

# L50 - Lab 3, Traffic Generation

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The goal of this lab is to learn about traffic generation and to get some hands-on experience in setting up traffic generation experiments.

As part of this lab you will not be required to write any scripts, or even command lines, and we expect that the majority of the lab will focus on the experimental setup, on the debug of the apparatus, and interpretation of results.

The lab allows you to compare between three traffic generation tools: `tcpreplay`, which is software based, `OSNT`, which is hardware based, and `MoonGen`, which is a hardware/software toolset.

As part of the lab we will use Endace DAG for traffic capture. We expect that you will build upon your experiences with the DAG in Lab 2 to interpret your results.

## 1 Setup

All experiments in this lab are using point-to-point connectivity, without a tap. You should use standard fibres when connecting to the DAG.

We recommend that you watch your terminal and attend to any error messages. The tools used in this lab are prone to crash when not invoked properly, and the Jupyter notebook does not reflect such errors. If you need to reset one of the machines following a crash, remember to repeat the relevant setup stages again (e.g., `dagload`, programming `OSNT`, etc.).

Remember to update (`git pull`) your local copy of the L50 git repository on your machines – thereby picking up all additions/fixes we have made. Note that this lab is broken into three Jupyter notebooks.

## 2 Expanding Your Experiments

The list of experiments provided in this lab is not conclusive. Once you complete the set of experiments covered by the three notebooks, look at your results and consider if and

how you can extend any of the experiments based on previous results. You can consider, for example, aspects of packet size, bandwidth or cross traffic.

Expanding your experiments is not mandatory, but can help you substantiate any claims made in your report.

### 3 Saving Your Experiments

Make sure to back up your experiments, including (but not limited to) Jupyter notebooks, dump files and scripts. Remember that multiple teams may use the same test machines, so be careful when handling data.

All the measurements are saved under your crsid folder, so backing up the entire folder is a good idea. To copy a remote directory onto your local machine:

```
sftp root@<hostname>.nf.cl.cam.ac.uk and get -r <directory>.
```

There are also other ways to copy a remote directory, you are welcome to use those as well. You may wish to compress results files in order to save space.

Exporting a Notebook as `.tex` will save graphs as separate files, which you can then include in your lab report.

Please do not push any changes, data or results directly to L50 repository. You can fork the repository to your own user and push changes there. If you would like to suggest a correction or an enhancement to a notebook or a script, please use pull-requests.

### 4 Understanding Your Measurements

A single lab report will be required for the first three labs. Instructions for the lab report were provided separately.

The following items are intended to help you understand your results, and may provide supporting evidence for your report. However, they are just suggestions - feel free to approach the data differently!

- Consider the way traffic generation is being defined. Explain how different vantage points, and, e.g., protocol's overheads, can affect the measured bandwidth.
- Discuss the limitations of each of the traffic generation tools.
- Compare and contrast software and hardware based traffic generation tools.
- Explain how the test setup can affect measurements results and discuss how such effects can be mitigated.
- Explore the limitations of the experiments conducted in this lab, and explain where the quality of the experiment (e.g., setup, methodology) could have been improved.

You should always look for odd or surprising results, and try to explain them. Note that sometimes exceptional results indicate a problem in your setup or scripts.