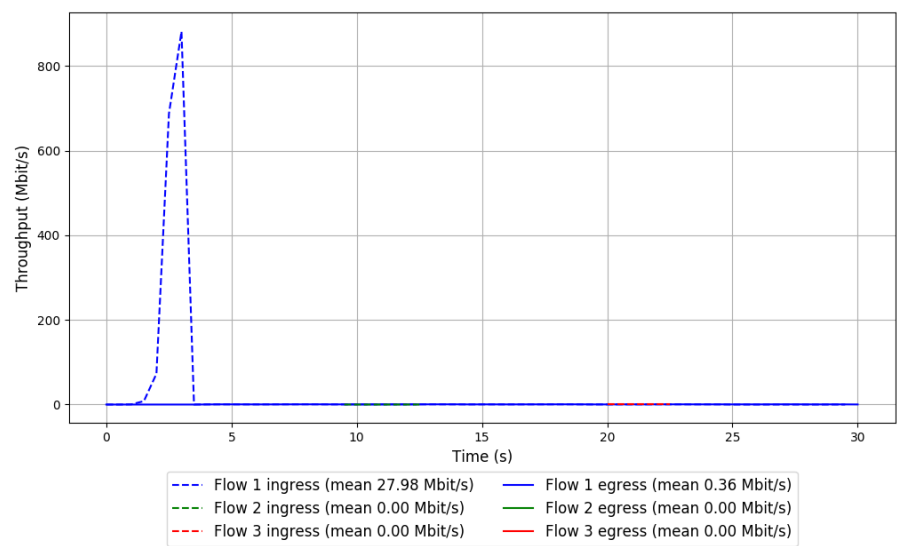
Start at: 2019-01-03 08:14:26

End at: 2019-01-03 08:14:56

Local clock offset: -0.951 ms

Remote clock offset: 5.197 ms

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

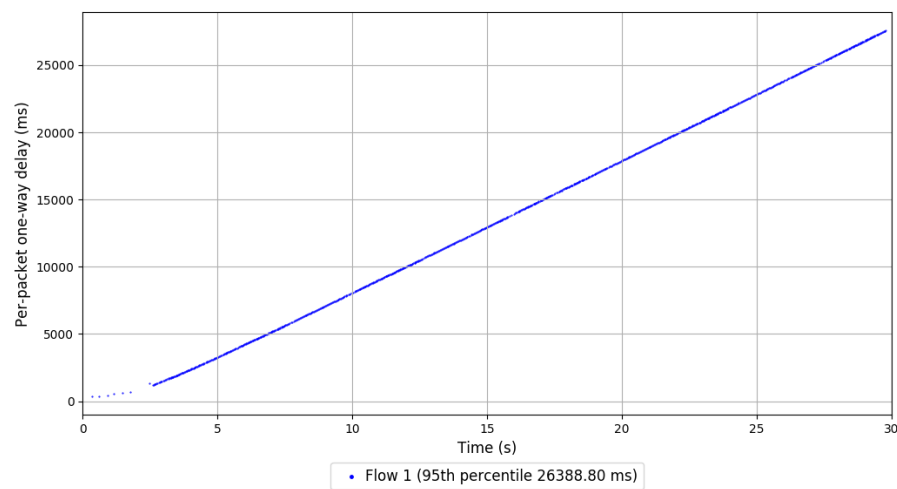
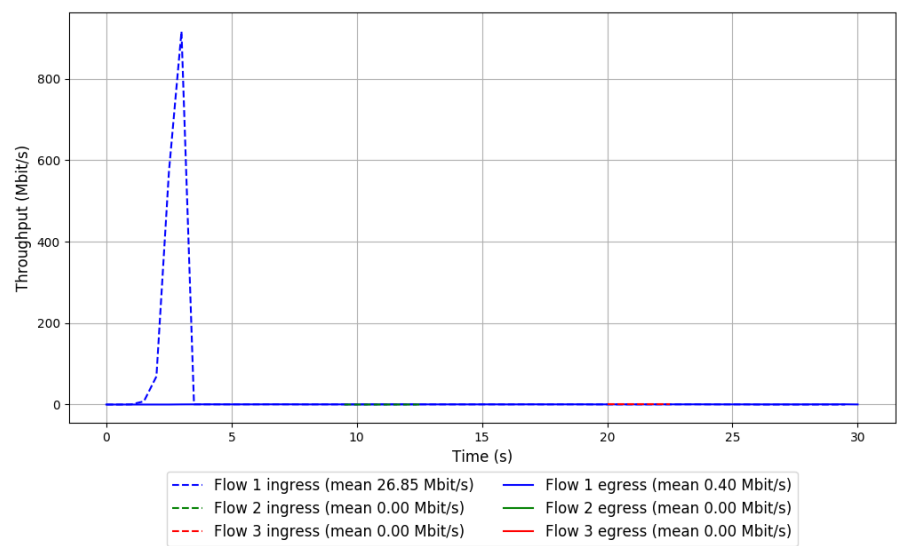
Start at: 2019-01-03 08:39:05

End at: 2019-01-03 08:39:35

Local clock offset: -6.132 ms

Remote clock offset: -2.219 ms

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

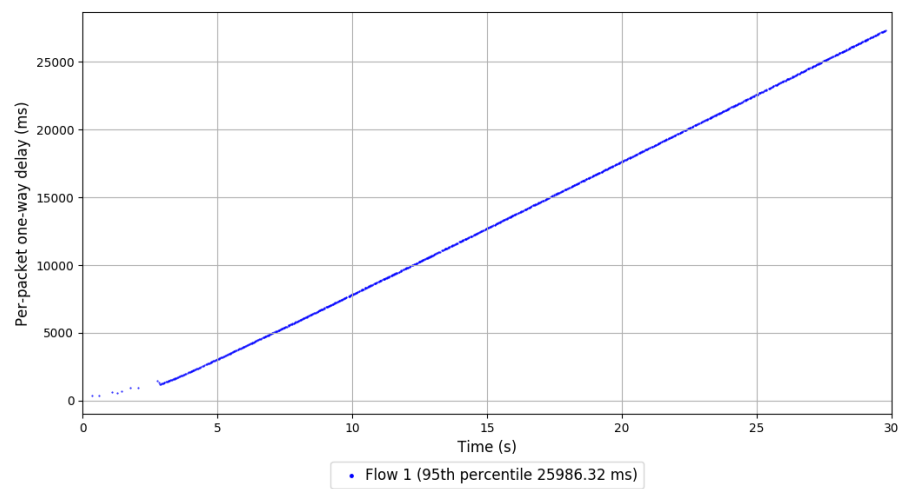
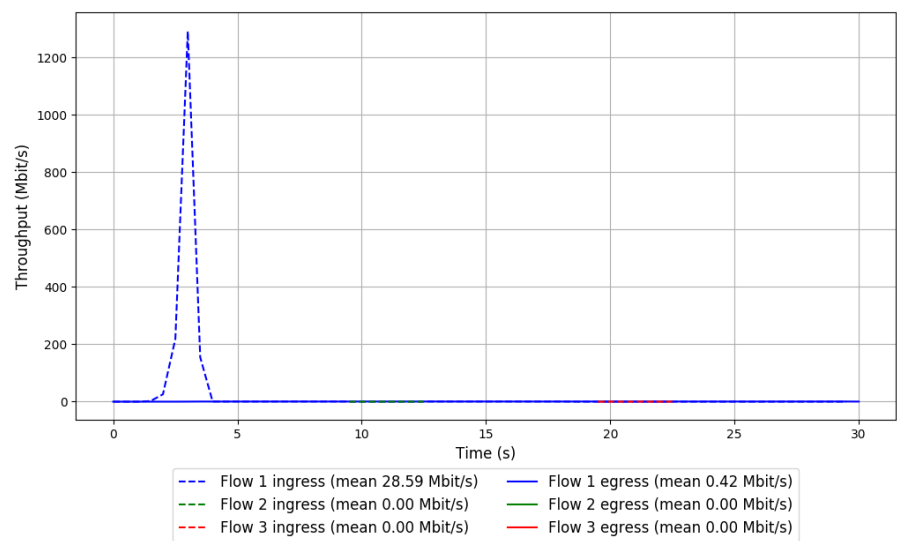
Start at: 2019-01-03 09:03:33

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

Local clock offset: -3.564 ms

Remote clock offset: -6.814 ms

Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

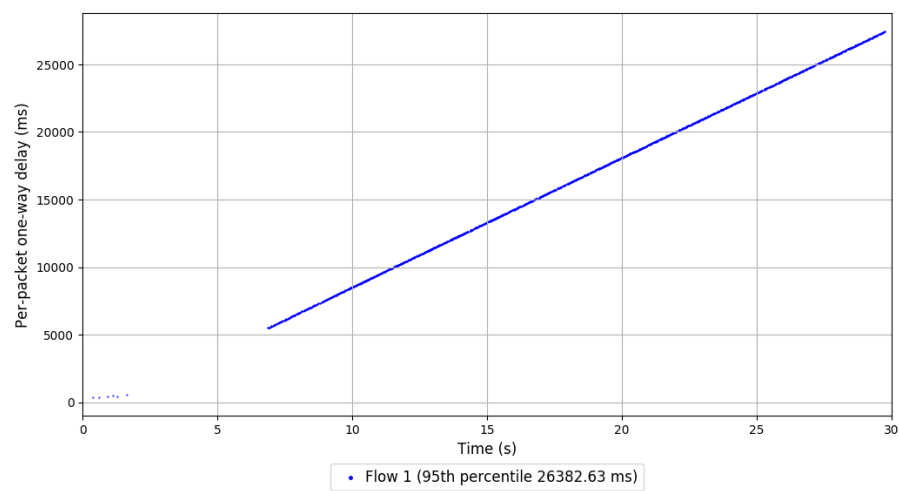
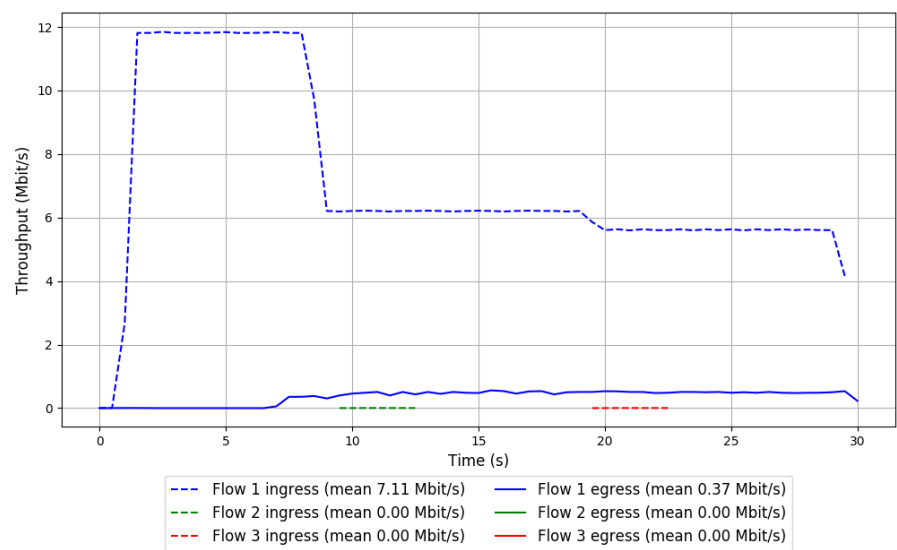
Start at: 2019-01-03 08:18:26

End at: 2019-01-03 08:18:56

Local clock offset: -1.331 ms

Remote clock offset: 3.235 ms

Run 1: Report of PCC-Expr — Data Link



Run 2: Statistics of PCC-Expr

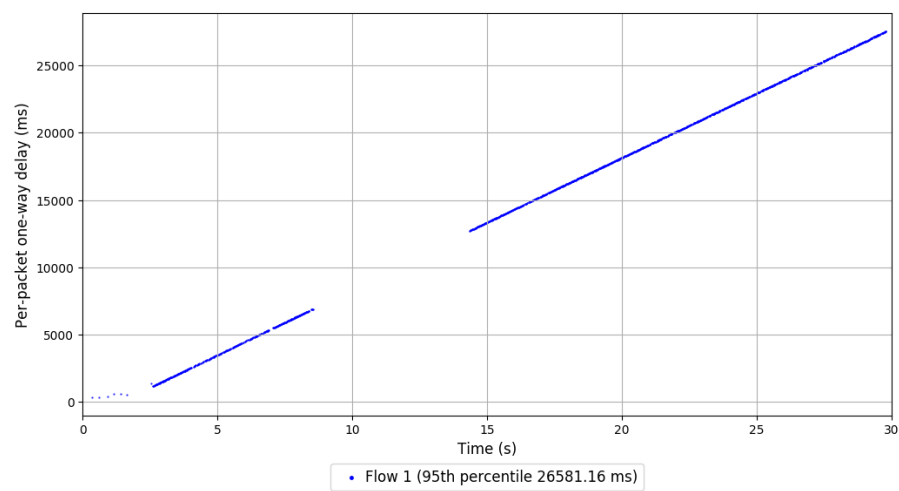
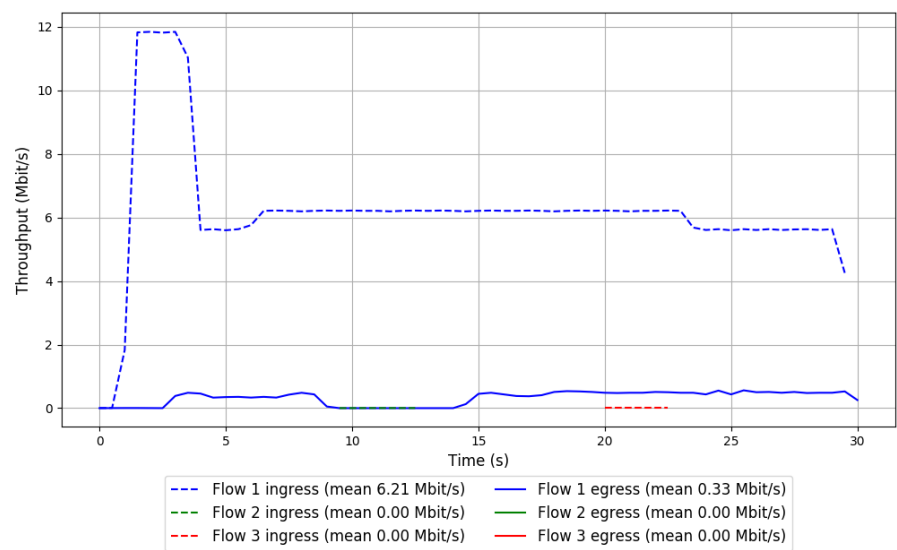
Start at: 2019-01-03 08:43:07

End at: 2019-01-03 08:43:37

Local clock offset: -6.818 ms

Remote clock offset: -2.797 ms

Run 2: Report of PCC-Expr — Data Link



Run 3: Statistics of PCC-Expr

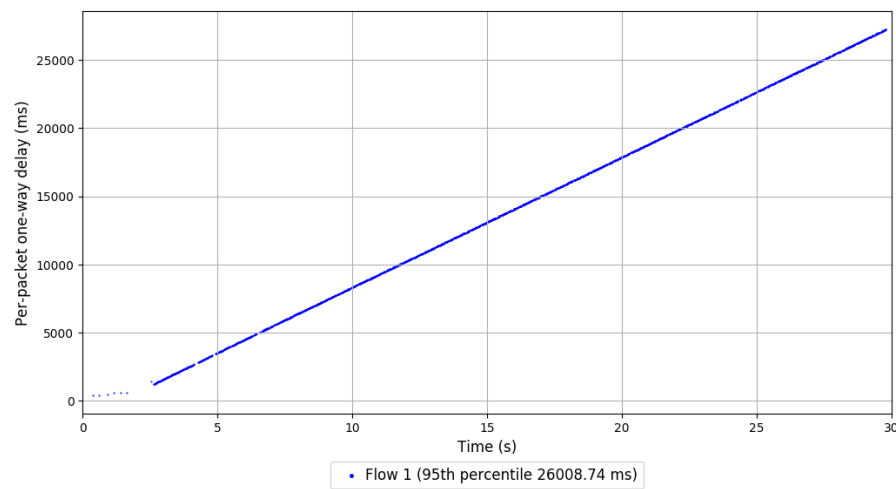
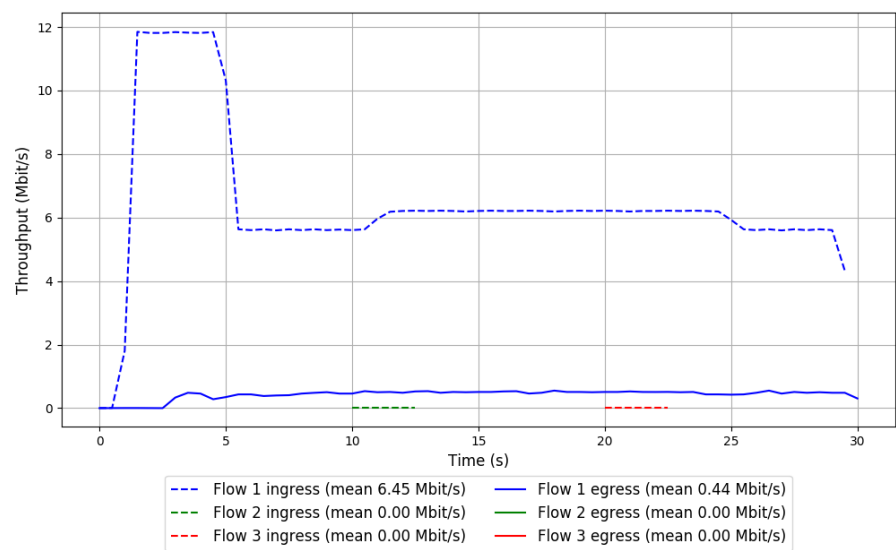
Start at: 2019-01-03 09:07:13

End at: 2019-01-03 09:07:43

Local clock offset: -3.482 ms

Remote clock offset: -7.814 ms

Run 3: Report of PCC-Expr — Data Link



Run 1: Statistics of QUIC Cubic

/home/ubuntu/pantheon/data/2019-01-03T08-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of QUIC Cubic — Data Link

Figure is missing

Figure is missing

Run 2: Statistics of QUIC Cubic

/home/ubuntu/pantheon/data/2019-01-03T08-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 2: Report of QUIC Cubic — Data Link

Figure is missing

Figure is missing

Run 3: Statistics of QUIC Cubic

/home/ubuntu/pantheon/data/2019-01-03T08-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 3: Report of QUIC Cubic — Data Link

Figure is missing

Figure is missing

Run 1: Statistics of SCReAM

Start at: 2019-01-03 08:09:26

End at: 2019-01-03 08:09:56

Local clock offset: -2.318 ms

Remote clock offset: 7.707 ms

Below is generated by plot.py at 2019-01-03 09:17:45

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 311.587 ms

Loss rate: 1.03%

-- Flow 1:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 281.521 ms

Loss rate: 0.79%

-- Flow 2:

Average throughput: 0.10 Mbit/s

95th percentile per-packet one-way delay: 308.584 ms

Loss rate: 1.02%

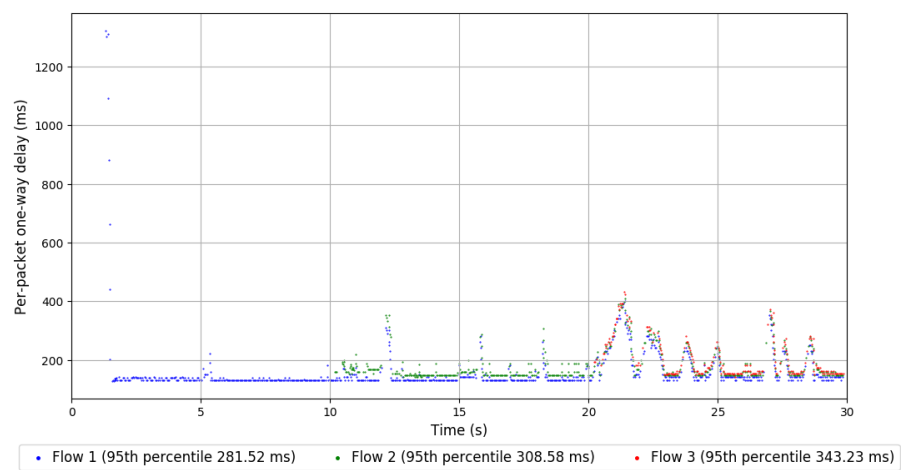
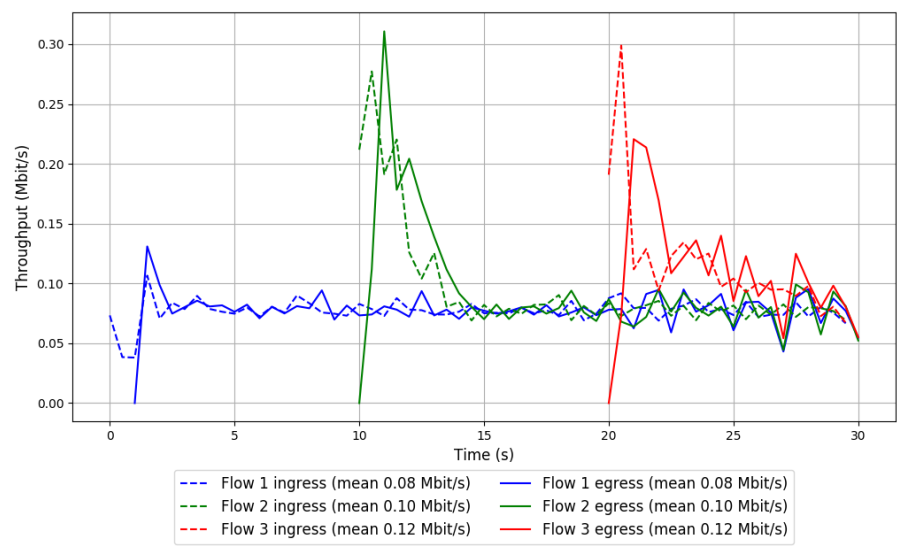
-- Flow 3:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 343.226 ms

Loss rate: 1.55%

Run 1: Report of SCSReAM — Data Link

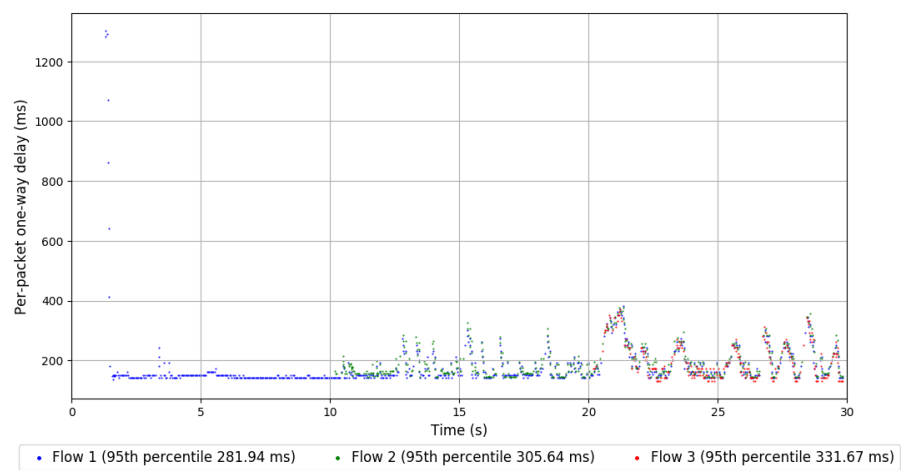
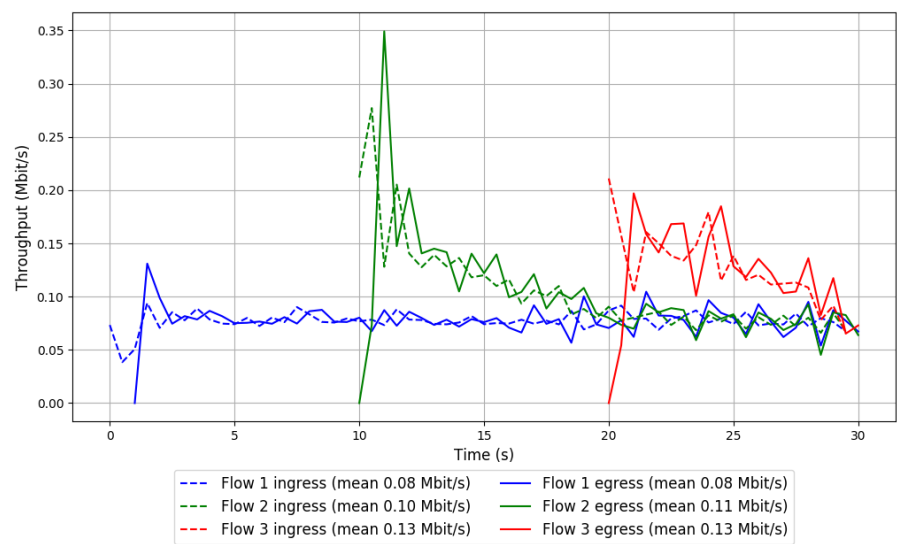


Run 2: Statistics of SCReAM

Start at: 2019-01-03 08:33:53
End at: 2019-01-03 08:34:23
Local clock offset: -5.674 ms
Remote clock offset: -0.825 ms

Below is generated by plot.py at 2019-01-03 09:17:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 305.603 ms
Loss rate: 0.98%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 281.940 ms
Loss rate: 0.79%
-- Flow 2:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 305.640 ms
Loss rate: 0.93%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 331.674 ms
Loss rate: 1.38%

Run 2: Report of SCSReAM — Data Link

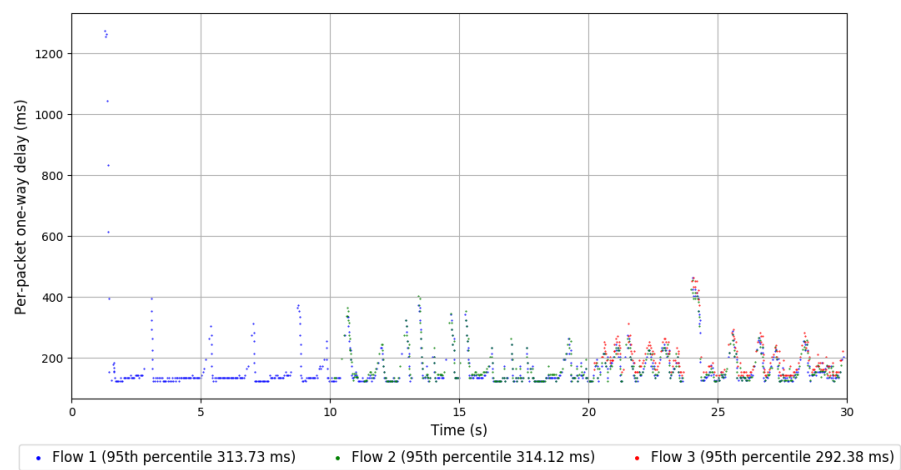
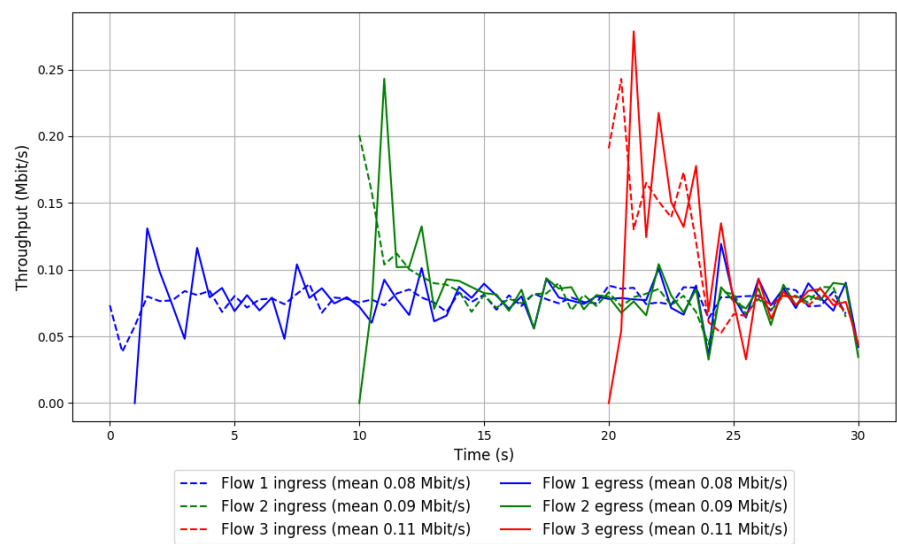


Run 3: Statistics of SReAM

Start at: 2019-01-03 08:58:18
End at: 2019-01-03 08:58:48
Local clock offset: -6.277 ms
Remote clock offset: -6.204 ms

Below is generated by plot.py at 2019-01-03 09:17:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 314.095 ms
Loss rate: 1.37%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 313.734 ms
Loss rate: 0.93%
-- Flow 2:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 314.115 ms
Loss rate: 1.41%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 292.384 ms
Loss rate: 2.25%

Run 3: Report of SReAM — Data Link



Run 1: Statistics of Sprout

/home/ubuntu/pantheon/data/2019-01-03T08-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of Sprout — Data Link

Figure is missing

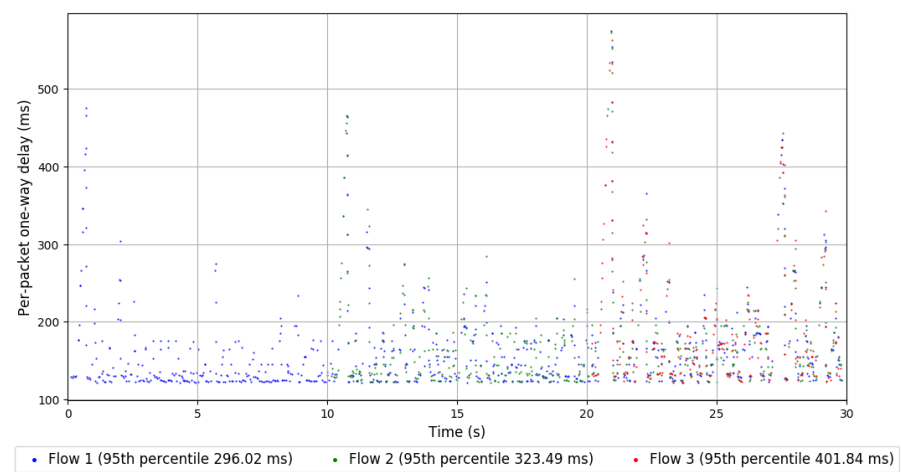
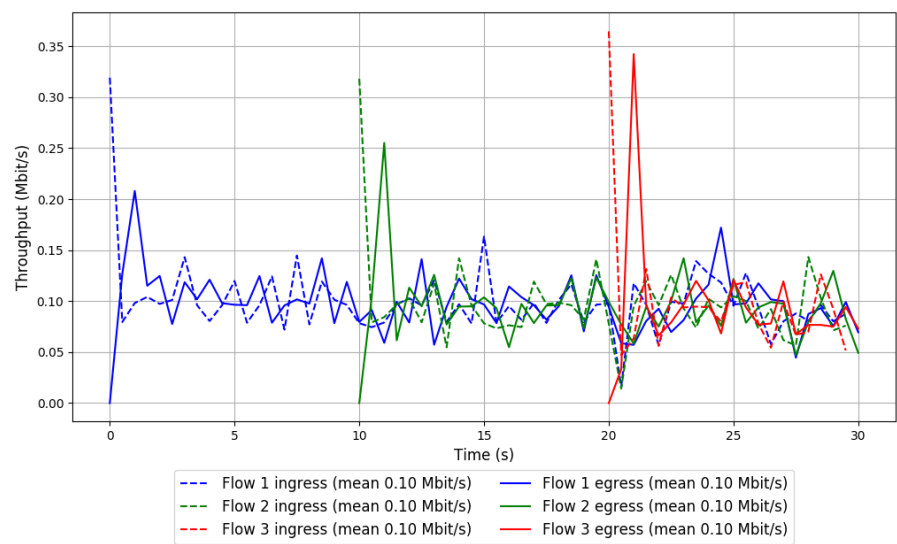
Figure is missing

Run 2: Statistics of Sprout

Start at: 2019-01-03 08:45:41
End at: 2019-01-03 08:46:11
Local clock offset: -7.804 ms
Remote clock offset: -3.314 ms

Below is generated by plot.py at 2019-01-03 09:17:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 323.489 ms
Loss rate: 1.18%
-- Flow 1:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 296.018 ms
Loss rate: 0.78%
-- Flow 2:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 323.489 ms
Loss rate: 1.18%
-- Flow 3:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 401.837 ms
Loss rate: 2.34%

Run 2: Report of Sprout — Data Link



Run 3: Statistics of Sprout

/home/ubuntu/pantheon/data/2019-01-03T08-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 3: Report of Sprout — Data Link

Figure is missing

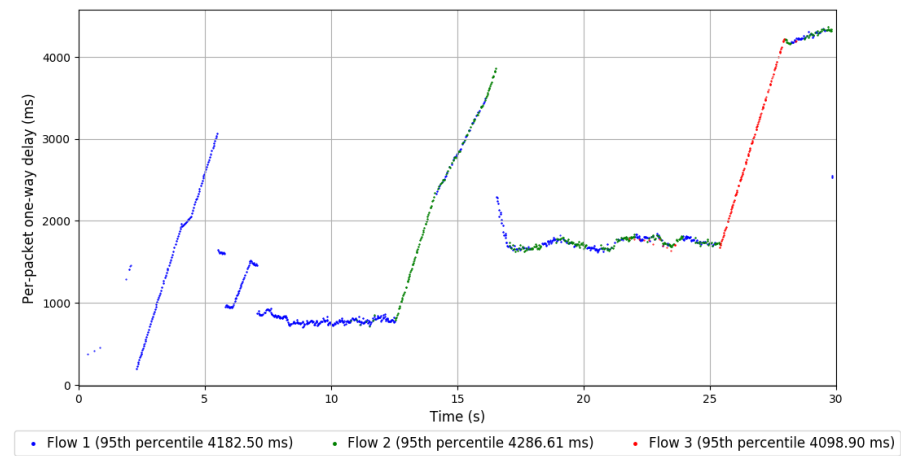
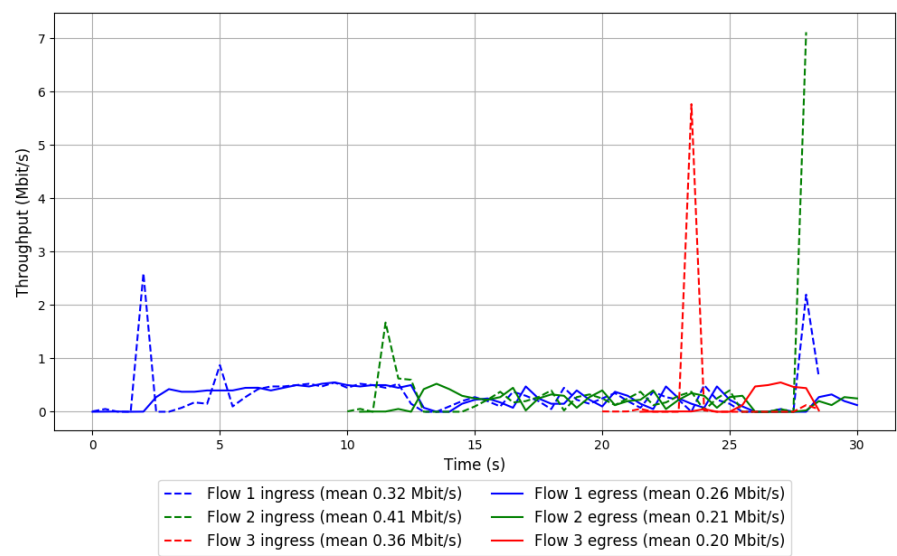
Figure is missing

```
Run 1: Statistics of TaoVA-100x

Start at: 2019-01-03 08:27:38
End at: 2019-01-03 08:28:08
Local clock offset: -2.399 ms
Remote clock offset: -3.476 ms

# Below is generated by plot.py at 2019-01-03 09:17:45
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.44 Mbit/s
95th percentile per-packet one-way delay: 4217.163 ms
Loss rate: 33.80%
-- Flow 1:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 4182.500 ms
Loss rate: 15.42%
-- Flow 2:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 4286.607 ms
Loss rate: 47.33%
-- Flow 3:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 4098.902 ms
Loss rate: 56.06%
```

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

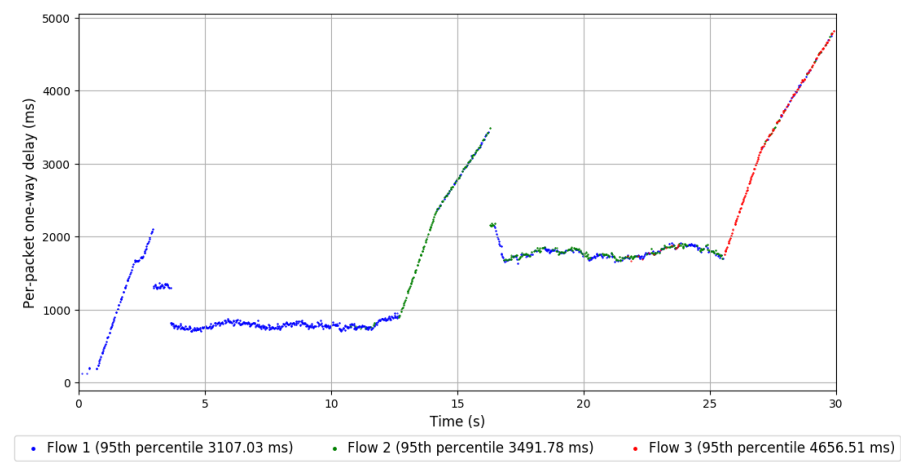
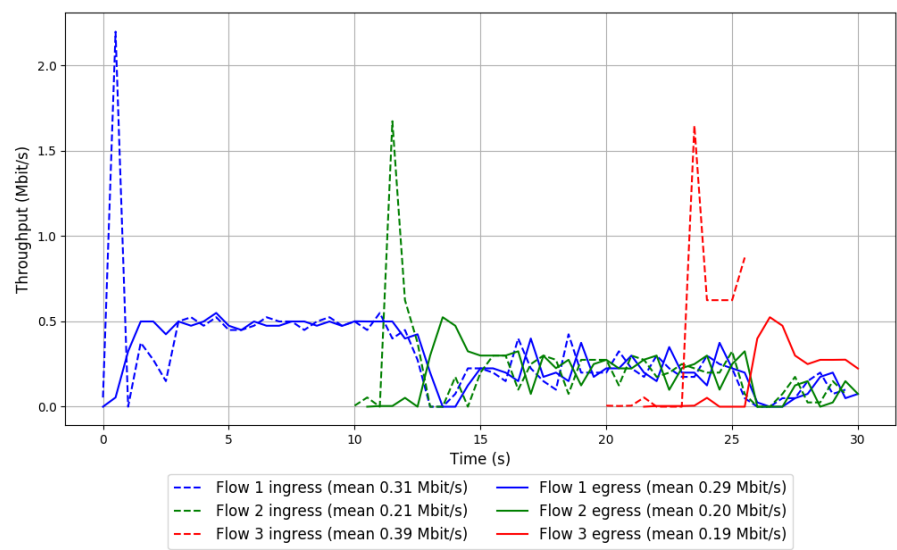


Run 2: Statistics of TaoVA-100x

Start at: 2019-01-03 08:52:10
End at: 2019-01-03 08:52:40
Local clock offset: -7.655 ms
Remote clock offset: -4.973 ms

Below is generated by plot.py at 2019-01-03 09:17:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 3996.279 ms
Loss rate: 10.08%
-- Flow 1:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 3107.032 ms
Loss rate: 4.76%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 3491.779 ms
Loss rate: 10.40%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 4656.508 ms
Loss rate: 31.32%

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



Run 3: Statistics of TaoVA-100x

Start at: 2019-01-03 09:16:33

End at: 2019-01-03 09:17:03

Local clock offset: -2.213 ms

Remote clock offset: 1.679 ms

Below is generated by plot.py at 2019-01-03 09:17:45

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.47 Mbit/s

95th percentile per-packet one-way delay: 4066.192 ms

Loss rate: 14.61%

-- Flow 1:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 2982.859 ms

Loss rate: 13.96%

-- Flow 2:

Average throughput: 0.20 Mbit/s

95th percentile per-packet one-way delay: 3606.232 ms

Loss rate: 10.40%

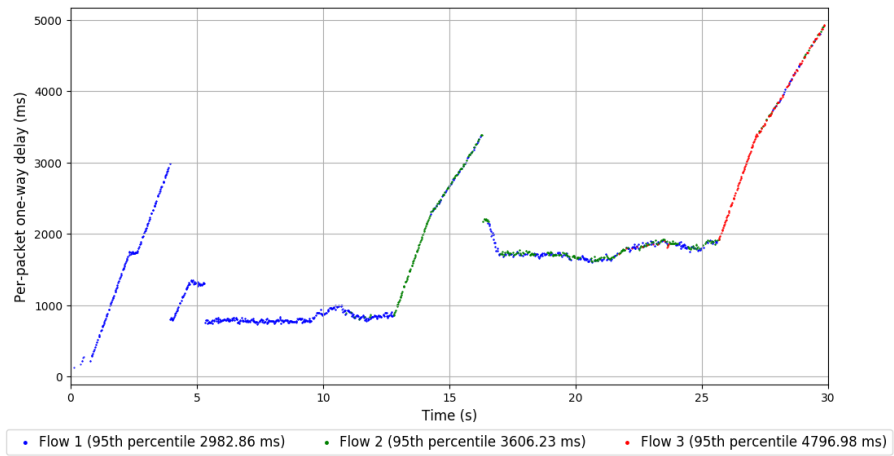
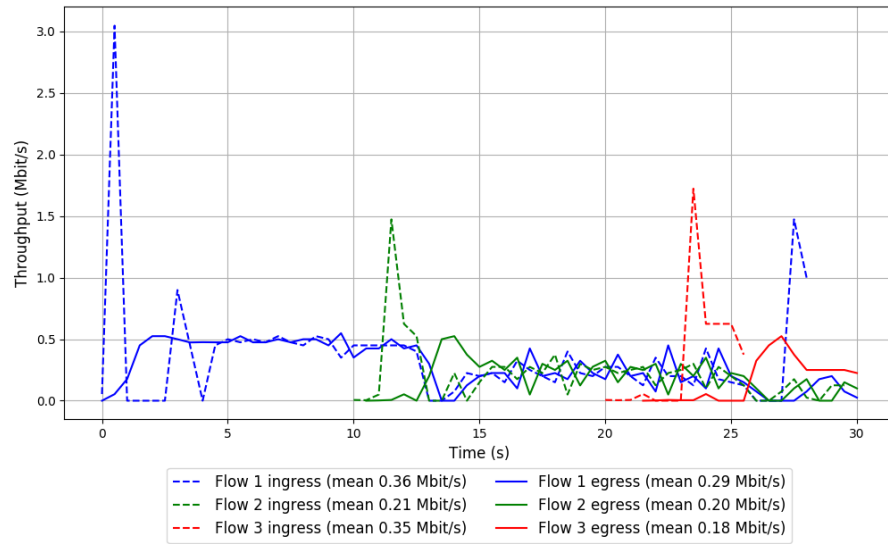
-- Flow 3:

Average throughput: 0.18 Mbit/s

95th percentile per-packet one-way delay: 4796.982 ms

Loss rate: 26.57%

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



Run 1: Statistics of TCP Vegas

Start at: 2019-01-03 08:05:45

End at: 2019-01-03 08:06:15

Local clock offset: -2.15 ms

Remote clock offset: 11.15 ms

Below is generated by plot.py at 2019-01-03 09:17:45

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.44 Mbit/s

95th percentile per-packet one-way delay: 2143.507 ms

Loss rate: 7.27%

-- Flow 1:

Average throughput: 0.29 Mbit/s

95th percentile per-packet one-way delay: 1915.406 ms

Loss rate: 3.54%

-- Flow 2:

Average throughput: 0.19 Mbit/s

95th percentile per-packet one-way delay: 2173.615 ms

Loss rate: 7.83%

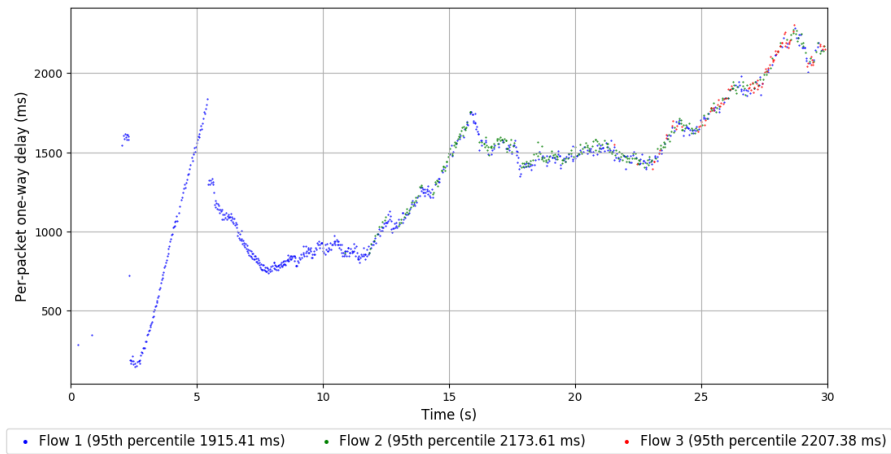
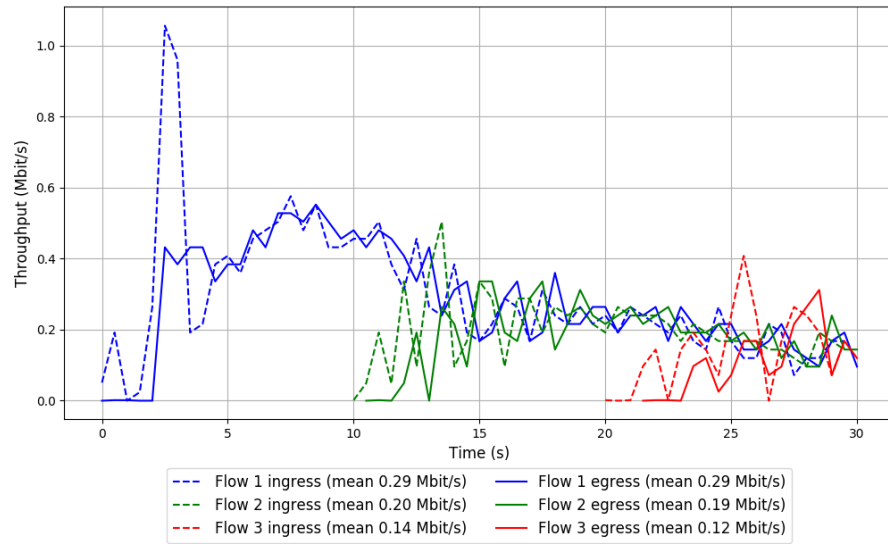
-- Flow 3:

Average throughput: 0.12 Mbit/s

95th percentile per-packet one-way delay: 2207.383 ms

Loss rate: 29.25%

Run 1: Report of TCP Vegas — Data Link

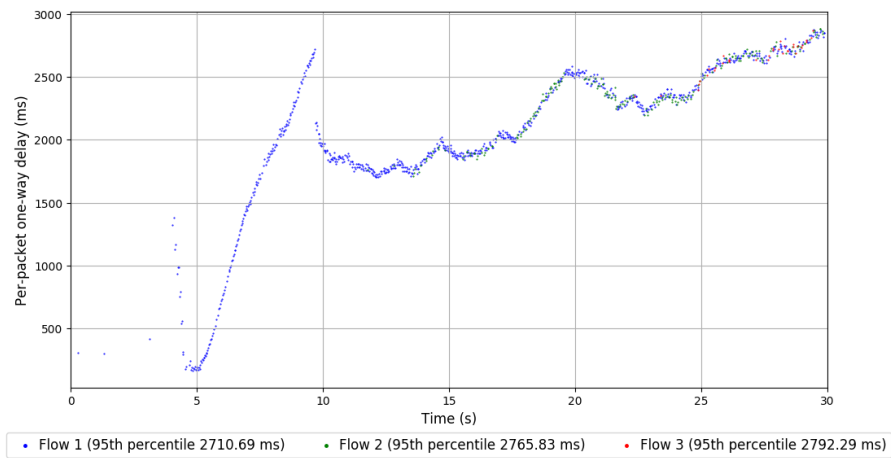
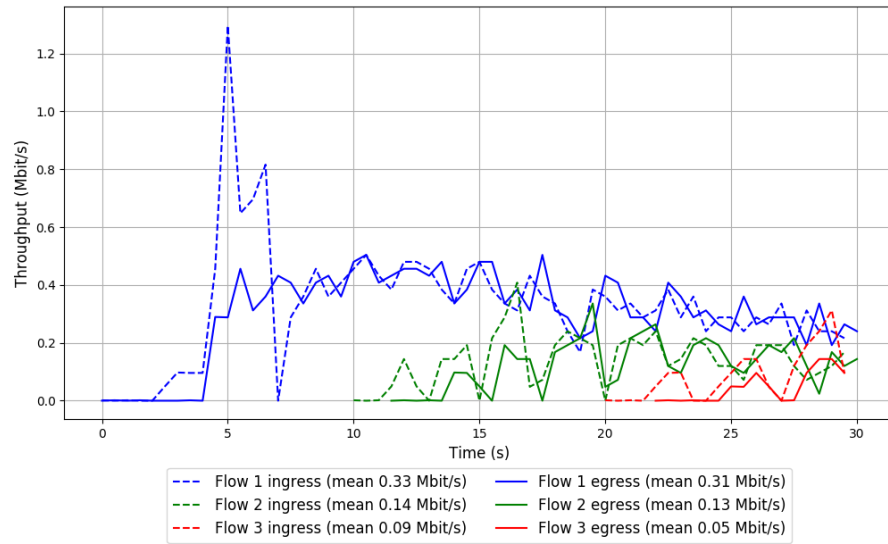


Run 2: Statistics of TCP Vegas

Start at: 2019-01-03 08:30:10
End at: 2019-01-03 08:30:40
Local clock offset: -4.406 ms
Remote clock offset: -3.846 ms

Below is generated by plot.py at 2019-01-03 09:17:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 2744.228 ms
Loss rate: 11.83%
-- Flow 1:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 2710.692 ms
Loss rate: 7.43%
-- Flow 2:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 2765.830 ms
Loss rate: 13.78%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 2792.290 ms
Loss rate: 56.90%

Run 2: Report of TCP Vegas — Data Link

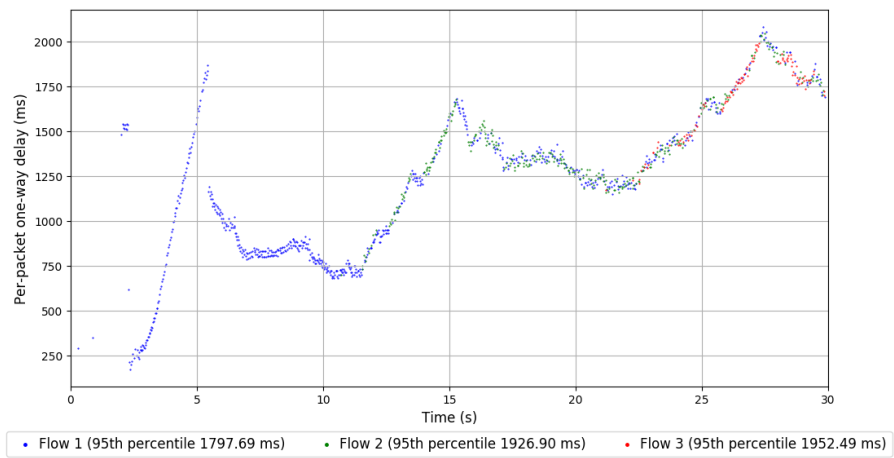
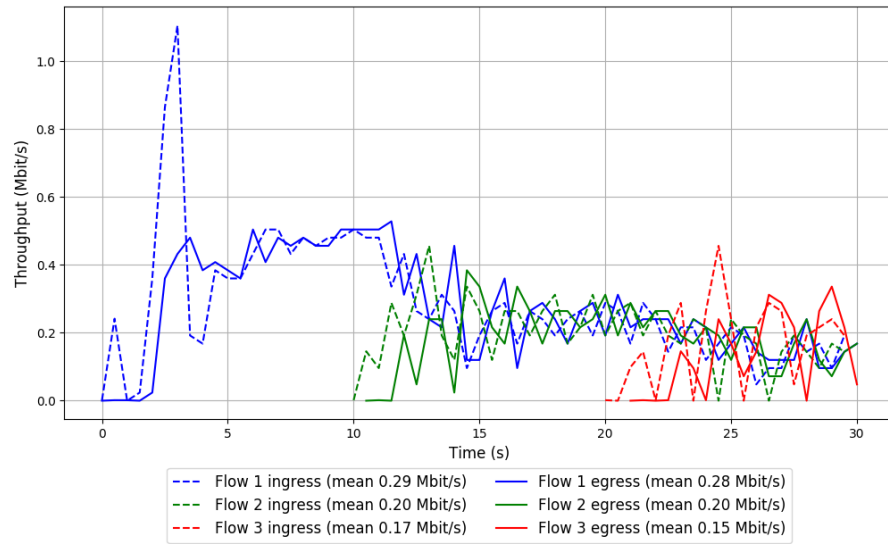


Run 3: Statistics of TCP Vegas

Start at: 2019-01-03 08:54:37
End at: 2019-01-03 08:55:07
Local clock offset: -7.506 ms
Remote clock offset: -5.279 ms

Below is generated by plot.py at 2019-01-03 09:17:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 1892.587 ms
Loss rate: 6.41%
-- Flow 1:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 1797.687 ms
Loss rate: 3.09%
-- Flow 2:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 1926.901 ms
Loss rate: 6.29%
-- Flow 3:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 1952.489 ms
Loss rate: 23.70%

Run 3: Report of TCP Vegas — Data Link



Run 1: Statistics of Verus

Start at: 2019-01-03 08:13:12

End at: 2019-01-03 08:13:42

Local clock offset: -1.071 ms

Remote clock offset: 5.767 ms

Below is generated by plot.py at 2019-01-03 09:17:45

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.48 Mbit/s

95th percentile per-packet one-way delay: 1793.222 ms

Loss rate: 4.42%

-- Flow 1:

Average throughput: 0.47 Mbit/s

95th percentile per-packet one-way delay: 1794.235 ms

Loss rate: 4.20%

-- Flow 2:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 1666.828 ms

Loss rate: 9.52%

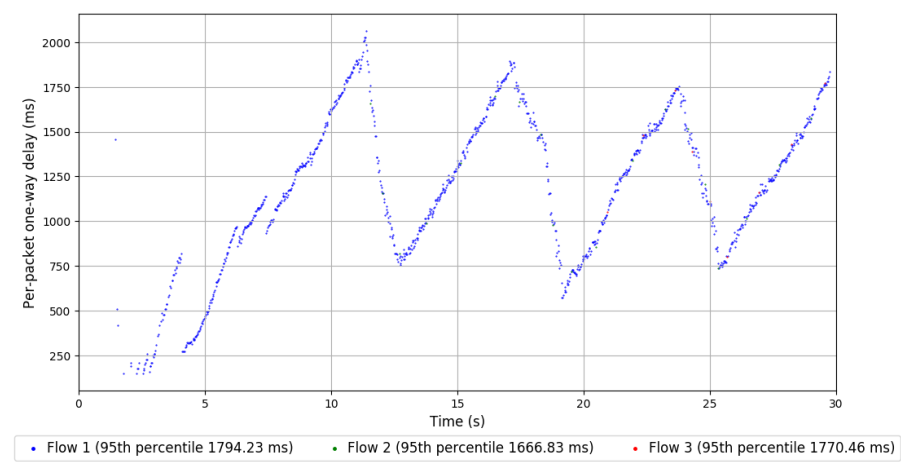
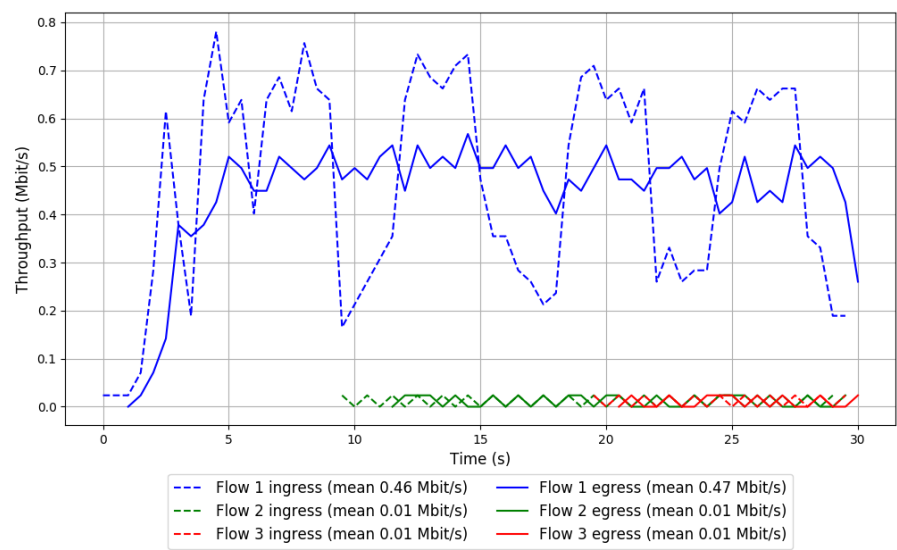
-- Flow 3:

Average throughput: 0.01 Mbit/s

95th percentile per-packet one-way delay: 1770.461 ms

Loss rate: 18.18%

Run 1: Report of Verus — Data Link

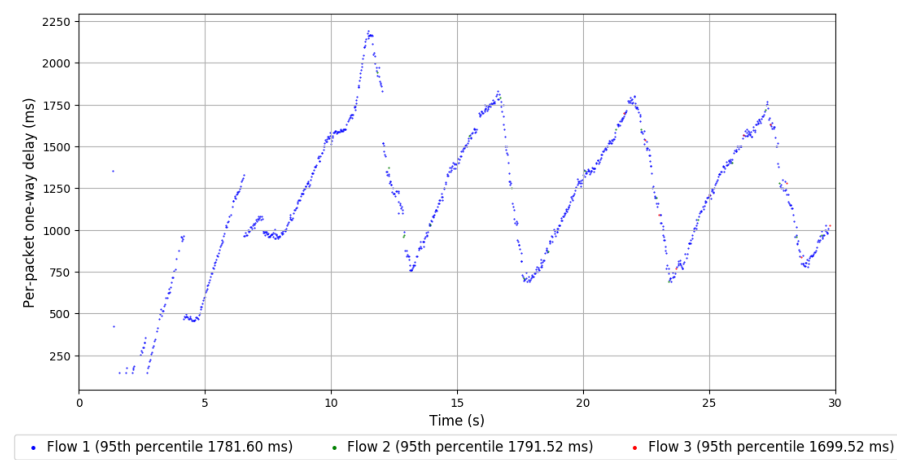
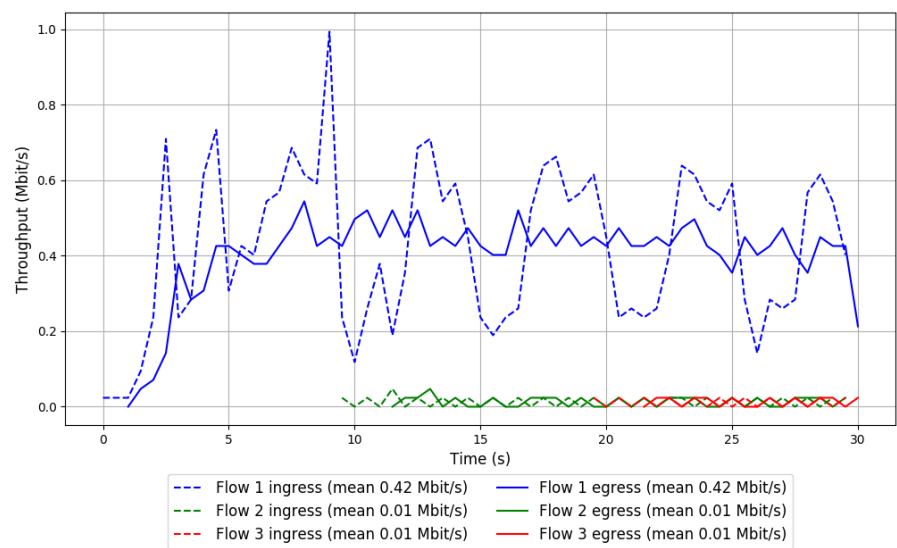


Run 2: Statistics of Verus

Start at: 2019-01-03 08:37:51
End at: 2019-01-03 08:38:21
Local clock offset: -6.721 ms
Remote clock offset: -1.859 ms

Below is generated by plot.py at 2019-01-03 09:17:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 1781.694 ms
Loss rate: 5.18%
-- Flow 1:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 1781.597 ms
Loss rate: 5.15%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1791.521 ms
Loss rate: 4.55%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1699.517 ms
Loss rate: 9.09%

Run 2: Report of Verus — Data Link

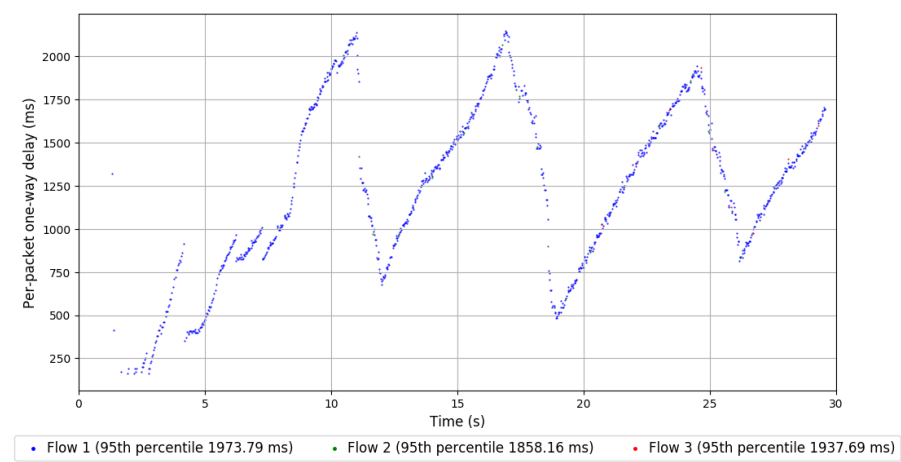
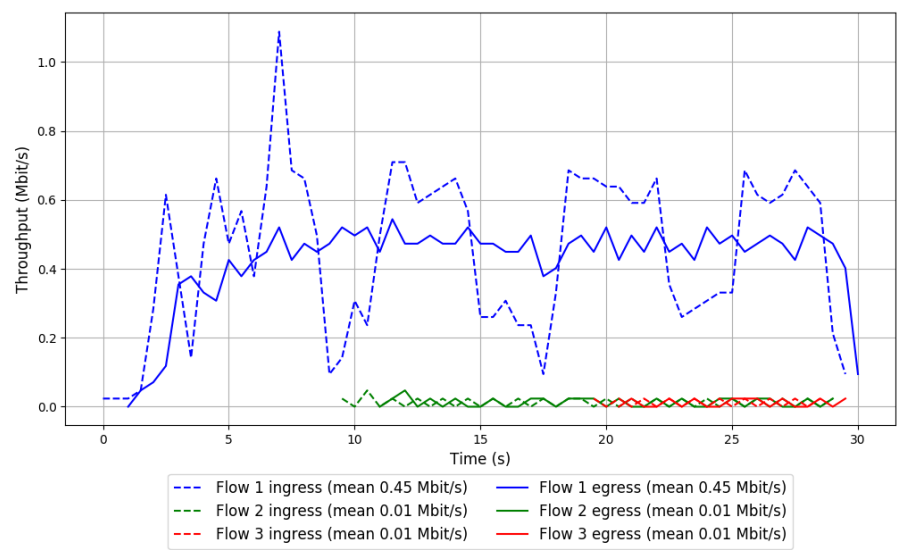


Run 3: Statistics of Verus

Start at: 2019-01-03 09:02:18
End at: 2019-01-03 09:02:48
Local clock offset: -4.722 ms
Remote clock offset: -6.812 ms

Below is generated by plot.py at 2019-01-03 09:17:45
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.46 Mbit/s
95th percentile per-packet one-way delay: 1971.814 ms
Loss rate: 6.50%
-- Flow 1:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 1973.791 ms
Loss rate: 6.42%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1858.165 ms
Loss rate: 9.09%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1937.690 ms
Loss rate: 10.00%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

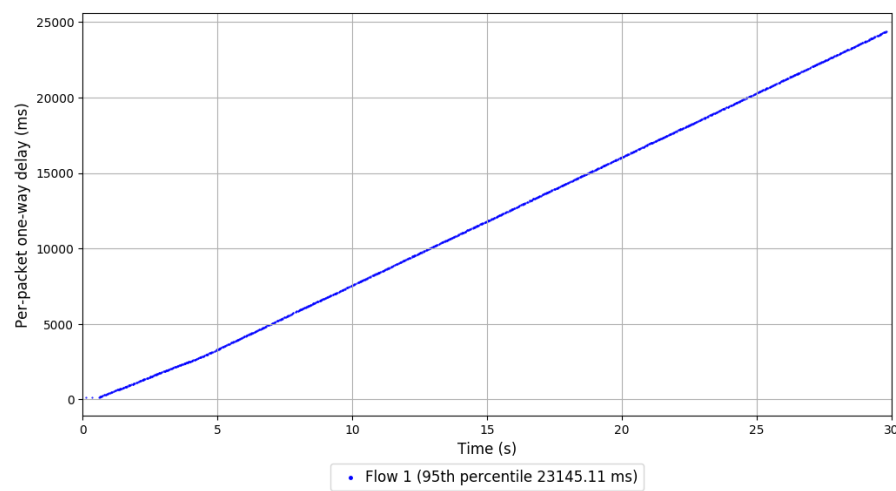
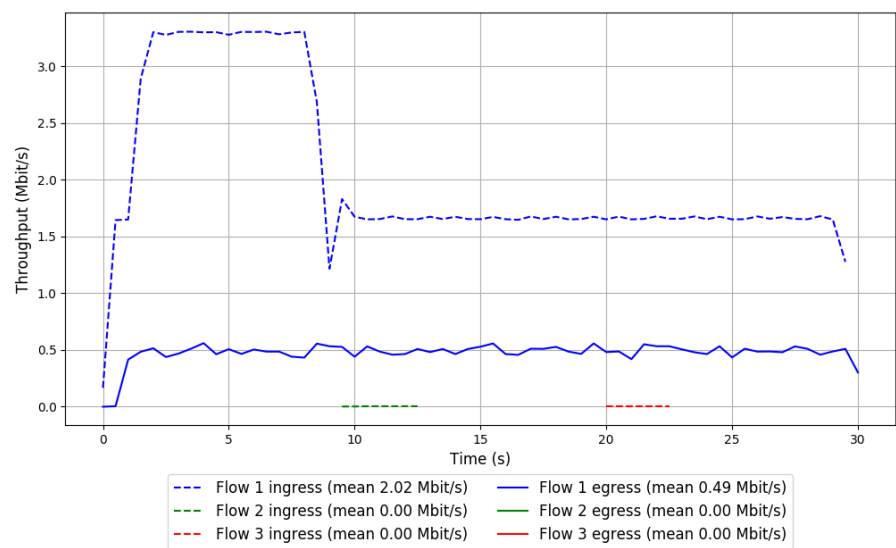
Start at: 2019-01-03 08:19:41

End at: 2019-01-03 08:20:11

Local clock offset: -0.468 ms

Remote clock offset: 2.836 ms

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

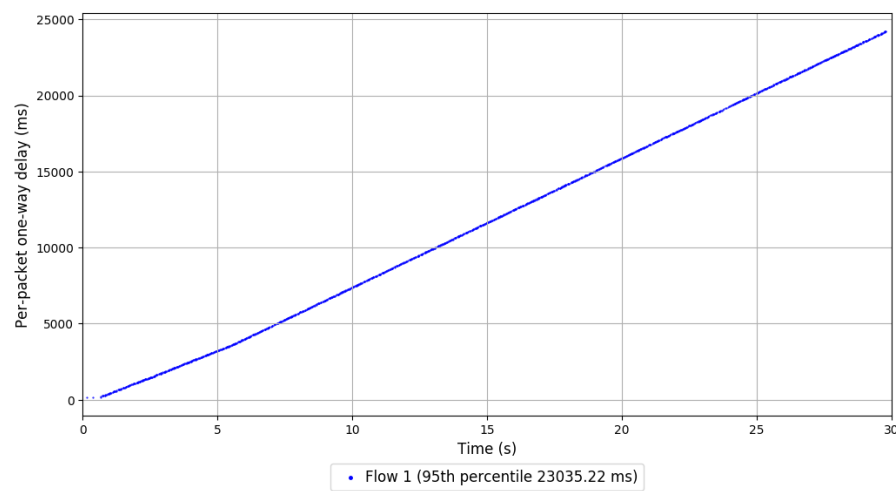
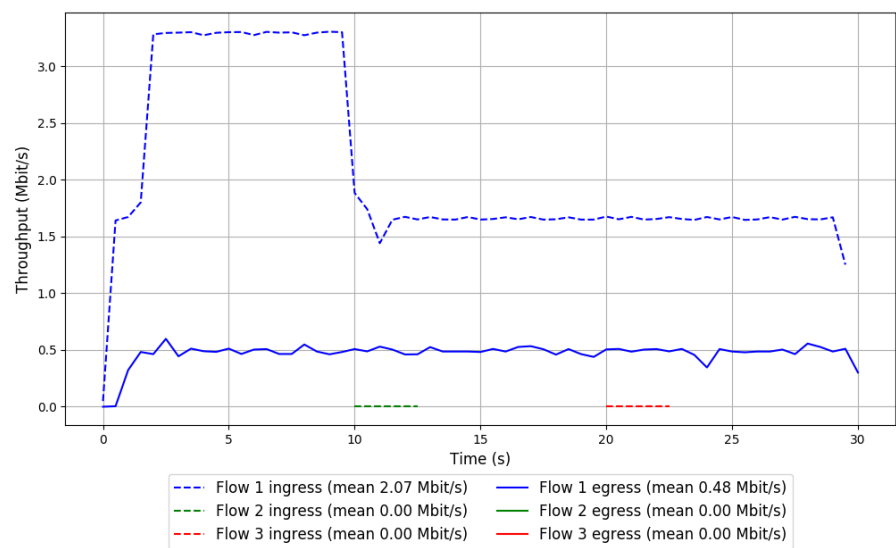
Start at: 2019-01-03 08:44:23

End at: 2019-01-03 08:44:53

Local clock offset: -7.68 ms

Remote clock offset: -7.262 ms

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

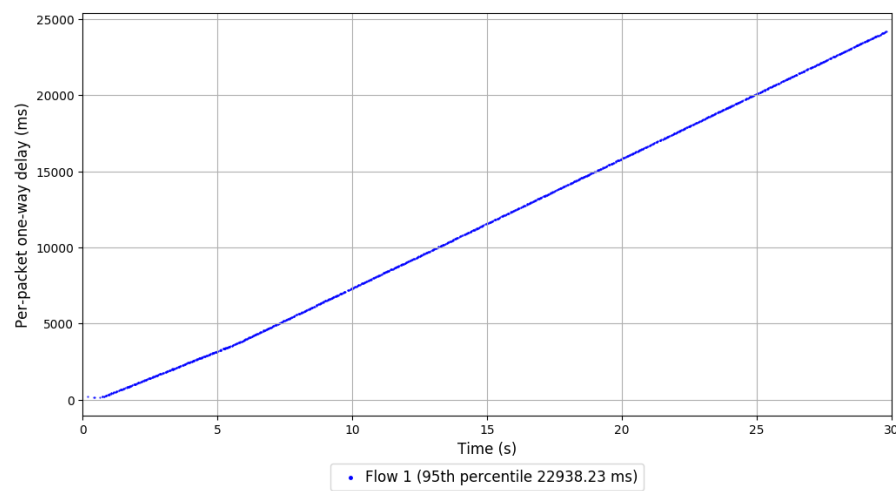
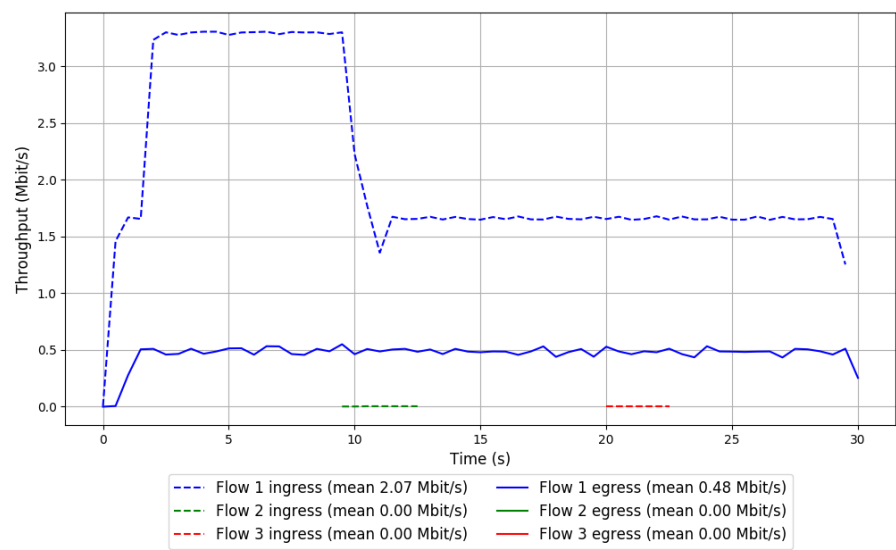
Start at: 2019-01-03 09:08:29

End at: 2019-01-03 09:08:59

Local clock offset: -3.238 ms

Remote clock offset: -11.564 ms

Run 3: Report of PCC-Vivace — Data Link

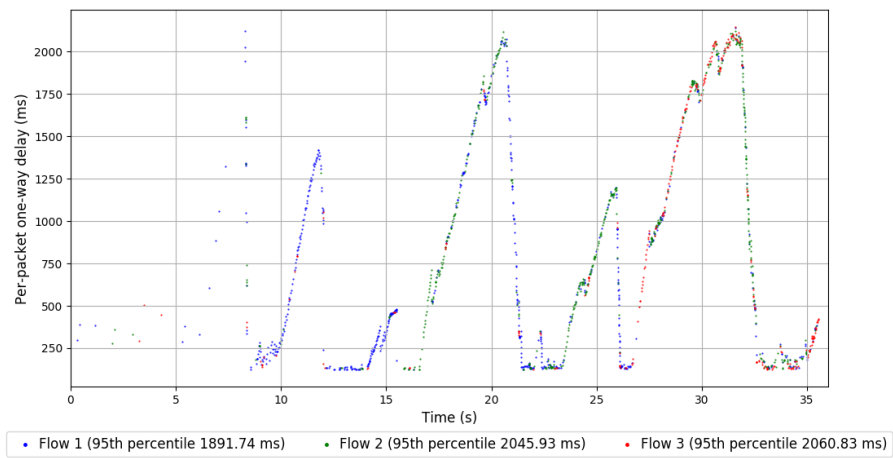
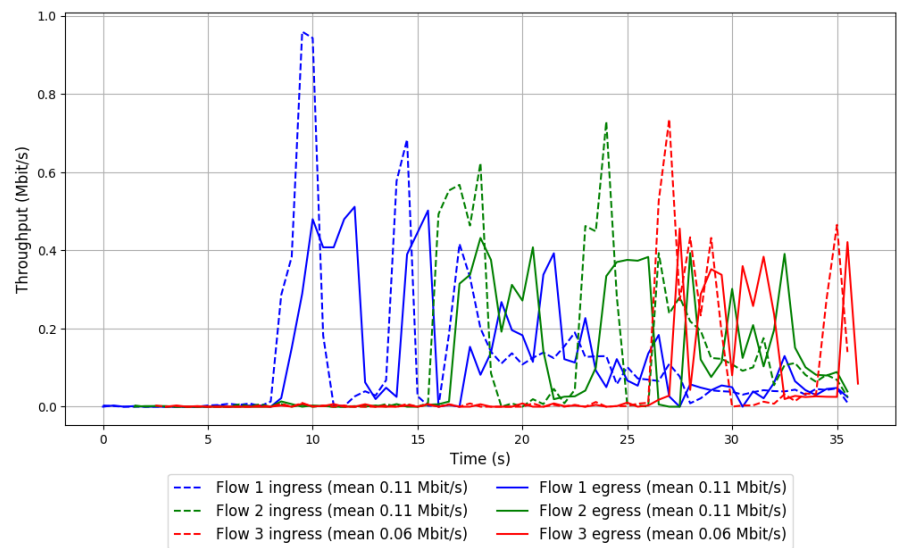


```
Run 1: Statistics of WebRTC media

Start at: 2019-01-03 08:04:28
End at: 2019-01-03 08:04:58
Local clock offset: -3.257 ms
Remote clock offset: 8.66 ms

# Below is generated by plot.py at 2019-01-03 09:17:46
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 2035.117 ms
Loss rate: 2.57%
-- Flow 1:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 1891.737 ms
Loss rate: 0.54%
-- Flow 2:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 2045.930 ms
Loss rate: 0.94%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 2060.828 ms
Loss rate: 9.84%
```

Run 1: Report of WebRTC media — Data Link

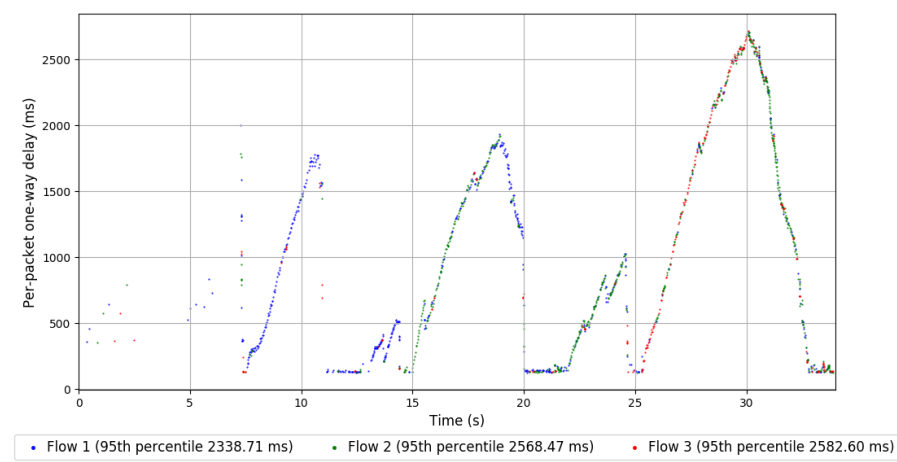
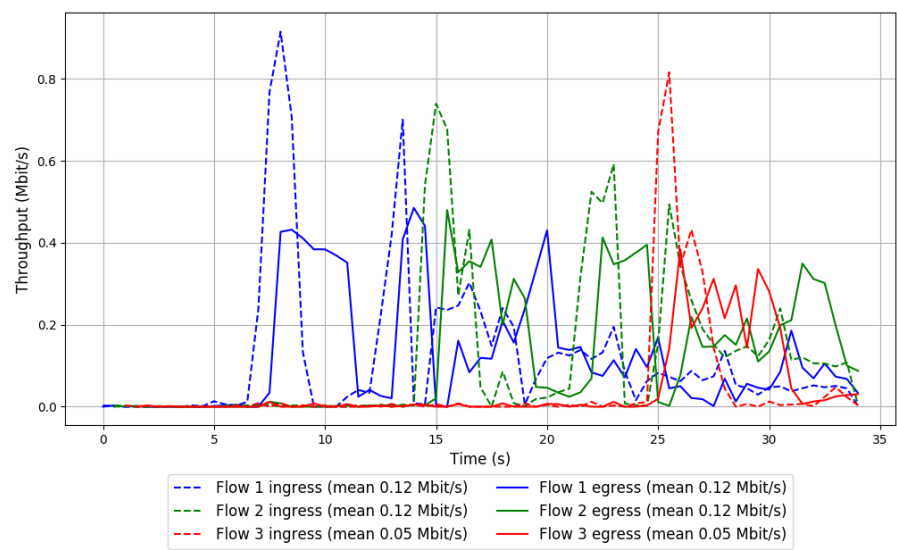


Run 2: Statistics of WebRTC media

Start at: 2019-01-03 08:28:52
End at: 2019-01-03 08:29:22
Local clock offset: -3.813 ms
Remote clock offset: -3.722 ms

Below is generated by plot.py at 2019-01-03 09:17:46
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 2537.156 ms
Loss rate: 0.44%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 2338.714 ms
Loss rate: 0.26%
-- Flow 2:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 2568.472 ms
Loss rate: 0.60%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 2582.604 ms
Loss rate: 0.51%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2019-01-03 08:53:23
End at: 2019-01-03 08:53:53
Local clock offset: -8.463 ms
Remote clock offset: -8.781 ms

Below is generated by plot.py at 2019-01-03 09:17:46
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.29 Mbit/s
95th percentile per-packet one-way delay: 1889.851 ms
Loss rate: 5.88%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 1873.478 ms
Loss rate: 1.43%
-- Flow 2:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 1911.238 ms
Loss rate: 0.73%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 1948.117 ms
Loss rate: 21.20%

Run 3: Report of WebRTC media — Data Link

