Repeated the test of 17 congestion control schemes 3 times.
Each test lasted for 30 seconds running 1 flow.
Increased UDP receive buffer to 16 MB (default) and 32 MB (max).
Tested BBR with qdisc of Fair Queuing (fq), and other schemes with the
default Linux qdisc (pfifo_fast).
NTP offsets were measured against gps.ntp.br and have been applied to
correct the timestamps in logs.

Git summary:
branch: master @ 70217998b3c9a7166a95460a70c0854d1326e100
third_party/calibrated_koho @ 3cb73c0d1c0322cdfae446ea37a522e53227db50
M datagrump/sender.cc
third_party/fillp @ fb9c9ab842e5614ad52911a76fb9bd1c1b0dc86
third_party/genericCC @ 80b516c448f795fd6e9675f7177b69c622f07da8
third_party/indigo @ a9b2060d39e4da2e8987e893e3eca2a6c7cd0ab9
third_party/indigo-1-layer-128-unit @ 3ae9e4ef4230db7484501f82ce8b377695f2f66d
third_party/indigo-1-layer-32-unit @ 2601c92e4aa9d58d38dc4dfe0ecdbf90c077e6d4
third_party/indigo-1-layer-32-unit-no-calib @ 1f3a7f75b411135ed5b540c0fd3d55939528e2a5f
third_party/indigo-no-calib @ 7224f2202e8a044d8306fa0b983ad84360c53d89
third_party/koho_cc @ f0f2e693303ae82ea808e6928eadcf4f108a6681
M datagrump/sender.cc
third_party/libutp @ b3465b942ede2826f2b179eaab4a906ce6bb7cf3cf
third_party/pantheon-tunnel1 @ fb1053193c2861da659ba9013db26744ccfcf993
third_party/pcc @ 1afcf958fa0d66d6b623c091a55f8ec872b4981e1
M receiver/src/buffer.h
M receiver/src/core.cpp
M sender/src/buffer.h
M sender/src/core.cpp
third_party/proto-quic @ 77961f1a82733a86b42f1bc8143ec97f83ccff42
third_party/scream @ c3370fd7bd17265a79ae34e4016ad23f59656885
third_party/sourdough @ f1a14bffe749737437f61b1eaeeb303b267cde681
third_party/sprout @ 6f2efe6e088d91066a9f023df375f8ee2665089ce
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 @ 7a4ba531e75b4a6f66f5c4580192120401784ce3
third_party/webrtc @ a488197ddd041ace68a42849b2540ad8348285f42

Pantheon Report

Generated at 2018-02-02 20:36:42 (UTC).
Data path: Colombia ppp0 (remote) → AWS Brazil 2 Ethernet (local).
Repeated the test of 17 congestion control schemes 3 times.
Each test lasted for 30 seconds running 1 flow.
Increased UDP receive buffer to 16 MB (default) and 32 MB (max).
Tested BBR with qdisc of Fair Queuing (fq), and other schemes with the
default Linux qdisc (pfifo_fast).
NTP offsets were measured against gps.ntp.br and have been applied to
correct the timestamps in logs.
test from Colombia ppp0 to AWS Brazil 2 Ethernet, 3 runs of 30s each per scheme (mean of all runs by scheme)
<table>
<thead>
<tr>
<th>scheme</th>
<th># runs</th>
<th>mean avg tput (Mbit/s)</th>
<th>mean 95th-%ile delay (ms)</th>
<th>mean loss rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP BBR</td>
<td>2</td>
<td>0.52</td>
<td>797.55</td>
<td>2.34</td>
</tr>
<tr>
<td>TCP Cubic</td>
<td>3</td>
<td>0.53</td>
<td>7848.69</td>
<td>31.40</td>
</tr>
<tr>
<td>LEDBAT</td>
<td>3</td>
<td>0.52</td>
<td>317.71</td>
<td>1.36</td>
</tr>
<tr>
<td>PCC</td>
<td>3</td>
<td>0.38</td>
<td>18779.63</td>
<td>65.80</td>
</tr>
<tr>
<td>QUIC Cubic</td>
<td>2</td>
<td>0.49</td>
<td>6141.38</td>
<td>24.81</td>
</tr>
<tr>
<td>SCReAM</td>
<td>3</td>
<td>0.11</td>
<td>202.01</td>
<td>0.79</td>
</tr>
<tr>
<td>WebRTC media</td>
<td>3</td>
<td>0.26</td>
<td>881.32</td>
<td>0.95</td>
</tr>
<tr>
<td>Sprout</td>
<td>3</td>
<td>0.09</td>
<td>296.24</td>
<td>1.28</td>
</tr>
<tr>
<td>TaoVA-100x</td>
<td>3</td>
<td>0.54</td>
<td>1308.54</td>
<td>2.77</td>
</tr>
<tr>
<td>TCP Vegas</td>
<td>3</td>
<td>0.52</td>
<td>1175.01</td>
<td>1.65</td>
</tr>
<tr>
<td>Verus</td>
<td>3</td>
<td>0.54</td>
<td>1964.68</td>
<td>7.20</td>
</tr>
<tr>
<td>Copa</td>
<td>3</td>
<td>0.45</td>
<td>287.36</td>
<td>3.47</td>
</tr>
<tr>
<td>FillP</td>
<td>3</td>
<td>0.53</td>
<td>22755.76</td>
<td>54.00</td>
</tr>
<tr>
<td>Indigo-1-32</td>
<td>3</td>
<td>0.43</td>
<td>663.33</td>
<td>2.17</td>
</tr>
<tr>
<td>Vivace-latency</td>
<td>3</td>
<td>0.36</td>
<td>14545.38</td>
<td>48.82</td>
</tr>
<tr>
<td>Vivace-loss</td>
<td>3</td>
<td>0.53</td>
<td>21282.59</td>
<td>89.84</td>
</tr>
<tr>
<td>Vivace-LTE</td>
<td>3</td>
<td>0.49</td>
<td>20962.01</td>
<td>75.39</td>
</tr>
</tbody>
</table>
Run 1: Statistics of TCP BBR

Start at: 2018-02-02 18:49:16
End at: 2018-02-02 18:49:46
Local clock offset: 0.341 ms
Remote clock offset: 2.776 ms

# Below is generated by plot.py at 2018-02-02 20:36:11
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 875.060 ms
Loss rate: 2.17%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 875.060 ms
Loss rate: 2.17%
Run 1: Report of TCP BBR — Data Link

![Graph of throughput and packet delay over time]

- **Flow 1 ingress** (mean 0.54 Mbit/s)
- **Flow 1 egress** (mean 0.53 Mbit/s)

![Graph of packet loss over time]

- **Flow 1 (95th percentile 875.06 ms)**
Run 2: Statistics of TCP BBR

Start at: 2018-02-02 19:09:25  
End at: 2018-02-02 19:09:55  
Local clock offset: 0.412 ms  
Remote clock offset: 2.379 ms

# Below is generated by plot.py at 2018-02-02 20:36:11  
# Datalink statistics  
-- Total of 1 flow:  
Average throughput: 0.50 Mbit/s  
95th percentile per-packet one-way delay: 720.046 ms  
Loss rate: 2.52%  
-- Flow 1:  
Average throughput: 0.50 Mbit/s  
95th percentile per-packet one-way delay: 720.046 ms  
Loss rate: 2.52%
Run 2: Report of TCP BBR — Data Link

![Graph showing throughput and packet delay over time for flow 1.]

- Flow 1 ingress (mean 0.49 Mbit/s)
- Flow 1 egress (mean 0.50 Mbit/s)

![Graph showing packet delay (95th percentile) over time for flow 1.]

- Flow 1 (95th percentile 720.05 ms)
Run 3: Statistics of TCP BBR

/home/ubuntu/pantheon_data/2018-02-02T18-34-Colombia-ppp0-to-AWS-Brazil-2-3-runs/bbr_stats_run3.log does not exist
Run 3: Report of TCP BBR — Data Link

Figure is missing

Figure is missing
Run 1: Statistics of TCP Cubic

Start at: 2018-02-02 18:36:17
End at: 2018-02-02 18:36:47
Local clock offset: 0.381 ms
Remote clock offset: -4.241 ms

# Below is generated by plot.py at 2018-02-02 20:36:12
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 7653.630 ms
Loss rate: 31.06%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 7653.630 ms
Loss rate: 31.06%
Run 1: Report of TCP Cubic — Data Link

![Graph 1: Throughput vs Time]

- **Throughput (Mbps)**
- **Time (s)**
- **Flow 1 ingress (mean 0.81 Mbps)**
- **Flow 1 egress (mean 0.56 Mbps)**

![Graph 2: Packet Delay vs Time]

- **Packet Delay (ms)**
- **Time (s)**
- **Flow 1 (95th percentile 7653.83 ms)**
Run 2: Statistics of TCP Cubic

Start at: 2018-02-02 18:56:27
End at: 2018-02-02 18:56:57
Local clock offset: 0.239 ms
Remote clock offset: 1.562 ms

# Below is generated by plot.py at 2018-02-02 20:36:12
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 7862.500 ms
Loss rate: 31.57%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 7862.500 ms
Loss rate: 31.57%
Run 2: Report of TCP Cubic — Data Link
Run 3: Statistics of TCP Cubic

Start at: 2018-02-02 19:16:28
End at: 2018-02-02 19:16:58
Local clock offset: 0.48 ms
Remote clock offset: 3.671 ms

# Below is generated by plot.py at 2018-02-02 20:36:12
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 8029.949 ms
Loss rate: 31.56%
-- Flow 1:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 8029.949 ms
Loss rate: 31.56%
Run 3: Report of TCP Cubic — Data Link
Run 1: Statistics of LEDBAT

Start at: 2018-02-02 18:35:07
End at: 2018-02-02 18:35:37
Local clock offset: 0.382 ms
Remote clock offset: 2.075 ms

# Below is generated by plot.py at 2018-02-02 20:36:12
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 321.661 ms
Loss rate: 1.46%
-- Flow 1:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 321.661 ms
Loss rate: 1.46%
Run 1: Report of LEDBAT — Data Link

The first graph shows the throughput (Mbps) over time (s) with two distinct flows:
- **Flow 1 ingress (mean 0.51 Mbit/s)**
- **Flow 1 egress (mean 0.51 Mbit/s)**

The second graph displays the 95th percentile delay (ms) over time (s) for Flow 1 (321.66 ms).

17
Run 2: Statistics of LEDBAT

Start at: 2018-02-02 18:55:16
End at: 2018-02-02 18:55:46
Local clock offset: 0.33 ms
Remote clock offset: 2.382 ms

# Below is generated by plot.py at 2018-02-02 20:36:12
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 302.101 ms
Loss rate: 1.22%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 302.101 ms
Loss rate: 1.22%
Run 2: Report of LEDBAT — Data Link

![Graph 1: Throughput vs Time](image1)

- Flow 1 ingress (mean 0.55 Mbit/s)
- Flow 1 egress (mean 0.55 Mbit/s)

![Graph 2: Packet Delay vs Time](image2)

- Flow 1 (95th percentile 302.10 ms)
Run 3: Statistics of LEDBAT

Start at: 2018-02-02 19:15:17
End at: 2018-02-02 19:15:47
Local clock offset: 0.462 ms
Remote clock offset: -2.179 ms

# Below is generated by plot.py at 2018-02-02 20:36:12
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 329.380 ms
Loss rate: 1.39%
-- Flow 1:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 329.380 ms
Loss rate: 1.39%
Run 3: Report of LEDBAT — Data Link
Run 1: Statistics of PCC

Start at: 2018-02-02 18:38:38  
End at: 2018-02-02 18:39:08  
Local clock offset: 0.368 ms  
Remote clock offset: 1.456 ms

# Below is generated by plot.py at 2018-02-02 20:36:14  
# Datalink statistics
-- Total of 1 flow:  
Average throughput: 0.00 Mbit/s  
95th percentile per-packet one-way delay: 2555.640 ms  
Loss rate: 2.12%  
-- Flow 1:  
Average throughput: 0.00 Mbit/s  
95th percentile per-packet one-way delay: 2555.640 ms  
Loss rate: 2.12%
Run 1: Report of PCC — Data Link
Run 2: Statistics of PCC

Start at: 2018-02-02 18:58:48
End at: 2018-02-02 18:59:18
Local clock offset: 0.341 ms
Remote clock offset: 1.721 ms

# Below is generated by plot.py at 2018-02-02 20:36:26
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 26915.187 ms
Loss rate: 96.87%
-- Flow 1:
Average throughput: 0.58 Mbit/s
95th percentile per-packet one-way delay: 26915.187 ms
Loss rate: 96.87%
Run 2: Report of PCC — Data Link

Graph 1: Throughput (Mbps)

Graph 2: Per-packet one-way delay (ms)

Flow 1 ingress (mean 18.21 Mbps)  Flow 1 egress (mean 0.58 Mbps)
Run 3: Statistics of PCC

Start at: 2018-02-02 19:18:58
End at: 2018-02-02 19:19:28
Local clock offset: 0.47 ms
Remote clock offset: -1.1 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 26868.051 ms
Loss rate: 98.41%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 26868.051 ms
Loss rate: 98.41%
Run 3: Report of PCC — Data Link
Run 1: Statistics of QUIC Cubic

Start at: 2018-02-02 18:54:05
End at: 2018-02-02 18:54:35
Local clock offset: 0.265 ms
Remote clock offset: 3.158 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 6968.694 ms
Loss rate: 26.96%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 6968.694 ms
Loss rate: 26.96%
Run 1: Report of QUIC Cubic — Data Link

![Graph showing throughput and packet delay over time](image)

- Flow 1 ingress (mean 0.75 Mbit/s)
- Flow 1 egress (mean 0.56 Mbit/s)

![Graph showing packet delay over time](image)

- Flow 1 (95th percentile 6968.69 ms)
Run 2: Statistics of QUIC Cubic

Start at: 2018-02-02 19:14:06
End at: 2018-02-02 19:14:36
Local clock offset: 0.434 ms
Remote clock offset: -1.29 ms
Run 2: Report of QUIC Cubic — Data Link

![Throughput Graph]

- Flow 1 ingress (mean 0.04 Mbit/s)
- Flow 1 egress (mean 0.04 Mbit/s)

![Packet Delay Graph]

- Flow 1 95th percentile 148.15 ms
Run 3: Statistics of QUIC Cubic

Start at: 2018-02-02 19:34:54
End at: 2018-02-02 19:35:24
Local clock offset: 0.376 ms
Remote clock offset: -0.627 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
  Average throughput: 0.43 Mbit/s
  95th percentile per-packet one-way delay: 5314.070 ms
  Loss rate: 22.66%
-- Flow 1:
  Average throughput: 0.43 Mbit/s
  95th percentile per-packet one-way delay: 5314.070 ms
  Loss rate: 22.66%
Run 3: Report of QUIC Cubic — Data Link

![Graph showing throughput and packet delay over time]

- **Throughput (Mbps):**
  - Flow 1 ingress (mean 0.35 Mbps)
  - Flow 1 egress (mean 0.43 Mbps)

- **Packet One Way Delay (ms):**
  - Flow 1 (99th percentile 5314.07 ms)
Run 1: Statistics of SCReAM

Start at: 2018-02-02 18:51:44
End at: 2018-02-02 18:52:14
Local clock offset: 0.307 ms
Remote clock offset: -3.533 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
  Average throughput: 0.08 Mbit/s
  95th percentile per-packet one-way delay: 145.082 ms
  Loss rate: 0.79%
-- Flow 1:
  Average throughput: 0.08 Mbit/s
  95th percentile per-packet one-way delay: 145.082 ms
  Loss rate: 0.79%
Run 1: Report of SCReAM — Data Link

[Graph showing network throughput over time for two data flows, with labels for Flow 1 ingress and egress mean data rates.]

[Graph showing per-packet one-way delay over time for Flow 1, with a label indicating the 95th percentile delay.]
Run 2: Statistics of SCReAM

Start at: 2018-02-02 19:11:46
End at: 2018-02-02 19:12:16
Local clock offset: 0.354 ms
Remote clock offset: -2.244 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 190.158 ms
Loss rate: 0.66%
-- Flow 1:
Average throughput: 0.17 Mbit/s
95th percentile per-packet one-way delay: 190.158 ms
Loss rate: 0.66%
Run 2: Report of SCReAM — Data Link
Run 3: Statistics of SCReAM

Start at: 2018-02-02 19:32:24
End at: 2018-02-02 19:32:54
Local clock offset: 0.456 ms
Remote clock offset: -1.592 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 270.785 ms
Loss rate: 0.91%
-- Flow 1:
Average throughput: 0.08 Mbit/s
95th percentile per-packet one-way delay: 270.785 ms
Loss rate: 0.91%
Run 3: Report of SCReAM — Data Link

![Graph 1: Throughput (Mbps) over time (s)]

- Flow 1 ingress (mean 0.08 Mbit/s)
- Flow 1 egress (mean 0.08 Mbit/s)

![Graph 2: Per-packet one-way delay (ms) over time (s)]

- Flow 1 (95th percentile 270.79 ms)
Run 1: Statistics of WebRTC media

Start at: 2018-02-02 18:43:21
End at: 2018-02-02 18:43:51
Local clock offset: 0.354 ms
Remote clock offset: -3.967 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
  Average throughput: 0.21 Mbit/s
  95th percentile per-packet one-way delay: 1063.854 ms
  Loss rate: 1.01%
-- Flow 1:
  Average throughput: 0.21 Mbit/s
  95th percentile per-packet one-way delay: 1063.854 ms
  Loss rate: 1.01%
Run 1: Report of WebRTC media — Data Link

Throughput (Mb/s)

Time (s)

Flow 1 ingress (mean 0.21 Mb/s)  Flow 1 egress (mean 0.21 Mb/s)

Per packet one way delay (ms)

Time (s)

Flow 1 (95th percentile: 1063.85 ms)
Run 2: Statistics of WebRTC media

Start at: 2018-02-02 19:03:31
End at: 2018-02-02 19:04:01
Local clock offset: 0.357 ms
Remote clock offset: -2.8 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 745.387 ms
Loss rate: 0.73%
-- Flow 1:
Average throughput: 0.32 Mbit/s
95th percentile per-packet one-way delay: 745.387 ms
Loss rate: 0.73%
Run 2: Report of WebRTC media — Data Link
Run 3: Statistics of WebRTC media

Start at: 2018-02-02 19:23:42
End at: 2018-02-02 19:24:12
Local clock offset: 0.446 ms
Remote clock offset: 3.892 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 834.722 ms
Loss rate: 1.12%
-- Flow 1:
Average throughput: 0.25 Mbit/s
95th percentile per-packet one-way delay: 834.722 ms
Loss rate: 1.12%
Run 3: Report of WebRTC media — Data Link
Run 1: Statistics of Sprout

Start at: 2018-02-02 18:50:33
End at: 2018-02-02 18:51:03
Local clock offset: 0.318 ms
Remote clock offset: -2.807 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 201.875 ms
Loss rate: 1.26%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 201.875 ms
Loss rate: 1.26%
Run 1: Report of Sprout — Data Link
Run 2: Statistics of Sprout

Start at: 2018-02-02 19:10:35
End at: 2018-02-02 19:11:05
Local clock offset: 0.427 ms
Remote clock offset: 3.326 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 226.736 ms
Loss rate: 1.68%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 226.736 ms
Loss rate: 1.68%
Run 2: Report of Sprout — Data Link

![Graph showing throughput and packet delay over time]

- Flow 1 ingress (mean 0.09 Mbit/s)
- Flow 1 egress (mean 0.09 Mbit/s)

![Graph showing packet delay over time]

- Flow 1 (95th percentile 226.74 ms)
Run 3: Statistics of Sprout

Start at: 2018-02-02 19:31:13
End at: 2018-02-02 19:31:43
Local clock offset: 0.396 ms
Remote clock offset: -1.567 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 460.115 ms
Loss rate: 0.90%
-- Flow 1:
Average throughput: 0.09 Mbit/s
95th percentile per-packet one-way delay: 460.115 ms
Loss rate: 0.90%
Run 3: Report of Sprout — Data Link

![Graph of network throughput and packet delay over time.](image)

- **Throughput:** The graph shows the throughput of network traffic over time, with a peak around the 5th second and fluctuations thereafter.
- **Packet Delay:** The packet delay is shown with a 95th percentile of 460.12 ms.
Run 1: Statistics of TaoVA-100x

Start at: 2018-02-02 18:40:59
End at: 2018-02-02 18:41:30
Local clock offset: 0.382 ms
Remote clock offset: 2.478 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 1170.874 ms
Loss rate: 2.78%
-- Flow 1:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 1170.874 ms
Loss rate: 2.78%
Run 1: Report of TaoVA-100x — Data Link

![Graph 1](#)

- Flow 1 ingress (mean 0.54 Mbit/s)
- Flow 1 egress (mean 0.54 Mbit/s)

![Graph 2](#)

- Flow 1 (95th percentile 1170.87 ms)
Run 2: Statistics of TaoVA-100x

Start at: 2018-02-02 19:01:10
End at: 2018-02-02 19:01:40
Local clock offset: 0.275 ms
Remote clock offset: -2.1 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 1629.585 ms
Loss rate: 2.82%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 1629.585 ms
Loss rate: 2.82%
Run 2: Report of TaoVA-100x — Data Link

[Graph showing throughput and per-packet end-to-end delay over time]

Flow 1 ingress (mean 0.54 Mbit/s)  Flow 1 egress (mean 0.53 Mbit/s)

[Graph showing per-packet end-to-end delay over time]

Flow 1 (99th percentile 1629.59 ms)
Run 3: Statistics of TaoVA-100x

Start at: 2018-02-02 19:21:21
End at: 2018-02-02 19:21:51
Local clock offset: 0.502 ms
Remote clock offset: -1.955 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
   Average throughput: 0.55 Mbit/s
   95th percentile per-packet one-way delay: 1125.171 ms
   Loss rate: 2.71%
-- Flow 1:
   Average throughput: 0.55 Mbit/s
   95th percentile per-packet one-way delay: 1125.171 ms
   Loss rate: 2.71%
Run 3: Report of TaoVA-100x — Data Link
Run 1: Statistics of TCP Vegas

Start at: 2018-02-02 18:45:42
End at: 2018-02-02 18:46:12
Local clock offset: 0.351 ms
Remote clock offset: 1.79 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 1075.178 ms
Loss rate: 1.28%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 1075.178 ms
Loss rate: 1.28%
Run 1: Report of TCP Vegas — Data Link

![Graph of Throughput](image1)

![Graph of Per-packet one-way delay](image2)
Run 2: Statistics of TCP Vegas

Start at: 2018-02-02 19:05:52
End at: 2018-02-02 19:06:22
Local clock offset: 0.4 ms
Remote clock offset: -2.619 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 1044.526 ms
Loss rate: 1.26%
-- Flow 1:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 1044.526 ms
Loss rate: 1.26%
Run 2: Report of TCP Vegas — Data Link
Run 3: Statistics of TCP Vegas

Start at: 2018-02-02 19:26:06
End at: 2018-02-02 19:26:36
Local clock offset: 0.431 ms
Remote clock offset: -0.892 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 1405.333 ms
Loss rate: 2.40%
-- Flow 1:
Average throughput: 0.48 Mbit/s
95th percentile per-packet one-way delay: 1405.333 ms
Loss rate: 2.40%
Run 3: Report of TCP Vegas — Data Link

![Graph of Throughput vs Time]

- Flow 1 ingress (mean 0.48 Mbit/s)
- Flow 1 egress (mean 0.48 Mbit/s)

![Graph of Per-packet one-way delay vs Time]

- Flow 1 (95th percentile 1.405.33 ms)
Run 1: Statistics of Verus

Start at: 2018-02-02 18:44:31
End at: 2018-02-02 18:45:01
Local clock offset: 0.274 ms
Remote clock offset: -3.897 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
  Average throughput: 0.54 Mbit/s
  95th percentile per-packet one-way delay: 1784.682 ms
  Loss rate: 9.92%
-- Flow 1:
  Average throughput: 0.54 Mbit/s
  95th percentile per-packet one-way delay: 1784.682 ms
  Loss rate: 9.92%
Run 1: Report of Verus — Data Link

![Graph 1](image1.png)

- Flow 1 ingress (mean 0.57 Mbit/s)
- Flow 1 egress (mean 0.54 Mbit/s)

![Graph 2](image2.png)

- Flow 1 (95th percentile 1784.68 ms)
Run 2: Statistics of Verus

Start at: 2018-02-02 19:04:42  
End at: 2018-02-02 19:05:12  
Local clock offset: 0.375 ms  
Remote clock offset: 2.922 ms

# Below is generated by plot.py at 2018-02-02 20:36:35  
# Datalink statistics

-- Total of 1 flow:
  Average throughput: 0.53 Mbit/s  
  95th percentile per-packet one-way delay: 2084.681 ms  
  Loss rate: 6.32%

-- Flow 1:
  Average throughput: 0.53 Mbit/s  
  95th percentile per-packet one-way delay: 2084.681 ms  
  Loss rate: 6.32%
Run 2: Report of Verus — Data Link
Run 3: Statistics of Verus

Start at: 2018-02-02 19:24:53
End at: 2018-02-02 19:25:23
Local clock offset: 0.476 ms
Remote clock offset: -0.909 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 2024.687 ms
Loss rate: 5.37%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 2024.687 ms
Loss rate: 5.37%
Run 3: Report of Verus — Data Link

![Graph 1: Throughput vs Time](image1)

**Flow 1 ingress (mean 0.56 Mbit/s)**
**Flow 1 egress (mean 0.56 Mbit/s)**

![Graph 2: Per-packet one-way delay vs Time](image2)

**Flow 1 (90th percentile 2024.69 ms)**

69
Run 1: Statistics of Copa

Start at: 2018-02-02 18:39:49
End at: 2018-02-02 18:40:19
Local clock offset: 0.307 ms
Remote clock offset: -4.143 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 203.606 ms
Loss rate: 3.75%
-- Flow 1:
Average throughput: 0.47 Mbit/s
95th percentile per-packet one-way delay: 203.606 ms
Loss rate: 3.75%
Run 1: Report of Copa — Data Link

![Graph 1: Throughput (Mbps)](image1)
- **Flow 1 ingress (mean 0.49 Mbps)**
- **Flow 1 egress (mean 0.47 Mbps)**

![Graph 2: Per-packet one-way delay (ms)](image2)
- **Flow 1 (95th percentile 203.61 ms)**
Run 2: Statistics of Copa

Start at: 2018-02-02 18:59:59
End at: 2018-02-02 19:00:29
Local clock offset: 0.325 ms
Remote clock offset: -2.178 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 228.654 ms
Loss rate: 1.93%
-- Flow 1:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 228.654 ms
Loss rate: 1.93%
Run 2: Report of Copa — Data Link
Run 3: Statistics of Copa

Start at: 2018-02-02 19:20:10  
End at: 2018-02-02 19:20:40  
Local clock offset: 0.461 ms  
Remote clock offset: 3.719 ms

# Below is generated by plot.py at 2018-02-02 20:36:35  
# Datalink statistics
-- Total of 1 flow:  
Average throughput: 0.37 Mbit/s  
95th percentile per-packet one-way delay: 429.819 ms  
Loss rate: 4.72%  
-- Flow 1:  
Average throughput: 0.37 Mbit/s  
95th percentile per-packet one-way delay: 429.819 ms  
Loss rate: 4.72%
Run 3: Report of Copa — Data Link

---

**Graph 1:**
- Y-axis: Throughput (Mbps)
- X-axis: Time (s)
- Legend: Flow 1 ingress (mean 0.38 Mbps) and Flow 1 egress (mean 0.37 Mbps)

**Graph 2:**
- Y-axis: Per-packet one way delay (ms)
- X-axis: Time (s)
- Legend: Flow 1 (95th percentile 429.82 ms)
Run 1: Statistics of FillP

Start at: 2018-02-02 18:42:10
End at: 2018-02-02 18:42:40
Local clock offset: 0.352 ms
Remote clock offset: -4.103 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 23444.352 ms
Loss rate: 64.84%
-- Flow 1:
Average throughput: 0.53 Mbit/s
95th percentile per-packet one-way delay: 23444.352 ms
Loss rate: 64.84%
Run 1: Report of FillP — Data Link

**Graph 1:**
- **Y-axis:** Throughput (Mbps)
- **X-axis:** Time (s)
- **Legend:**
  - Flow 1 ingress (mean 1.47 Mbps)
  - Flow 1 egress (mean 0.53 Mbps)

**Graph 2:**
- **Y-axis:** Packet per one way delay (ms)
- **X-axis:** Time (s)
- **Legend:**
  - Flow 1 (95th percentile 23444.35 ms)
Run 2: Statistics of FillP

Start at: 2018-02-02 19:02:20
End at: 2018-02-02 19:02:50
Local clock offset: 0.287 ms
Remote clock offset: 1.982 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 21517.451 ms
Loss rate: 47.97%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 21517.451 ms
Loss rate: 47.97%
Run 2: Report of FillP — Data Link

![Graph 1: Throughput vs Time](image1)

- **Flow 1 ingress (mean 1.05 Mbit/s)**
- **Flow 1 egress (mean 0.55 Mbit/s)**

![Graph 2: Per-packet one-way delay vs Time](image2)

- **Flow 1 (95th percentile 21517.43 ms)**
Run 3: Statistics of FillP

Start at: 2018-02-02 19:22:32
End at: 2018-02-02 19:23:02
Local clock offset: 0.489 ms
Remote clock offset: -0.986 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
  Average throughput: 0.50 Mbit/s
  95th percentile per-packet one-way delay: 23305.485 ms
  Loss rate: 49.20%
-- Flow 1:
  Average throughput: 0.50 Mbit/s
  95th percentile per-packet one-way delay: 23305.485 ms
  Loss rate: 49.20%
Run 3: Report of FillP — Data Link

[Graph showing throughput and per-packet one-way delay over time]

- Flow 1 ingress (mean 0.97 Mbit/s)
- Flow 1 egress (mean 0.50 Mbit/s)

Flow 1 (95th percentile 23305.49 ms)
Run 1: Statistics of Indigo-1-32

Start at: 2018-02-02 18:46:53
End at: 2018-02-02 18:47:23
Local clock offset: 0.332 ms
Remote clock offset: -2.959 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 755.397 ms
Loss rate: 1.17%
-- Flow 1:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 755.397 ms
Loss rate: 1.17%
Run 1: Report of Indigo-1-32 — Data Link

![Graph showing throughput and packet delay over time for Flow 1.]

Throughput (Mbit/s)

Time (s)

- Flow 1 ingress (mean 0.48 Mbit/s)
- Flow 1 egress (mean 0.51 Mbit/s)

Packet delay (ms)

Time (s)

- Flow 1 (95th percentile 755.40 ms)
Run 2: Statistics of Indigo-1-32

Start at: 2018-02-02 19:07:04
End at: 2018-02-02 19:07:34
Local clock offset: 0.371 ms
Remote clock offset: -1.75 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 823.001 ms
Loss rate: 4.04%
-- Flow 1:
Average throughput: 0.50 Mbit/s
95th percentile per-packet one-way delay: 823.001 ms
Loss rate: 4.04%
Run 2: Report of Indigo-1-32 — Data Link
Run 3: Statistics of Indigo-1-32

Start at: 2018-02-02 19:27:17
End at: 2018-02-02 19:27:47
Local clock offset: 0.415 ms
Remote clock offset: 3.993 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
  Average throughput: 0.28 Mbit/s
  95th percentile per-packet one-way delay: 411.602 ms
  Loss rate: 1.29%
-- Flow 1:
  Average throughput: 0.28 Mbit/s
  95th percentile per-packet one-way delay: 411.602 ms
  Loss rate: 1.29%
Run 3: Report of Indigo-1-32 — Data Link

![Throughput Over Time](chart1)

Flow 1 ingress (mean 0.28 Mbit/s)  
Flow 1 egress (mean 0.28 Mbit/s)

![Packet Delay Over Time](chart2)

Flow 1 (95th percentile 411.60 ms)
Run 1: Statistics of Vivace-latency

Start at: 2018-02-02 18:52:54
End at: 2018-02-02 18:53:24
Local clock offset: 0.332 ms
Remote clock offset: 3.09 ms

# Below is generated by plot.py at 2018-02-02 20:36:35
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2188.750 ms
Loss rate: 2.13%
-- Flow 1:
Average throughput: 0.00 Mbit/s
95th percentile per-packet one-way delay: 2188.750 ms
Loss rate: 2.13%
Run 1: Report of Vivace-latency — Data Link

![Graph of Throughput vs Time](image1)

![Graph of Per-packet one-way delay vs Time](image2)
Run 2: Statistics of Vivace-latency

Start at: 2018-02-02 19:12:56
End at: 2018-02-02 19:13:26
Local clock offset: 0.368 ms
Remote clock offset: 3.414 ms

# Below is generated by plot.py at 2018-02-02 20:36:36
# Datalink statistics
-- Total of 1 flow:
  Average throughput: 0.53 Mbit/s
  95th percentile per-packet one-way delay: 21323.992 ms
  Loss rate: 73.75%
-- Flow 1:
  Average throughput: 0.53 Mbit/s
  95th percentile per-packet one-way delay: 21323.992 ms
  Loss rate: 73.75%
Run 2: Report of Vivace-latency — Data Link

![Graph showing throughput and latency over time]

The graphs above illustrate the throughput and latency for Flow 1 over a 30-second period. The throughput is measured in Mbps, while the latency is measured in milliseconds (ms). The graphs show fluctuations in both throughput and latency, indicating variations in network performance over time.
Run 3: Statistics of Vivace-latency

Start at: 2018-02-02 19:33:34  
End at: 2018-02-02 19:34:04  
Local clock offset: 0.395 ms  
Remote clock offset: -1.496 ms

# Below is generated by plot.py at 2018-02-02 20:36:36
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 20123.407 ms
Loss rate: 70.58%
-- Flow 1:
Average throughput: 0.54 Mbit/s
95th percentile per-packet one-way delay: 20123.407 ms
Loss rate: 70.58%
Run 3: Report of Vivace-latency — Data Link

![Graph showing throughput and per-packet one-way delay over time.]

- **Throughput (Mbps)**
  - Flow 1 ingress (mean 1.79 Mbps)
  - Flow 1 egress (mean 0.54 Mbps)

- **Per-packet one-way delay (ms)**
  - Flow 1 (95th percentile 20.12341 ms)
Run 1: Statistics of Vivace-loss

Start at: 2018-02-02 18:37:28
End at: 2018-02-02 18:37:58
Local clock offset: 0.379 ms
Remote clock offset: 2.218 ms

# Below is generated by plot.py at 2018-02-02 20:36:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 20868.022 ms
Loss rate: 89.20%
-- Flow 1:
Average throughput: 0.55 Mbit/s
95th percentile per-packet one-way delay: 20868.022 ms
Loss rate: 89.20%
Run 1: Report of Vivace-loss — Data Link
Run 2: Statistics of Vivace-loss

Start at: 2018-02-02 18:57:37
End at: 2018-02-02 18:58:07
Local clock offset: 0.267 ms
Remote clock offset: 1.769 ms

# Below is generated by plot.py at 2018-02-02 20:36:40
# Datalink statistics
-- Total of 1 flow:
  Average throughput: 0.54 Mbit/s
  95th percentile per-packet one-way delay: 21332.872 ms
  Loss rate: 90.27%
-- Flow 1:
  Average throughput: 0.54 Mbit/s
  95th percentile per-packet one-way delay: 21332.872 ms
  Loss rate: 90.27%
Run 2: Report of Vivace-loss — Data Link

![Graph of throughput and packet delay vs time]

- **Throughput (Mb/s):**
  - **Flow 1 ingress (mean 5.39 Mb/s)**
  - **Flow 1 egress (mean 0.54 Mb/s)**

- **Packet delay (ms):**
  - **Flow 1 (95th percentile 21332.87 ms)**
Run 3: Statistics of Vivace-loss

Start at: 2018-02-02 19:17:46
End at: 2018-02-02 19:18:16
Local clock offset: 0.467 ms
Remote clock offset: -2.055 ms

# Below is generated by plot.py at 2018-02-02 20:36:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 21646.879 ms
Loss rate: 90.06%
-- Flow 1:
Average throughput: 0.51 Mbit/s
95th percentile per-packet one-way delay: 21646.879 ms
Loss rate: 90.06%
Run 3: Report of Vivace-loss — Data Link

![Graph 1: Throughput vs Time]

- **Flow 1 ingress (mean 5.04 Mbit/s)**
- **Flow 1 egress (mean 0.51 Mbit/s)**

![Graph 2: End-to-end delay vs Time]

- **Flow 1 (95th percentile 21646.88 ms)**
Run 1: Statistics of Vivace-LTE

Start at: 2018-02-02 18:48:04
End at: 2018-02-02 18:48:34
Local clock offset: 0.33 ms
Remote clock offset: -2.933 ms

# Below is generated by plot.py at 2018-02-02 20:36:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 21546.178 ms
Loss rate: 71.32%
-- Flow 1:
Average throughput: 0.56 Mbit/s
95th percentile per-packet one-way delay: 21546.178 ms
Loss rate: 71.32%
Run 1: Report of Vivace-LTE — Data Link

Throughput (Mbps)

0.0  0.5  1.0  1.5  2.0  2.5  3.0

Time (s)

Flow 1 ingress (mean 1.92 Mbit/s)  Flow 1 egress (mean 0.56 Mbit/s)

Per-packet end-to-end delay (ms)

0  5000  10000  15000  20000

Time (s)

Flow 1 (95th percentile 21546.18 ms)
Run 2: Statistics of Vivace-LTE

Start at: 2018-02-02 19:08:14
End at: 2018-02-02 19:08:44
Local clock offset: 0.388 ms
Remote clock offset: -1.571 ms

# Below is generated by plot.py at 2018-02-02 20:36:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 20454.768 ms
Loss rate: 69.13%
-- Flow 1:
Average throughput: 0.57 Mbit/s
95th percentile per-packet one-way delay: 20454.768 ms
Loss rate: 69.13%
Run 2: Report of Vivace-LTE — Data Link

![Graph 1: Throughput vs Time (Mbps)](image1)
Flow 1 ingress (mean 1.78 Mbit/s)  Flow 1 egress (mean 0.57 Mbit/s)

![Graph 2: Per-Packet One-Way Delay vs Time (ms)](image2)
Flow 1 (95th percentile 20454.77 ms)
Run 3: Statistics of Vivace-LTE

Start at: 2018-02-02 19:28:27
End at: 2018-02-02 19:28:57
Local clock offset: 0.394 ms
Remote clock offset: -1.637 ms

# Below is generated by plot.py at 2018-02-02 20:36:40
# Datalink statistics
-- Total of 1 flow:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 20885.088 ms
Loss rate: 85.71%
-- Flow 1:
Average throughput: 0.33 Mbit/s
95th percentile per-packet one-way delay: 20885.088 ms
Loss rate: 85.71%
Run 3: Report of Vivace-LTE — Data Link