

Introduction

With the growing number of wireless devices and development of new transmission technology, the wireless spectrum become a important natural resource that is in limited supply. The goal of this project is to use SDR to observe the transmission process and collect the transmission data for AI to ML to improve the efficiency of transmission.

Objectives

- **Spectrum Sensing:** Spectrum Sensing is a key function of cognitive radio to prevent the interference and identify the available spectrum for improving spectrum's utilization.
- **Common Coordination Channel:** Channel coordination is to coordinate multi-communication within the spectrum.
- **Channel Assignment:** Channel assignment is the process of assigning separate channels to all the nodes in the communication range.

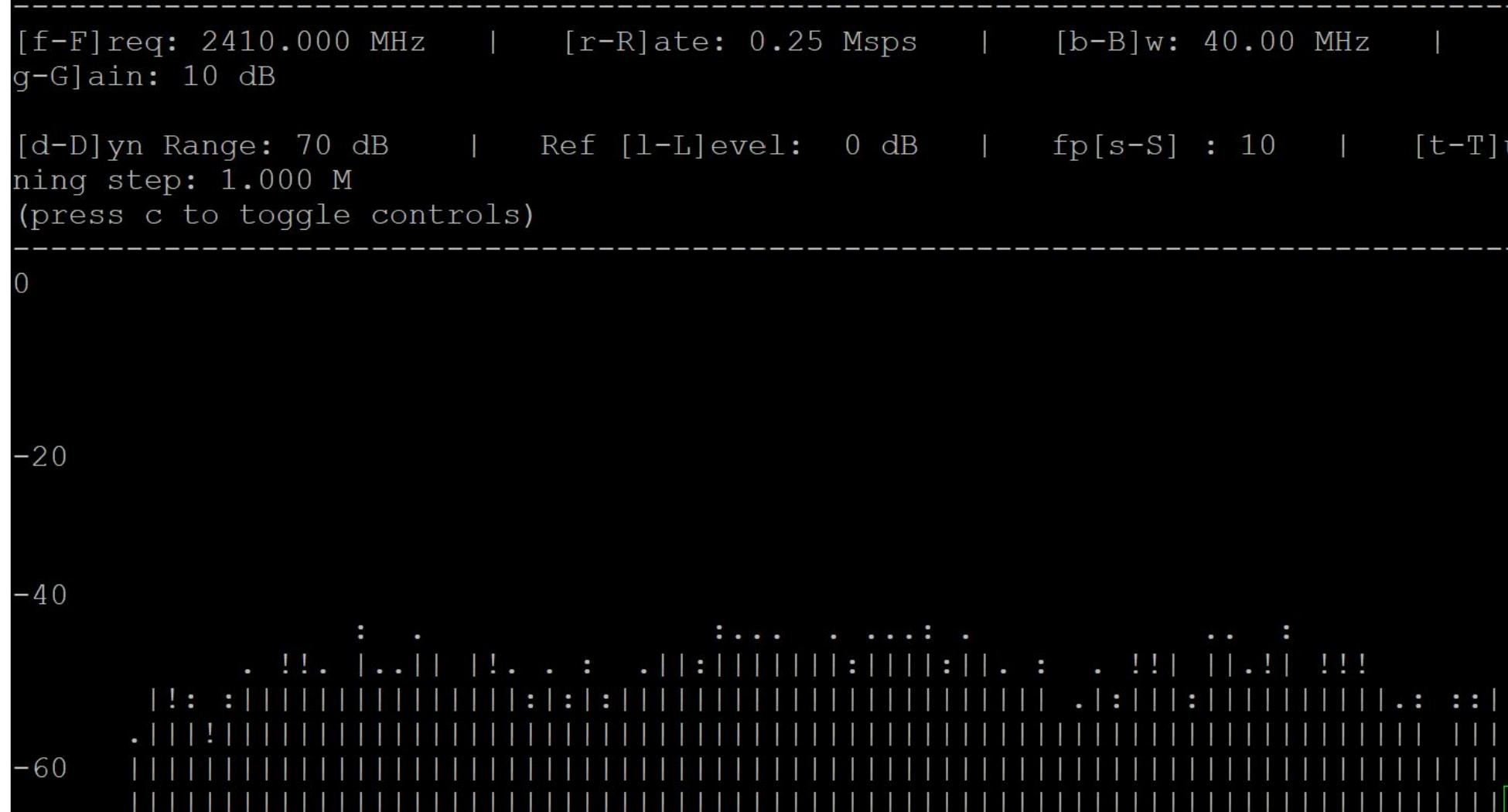
Devices

- Sandboxes in Orbit facilities
- USRP X310



Experiment

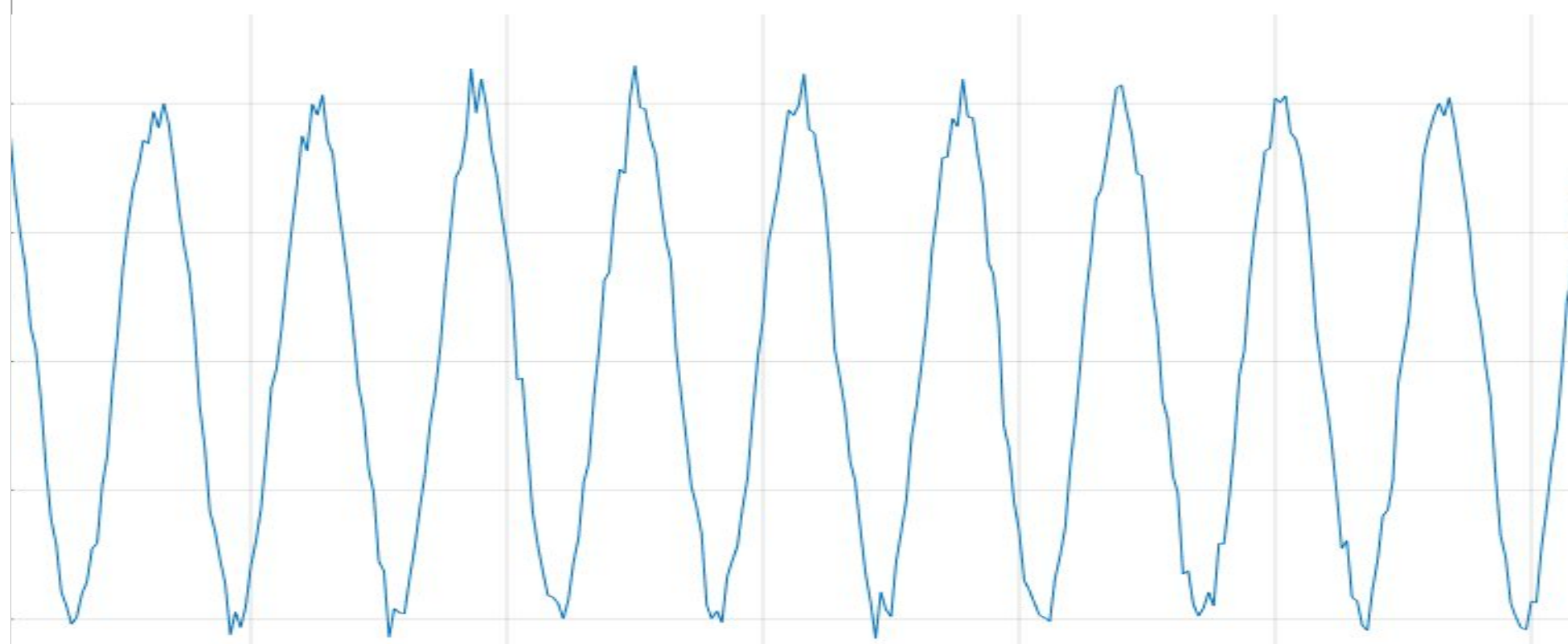
- Simple Radio with USRP X310



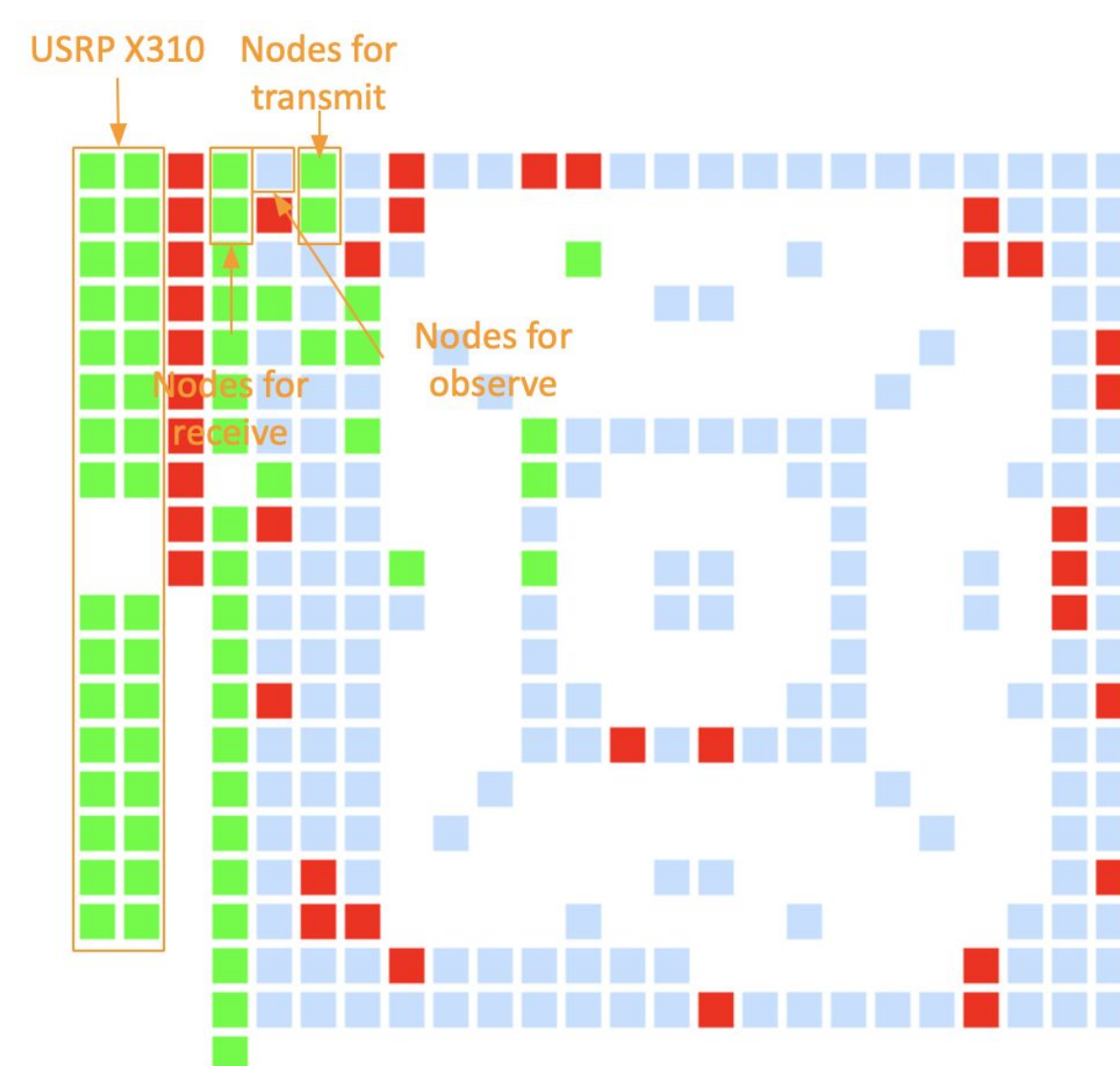
Transmission parameters

Freq	Bitrate	Modulation	Gain	Amplitude
2.41GHz	0.25MHz	BPSK	10	0.5

Transmit a sine wave and capture with frequency 2e3Hz and amplitude 0.5, plotted in MATLAB in time domain.



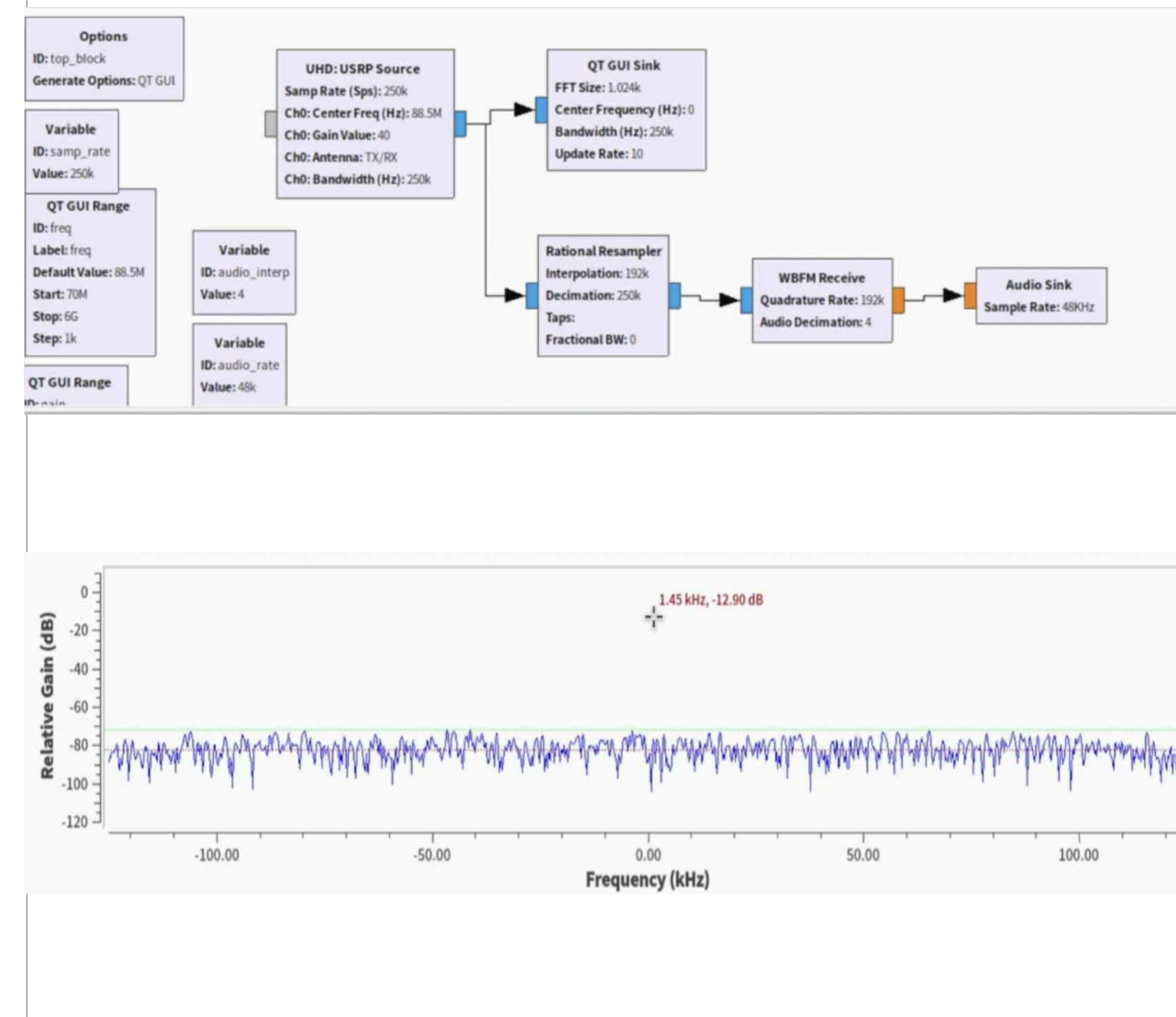
- Data collection experiment, using grid on orbit facilities



GNU radio and UHD

What It Is:

- GNU radio: Simulation software for SDR development (Software Defined Radio)
- UHD: The USRP Hardware Driver is a user-space library that runs on a general purpose processor and communicates with and controls all of the USRP device family



Future Plans

- With the collected data, using Artificial Intelligent (AI) approaches to build intelligent networks, in order to adapt their spectral behavior.
- Based on the behavior of difference wireless devices user, using algorithm to assign limit spectrum capacity in a more efficient way.