

## Accepted Manuscript

Application of wavelet transform in spectrum sensing for Cognitive radio:  
A survey

P.Y. Dibal, E.N Onwuka, J. Agajo, C.O. Alenoghena

PII: S1874-4907(17)30330-0

DOI: <https://doi.org/10.1016/j.phycom.2018.03.004>

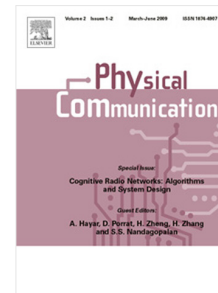
Reference: PHYCOM 506

To appear in: *Physical Communication*

Received date: 7 August 2017

Revised date: 15 February 2018

Accepted date: 12 March 2018



Please cite this article as: P.Y. Dibal, E.N. Onwuka, J. Agajo, C.O. Alenoghena, Application of wavelet transform in spectrum sensing for Cognitive radio: A survey, *Physical Communication* (2018), <https://doi.org/10.1016/j.phycom.2018.03.004>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Application of Wavelet Transform in Spectrum Sensing for Cognitive Radio: A Survey

†P.Y. Dibal, \*E.N Onwuka, \*\*J. Agajo, \*C.O Alenoghena,

†\*Telecommunications Engineering Department, Federal University of Technology Minna

\*\* Computer Engineering Department, Federal University of Technology Minna

†yoksa77@gmail.com

*Abstract*—Spectrum sensing is an important technological requirement in the quest to realize dynamic spectrum access (DSA) in today's wireless world. Cognitive radio (CR) has been identified as an enabling technology that will considerably mitigate the effect of spectrum underutilization and cushion spectrum scarcity. But for this to happen, fast and accurate sensing technique must be developed. Quite a number of spectrum sensing techniques are available in literature, but these are not without inherent short comings. Recently, applications of wavelet techniques for spectrum sensing is receiving attention in the research community, this is attributed to its unique ability to operate both in the time and frequency domains and its suitability for wideband sensing. This paper takes a general look at the applications of wavelets in solving problems in science and engineering and then focused on its recent applications in spectrum sensing. Besides discussing the general spectrum sensing techniques in literature, the paper also discussed wavelet-based spectrum sensing, and its variants; pointing out the merits and limitations of each. It noted that, like any other sensing technique, wavelet-based technique has its strengths and weaknesses, hence, the advantages and disadvantages of this technique are also highlighted. Also, wavelet techniques in spectrum sensing was variously compared with existing wavelet sensing techniques; other spectrum sensing techniques; and existing wideband sensing techniques. Emerging research trends involving wavelets in wireless communications systems design are discussed while some challenges posed by wavelet techniques are mentioned. The paper is intended to provide necessary information and serve as a pointer to relevant literatures for researchers seeking information about wavelets and their applications in science and engineering and particularly in spectrum sensing for CR.

*Keywords*-Spectrum Sensing; Cognitive Radio; Wavelet; Wavelet Packets

## 1. INTRODUCTION

The electromagnetic radio spectrum is a unique natural resource which can be reused over and over by both transmitters and receivers that are licensed by regulatory bodies and also the unlicensed radios based on a given plan. This property of reusability makes the radio spectrum a high-valued commodity with the capability of allowing a large number of concurrent users derive maximum benefit from it as long as good management and careful planning are observed. However, with increasing wireless applications, there appears to be a scarcity of radio spectrum. Investigation has revealed that this scarcity is caused by poor utilization of allocated radio spectrum by primary users of such spectrum, causing wastage and making the spectrum appear scarce [1-2]. The second cause of the scarcity of radio spectrum is the convergence of wireless communications and computing systems, which include entertainment systems, information systems, and multimedia systems. This convergence has increased the competition for available wireless bandwidth, hence the scarcity [3].

Cognitive radio (CR) is a technological innovation that is envisaged to provide solution to the problem of static spectrum allocation and thus enable dynamic spectrum access and management in wireless communication systems. Its core objective is the provision of spectrum through dynamic and opportunistic access of the primary user spectrum so long as there is no harmful

Download English Version:

<https://daneshyari.com/en/article/6889035>

Download Persian Version:

<https://daneshyari.com/article/6889035>

[Daneshyari.com](https://daneshyari.com)