Dept. of Electrical Engineering

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Dual Degree Project Stage 1

OpenBTS with cognitive capabilities

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Abstract

Our goal is to set up an OpenBTS system with cognitive capabilities. We have a predefined frequency band to run our cognitive OpenBTS system in. First we sense the presence of primary users in that particular frequency band by detecting the presence of ongoing calls. If it turns out that the calls made by primary users end, then we start our secondary OpenBTS system thus allowing secondary users to make calls.

Contents

Chapter 1

Introduction

1.1 Cognitive Radio

A cognitive radio is an intelligent radio that can be programmed and configured dynamically. Its transceiver is designed to use the best wireless channels in its vicinity. Such a radio automatically detects available channels in wireless spectrum, then accordingly changes its transmission or reception parameters to allow more concurrent wireless communications in a given spectrum band at one location. This process is a form of dynamic spectrum management[1].

1.2 Motivation

Studies have shown that most of the spectrum allotted to licensed networks remain unused most of the time[2]. To utilize these unused spectral resources we can make use of dynamic spectrum management. We can allow secondary (unlicensed) users to utilize the spectrum whenever that particular spectrum becomes available. For this we need cognitive capabilities to sense the availability of the spectrum.

1.3 Organization

Chapter 2

Software Defined Radio

2.1 Introduction

2.2 USRP

USRP (Universal Software Radio Peripheral) is a hardware kit developed by Ettus, Inc. to run software defined radio applications.

2.3 GnuRadio

2.4 OpenBTS

Chapter 3

Spectrum Sensing

3.1 Matched filter detection

3.2 Energy based detection

Bibliography

[1] `http://en.wikipedia.org/wiki/Cognitive_radio`.

[2] Federal Communications Commission. Spectrum policy task force. *ET Docket No. 02-135*, November 2002.