

Pantheon Report

Generated at 2018-12-02 14:16:20 (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:

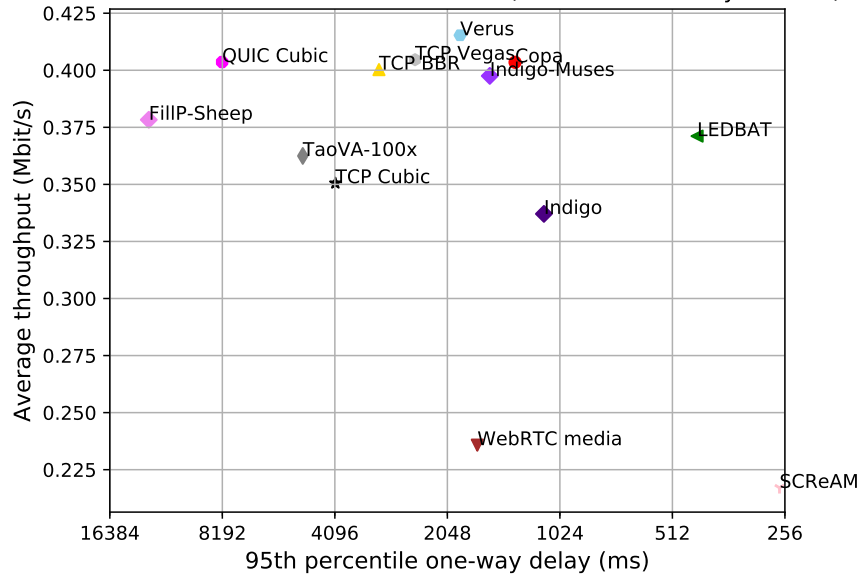
```
Linux 4.15.0-1027-aws
net.core.default_qdisc = fq
net.core.rmem_default = 16777216
net.core.rmem_max = 536870912
net.core.wmem_default = 16777216
net.core.wmem_max = 536870912
net.ipv4.tcp_rmem = 4096 16777216 536870912
net.ipv4.tcp_wmem = 4096 16777216 536870912
```

Git summary:

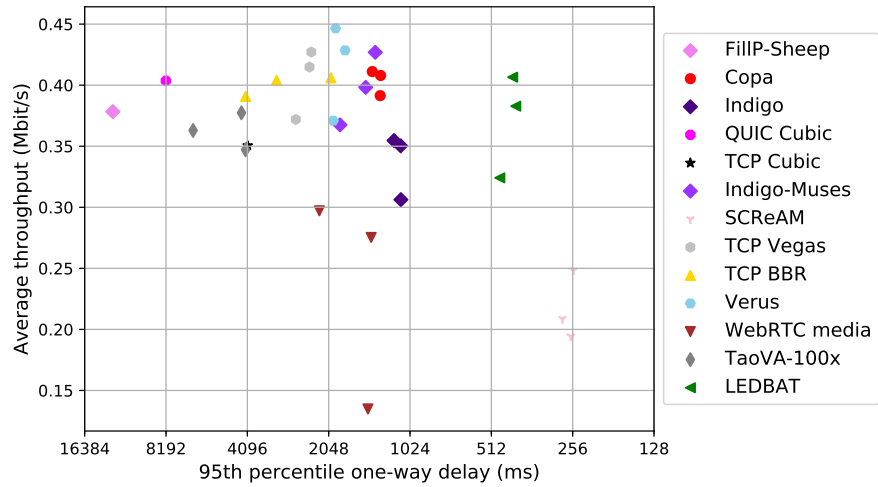
```
branch: muses @ 7b6dad87cde3ab65f7c4052140eb54098aa58e9d
third_party/fillp @ d6da1459332fcee56963885d7eba17e6a32d4519
third_party/fillp-sheep @ 0e5bb722943babcd2b090d2c64fcd45e12e923f9
third_party/genericCC @ d0153f8e594aa89e93b032143cedbdf58e562f4
third_party/indigo @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e64d
third_party/indigo-96d2da3 @ 8413272d46f8aa0bcb967ed7048b6a8f994abb95
third_party/libutp @ b3465b942e2826f2b179eaab4a906ce6bb7cf3cf
third_party/muses @ 65ac1b19bbefed0c6349ae986009b4fa8643c40a
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



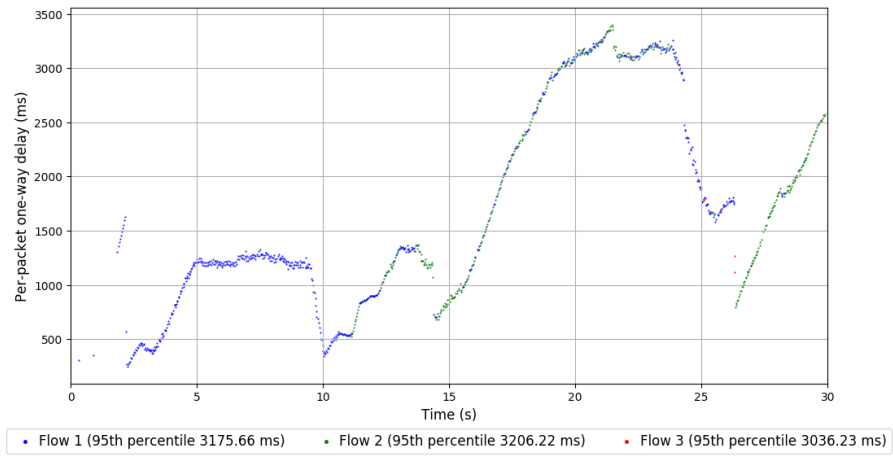
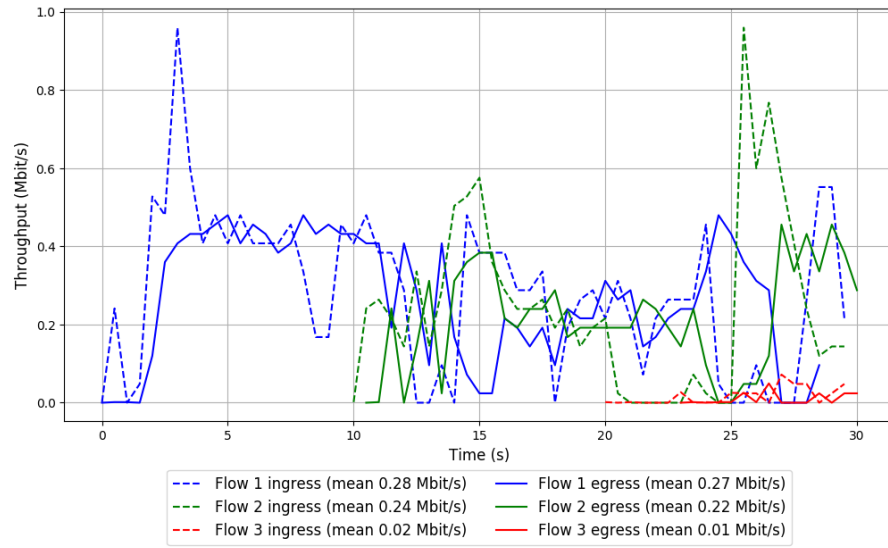
scheme	# runs	mean avg tput (Mbit/s)			mean 95th-%ile delay (ms)			mean loss rate (%)		
		flow 1	flow 2	flow 3	flow 1	flow 2	flow 3	flow 1	flow 2	flow 3
TCP BBR	3	0.26	0.18	0.06	3089.14	3120.28	3107.63	5.35	8.95	41.97
Copa	3	0.24	0.19	0.10	1300.55	1368.47	1393.97	4.08	7.21	11.79
TCP Cubic	1	0.34	0.02	0.00	4050.60	4438.29	4214.45	20.92	50.67	61.79
FillP	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
FillP-Sheep	1	0.37	0.01	0.01	12963.67	7173.17	4589.29	17.41	0.00	98.44
Indigo	3	0.16	0.17	0.18	1183.23	1008.80	1119.88	0.51	1.24	1.90
Indigo-96d2da3	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEDBAT	3	0.16	0.21	0.23	415.78	463.08	439.10	0.73	0.77	4.21
Indigo-Muses	3	0.21	0.18	0.22	1715.88	1397.71	1590.35	1.86	3.17	8.34
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	1	0.40	0.00	0.00	8188.65	8309.18	8543.59	32.39	33.33	66.67
SCReAM	3	0.08	0.14	0.12	247.46	255.65	296.18	0.71	0.73	1.67
Sprout	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TaoVA-100x	3	0.23	0.19	0.09	4306.90	5234.67	4338.61	14.18	22.16	66.68
TCP Vegas	3	0.29	0.15	0.08	2377.22	2568.54	2621.74	4.83	10.34	40.48
Verus	3	0.40	0.01	0.01	1894.49	1821.59	1808.14	4.97	7.72	16.36
PCC-Vivace	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WebRTC media	3	0.10	0.10	0.05	1740.25	1666.38	1670.97	0.22	1.57	6.65

Run 1: Statistics of TCP BBR

Start at: 2018-12-02 13:15:33
End at: 2018-12-02 13:16:03
Local clock offset: -0.359 ms
Remote clock offset: 10.881 ms

Below is generated by plot.py at 2018-12-02 14:15:48
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 3194.295 ms
Loss rate: 10.92%
-- Flow 1:
Average throughput: 0.27 Mbit/s
95th percentile per-packet one-way delay: 3175.658 ms
Loss rate: 9.44%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 3206.217 ms
Loss rate: 11.88%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 3036.228 ms
Loss rate: 55.68%

Run 1: Report of TCP BBR — Data Link

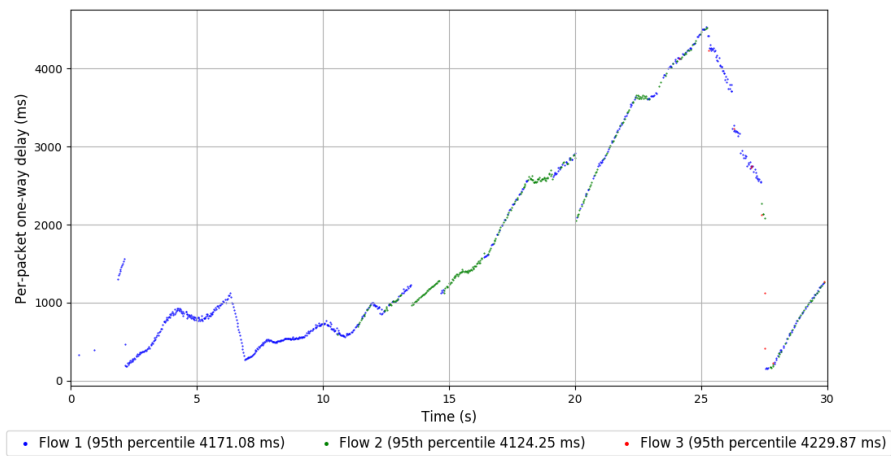
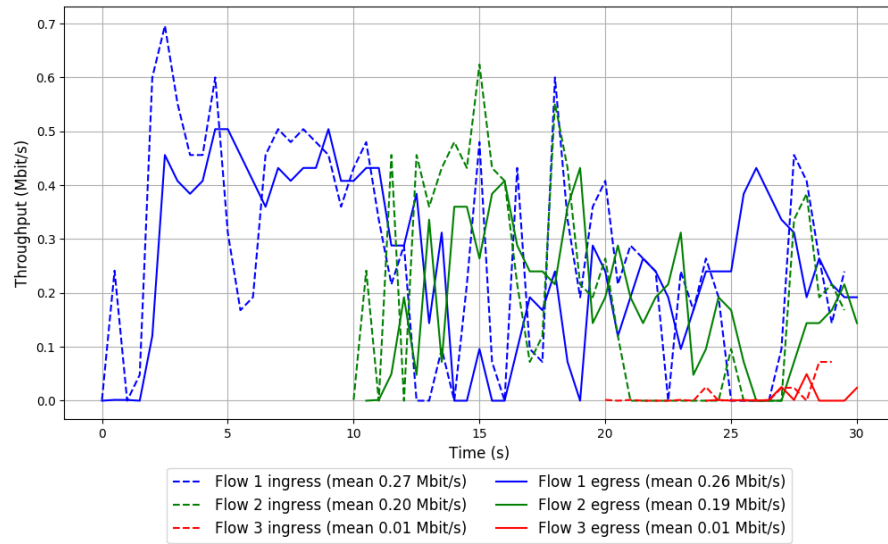


Run 2: Statistics of TCP BBR

Start at: 2018-12-02 13:39:49
End at: 2018-12-02 13:40:19
Local clock offset: -6.399 ms
Remote clock offset: -5.207 ms

Below is generated by plot.py at 2018-12-02 14:15:48
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.39 Mbit/s
95th percentile per-packet one-way delay: 4158.851 ms
Loss rate: 4.84%
-- Flow 1:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 4171.081 ms
Loss rate: 3.42%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 4124.254 ms
Loss rate: 6.38%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 4229.870 ms
Loss rate: 53.37%

Run 2: Report of TCP BBR — Data Link

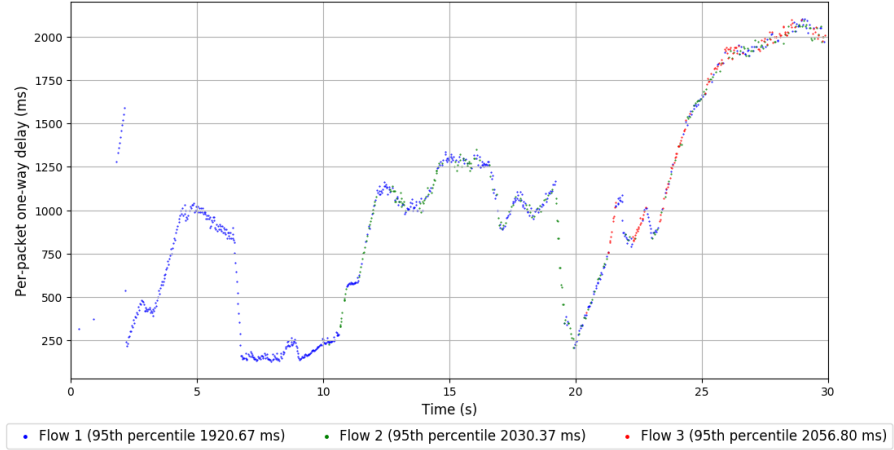
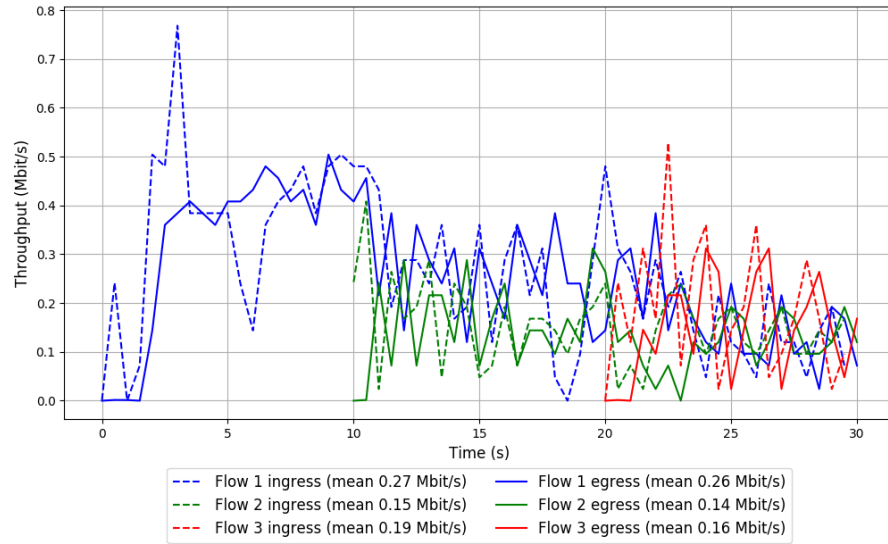


Run 3: Statistics of TCP BBR

Start at: 2018-12-02 14:03:43
End at: 2018-12-02 14:04:13
Local clock offset: -2.843 ms
Remote clock offset: -17.922 ms

Below is generated by plot.py at 2018-12-02 14:15:48
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 2010.676 ms
Loss rate: 6.45%
-- Flow 1:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 1920.675 ms
Loss rate: 3.19%
-- Flow 2:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 2030.368 ms
Loss rate: 8.59%
-- Flow 3:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 2056.797 ms
Loss rate: 16.87%

Run 3: Report of TCP BBR — Data Link



Run 1: Statistics of Copa

Start at: 2018-12-02 13:16:47

End at: 2018-12-02 13:17:17

Local clock offset: 0.534 ms

Remote clock offset: 7.485 ms

Below is generated by plot.py at 2018-12-02 14:15:49

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.39 Mbit/s

95th percentile per-packet one-way delay: 1320.718 ms

Loss rate: 5.54%

-- Flow 1:

Average throughput: 0.25 Mbit/s

95th percentile per-packet one-way delay: 1281.312 ms

Loss rate: 4.30%

-- Flow 2:

Average throughput: 0.17 Mbit/s

95th percentile per-packet one-way delay: 1355.588 ms

Loss rate: 7.19%

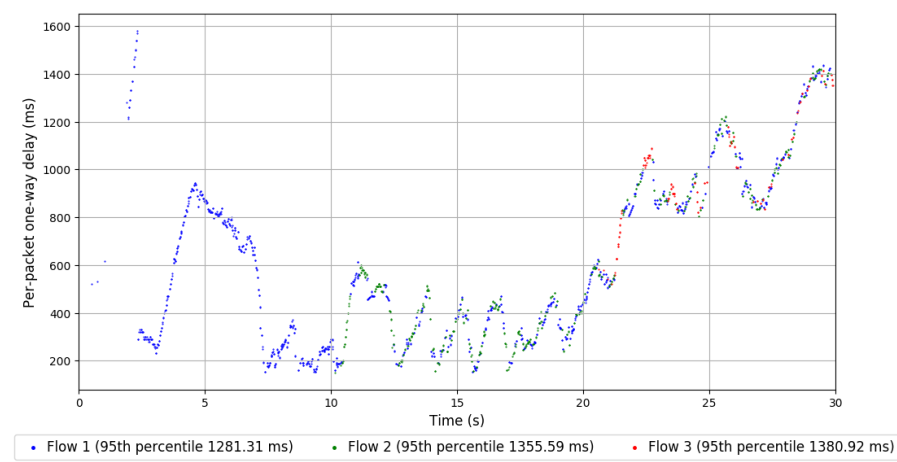
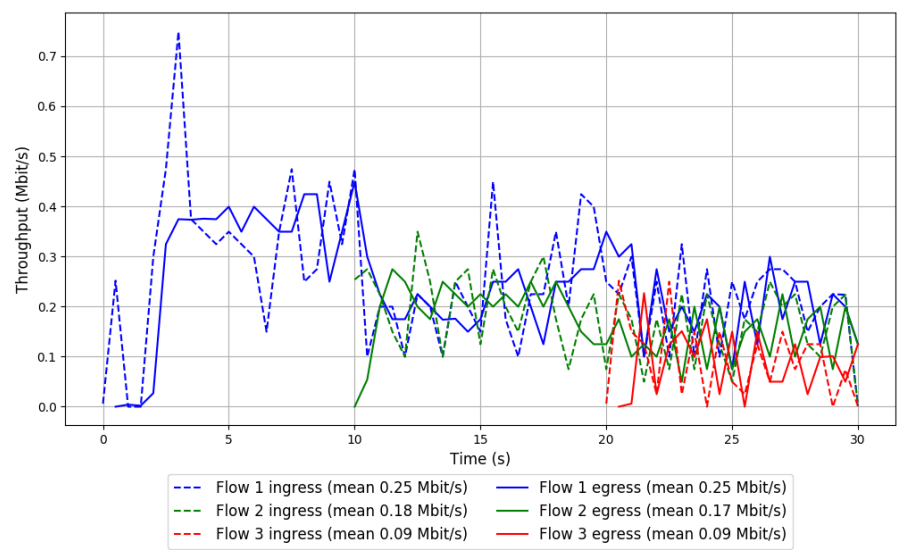
-- Flow 3:

Average throughput: 0.09 Mbit/s

95th percentile per-packet one-way delay: 1380.916 ms

Loss rate: 9.05%

Run 1: Report of Copa — Data Link

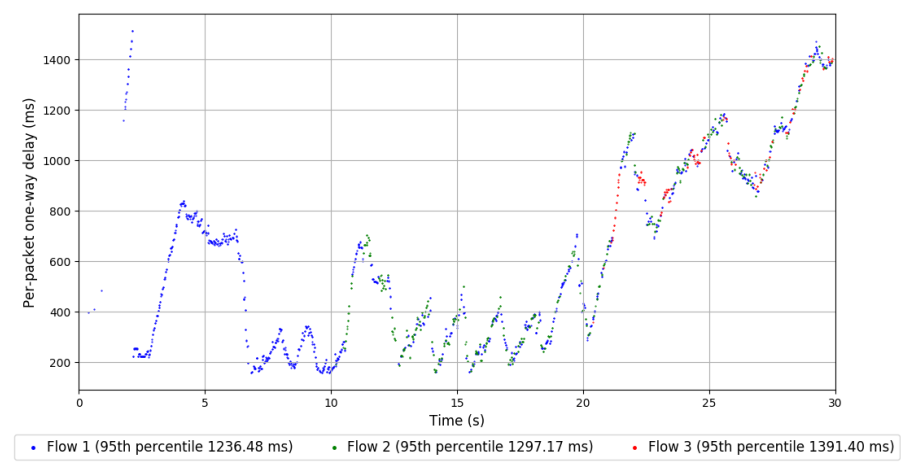
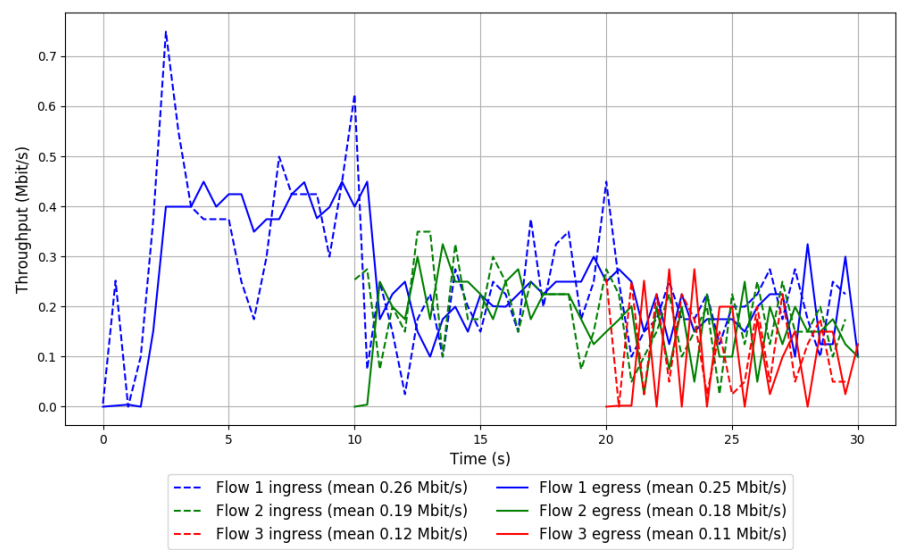


Run 2: Statistics of Copa

Start at: 2018-12-02 13:41:02
End at: 2018-12-02 13:41:32
Local clock offset: -5.65 ms
Remote clock offset: -11.897 ms

Below is generated by plot.py at 2018-12-02 14:15:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 1315.718 ms
Loss rate: 5.31%
-- Flow 1:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 1236.483 ms
Loss rate: 3.70%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 1297.166 ms
Loss rate: 6.64%
-- Flow 3:
Average throughput: 0.11 Mbit/s
95th percentile per-packet one-way delay: 1391.398 ms
Loss rate: 11.55%

Run 2: Report of Copa — Data Link

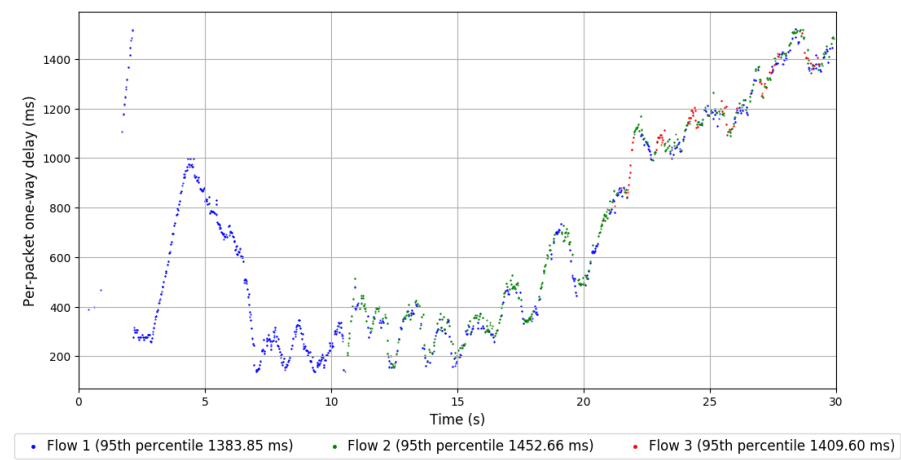
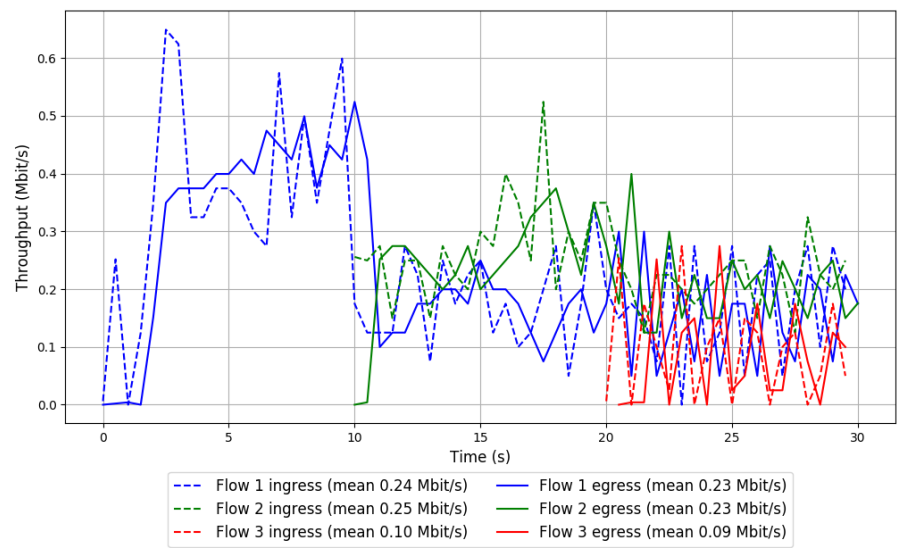


Run 3: Statistics of Copa

Start at: 2018-12-02 14:04:57
End at: 2018-12-02 14:05:27
Local clock offset: -3.522 ms
Remote clock offset: -17.876 ms

Below is generated by plot.py at 2018-12-02 14:15:49
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 1412.650 ms
Loss rate: 6.35%
-- Flow 1:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 1383.854 ms
Loss rate: 4.24%
-- Flow 2:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 1452.659 ms
Loss rate: 7.79%
-- Flow 3:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 1409.600 ms
Loss rate: 14.78%

Run 3: Report of Copa — Data Link



Run 1: Statistics of TCP Cubic

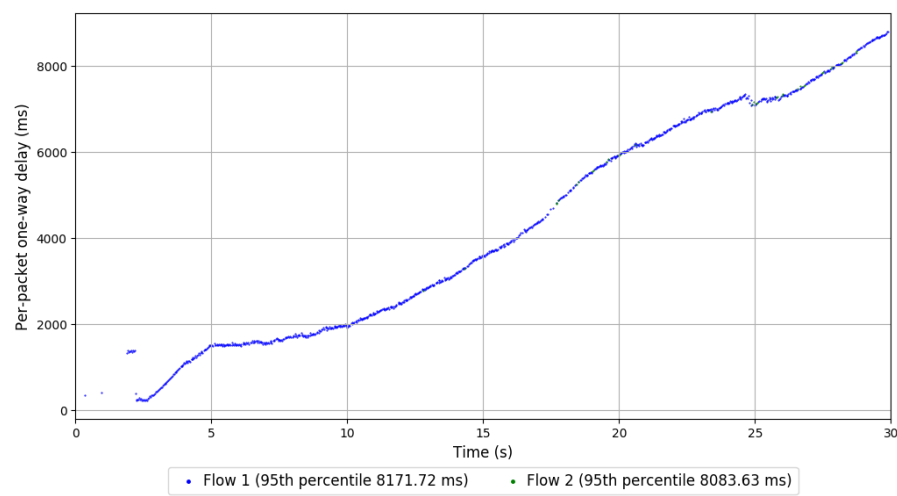
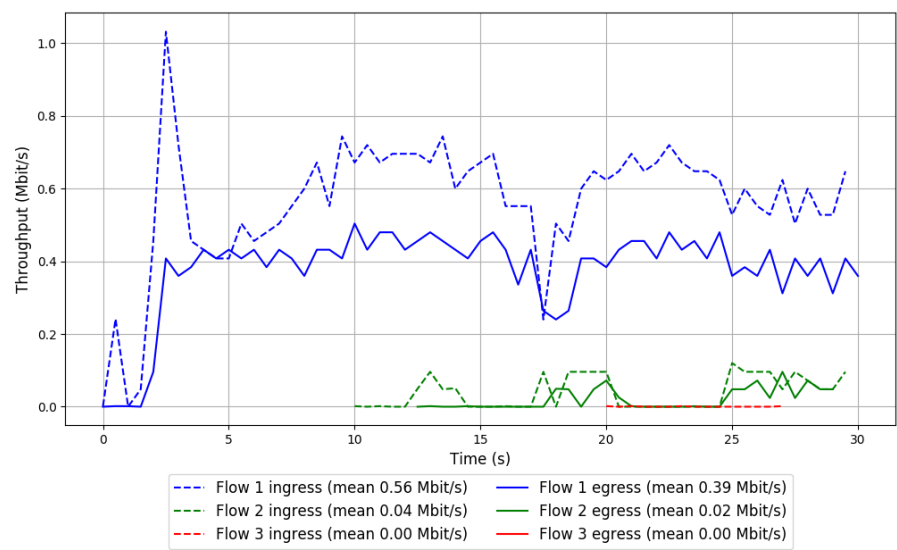
Start at: 2018-12-02 13:07:53

End at: 2018-12-02 13:08:23

Local clock offset: -1.265 ms

Remote clock offset: 19.715 ms

Run 1: Report of TCP Cubic — Data Link



Run 2: Statistics of TCP Cubic

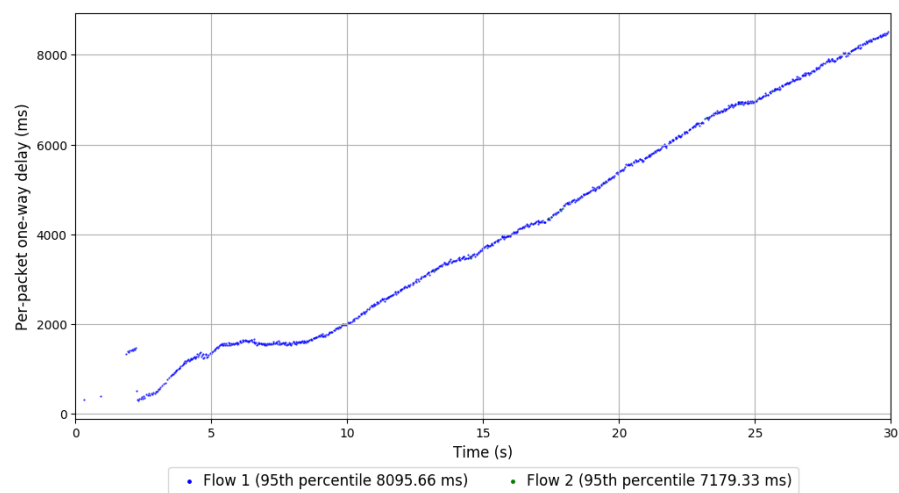
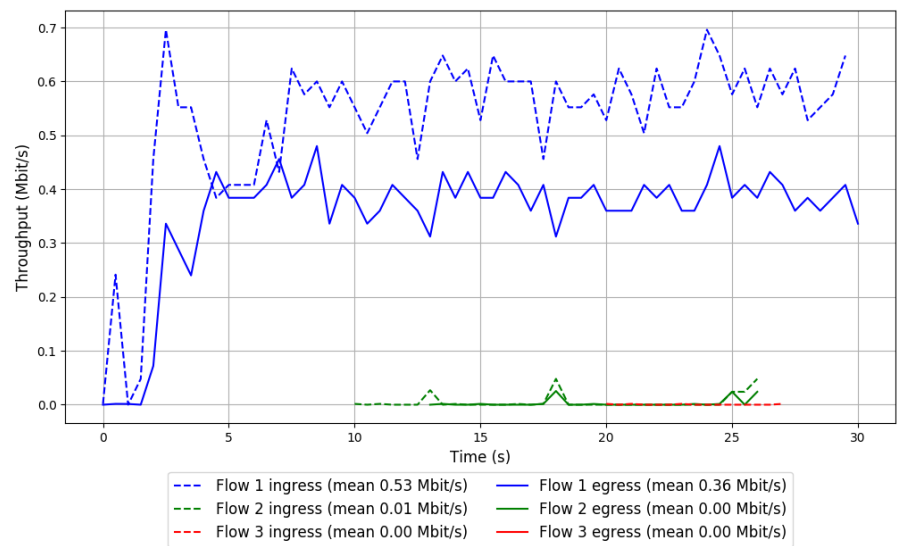
Start at: 2018-12-02 13:32:09

End at: 2018-12-02 13:32:39

Local clock offset: -4.725 ms

Remote clock offset: -8.292 ms

Run 2: Report of TCP Cubic — Data Link

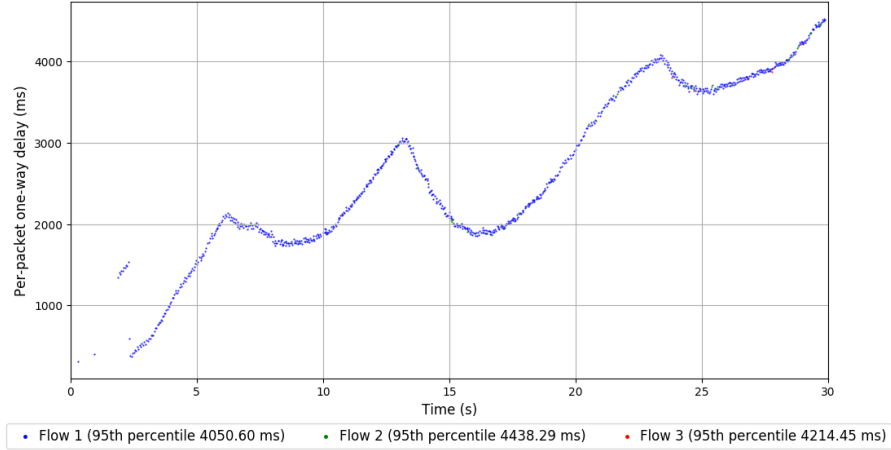
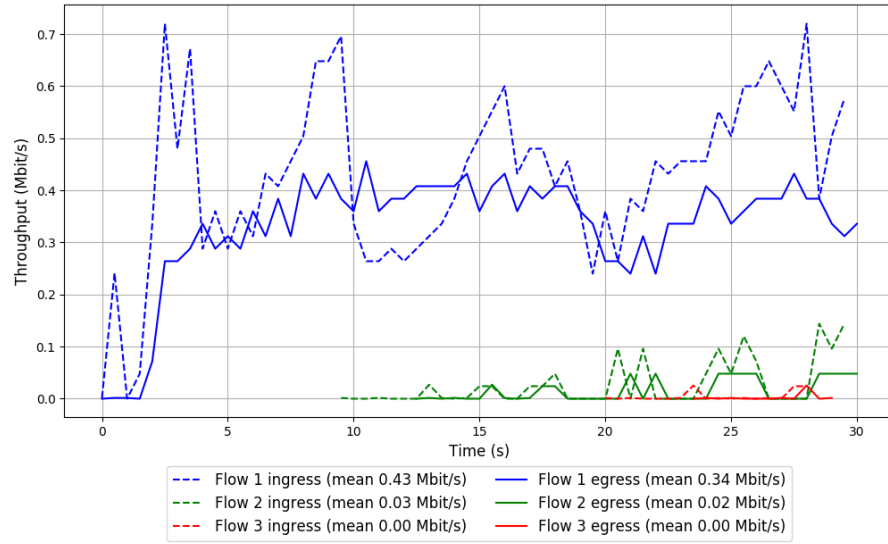


Run 3: Statistics of TCP Cubic

Start at: 2018-12-02 13:56:04
End at: 2018-12-02 13:56:34
Local clock offset: -3.79 ms
Remote clock offset: -15.402 ms

Below is generated by plot.py at 2018-12-02 14:15:52
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 4083.180 ms
Loss rate: 22.31%
-- Flow 1:
Average throughput: 0.34 Mbit/s
95th percentile per-packet one-way delay: 4050.601 ms
Loss rate: 20.92%
-- Flow 2:
Average throughput: 0.02 Mbit/s
95th percentile per-packet one-way delay: 4438.290 ms
Loss rate: 50.67%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 4214.453 ms
Loss rate: 61.79%

Run 3: Report of TCP Cubic — Data Link



Run 1: Statistics of FillP

/home/ubuntu/pantheon/data/2018-12-02T13-03-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

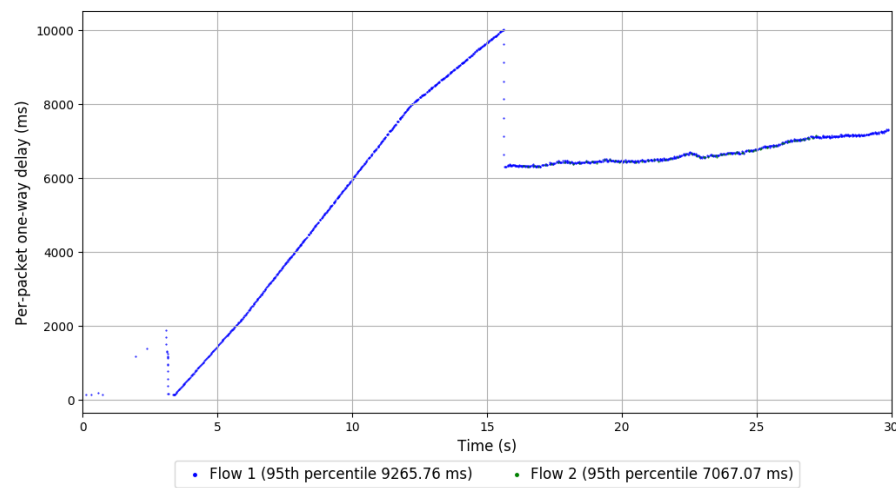
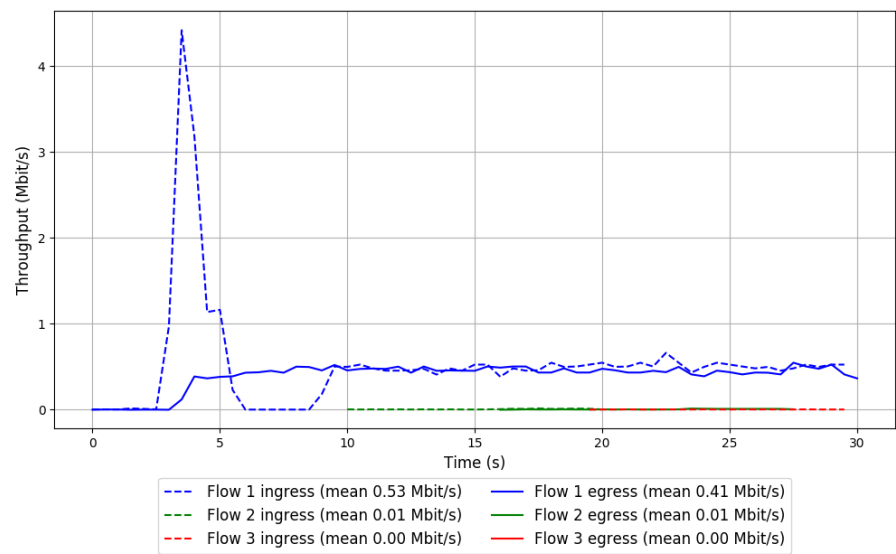
Start at: 2018-12-02 13:48:23

End at: 2018-12-02 13:48:53

Local clock offset: -6.662 ms

Remote clock offset: -8.077 ms

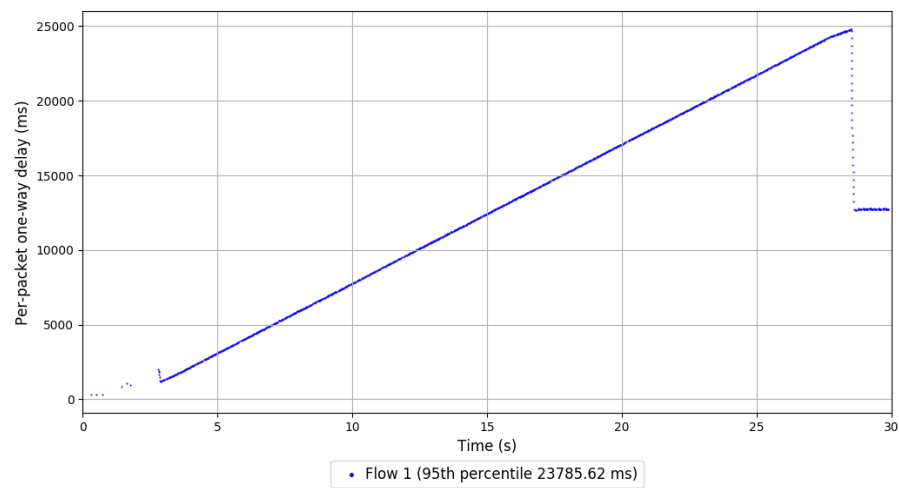
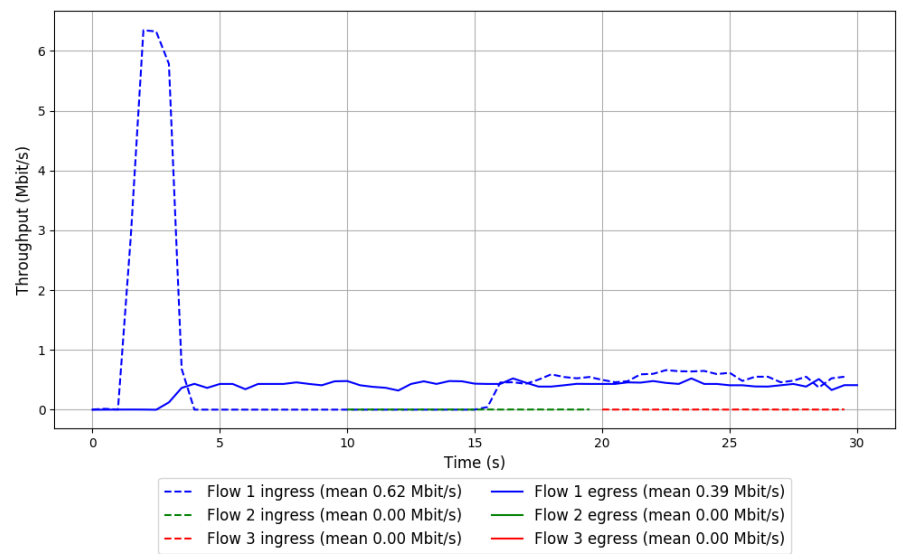
Run 2: Report of FillP — Data Link



Run 3: Statistics of FillP

Start at: 2018-12-02 14:12:18
End at: 2018-12-02 14:12:48
Local clock offset: -2.318 ms
Remote clock offset: -20.163 ms

Run 3: Report of FillP — Data Link

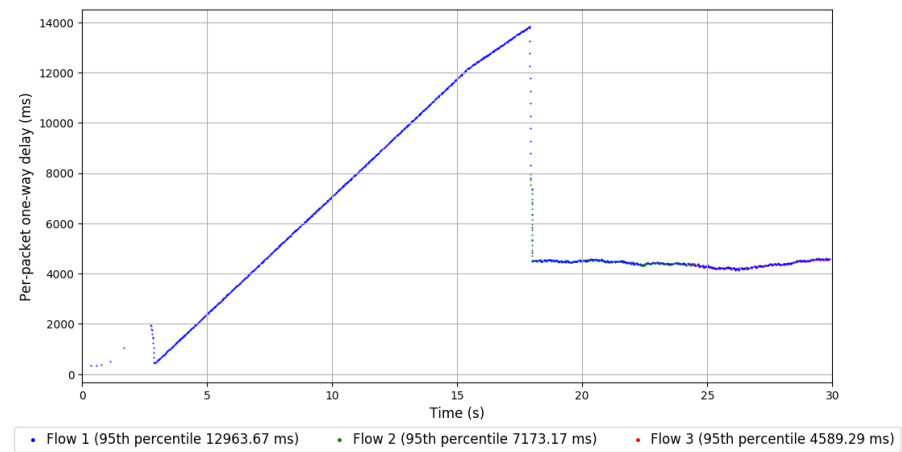
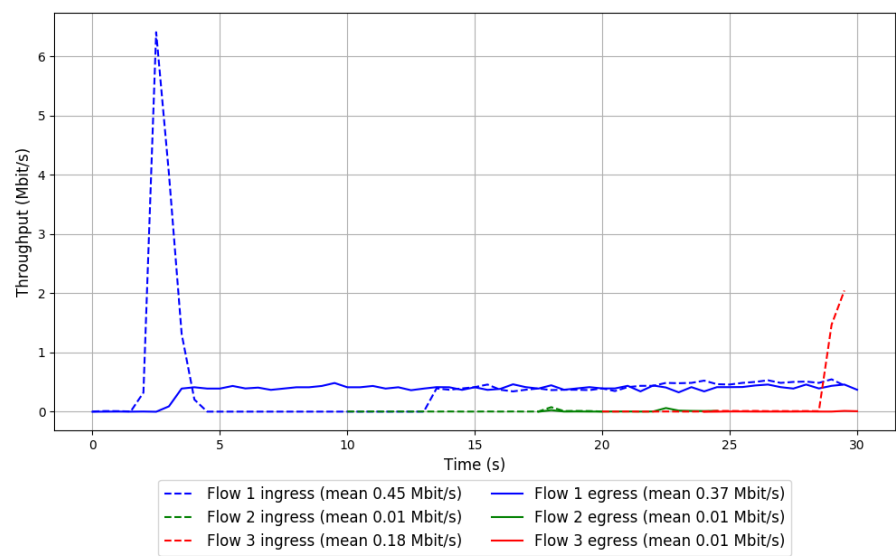


Run 1: Statistics of FillP-Sheep

Start at: 2018-12-02 13:25:40
End at: 2018-12-02 13:26:10
Local clock offset: -3.167 ms
Remote clock offset: -4.729 ms

Below is generated by plot.py at 2018-12-02 14:15:53
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 12887.410 ms
Loss rate: 27.00%
-- Flow 1:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 12963.670 ms
Loss rate: 17.41%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 7173.167 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 4589.292 ms
Loss rate: 98.44%

Run 1: Report of FillP-Sheep — Data Link



Run 2: Statistics of FillP-Sheep

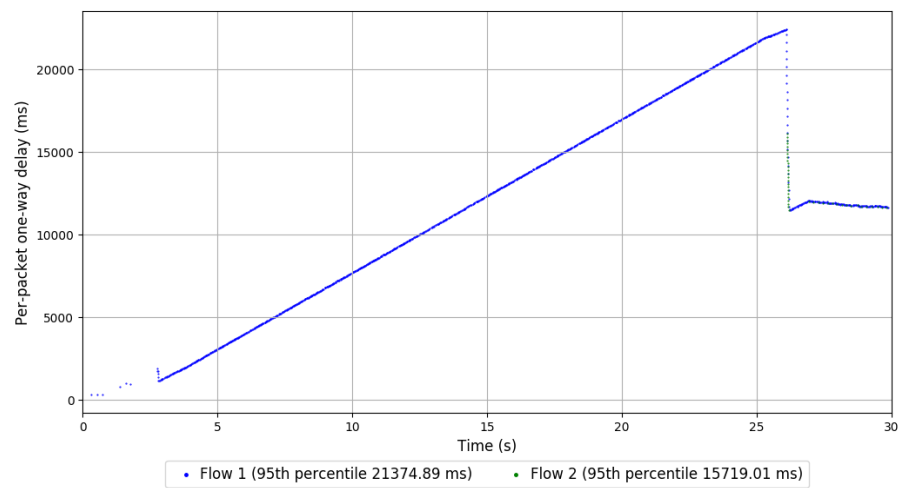
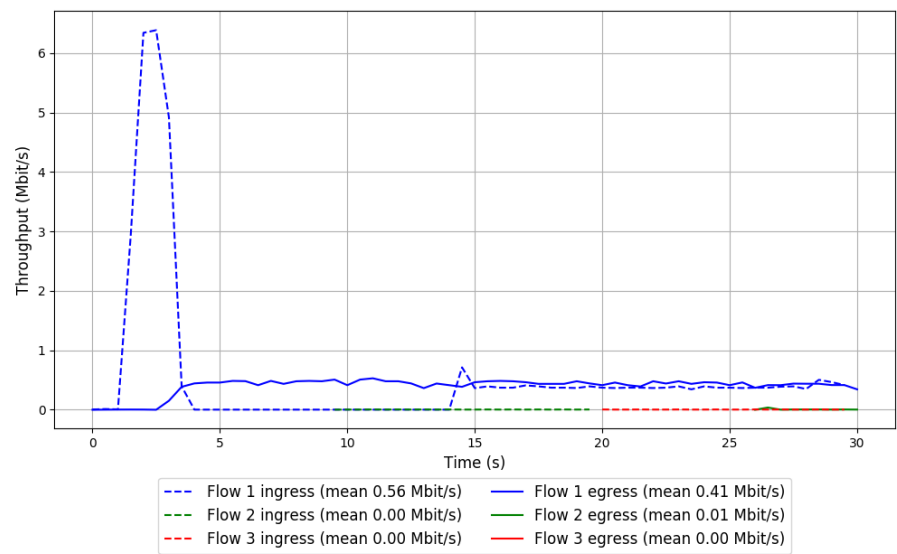
Start at: 2018-12-02 13:49:37

End at: 2018-12-02 13:50:07

Local clock offset: -5.439 ms

Remote clock offset: -9.647 ms

Run 2: Report of FillP-Sheep — Data Link



Run 3: Statistics of FillP-Sheep

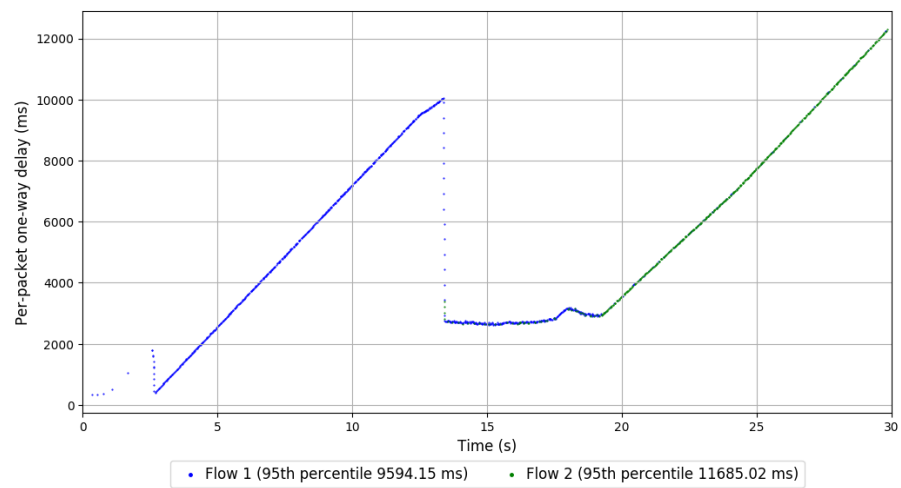
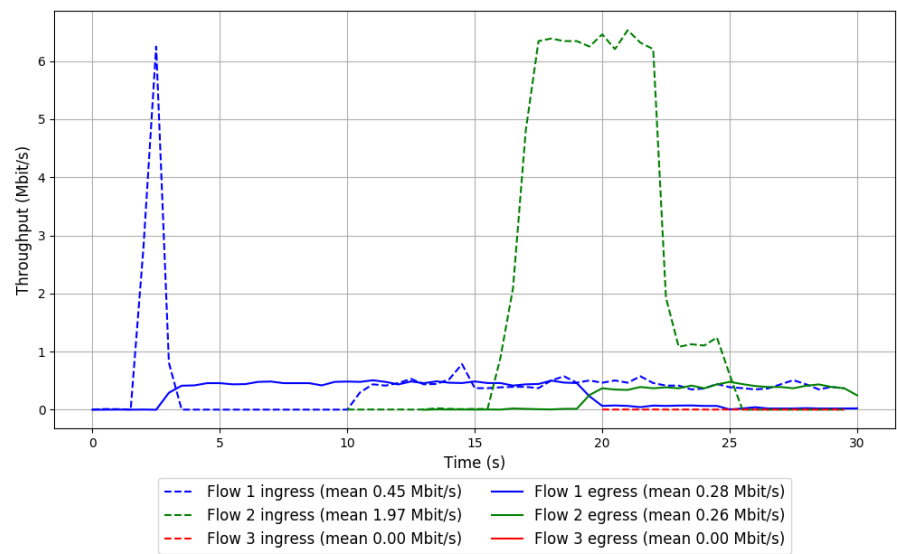
Start at: 2018-12-02 14:13:32

End at: 2018-12-02 14:14:02

Local clock offset: -3.044 ms

Remote clock offset: -16.572 ms

Run 3: Report of FillP-Sheep — Data Link

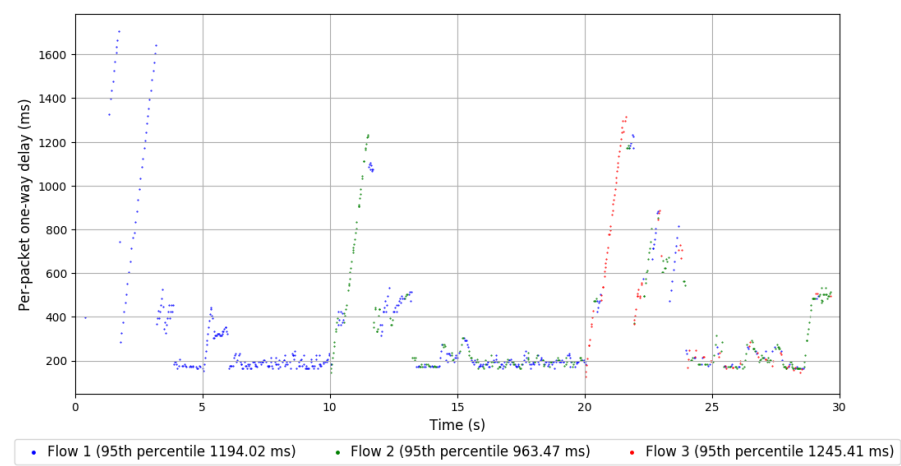
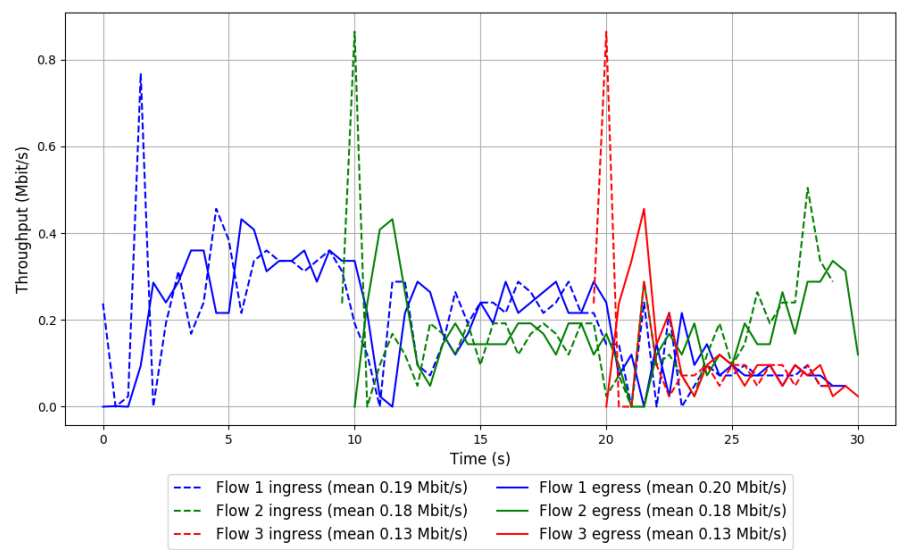


Run 1: Statistics of Indigo

Start at: 2018-12-02 13:21:41
End at: 2018-12-02 13:22:11
Local clock offset: -1.616 ms
Remote clock offset: -1.688 ms

Below is generated by plot.py at 2018-12-02 14:15:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 1173.939 ms
Loss rate: 1.14%
-- Flow 1:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 1194.021 ms
Loss rate: 0.42%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 963.472 ms
Loss rate: 2.35%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 1245.413 ms
Loss rate: 0.97%

Run 1: Report of Indigo — Data Link

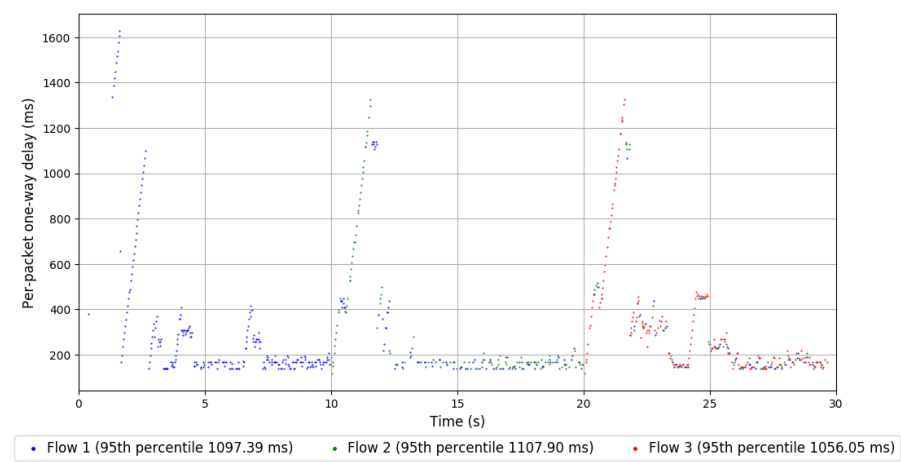
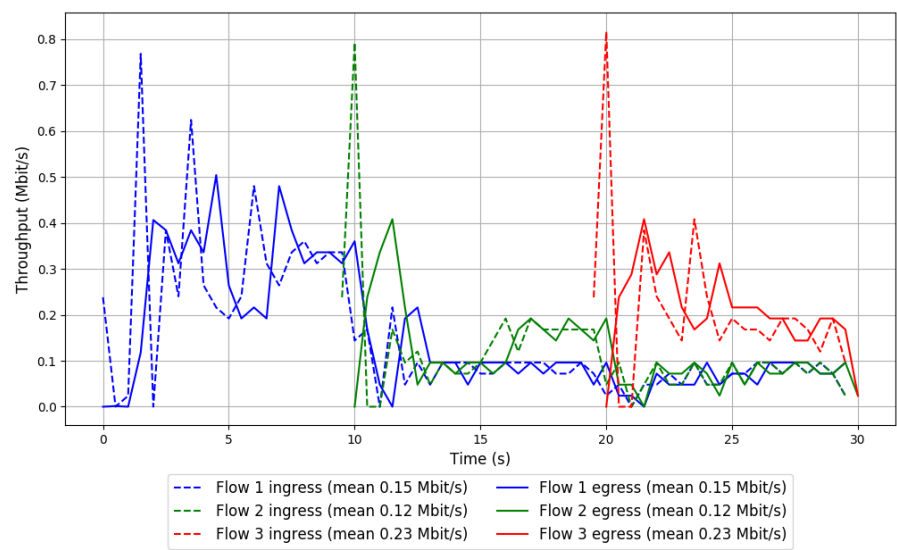


Run 2: Statistics of Indigo

Start at: 2018-12-02 13:45:56
End at: 2018-12-02 13:46:26
Local clock offset: -6.748 ms
Remote clock offset: -7.325 ms

Below is generated by plot.py at 2018-12-02 14:15:55
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.31 Mbit/s
95th percentile per-packet one-way delay: 1106.844 ms
Loss rate: 0.93%
-- Flow 1:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 1097.388 ms
Loss rate: 0.53%
-- Flow 2:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 1107.904 ms
Loss rate: 0.52%
-- Flow 3:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 1056.054 ms
Loss rate: 2.16%

Run 2: Report of Indigo — Data Link

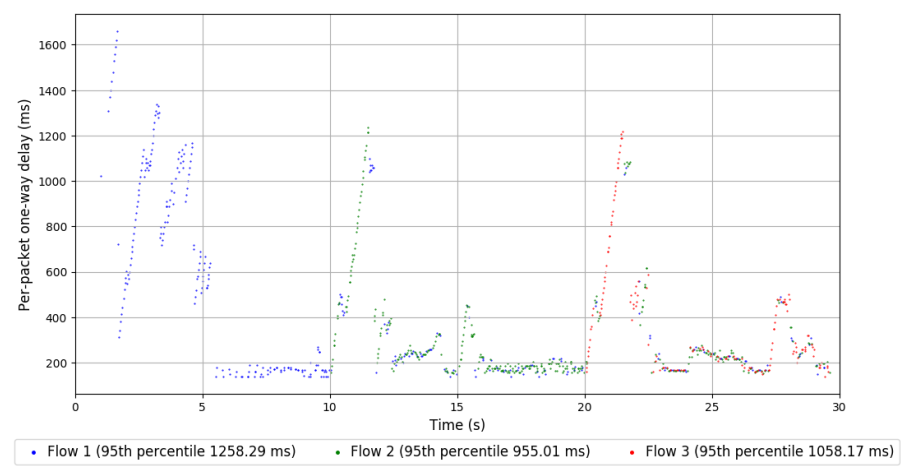
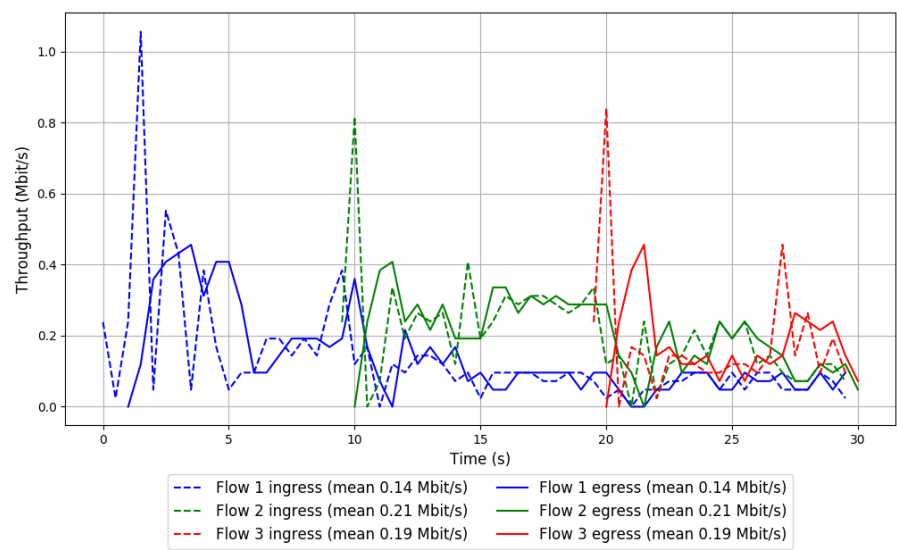


Run 3: Statistics of Indigo

Start at: 2018-12-02 14:09:51
End at: 2018-12-02 14:10:21
Local clock offset: -3.277 ms
Remote clock offset: -19.706 ms

Below is generated by plot.py at 2018-12-02 14:15:56
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 1108.928 ms
Loss rate: 1.07%
-- Flow 1:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 1258.293 ms
Loss rate: 0.59%
-- Flow 2:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 955.012 ms
Loss rate: 0.85%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 1058.171 ms
Loss rate: 2.57%

Run 3: Report of Indigo — Data Link



Run 1: Statistics of Indigo-96d2da3

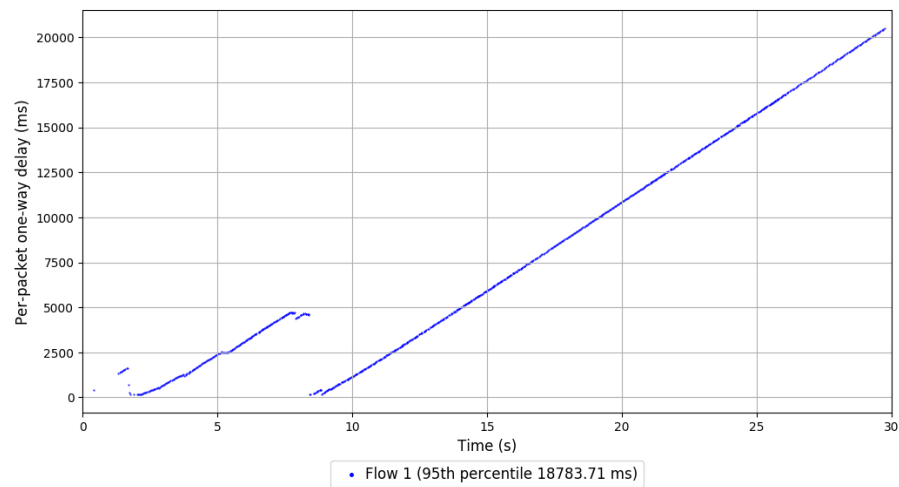
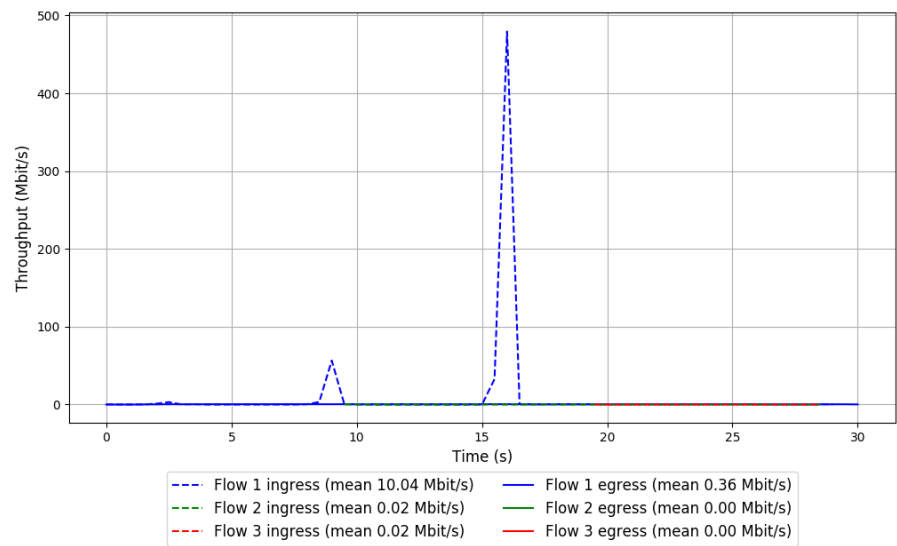
Start at: 2018-12-02 13:22:54

End at: 2018-12-02 13:23:24

Local clock offset: -3.034 ms

Remote clock offset: 1.232 ms

Run 1: Report of Indigo-96d2da3 — Data Link



Run 2: Statistics of Indigo-96d2da3

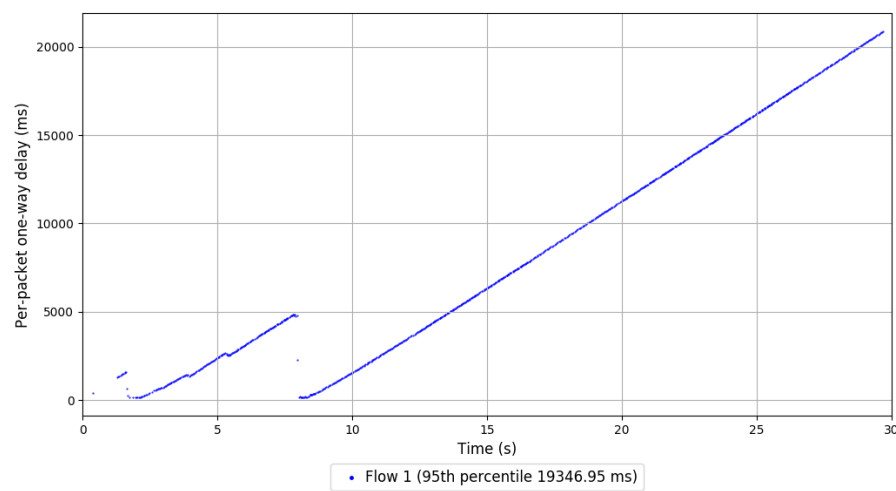
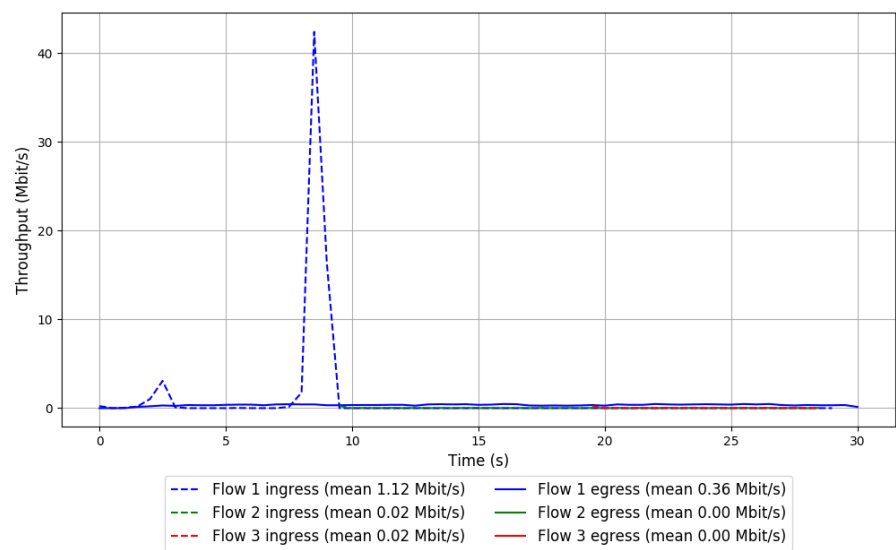
Start at: 2018-12-02 13:47:11

End at: 2018-12-02 13:47:41

Local clock offset: -6.82 ms

Remote clock offset: -7.48 ms

Run 2: Report of Indigo-96d2da3 — Data Link



Run 3: Statistics of Indigo-96d2da3

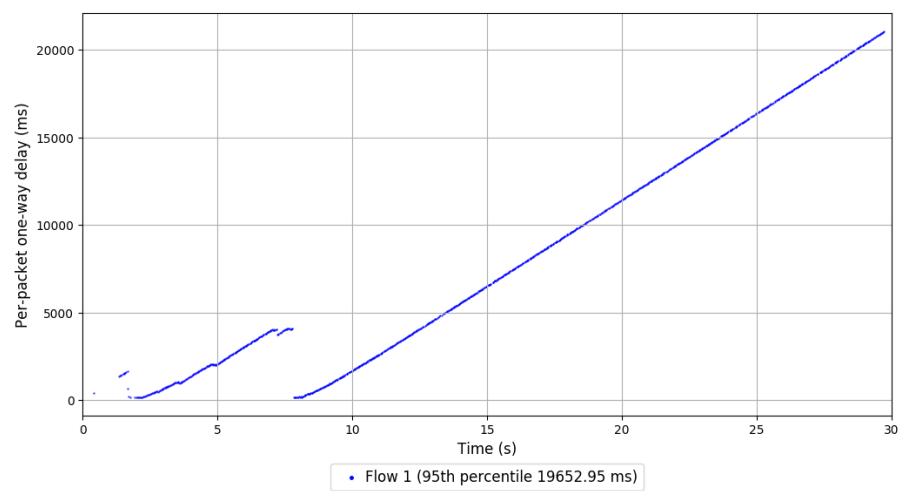
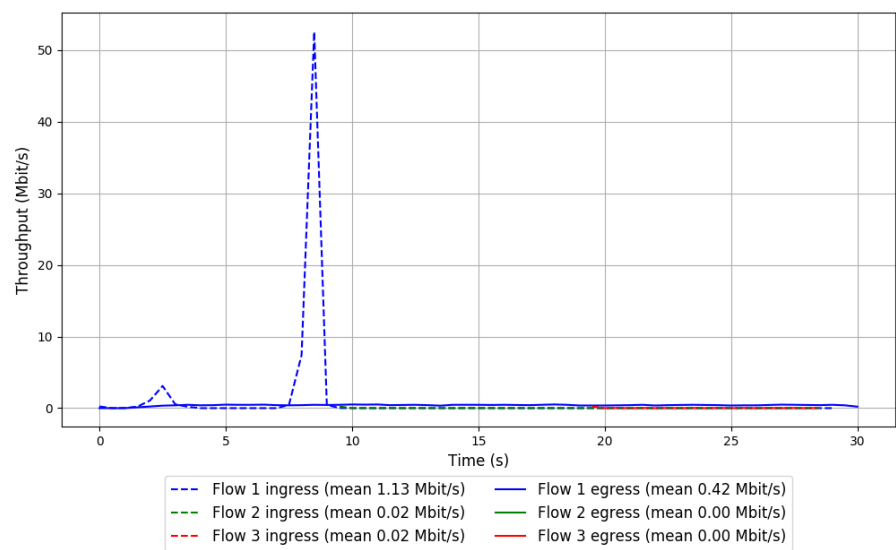
Start at: 2018-12-02 14:11:05

End at: 2018-12-02 14:11:35

Local clock offset: -2.387 ms

Remote clock offset: -14.969 ms

Run 3: Report of Indigo-96d2da3 — Data Link

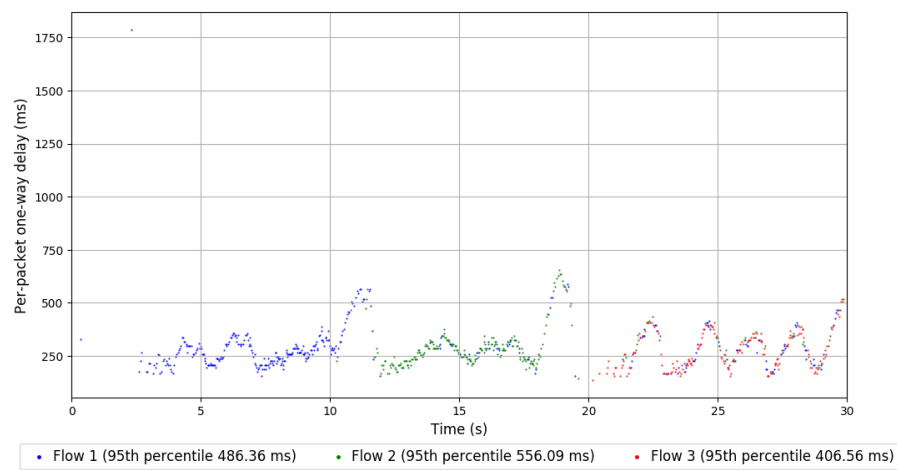
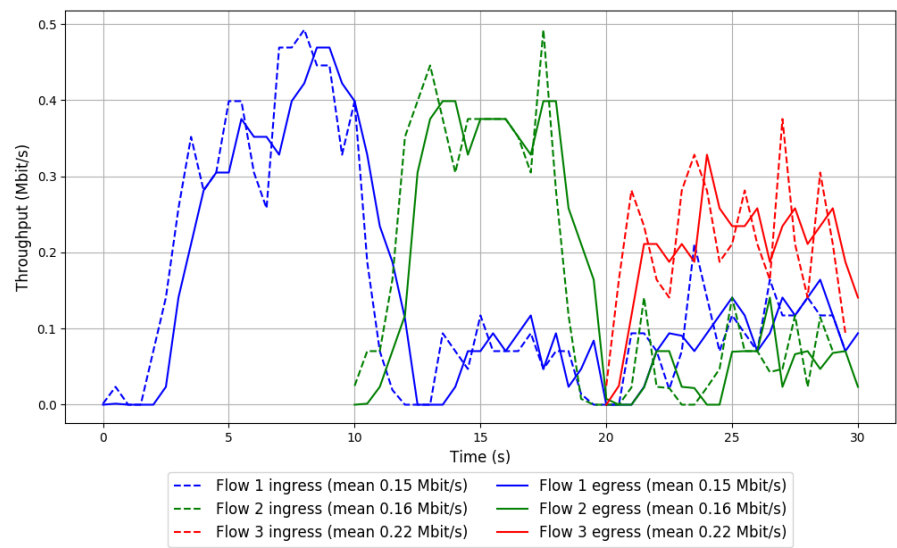


```
Run 1: Statistics of LEDBAT

Start at: 2018-12-02 13:20:28
End at: 2018-12-02 13:20:58
Local clock offset: -1.086 ms
Remote clock offset: 0.606 ms

# Below is generated by plot.py at 2018-12-02 14:16:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 476.490 ms
Loss rate: 1.21%
-- Flow 1:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 486.362 ms
Loss rate: 0.80%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 556.089 ms
Loss rate: 0.75%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 406.564 ms
Loss rate: 2.73%
```

Run 1: Report of LEDBAT — Data Link

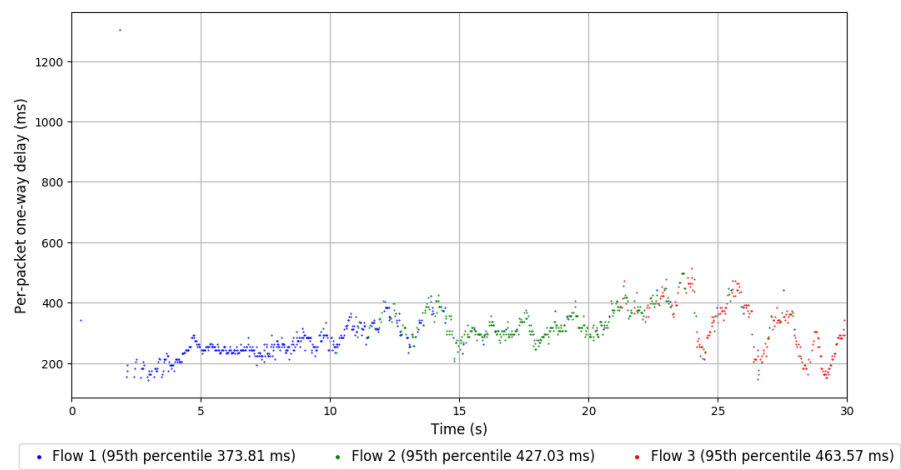
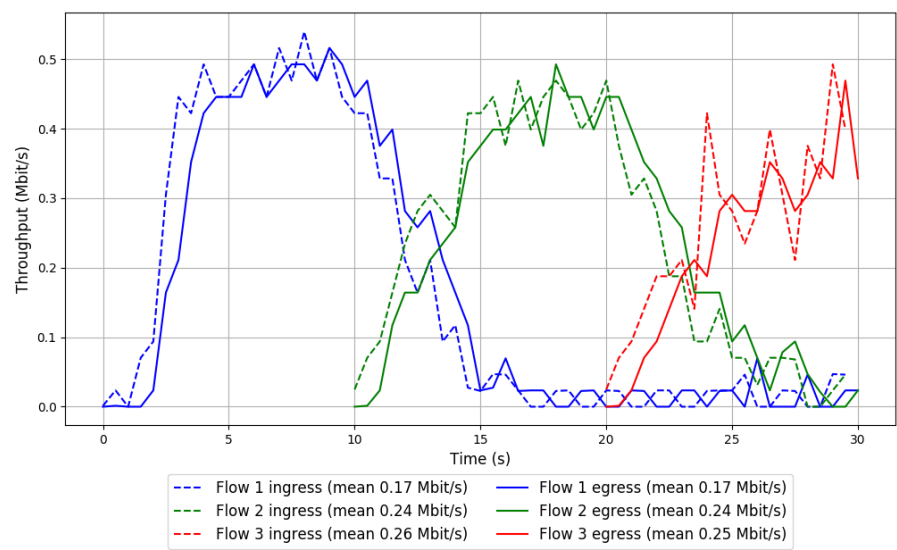


Run 2: Statistics of LEDBAT

Start at: 2018-12-02 13:44:43
End at: 2018-12-02 13:45:13
Local clock offset: -6.72 ms
Remote clock offset: -9.327 ms

Below is generated by plot.py at 2018-12-02 14:16:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.41 Mbit/s
95th percentile per-packet one-way delay: 427.030 ms
Loss rate: 1.53%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 373.806 ms
Loss rate: 0.46%
-- Flow 2:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 427.030 ms
Loss rate: 0.49%
-- Flow 3:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 463.567 ms
Loss rate: 5.53%

Run 2: Report of LEDBAT — Data Link

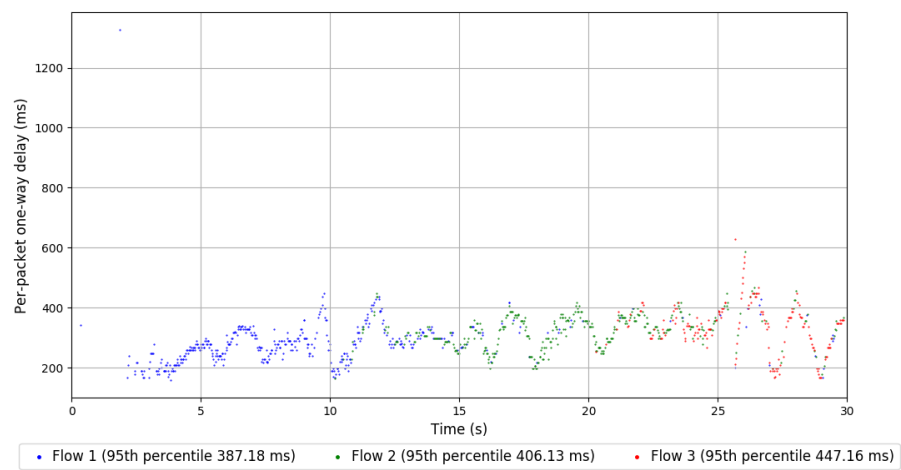
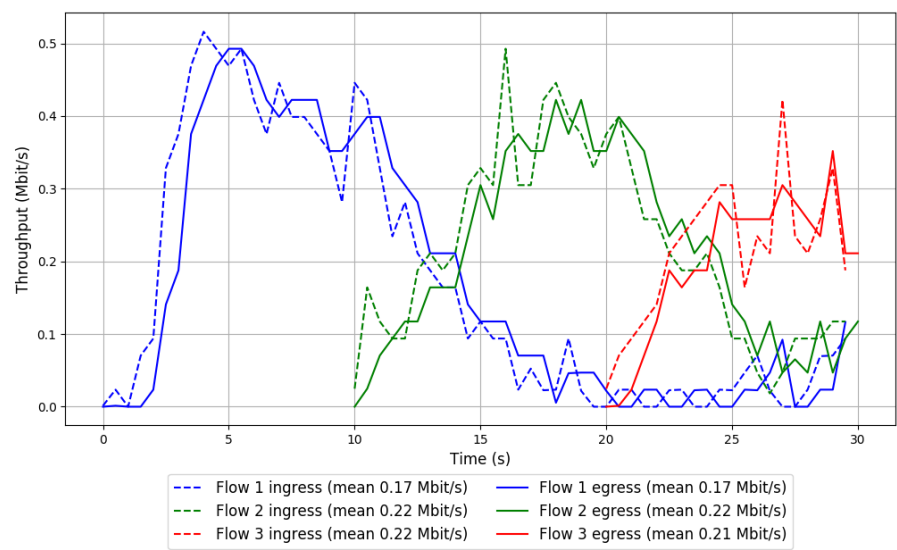


Run 3: Statistics of LEDBAT

Start at: 2018-12-02 14:08:38
End at: 2018-12-02 14:09:08
Local clock offset: -2.51 ms
Remote clock offset: -20.394 ms

Below is generated by plot.py at 2018-12-02 14:16:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 415.964 ms
Loss rate: 1.63%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 387.183 ms
Loss rate: 0.94%
-- Flow 2:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 406.135 ms
Loss rate: 1.08%
-- Flow 3:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 447.162 ms
Loss rate: 4.37%

Run 3: Report of LEDBAT — Data Link

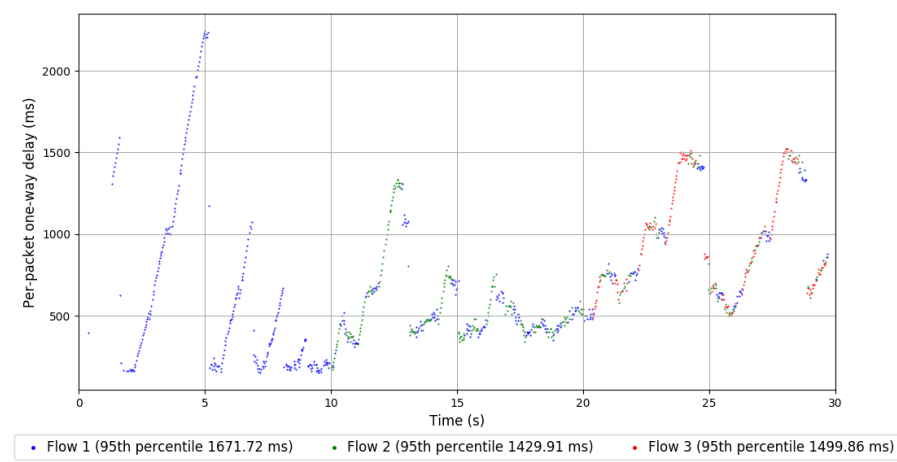
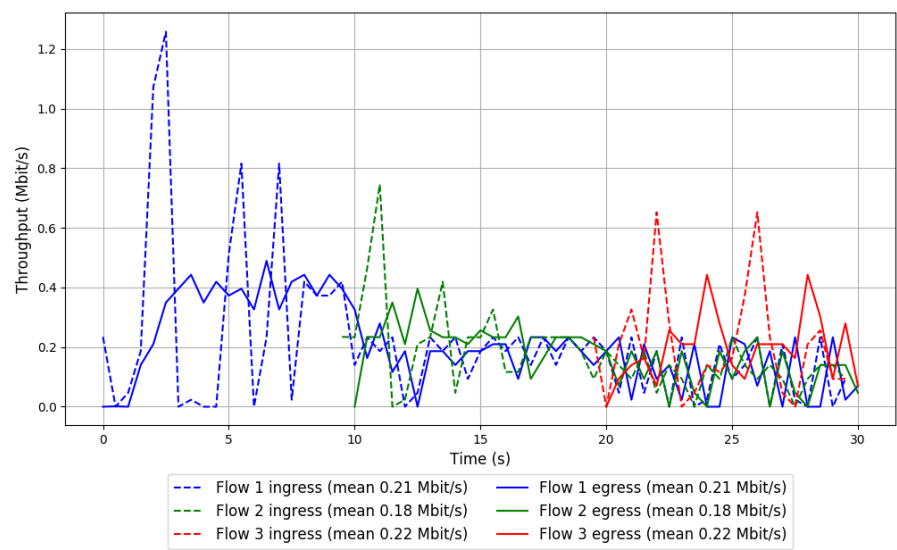


```
Run 1: Statistics of Indigo-Muses

Start at: 2018-12-02 13:19:14
End at: 2018-12-02 13:19:44
Local clock offset: -0.418 ms
Remote clock offset: 4.735 ms

# Below is generated by plot.py at 2018-12-02 14:16:01
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 1494.397 ms
Loss rate: 2.82%
-- Flow 1:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 1671.720 ms
Loss rate: 1.85%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 1429.910 ms
Loss rate: 3.27%
-- Flow 3:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 1499.858 ms
Loss rate: 4.89%
```

Run 1: Report of Indigo-Muses — Data Link

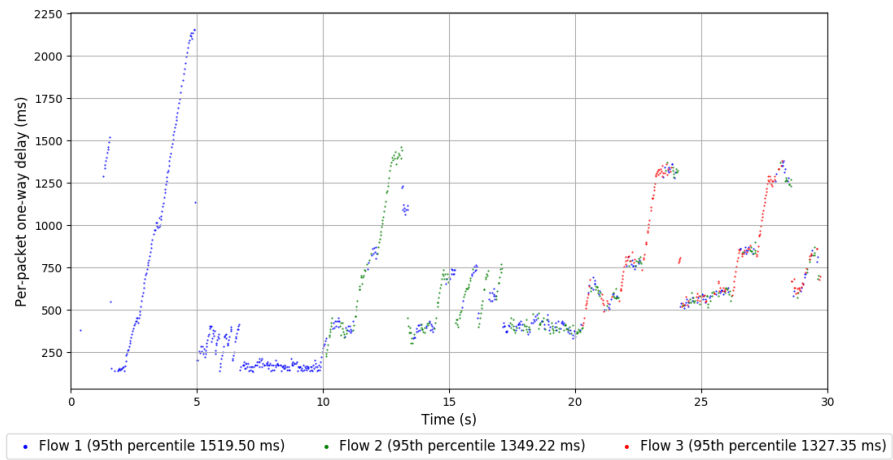
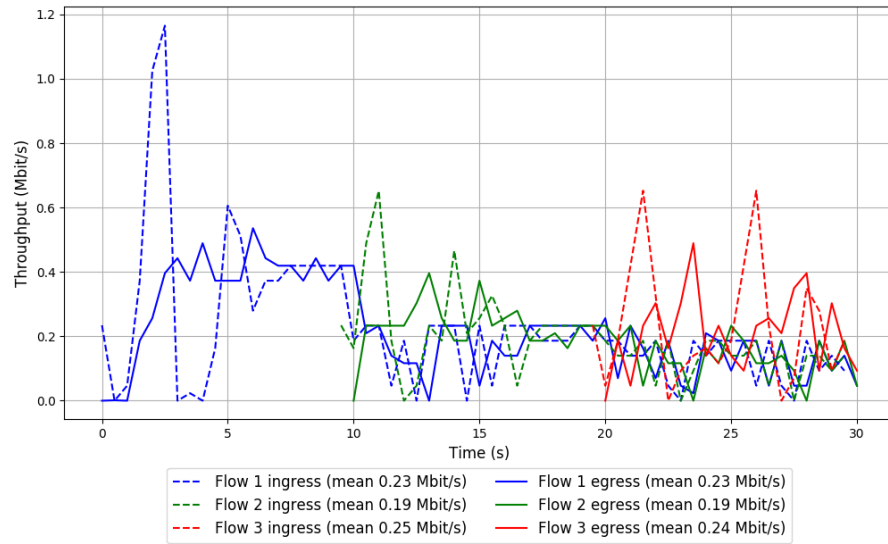


Run 2: Statistics of Indigo-Muses

Start at: 2018-12-02 13:43:29
End at: 2018-12-02 13:43:59
Local clock offset: -6.612 ms
Remote clock offset: -8.685 ms

Below is generated by plot.py at 2018-12-02 14:16:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 1377.416 ms
Loss rate: 3.42%
-- Flow 1:
Average throughput: 0.23 Mbit/s
95th percentile per-packet one-way delay: 1519.496 ms
Loss rate: 1.74%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 1349.217 ms
Loss rate: 3.05%
-- Flow 3:
Average throughput: 0.24 Mbit/s
95th percentile per-packet one-way delay: 1327.354 ms
Loss rate: 8.65%

Run 2: Report of Indigo-Muses — Data Link

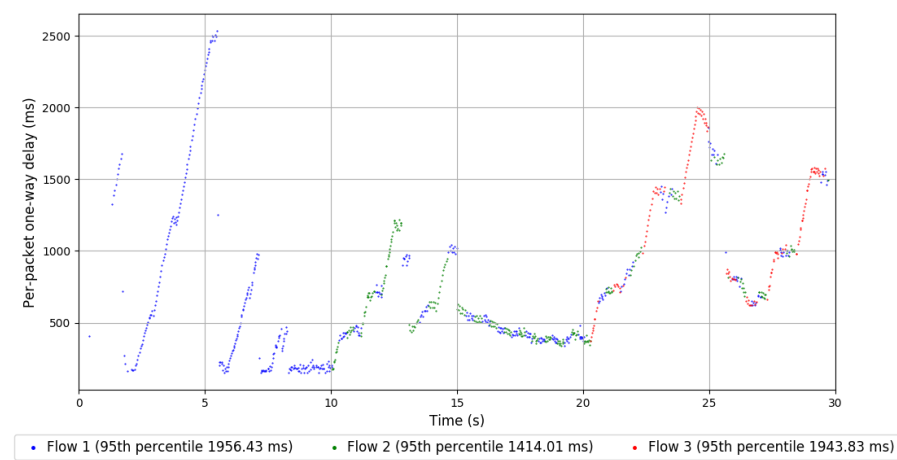
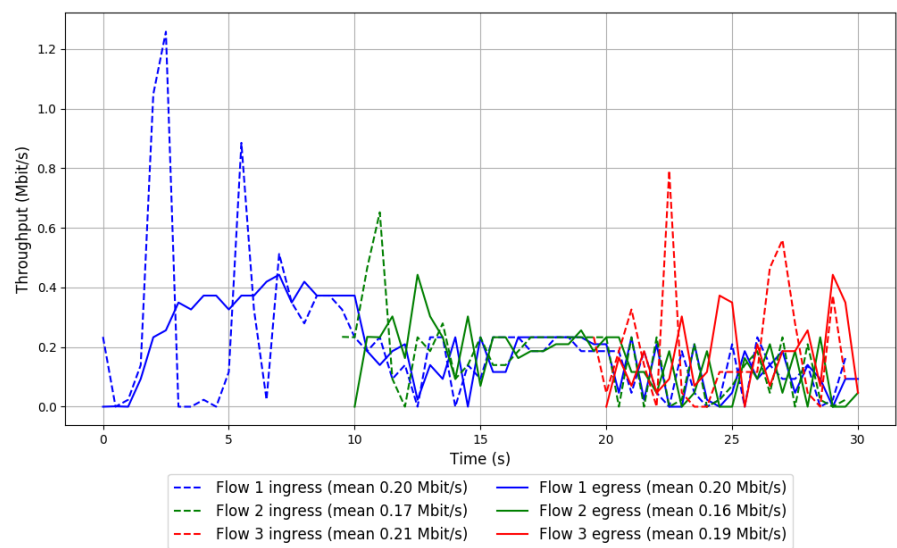


Run 3: Statistics of Indigo-Muses

Start at: 2018-12-02 14:07:24
End at: 2018-12-02 14:07:54
Local clock offset: -2.593 ms
Remote clock offset: -14.847 ms

Below is generated by plot.py at 2018-12-02 14:16:01
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 1859.806 ms
Loss rate: 4.05%
-- Flow 1:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 1956.434 ms
Loss rate: 1.98%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 1414.005 ms
Loss rate: 3.18%
-- Flow 3:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 1943.826 ms
Loss rate: 11.49%

Run 3: Report of Indigo-Muses — Data Link



Run 1: Statistics of PCC-Allegro

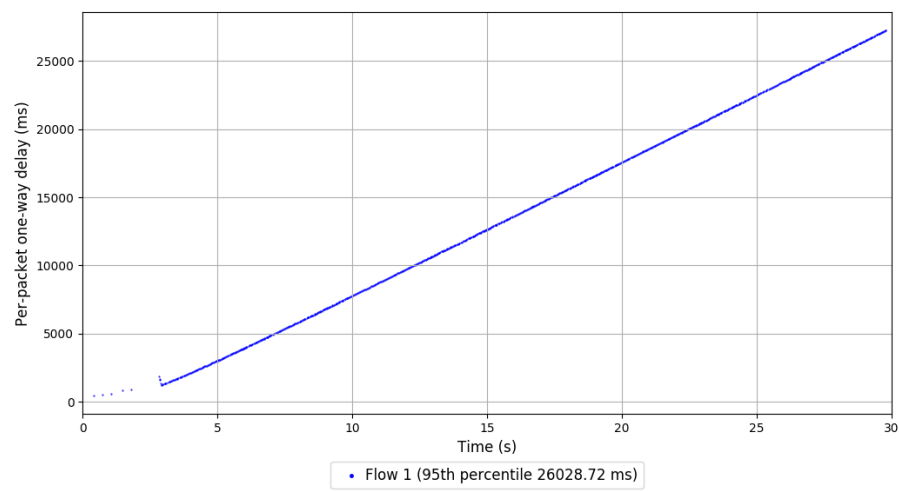
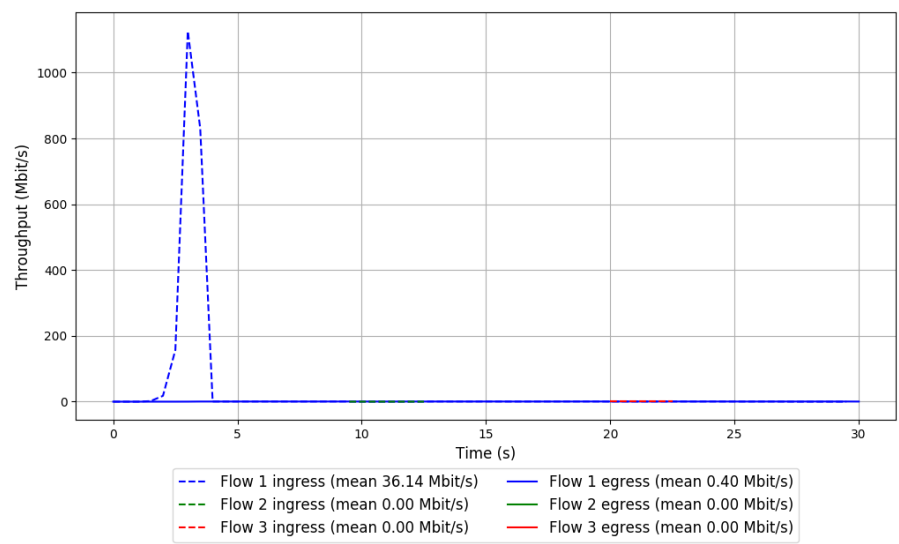
Start at: 2018-12-02 13:03:53

End at: 2018-12-02 13:04:23

Local clock offset: -1.103 ms

Remote clock offset: 19.354 ms

Run 1: Report of PCC-Allegro — Data Link



Run 2: Statistics of PCC-Allegro

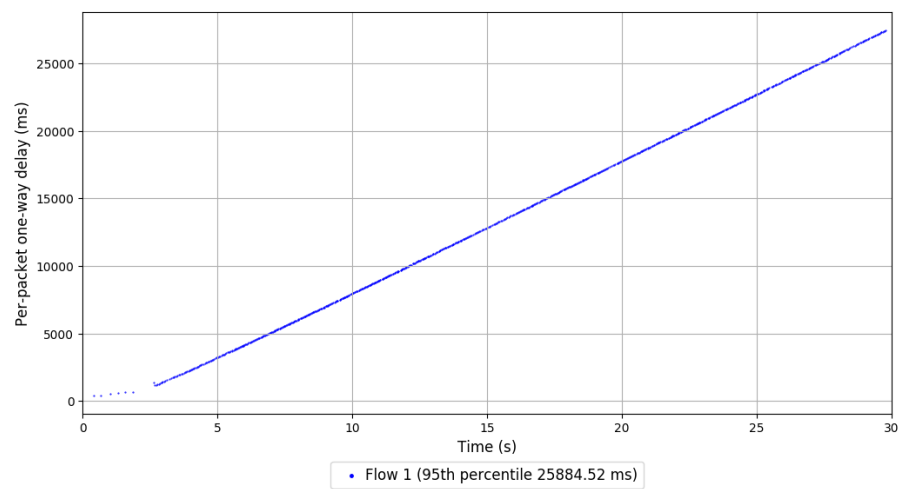
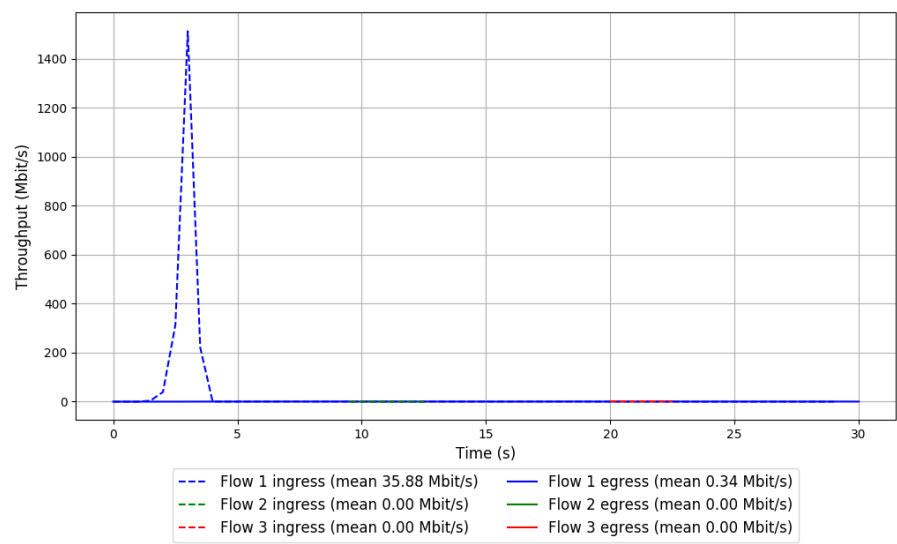
Start at: 2018-12-02 13:28:07

End at: 2018-12-02 13:28:37

Local clock offset: -4.613 ms

Remote clock offset: -5.176 ms

Run 2: Report of PCC-Allegro — Data Link



Run 3: Statistics of PCC-Allegro

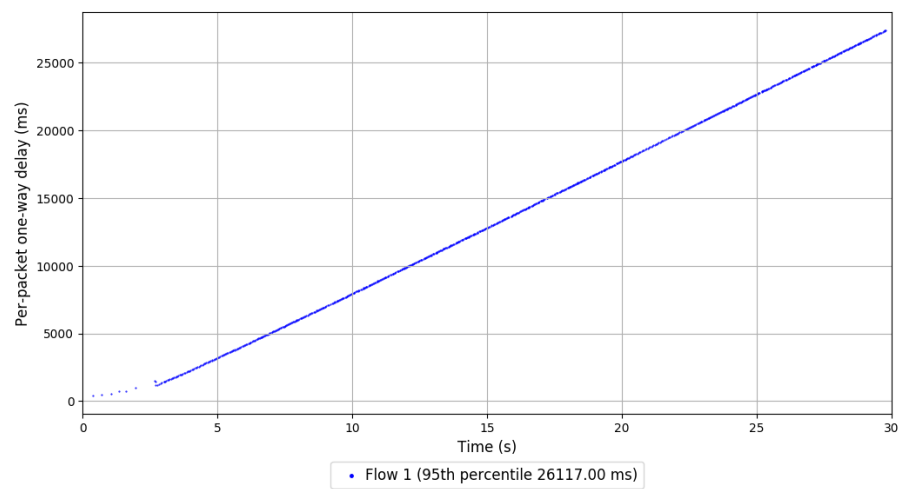
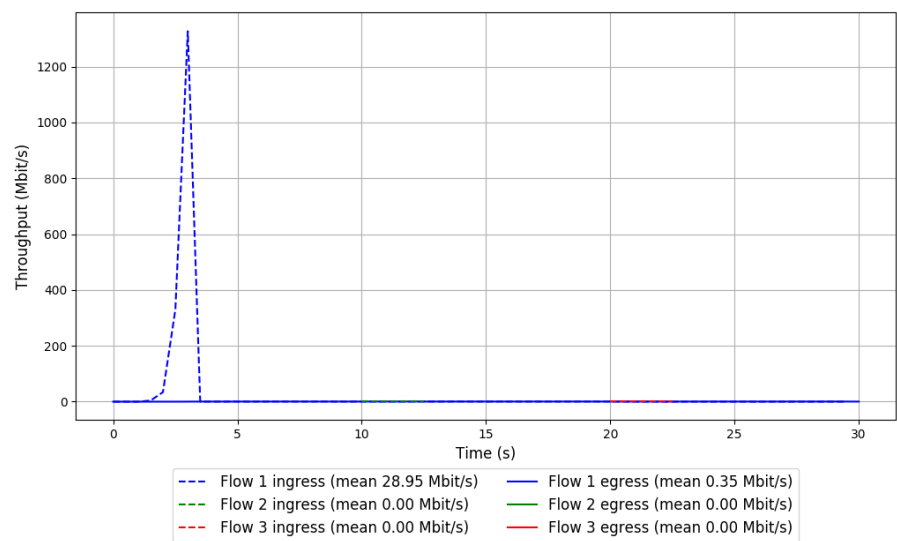
Start at: 2018-12-02 13:52:04

End at: 2018-12-02 13:52:34

Local clock offset: -5.461 ms

Remote clock offset: -10.015 ms

Run 3: Report of PCC-Allegro — Data Link



Run 1: Statistics of PCC-Expr

/home/ubuntu/pantheon/data/2018-12-02T13-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 1: Report of PCC-Expr — Data Link

Figure is missing

Figure is missing

Run 2: Statistics of PCC-Expr

/home/ubuntu/pantheon/data/2018-12-02T13-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 2: Report of PCC-Expr — Data Link

Figure is missing

Figure is missing

Run 3: Statistics of PCC-Expr

/home/ubuntu/pantheon/data/2018-12-02T13-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 3: Report of PCC-Expr — Data Link

Figure is missing

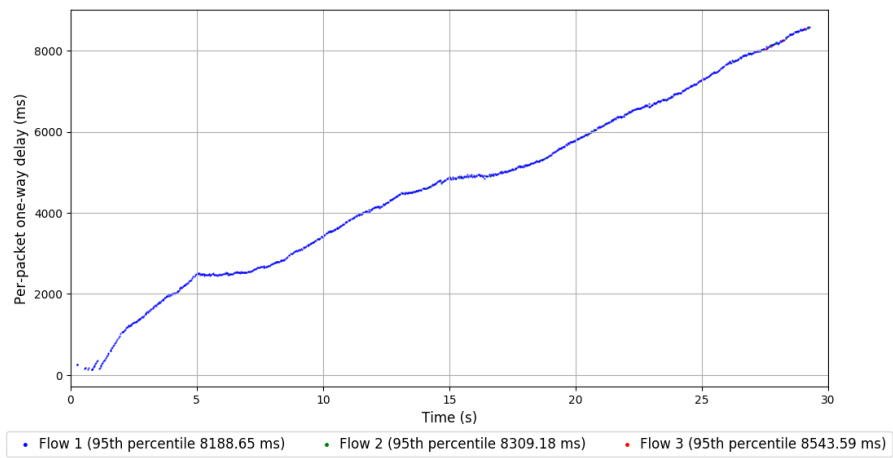
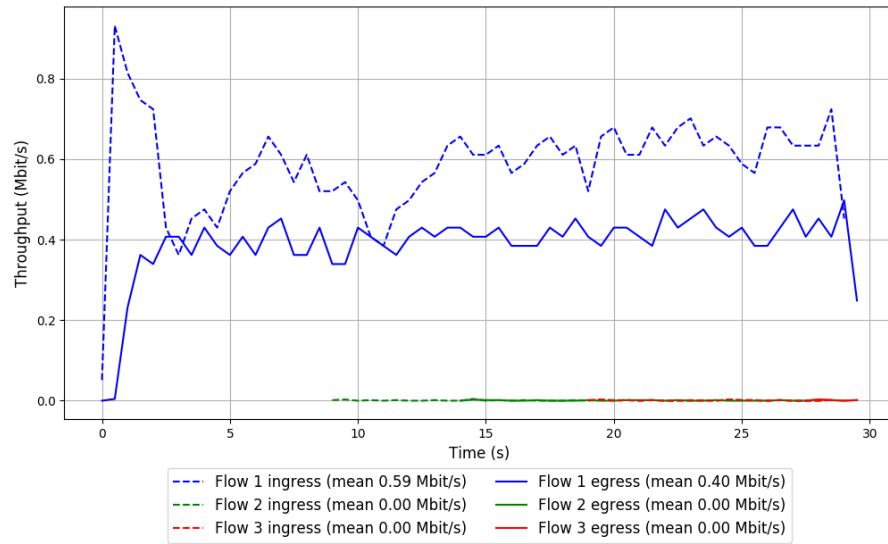
Figure is missing

Run 1: Statistics of QUIC Cubic

Start at: 2018-12-02 13:26:54
End at: 2018-12-02 13:27:24
Local clock offset: -4.358 ms
Remote clock offset: -5.587 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 8203.871 ms
Loss rate: 32.40%
-- Flow 1:
Average throughput: 0.40 Mbit/s
95th percentile per-packet one-way delay: 8188.650 ms
Loss rate: 32.39%
-- Flow 2:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8309.180 ms
Loss rate: 33.33%
-- Flow 3:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 8543.592 ms
Loss rate: 66.67%

Run 1: Report of QUIC Cubic — Data Link



Run 2: Statistics of QUIC Cubic

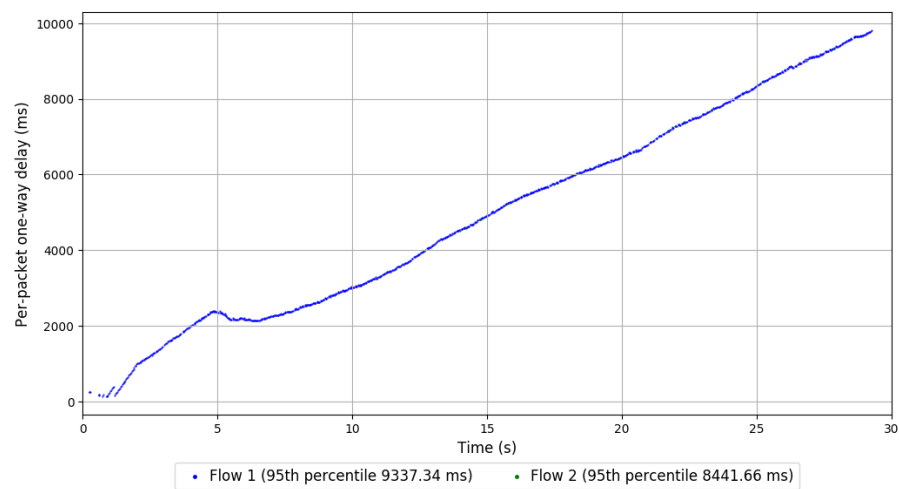
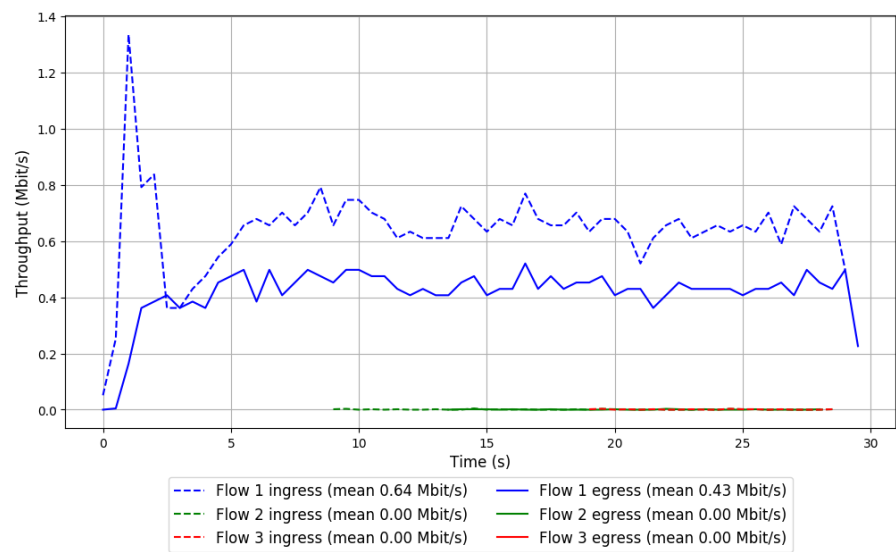
Start at: 2018-12-02 13:50:51

End at: 2018-12-02 13:51:21

Local clock offset: -5.035 ms

Remote clock offset: -10.088 ms

Run 2: Report of QUIC Cubic — Data Link



Run 3: Statistics of QUIC Cubic

/home/ubuntu/pantheon/data/2018-12-02T13-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 3: Report of QUIC Cubic — Data Link

Figure is missing

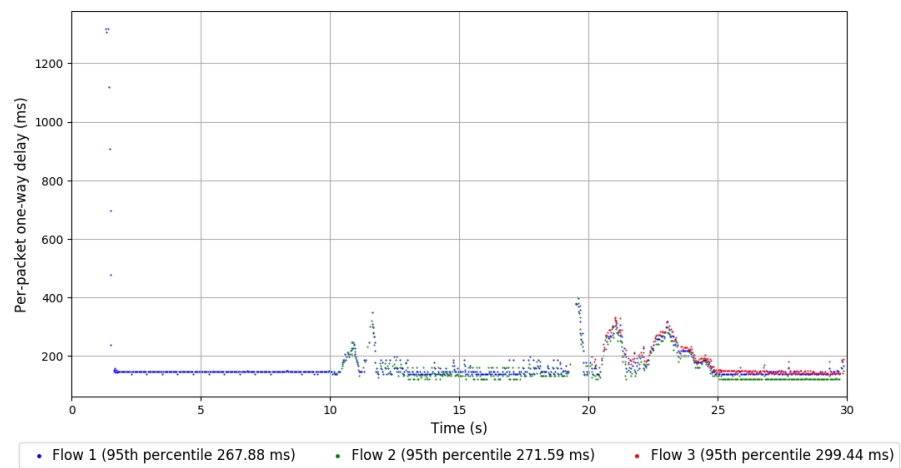
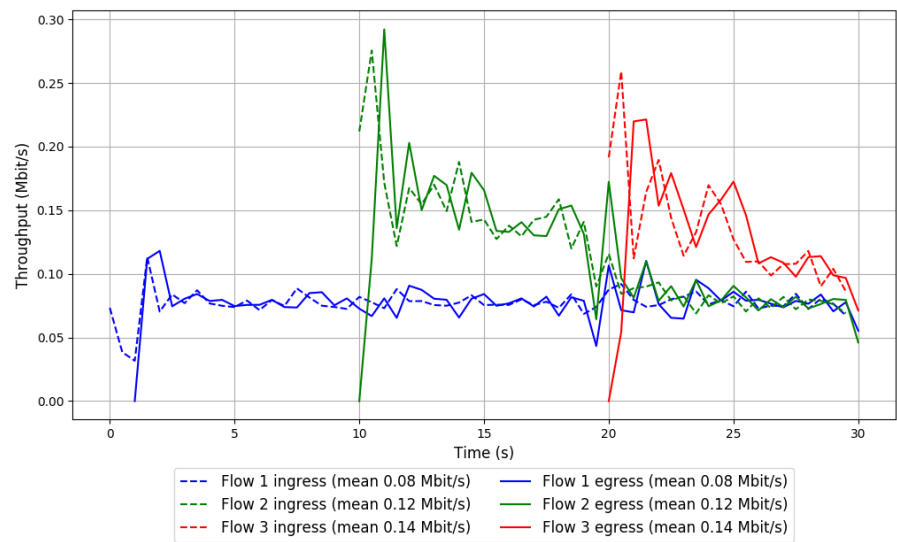
Figure is missing

```
Run 1: Statistics of SCReAM

Start at: 2018-12-02 13:18:01
End at: 2018-12-02 13:18:31
Local clock offset: 0.569 ms
Remote clock offset: 3.412 ms

# Below is generated by plot.py at 2018-12-02 14:16:18
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.21 Mbit/s
95th percentile per-packet one-way delay: 279.492 ms
Loss rate: 1.01%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 267.885 ms
Loss rate: 0.79%
-- Flow 2:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 271.593 ms
Loss rate: 0.83%
-- Flow 3:
Average throughput: 0.14 Mbit/s
95th percentile per-packet one-way delay: 299.438 ms
Loss rate: 1.72%
```

Run 1: Report of SReAM — Data Link

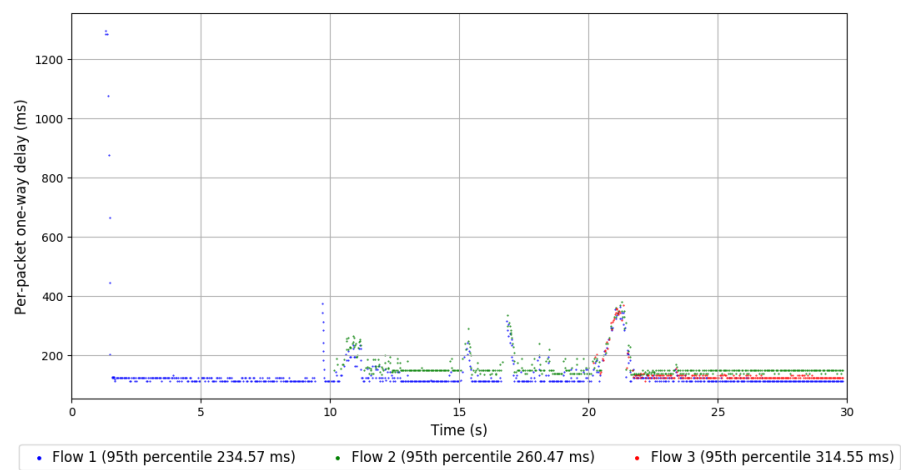
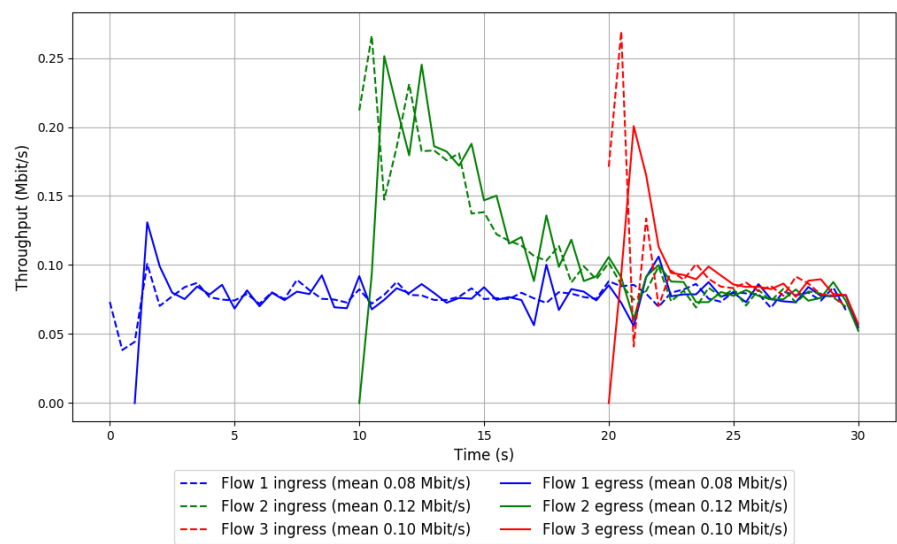


Run 2: Statistics of SReAM

Start at: 2018-12-02 13:42:16
End at: 2018-12-02 13:42:46
Local clock offset: -6.515 ms
Remote clock offset: -8.525 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 260.215 ms
Loss rate: 0.91%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 234.571 ms
Loss rate: 0.66%
-- Flow 2:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 260.466 ms
Loss rate: 0.86%
-- Flow 3:
Average throughput: 0.10 Mbit/s
95th percentile per-packet one-way delay: 314.549 ms
Loss rate: 1.59%

Run 2: Report of SReAM — Data Link

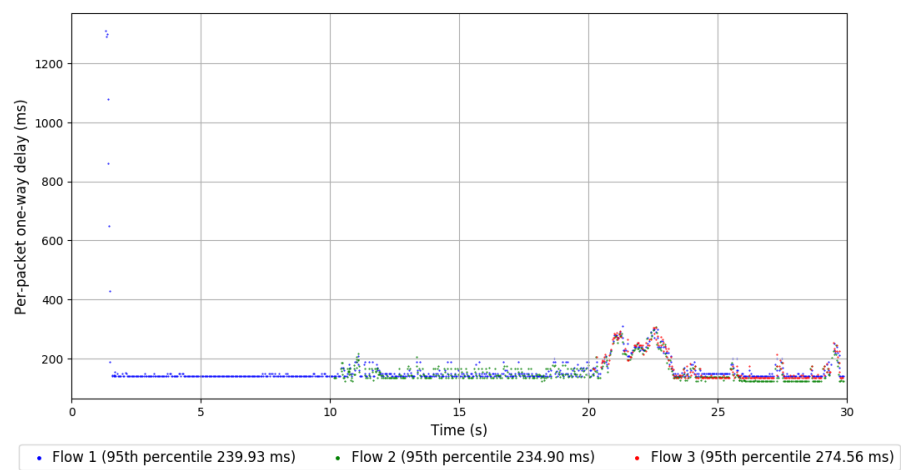
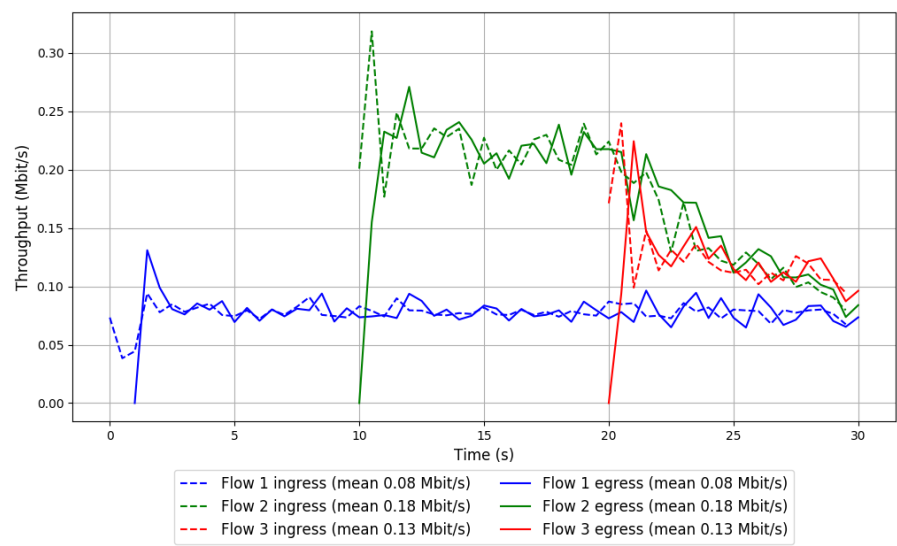


Run 3: Statistics of SCReAM

Start at: 2018-12-02 14:06:11
End at: 2018-12-02 14:06:41
Local clock offset: -2.731 ms
Remote clock offset: -18.354 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 254.463 ms
Loss rate: 0.76%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 239.934 ms
Loss rate: 0.67%
-- Flow 2:
Average throughput: 0.18 Mbit/s
95th percentile per-packet one-way delay: 234.900 ms
Loss rate: 0.50%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 274.559 ms
Loss rate: 1.70%

Run 3: Report of SCSReAM — Data Link



Run 1: Statistics of Sprout

/home/ubuntu/pantheon/data/2018-12-02T13-03-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

/home/ubuntu/pantheon/data/2018-12-02T13-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 2: Report of Sprout — Data Link

Figure is missing

Figure is missing

Run 3: Statistics of Sprout

/home/ubuntu/pantheon/data/2018-12-02T13-03-Colombia-cellular-to-AWS-Brazil-2-3-runs-3-flows

Run 3: Report of Sprout — Data Link

Figure is missing

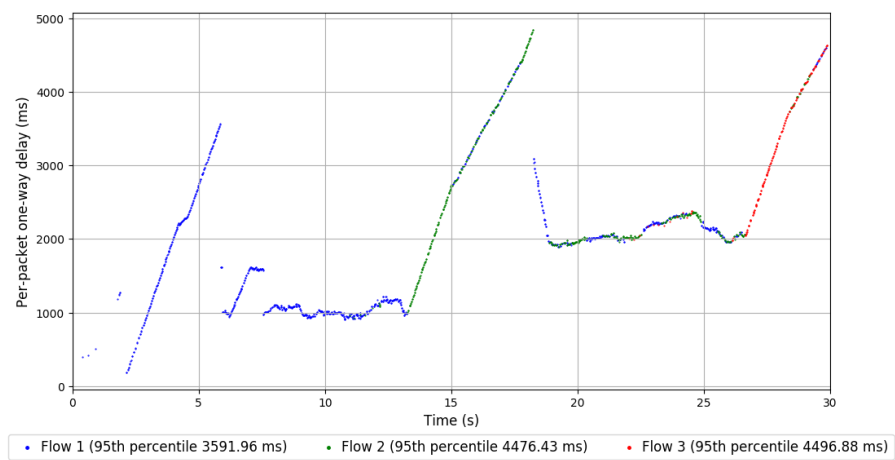
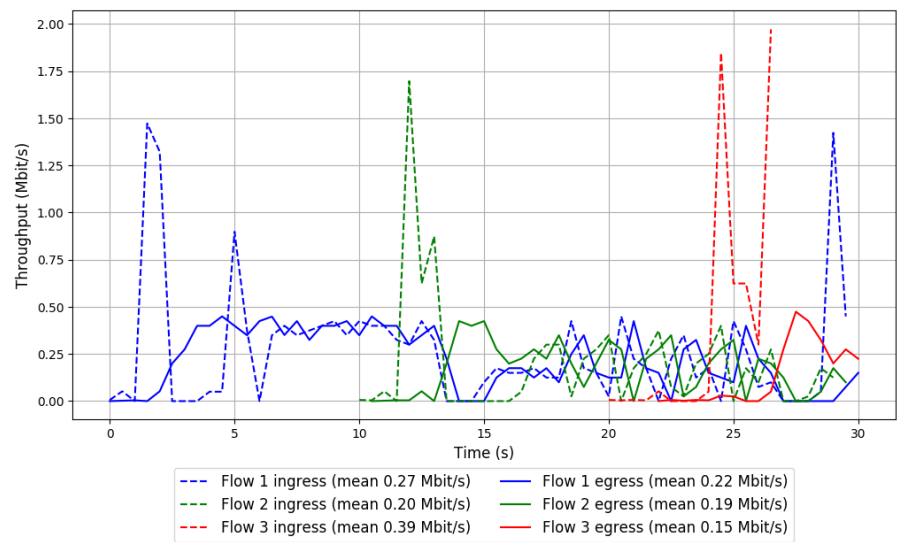
Figure is missing

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

Start at: 2018-12-02 13:14:20
End at: 2018-12-02 13:14:50
Local clock offset: 0.302 ms
Remote clock offset: 11.398 ms

# Below is generated by plot.py at 2018-12-02 14:16:18
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.38 Mbit/s
95th percentile per-packet one-way delay: 4307.384 ms
Loss rate: 22.91%
-- Flow 1:
Average throughput: 0.22 Mbit/s
95th percentile per-packet one-way delay: 3591.964 ms
Loss rate: 16.31%
-- Flow 2:
Average throughput: 0.19 Mbit/s
95th percentile per-packet one-way delay: 4476.427 ms
Loss rate: 11.46%
-- Flow 3:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 4496.875 ms
Loss rate: 57.75%
```

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



Run 2: Statistics of TaoVA-100x

Start at: 2018-12-02 13:38:35

End at: 2018-12-02 13:39:05

Local clock offset: -6.209 ms

Remote clock offset: -6.79 ms

Below is generated by plot.py at 2018-12-02 14:16:18

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.36 Mbit/s

95th percentile per-packet one-way delay: 6505.166 ms

Loss rate: 20.89%

-- Flow 1:

Average throughput: 0.27 Mbit/s

95th percentile per-packet one-way delay: 5168.034 ms

Loss rate: 19.49%

-- Flow 2:

Average throughput: 0.22 Mbit/s

95th percentile per-packet one-way delay: 7182.391 ms

Loss rate: 21.46%

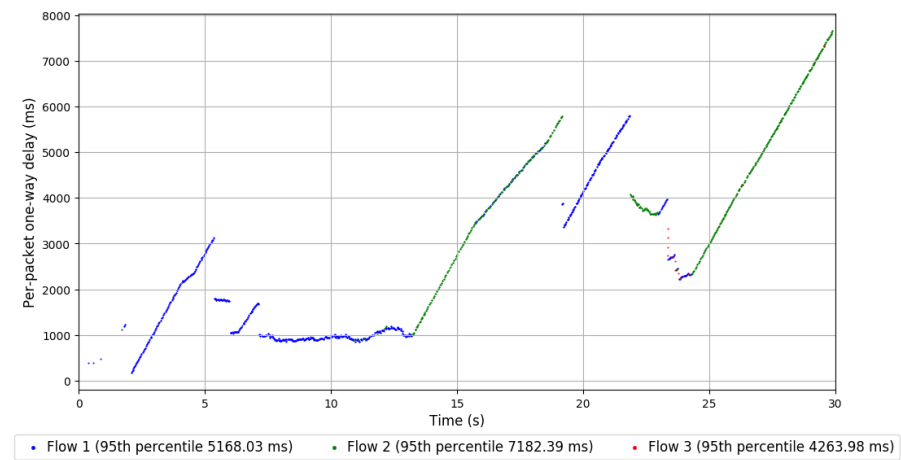
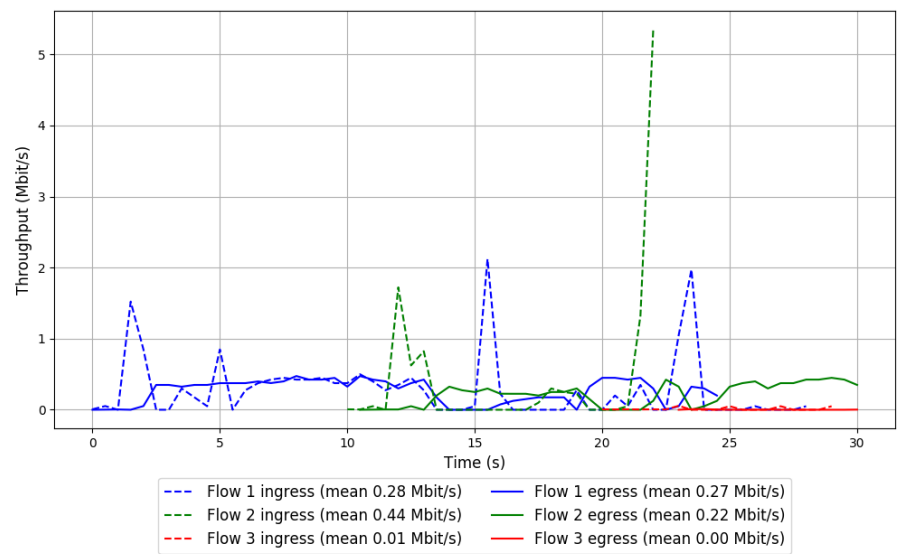
-- Flow 3:

Average throughput: 0.00 Mbit/s

95th percentile per-packet one-way delay: 4263.981 ms

Loss rate: 89.61%

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

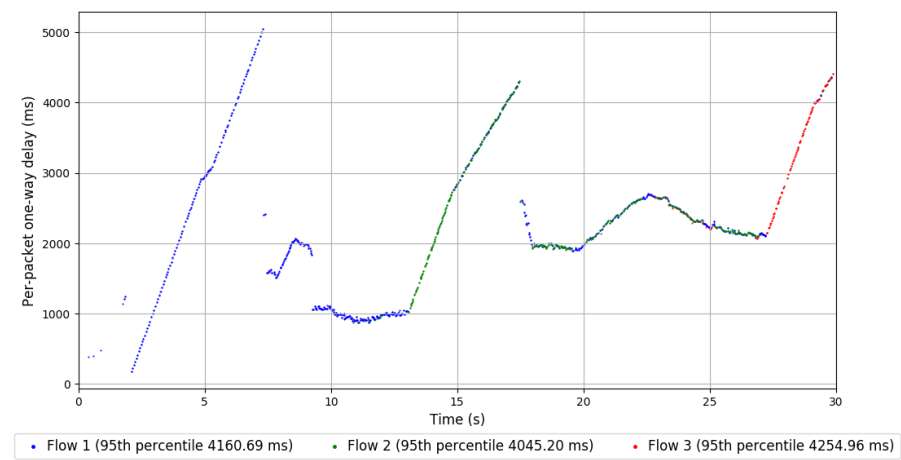
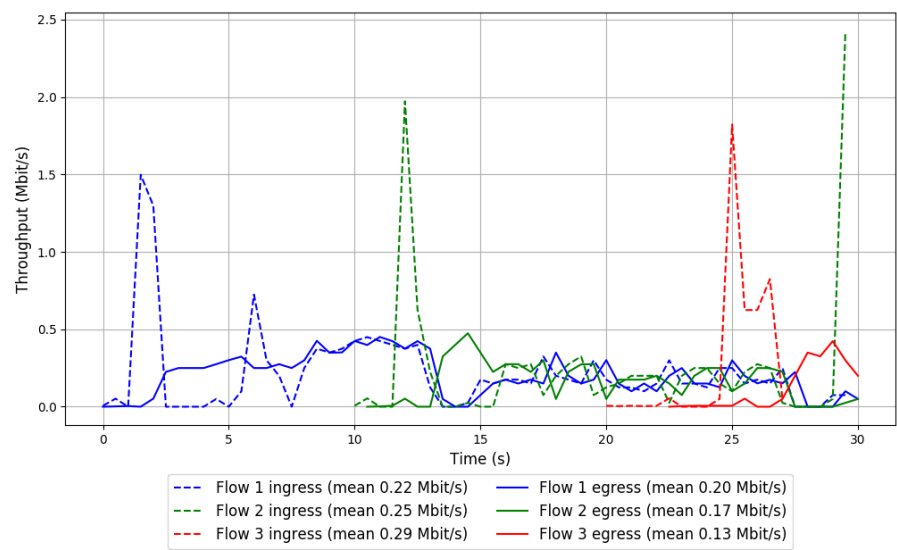


Run 3: Statistics of TaoVA-100x

Start at: 2018-12-02 14:02:30
End at: 2018-12-02 14:03:00
Local clock offset: -2.961 ms
Remote clock offset: -13.445 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.35 Mbit/s
95th percentile per-packet one-way delay: 4160.371 ms
Loss rate: 23.51%
-- Flow 1:
Average throughput: 0.20 Mbit/s
95th percentile per-packet one-way delay: 4160.694 ms
Loss rate: 6.75%
-- Flow 2:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 4045.195 ms
Loss rate: 33.55%
-- Flow 3:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 4254.963 ms
Loss rate: 52.69%

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



Run 1: Statistics of TCP Vegas

Start at: 2018-12-02 13:13:06

End at: 2018-12-02 13:13:36

Local clock offset: 0.173 ms

Remote clock offset: 9.672 ms

Below is generated by plot.py at 2018-12-02 14:16:18

Datalink statistics

-- Total of 3 flows:

Average throughput: 0.41 Mbit/s

95th percentile per-packet one-way delay: 2411.505 ms

Loss rate: 8.67%

-- Flow 1:

Average throughput: 0.30 Mbit/s

95th percentile per-packet one-way delay: 2333.346 ms

Loss rate: 4.86%

-- Flow 2:

Average throughput: 0.14 Mbit/s

95th percentile per-packet one-way delay: 2426.217 ms

Loss rate: 9.99%

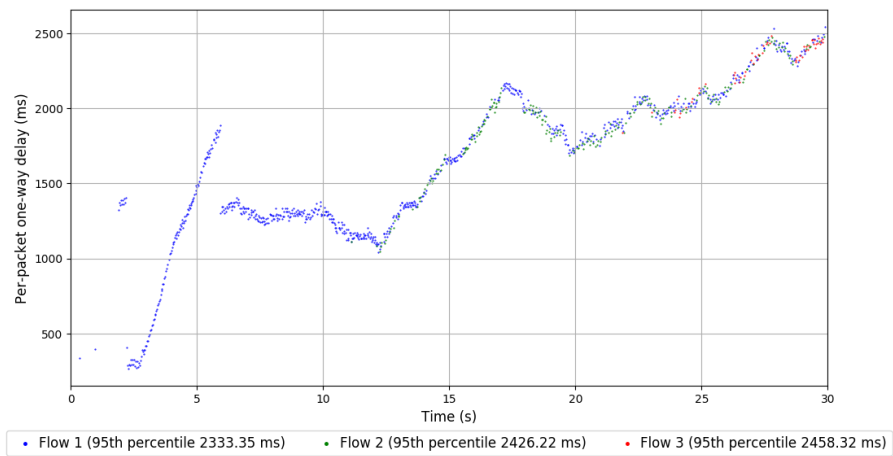
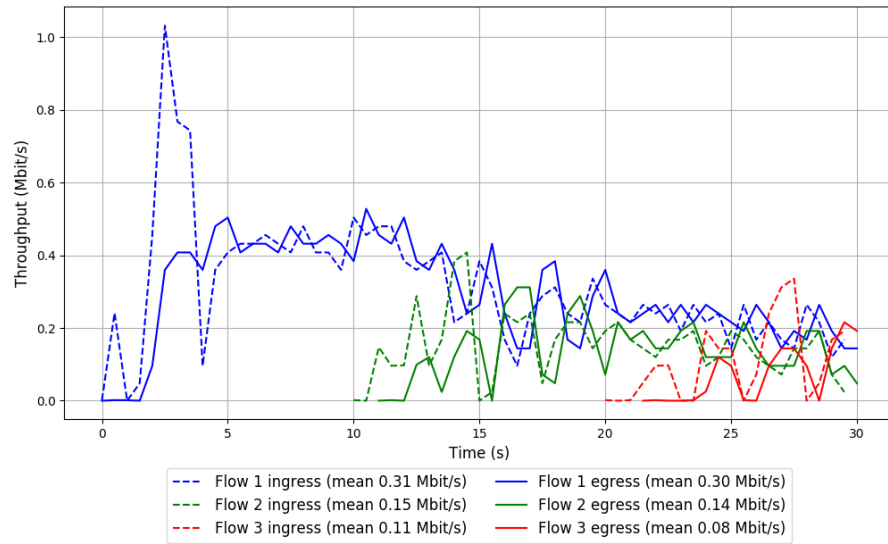
-- Flow 3:

Average throughput: 0.08 Mbit/s

95th percentile per-packet one-way delay: 2458.325 ms

Loss rate: 38.97%

Run 1: Report of TCP Vegas — Data Link

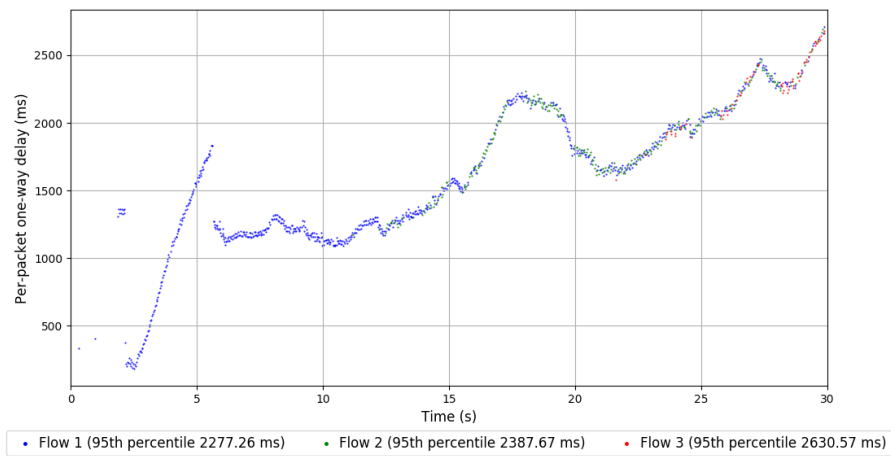
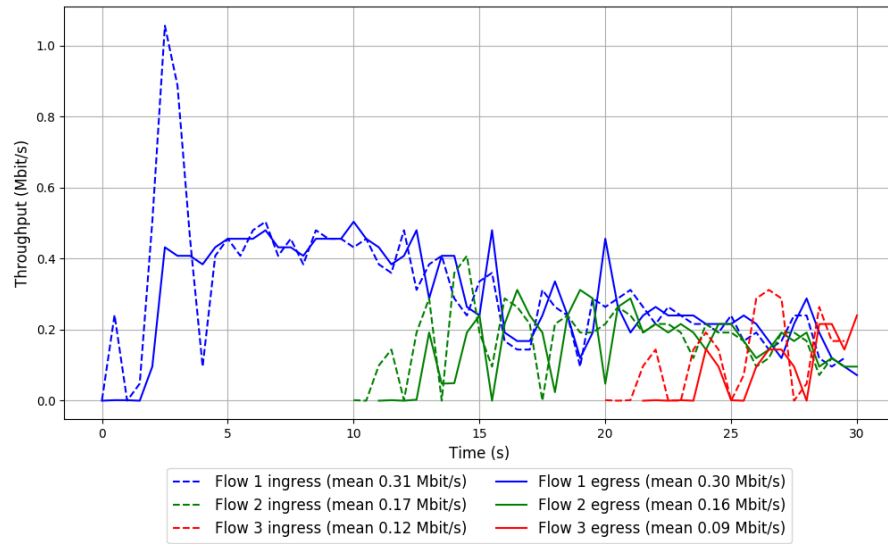


Run 2: Statistics of TCP Vegas

Start at: 2018-12-02 13:37:22
End at: 2018-12-02 13:37:52
Local clock offset: -5.341 ms
Remote clock offset: -9.584 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 2374.409 ms
Loss rate: 8.84%
-- Flow 1:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 2277.262 ms
Loss rate: 4.93%
-- Flow 2:
Average throughput: 0.16 Mbit/s
95th percentile per-packet one-way delay: 2387.674 ms
Loss rate: 10.83%
-- Flow 3:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 2630.571 ms
Loss rate: 33.93%

Run 2: Report of TCP Vegas — Data Link

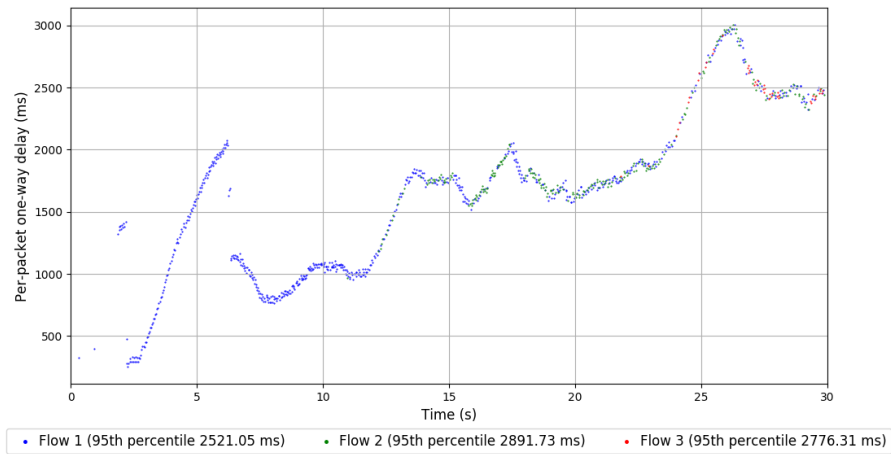
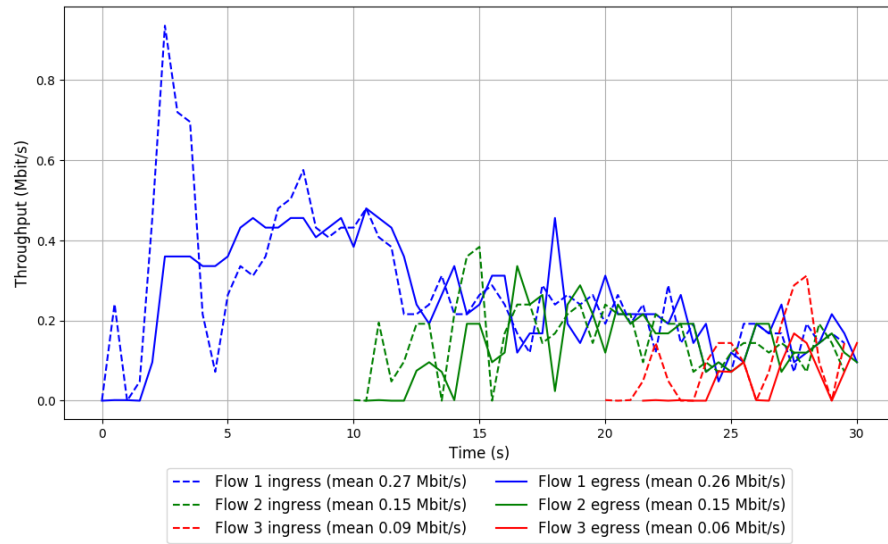


Run 3: Statistics of TCP Vegas

Start at: 2018-12-02 14:01:16
End at: 2018-12-02 14:01:46
Local clock offset: -3.133 ms
Remote clock offset: -17.129 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 2711.235 ms
Loss rate: 9.40%
-- Flow 1:
Average throughput: 0.26 Mbit/s
95th percentile per-packet one-way delay: 2521.053 ms
Loss rate: 4.71%
-- Flow 2:
Average throughput: 0.15 Mbit/s
95th percentile per-packet one-way delay: 2891.731 ms
Loss rate: 10.19%
-- Flow 3:
Average throughput: 0.06 Mbit/s
95th percentile per-packet one-way delay: 2776.310 ms
Loss rate: 48.53%

Run 3: Report of TCP Vegas — Data Link

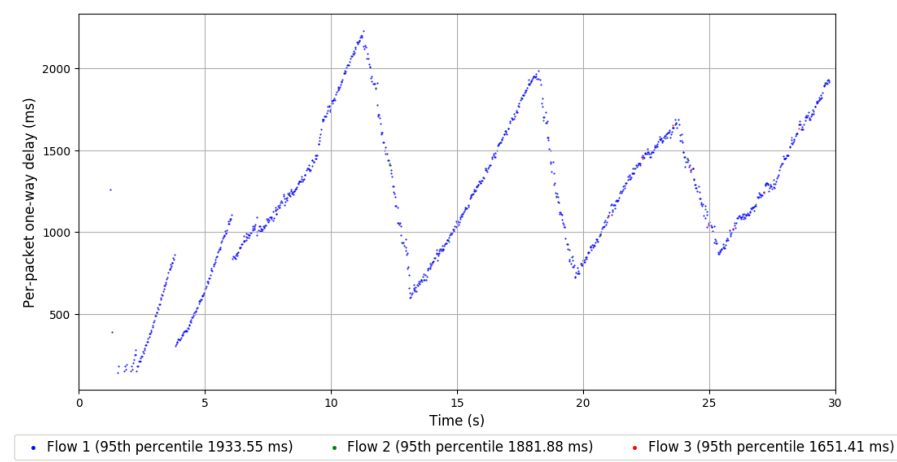
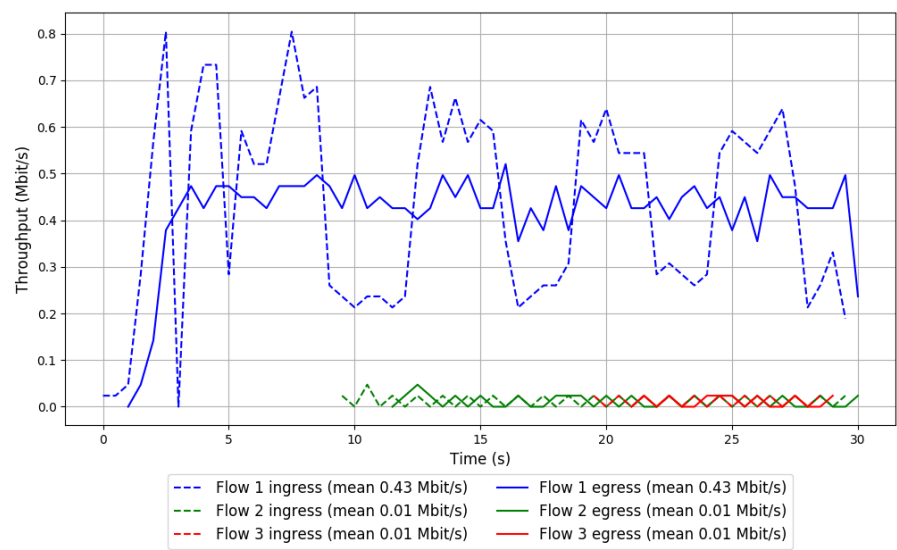


Run 1: Statistics of Verus

Start at: 2018-12-02 13:06:40
End at: 2018-12-02 13:07:10
Local clock offset: -0.63 ms
Remote clock offset: 22.241 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.45 Mbit/s
95th percentile per-packet one-way delay: 1931.118 ms
Loss rate: 4.27%
-- Flow 1:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 1933.553 ms
Loss rate: 4.03%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1881.883 ms
Loss rate: 9.09%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1651.412 ms
Loss rate: 20.00%

Run 1: Report of Verus — Data Link

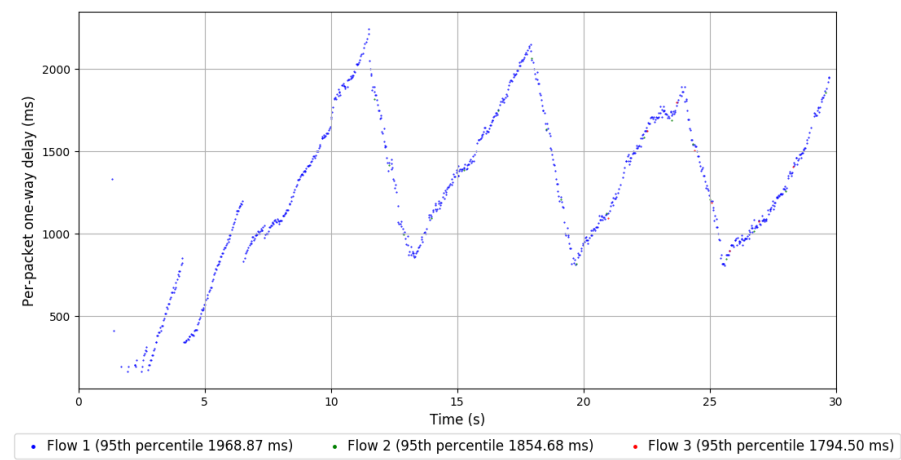
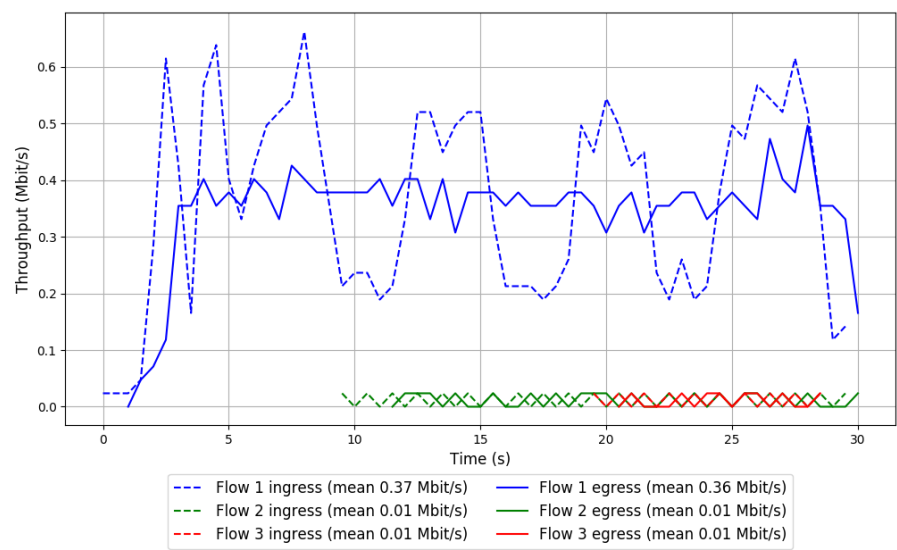


Run 2: Statistics of Verus

Start at: 2018-12-02 13:30:54
End at: 2018-12-02 13:31:24
Local clock offset: -4.462 ms
Remote clock offset: -6.531 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.37 Mbit/s
95th percentile per-packet one-way delay: 1968.873 ms
Loss rate: 6.51%
-- Flow 1:
Average throughput: 0.36 Mbit/s
95th percentile per-packet one-way delay: 1968.873 ms
Loss rate: 6.29%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1854.682 ms
Loss rate: 9.52%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1794.497 ms
Loss rate: 20.00%

Run 2: Report of Verus — Data Link

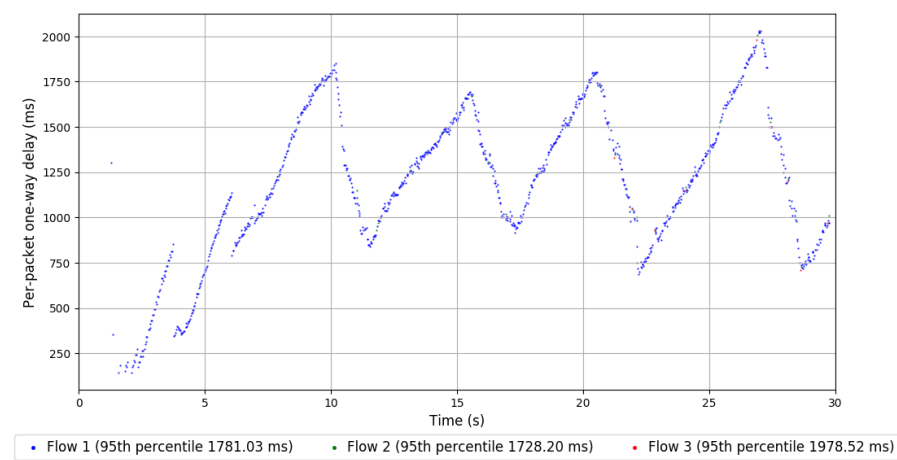
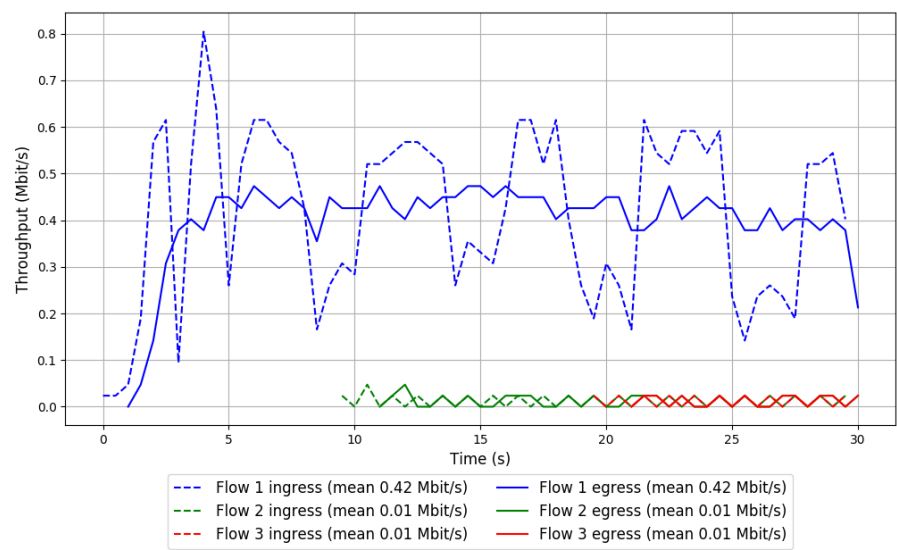


Run 3: Statistics of Verus

Start at: 2018-12-02 13:54:50
End at: 2018-12-02 13:55:20
Local clock offset: -4.104 ms
Remote clock offset: -16.287 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.43 Mbit/s
95th percentile per-packet one-way delay: 1781.032 ms
Loss rate: 4.63%
-- Flow 1:
Average throughput: 0.42 Mbit/s
95th percentile per-packet one-way delay: 1781.032 ms
Loss rate: 4.58%
-- Flow 2:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1728.198 ms
Loss rate: 4.55%
-- Flow 3:
Average throughput: 0.01 Mbit/s
95th percentile per-packet one-way delay: 1978.522 ms
Loss rate: 9.09%

Run 3: Report of Verus — Data Link



Run 1: Statistics of PCC-Vivace

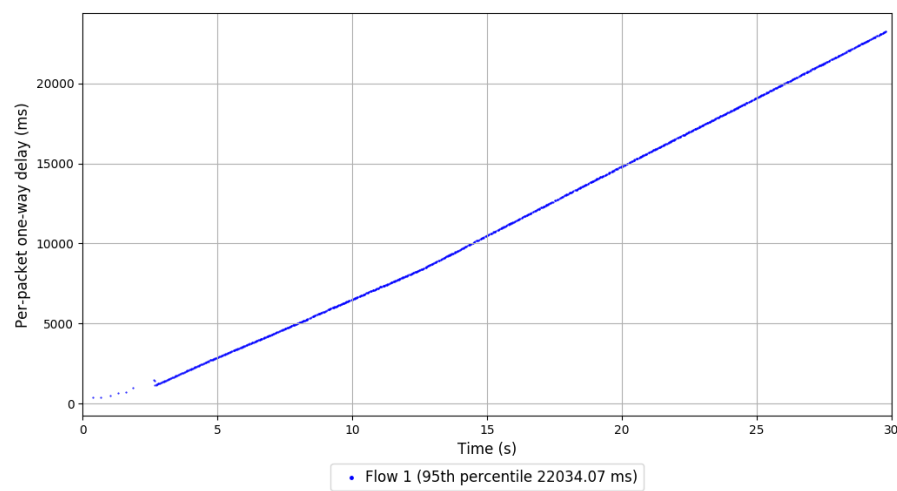
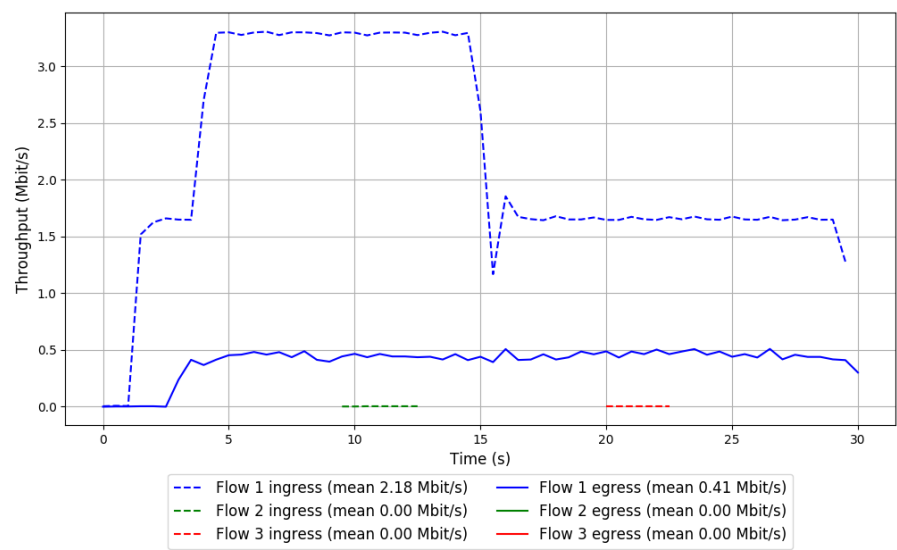
Start at: 2018-12-02 13:09:07

End at: 2018-12-02 13:09:37

Local clock offset: -1.098 ms

Remote clock offset: 19.951 ms

Run 1: Report of PCC-Vivace — Data Link



Run 2: Statistics of PCC-Vivace

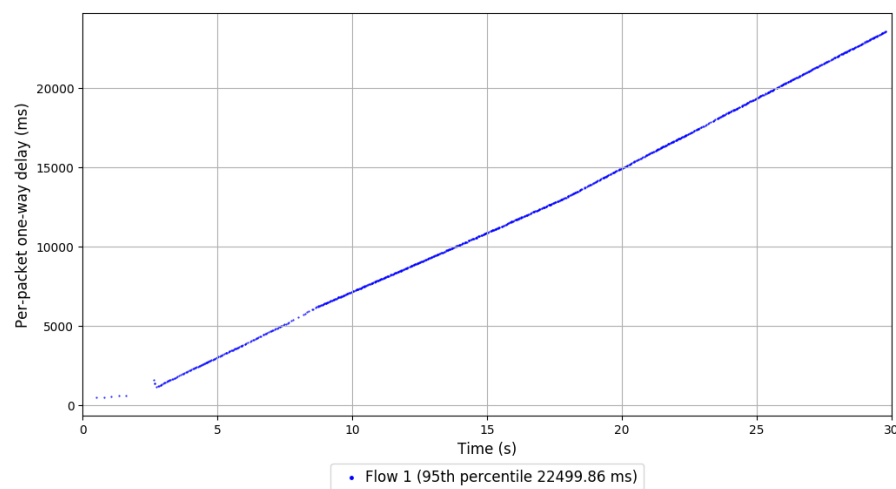
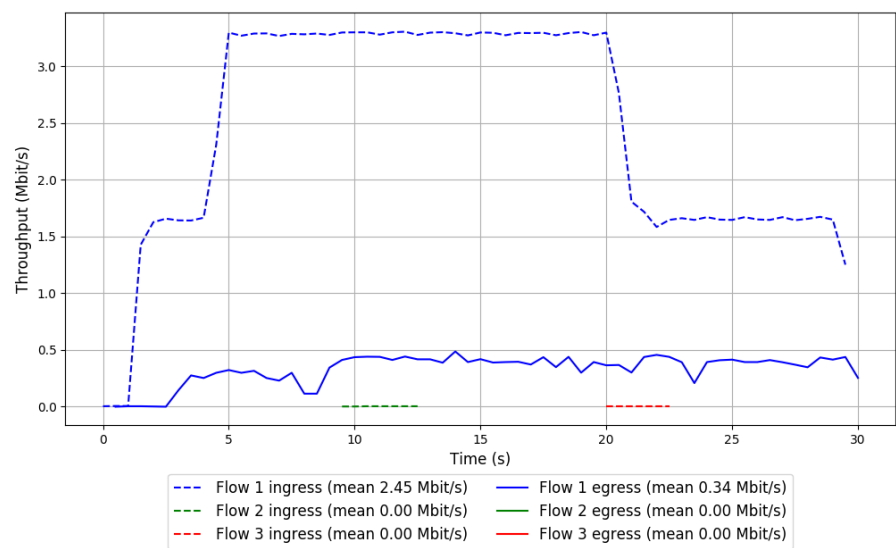
Start at: 2018-12-02 13:33:23

End at: 2018-12-02 13:33:53

Local clock offset: -5.638 ms

Remote clock offset: -5.041 ms

Run 2: Report of PCC-Vivace — Data Link



Run 3: Statistics of PCC-Vivace

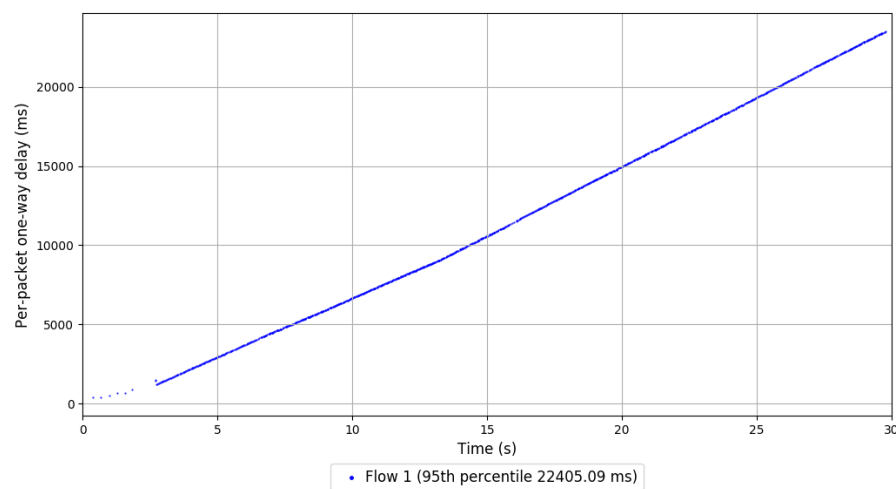
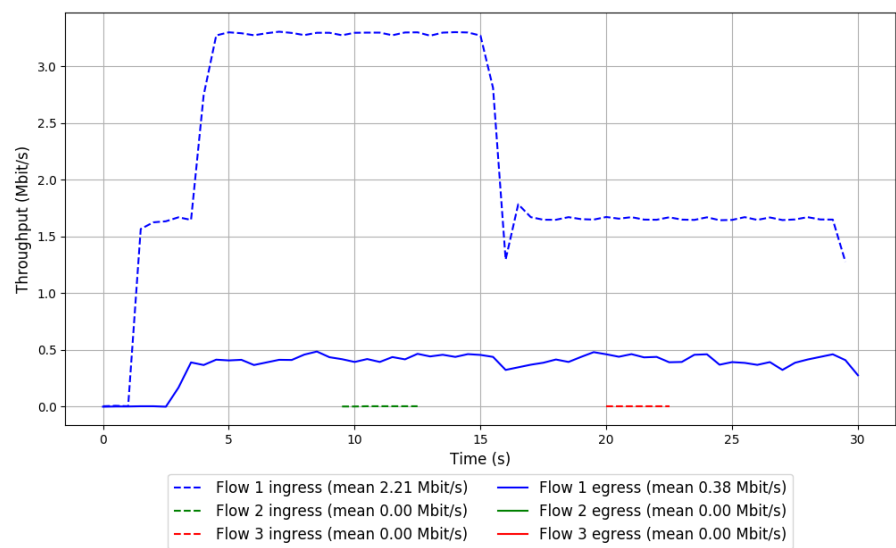
Start at: 2018-12-02 13:57:18

End at: 2018-12-02 13:57:48

Local clock offset: -4.356 ms

Remote clock offset: -15.767 ms

Run 3: Report of PCC-Vivace — Data Link

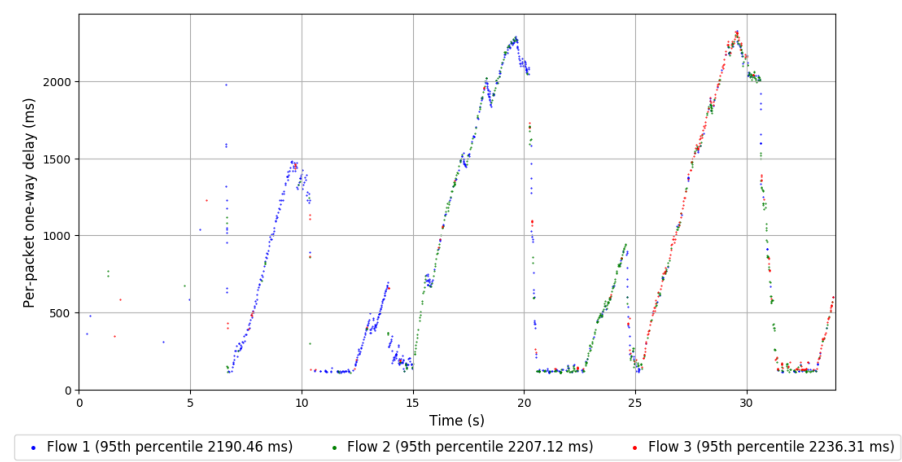
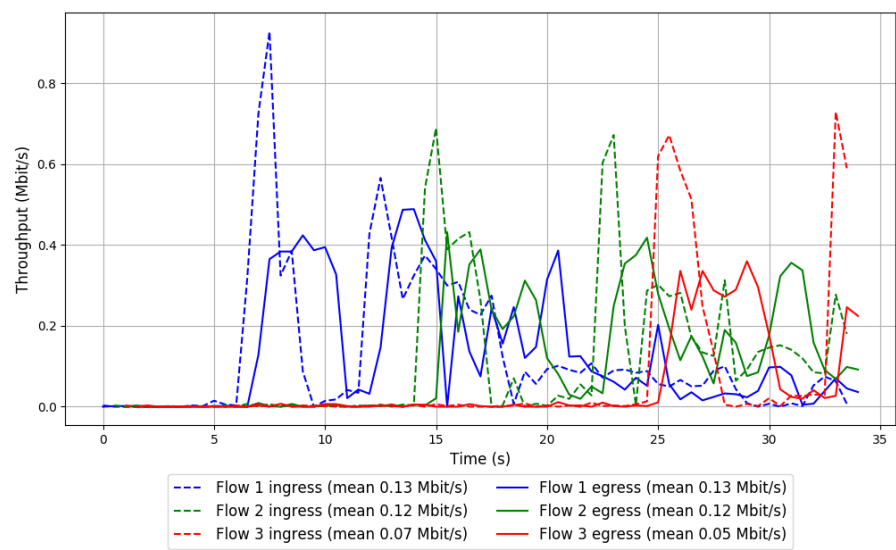


```
Run 1: Statistics of WebRTC media

Start at: 2018-12-02 13:11:52
End at: 2018-12-02 13:12:22
Local clock offset: -0.016 ms
Remote clock offset: 18.516 ms

# Below is generated by plot.py at 2018-12-02 14:16:18
# Datalink statistics
-- Total of 3 flows:
Average throughput: 0.30 Mbit/s
95th percentile per-packet one-way delay: 2217.046 ms
Loss rate: 5.50%
-- Flow 1:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 2190.462 ms
Loss rate: 0.08%
-- Flow 2:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 2207.124 ms
Loss rate: 3.73%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 2236.312 ms
Loss rate: 19.74%
```

Run 1: Report of WebRTC media — Data Link

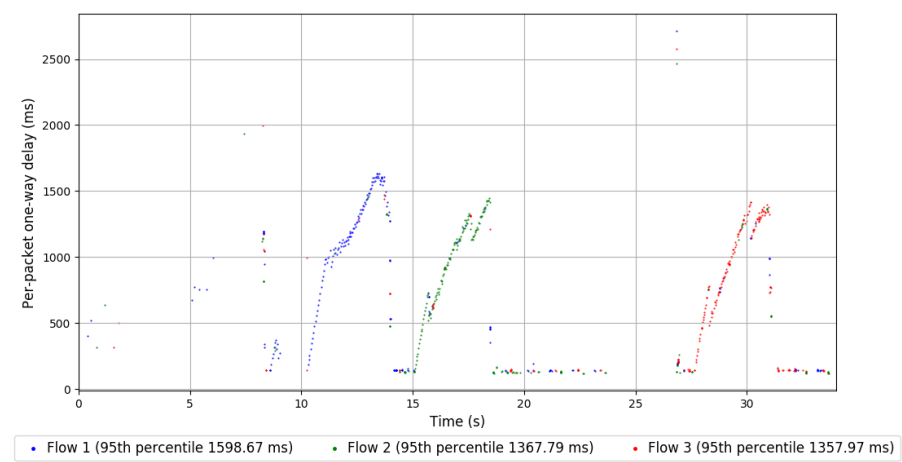
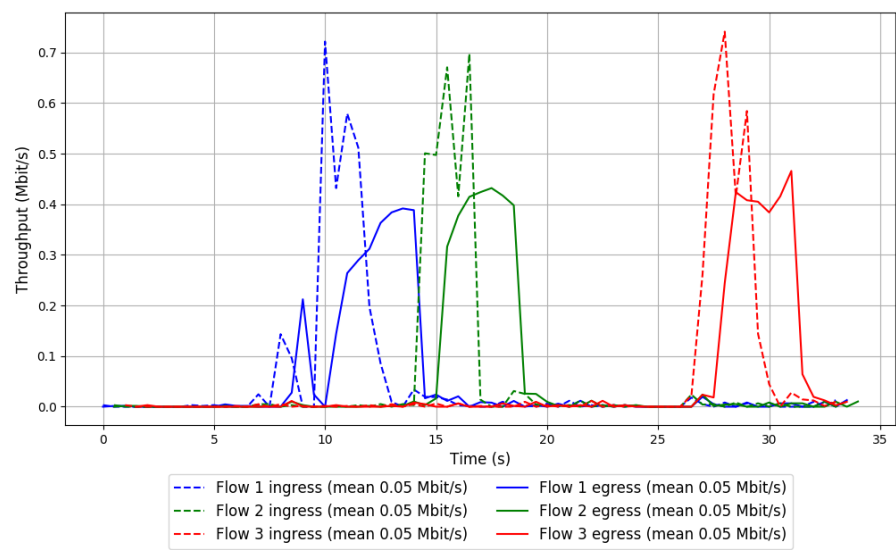


Run 2: Statistics of WebRTC media

Start at: 2018-12-02 13:36:08
End at: 2018-12-02 13:36:39
Local clock offset: -5.958 ms
Remote clock offset: -10.221 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.13 Mbit/s
95th percentile per-packet one-way delay: 1465.917 ms
Loss rate: 0.00%
-- Flow 1:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 1598.672 ms
Loss rate: 0.00%
-- Flow 2:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 1367.786 ms
Loss rate: 0.00%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 1357.974 ms
Loss rate: 0.00%

Run 2: Report of WebRTC media — Data Link



Run 3: Statistics of WebRTC media

Start at: 2018-12-02 14:00:03
End at: 2018-12-02 14:00:33
Local clock offset: -3.989 ms
Remote clock offset: -13.721 ms

Below is generated by plot.py at 2018-12-02 14:16:18
Datalink statistics
-- Total of 3 flows:
Average throughput: 0.28 Mbit/s
95th percentile per-packet one-way delay: 1426.112 ms
Loss rate: 0.69%
-- Flow 1:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 1431.622 ms
Loss rate: 0.57%
-- Flow 2:
Average throughput: 0.12 Mbit/s
95th percentile per-packet one-way delay: 1424.215 ms
Loss rate: 0.99%
-- Flow 3:
Average throughput: 0.05 Mbit/s
95th percentile per-packet one-way delay: 1418.632 ms
Loss rate: 0.22%

Run 3: Report of WebRTC media — Data Link

