

P51 - Running Latency Tests

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The goal of this handout is to introduce you to simple tests of your design, using the OSNT platform.

1 Test Machines

For measuring latency you will use both your machines: one as the device under test (DUT), and the other as the network tester. You will interact with the machines via ssh, as in the previous labs.

2 Test Description

OSNT is an open source network tester, running on NetFPGA. It allows to generate traffic at full rate, and to capture traffic. Note that only low rate traffic, on a single port, can be captured.

OSNT can be invoked using a GUI, or using the command line. While in this exercise we use the command line, the GUI can be useful as well.

In our experiment we will use OSNT to generate traffic using different packet sizes, and measure the latency per packet size. The script compensates for the setup's latency, however in general this fixed-value should be measured and updated in the settings.

3 Practical Instructions

This section provides step-by-step instructions to running the latency test.

3.1 Accessing the board

1. Login to the development machine and program the board

```
$ ssh root@<hostname>.nf.cl.cam.ac.uk
$ cd ~/NetFPGA-SUME-live/
$ source tools/settings.sh
$ cd tools/scripts/
```

```
$ ./run_load_image.sh $NF_DESIGN_DIR/bitfiles/reference_switch.sh
```

2. Login to the test machine and program the board

```
$ ssh root@<hostname>.nf.cl.cam.ac.uk
$ cd ~/OSNT-SUME-live/projects/osnt/test/
$ wget https://www.cl.cam.ac.uk/research/srg/netos/projects/netfpga/bitfiles/
OSNT-SUME-live/osnt_20170129.bit
$ ./run_load_image.sh osnt_20170129.bit
```

If the board is programmed, but the network interfaces are down try to (1) reset the machine, if this is the first time the board is programmed after reset. (2) compile the driver.

3. Connect OSNT on the test machine to NetFPGA on the development machine. Connect port nf0 on OSNT to port nf0 on NetFPGA, port nf1 on OSNT to port nf1 on NetFPGA etc. Use the provided fibres.
4. Run a latency test using a single port:

```
$ cd ~/OSNT-SUME-live/
$ mkdir p51
$ cd p51
$ wget https://www.cl.cam.ac.uk/teaching/current/P51/osnt.zip
$ unzip osnt.zip
$ make build
$ make traces
$ make oneport
```

Ignore messages of the form “WARNING: No route found for IPv6 destination :: (no default route?)”. Results will be displayed on the screen and written under the folder *oneport*.

4 OSNT Resources

The best source for information on OSNT is <https://github.com/NetFPGA/OSNT-Public/wiki>. In addition:

- When programming the board for the first time, or after power up, a reset (init 6 / reboot) is required. After the reset, you need to reprogramme the board.
- Check if OSNT is recognized by the motherboard by running `lspci -vvx | grep Xi1`. The expected result will show an entry stating Xilinx and a value (typically 7038).

- Check that OSNT-SUME-live repo is cloned under /root/P51/ and that make was run as detailed in <https://github.com/NetFPGA/OSNT-Public/wiki/OSNT-SUME-Getting-Started-Guide>.
- Check that the leds are green on connected interfaces.

5 Empirical Traffic Generator

While OSNT is useful for accurate throughput stimulus and latency measurements, it has a limited ability to generate a large number of flows. One useful tool for generating a large number of flows and measuring their completion time is an empirical traffic generator, by Mohammad Alizadeh, obtainable from:

```
$ git clone https://github.com/datacenter/empirical-traffic-gen
```

The repository includes a README file with usage instructions.

Note that this tool is not as accurate as OSNT. Consult with the course's team if you want to use it as part of your evaluation plan.