Remote Radio Operation with POWDER and srsLTE

1. Please follow the registration instructions from Part 1 if you didn't follow the previous tutorial session.

2. Log in to POWDER:

   https://www.powderwireless.net/

3. Start a new experiment (use the "Experiments" menu "Start Experiment" entry if necessary), and change to the GNURADIO-SIM profile. Select the "Cloudlab Utah" cluster, and a duration of 2 hours.

4. Once the experiment is ready (several minutes), choose the only node in the experiment and open a shell. Within the shell, execute:

   /share/powder/runvnc.sh

5. Open the link given in the shell, of the form:

   https://node.foo.merif2019-pg0.utah.cloudlab.us:8787/vnc_auto.html

6. Within a terminal in the resulting VNC desktop, install srsLTE (including the GUI) as shown below. The shell commands are available from http://powderwireless.net/powder/srslte to copy and paste.

   ```
   sudo bash
   apt-get update
   apt-get -y install libboost-system-dev libboost-test-dev
     libboost-thread-dev libqwt-dev libqt4-dev cmake
   cd /usr/local/src
   git clone https://github.com/srsLTE/srsGUI.git
   cd srsGUI
   mkdir build
   cd build
   cmake ../
   make
   make install
   apt-get -y install libfftw3-dev libmbedtls-dev
     libboost-program-options-dev libconfig++-dev libsctp-dev
   cd /usr/local/src
   git clone https://github.com/srsLTE/srsLTE.git
   cd srsLTE
   mkdir build
   cd build
   cmake ../
   make
   make install
   ```

7. Now take a snapshot of the node with the "Create Disk Image" button on the Experiment Status page. The image namespace is shared with others in the project, so include your username in the image name to avoid collisions. The snapshot will take several minutes to complete, and please note the URN given at the end.

8. Next you can derive a new profile by using the "Copy" button on the Experiment Status page. Include your username in the profile name (to avoid collisions), and then use the "Edit Code" button, and update the `disk_image` assignment to the URN you obtained in the previous step. You might also like to update the docstring.

9. Please terminate your old experiment, on its status page.

10. Now instantiate the new profile you just created. Do this exactly as the original profile, but use the name you specified in step 8.

11. Repeat steps 4 and 5 to bring up the desktop in the new profile.

12. Use srsLTE to encode and decode a downlink waveform, as follows:

```
cd /usr/local/src/srsLTE/build/lib/examples
./pdsch_enodeb -o /tmp/samp -n 5000 -m 9 -v
./pdsch_ue -i /tmp/samp -n 5000 -r 1234 -v
```

13. When you are finished, return to the experiment page and press the "Terminate" button.