WIRELESS OPEN-ACCESS
RESEARCH PLATFORM

Introduction to WARPLab

Melissa Duarte

Rice University

WARP Project

April 28, 2011

1 Introduction

Lab 1 is an introduction to the WARPLab framework. You will use the WARPLab framework to sense the spectrum using WARP and MATLAB.

For this lab exercise you will use several of the functions that are part of the WARPLab reference M-Code. You can view these functions in MATLAB by entering **edit FunctionName** in the MATLAB command line. For example, to open the function **warplab_initialize** enter **edit warplab_initialize**. The functions are also available in the repository, click here to access the repository. You can also access the WARPLab functions in the repository from http://warp.rice.edu/trac/wiki/WARPLab by clicking on the link for 'Releases' on the upper right menu and then going to the 'Releases' section and the link labeled as 'Reference M-Code Version 5.2'.

Note: All files are stored in `C:\workshop` . This location will be referred to as `.\` for the rest of the lab.

Note: WARPLab documentation can be found online at http://warp.rice.edu/trac/wiki/WARPLab.

2 Spectrum Sensing using MATLAB

The setup that you are using is shown in Figure 1, a computer running MATLAB and a WARP node are connected to a switch via Ethernet links. You will use the WARPLab framework to sense the spectrum using WARP and MATLAB. The lab instructors have setup a radio transmitting at two frequencies f_1 and f_2 and you will use the WARPLab framework to sense which are the frequencies f_1 and f_2 at which the instructor's radio is transmitting.

To continue with the lab exercise please follow the instructions below.

1. Open MATLAB and set the Current Directory to `.\Lab1_WARPLab\Workshop_Exercises`.
2. Open the file **warplab_SpectrumSensing_WorkshopExercise.m** and follow the instructions given at the beginning of the file.
3. On your working **warplab_SpectrumSensing_WorkshopExercise.m** file, modify the values of the Receiver Gains and observe the effects on the received signal.

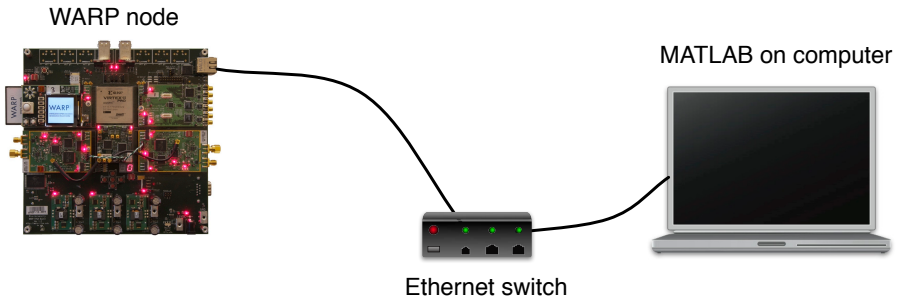

Figure 1: *Spectrum sensing setup.*

3 Optional Exercises

If you finish the lab with extra time you can pair up with another group to implement some of the WARPLab examples available on-line at http://warp.rice.edu/trac/wiki/WARPLab/Releases in the

'Resources' section in the link labeled as ' M-Code examples'. Notice that the WARPLab examples available at http://warp.rice.edu/trac/wiki/WARPLab/Releases have been designed for a WARPLab setup where two WARP nodes are connected to a host computer via an ethernet switch and one WARP node is used for transmission and the other WARP node is used for reception, as is shown in Figure 2. The setup for today's workshop is as shown in Figure 1, hence, to implement the examples available at http://warp.rice.edu/trac/wiki/WARPLab/Releases you should pair with another group so one group can implement the transmitter node and the other group can implement the receiver node.

You can start by implementing a continuous transmitter node by using the example for continuous transmission (warplab_siso_example_ ContinuousTx.m) as a guideline. Implement the continuous transmitter node and other groups should be able to sense the signal that you are transmitting.

After implementing and testing the continuous transmitter you can pair up with another group so one group implements a transmitter of modulated bits and the other group implements the receiver. To do this you can use the communication system example (warplab_siso_example_Comm.m) as a guideline and the transmitter node should be set to continuous transmission mode.

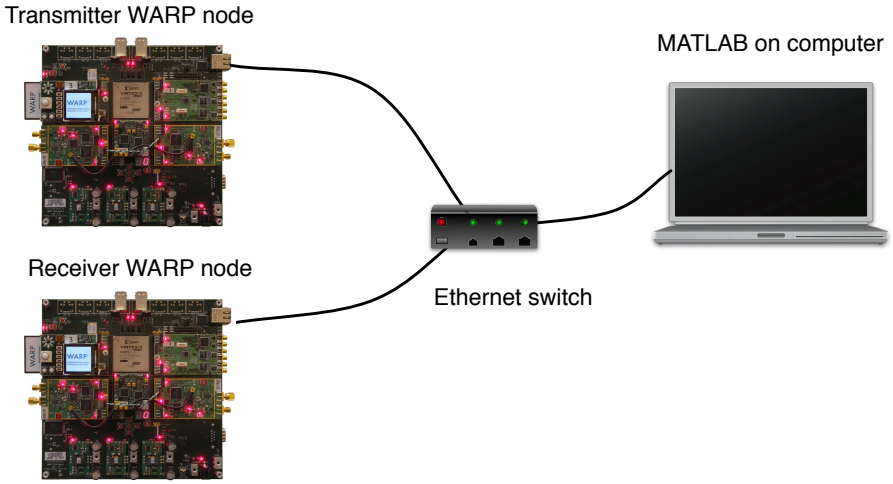

Figure 2: *WARPLab setup with two nodes.*