

A Review on: Improving Channel Sensing in Cognitive Radios with OHTP Based Source Nodes

¹Kahekasha Shaikh, ²Ashish Manusmare

^{1,2}Electronics & Communication, Ballarpur Institute of Tech., Ballarpur, Gondwana University, India

Abstract

Cognitive radio allows unlicensed users to use licensed frequency band through dynamic spectrum access so as to minimize spectrum inefficiency. This needs good sensing technique like cooperative sensing which develops the use of information from number of the users. The cognitive radio system faces the main challenge is to increase the secondary users performance by limiting the interference forcefully on licensed user. For this finding the optimal and accurate sensing techniques are required in cognitive radio networks. The deficiency of spectrum and also enhancement in technologies & usage of wireless technologies causing to scarcity of spectrum. To overcome this issue the solution in the literature is to allow the spectrum dynamically or opportunistically. So for that use opportunistic hybrid transport protocol for cognitive radio adhoc sensor network. For that we can develop method congestion control mechanism to differentiate between the true congestion from the interruption loss. After such a process of detection and differentiation we can implement the method to handle them opportunistically. There are lots of advantages to window and rate based protocols. To take the advantages of both to enhance system performance, we can implement a hybrid transport protocol. We are going to analyse our proposed work by using NS-2 simulator and the result parameters are throughput, delay and energy.

Keywords

Spectrum sensing, Cognitive radio ad hoc sensor network, Opportunistic, Primary user(PU), Secondary user(SU)

I. Introduction

Cognitive radio allows the unlicensed user to access the licensed user frequency band so as to minimize spectrum inefficiency. The authority to use the spectrum is normally explain by frequency, spectrum owner (i.e. license), transmission power, types of use and the period of license in wireless communication system. Normally a license is issued to the one user, and the access of spectrum by this user must be confirmed to the characteristics in the license. The more idea is to make spectrum more flexible by allowing the secondary user to use the radio spectrum under some conditions. The main goal of the concept of the concept of the cognitive radio is to provide adaptability to wireless transmission via dynamic spectrum access (DSA). So the frequency spectrum can be enhanced without losing the advantages related with static spectrum allocation. The main two important characteristics of cognitive radio is cognitive capability and re-configurability.

The cognitive radio has the cognitive cycle having the four steps i.e. 1] Spectrum sensing which refers to the detection of the spectrum holes detecting license user to share unused spectrum without harmful interference with other user. 2] Spectrum management is the way to fulfill the requirement of user communication by capturing the best available spectrum. 3] Spectrum mobility is the way or process of cognitive user to interchanging the frequency of operation. 4] Spectrum sharing is the method to providing a proper spectrum scheduling among the users.

The most important term of cognitive user is spectrum sensing for that focusing over the spectrum sensing technique like the energy detector and the wavelet based detector and implementing a advantageous spectrum sensing. Hybrid detector to sensing the spectrum in term of some parameters like delay, throughput, energy, etc. With ever increasing in the wireless technologies and applications requires large spectrum allocation policy gives full authority to the primary user i.e. license operators. The factor contributing to spectrum underutilization is one of it. Also the FCC survey point out the deficiency in the usage of assigned spectrum.

To solve this problem the cognitive radio network is good solution to improve the efficiency of spectrum usage and network capacity.

In CRN the unlicensed user opportunistically use the spectrum band when the primary user is not using. But the main condition is protect the licensed used transmission. So, whenever primary user arrives then secondary user must vacant the channel immediately. So we are going to proposed new transport protocol named opportunistic hybrid transport protocol (OHTP) cognitive radio ad hoc network. The objective is to provide new congestion control mechanism by considering the dynamic nature of cognitive radio ad hoc sensor network. Also it takes the benefits of window based and rate based protocol according to the network condition to improve the overall performance of the system.

So we are going to improving the spectrum sensing in the network by implementing the hybrid detection with and the also implementing the OHTP at the source node to reduce the congestion in CRASN.

II. Literature Survey

There are some papers which are taken as a review papers as given below:

The OHTP is compared with the TFRC, TFRC-CR, and TFWC and the come out with the conclusion that the OHTP is the very meritorious protocol among them. As designed and implement the new congestion control mechanism to handle the licensed user arrival, if the network is largely congested for that rate based transmission is good to give smooth throughput otherwise window based transmission is better option[1].

In Cognitive radio permits unlicensed users to access licensed frequency bands so dynamic spectrum signal access so as to reduce low down the spectrum deficiency. This requires intelligent spectrum sensing techniques like co-operative sensing which creates use of information from number of users. A survey has been done on cognitive radio spectrum sensing technique which explains some primary role of cognitive radio are spectrum sensing, spectrum management, spectrum sharing and spectrum mobility[2].

There is a different spectrum sensing techniques to access the unlicensed user in the band of licensed user when the licensed user is free and it is being wasted at that time. The analysis and

numerical result confirm that collaboration can significantly improve the spectrum sensing performance in a noise power fluctuating environment. The sensitivity of the spectrum sensing is improved by Asynchronous cooperative spectrum sensing method and by using energy detection evaluates the false alarm or detection for spectrum sensing[3].

There are different signal sensing techniques by taking into the consideration the pros and cons and compare them in the terms of operation, complexity, accuracy and implementations get the energy detection because of its low computational and implementation complexity. The signal detection can be done by comparing the output of detector by the given threshold value[4].

III. Problem Formulation

In the cognitive radio network the unlicensed user access the licensed user frequency when the licensed user I not using the frequency channel. But the main objective is to protect the licensed user transmission. So, when as the licensed user arrives, then the unlicensed user using the channel of licensed user must vacant the channel immediately. As the cognitive radio network may consist of the single channel multichannel but as the primary user arrives the secondary user has to leave the channel and wait for the another channel to free. The CRASN does not have any infrastructure backbone.

Further there are using the some protocol as the TFRC, TFRC-CR and TFWC. But there are some demerits in the parameters of this protocols. So we proposed the OHTP for the CRASN to achieve the same goal as cognitive radio. We can design and embedded the new congestion control algorithm to handle licensed user arrival intelligently in the transport protocol. As there is an congestion in the network the cwnd value is low, then the rate based transmission is suited to give the proper throughput. On the other hand, the better option is window based transmission. So, for that we are propose the hybrid transport protocol.

The critical task is to ensure that the licensed user interruption detection for optimal performance. So there should be differentiation between true and fake congestion. Because of congestion there is a packet losses due to this there is bad effect on transmission rat licensed user interruption cause packet loss not considered as congestion either they are interruption losses. So for that we can keep the cwnd same or same rate for future transmission to exploit the next available spectrum. So, the opportunistic way to transmit more packet within the given time. In the case of true congestion we reduce the rate by the same packet loss ratio and the OHTP having great parameters than TFRC, TFRC-CR and TFWC.

In the existing work, researchers have performed various channel sensing techniques and measured their Performances. These performances are measured with already existing algorithms and no new algorithm is proposed. Our proposed work is significant, because we are developing a new hybrid algorithm that combines energy detector and wavelet based detector for channel sensing. The hybrid technique will be combine with OHTP protocol to improve the performance of the source node for communication of data in cognitive radios.

IV. Objectives

1] Further there is very deficiency in the network but by the proposed work we can improve the energy deficiency of the network using OHTP in place of the others TFRC, TFRC-CR and TFWC and get the hybrid protocol.

2] We can implement the hybrid sensing technique by taking the energy detector and the wavelet based detector and make the hybrid detector to introduce the new protocol for hybrid channel sensing.

V. Methodology

The planning and methodology for proposed work named as “Improving Channel Sensing In Cognitive Radios With OHTP Based Source Nodes” can be according to the name divided into various modules which is depend on the how work can be done in the process of proposed work. The flowchart for it can be shown in the following figure.

The modules of the proposed work can be divided into the six parts according to the implementation of the proposed work of the project. It starts with the development of the cognitive network and end with the taking the result analysis in between there is some involvement of the sensing techniques. All the proposed work will be going to be done in NS2 i.e. network stimulation 2.

In the below figure there is a flowchart for the planning of proposed work in this there are six modules are explained below:

Design of a cognitive radio network: The base of the proposed work is it is in cognitive domain for that first of all we have to develop a cognitive radio network where we have to decide the source and destination, primary users and secon

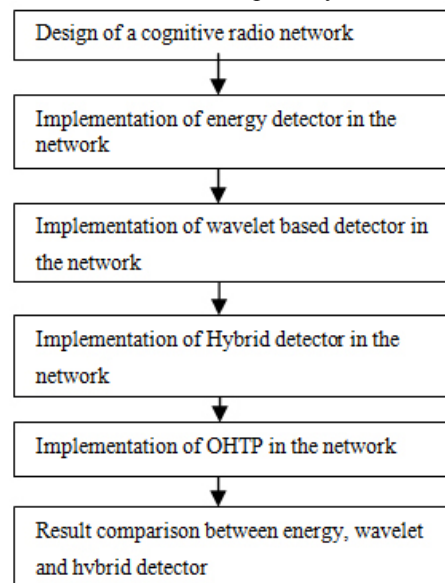


Fig. Flowchart for methodology

Implementation of energy detector in the network: Energy detection method is the broadly used spectrum sensing method since previous knowledge of the licensed user signal is not required, it will performs well with unknown channels and it has less computational and implementation complexity with less delay compared to other methods.. Energy detection is most positive for detecting independent and identically distributed signals in high SNR conditions, but not best for detecting correlated signals. Implementation of wavelet based detector in the network: Wavelet transform we can have multi resolution analysis i.e. we can, Investigate the signal at different frequencies with different resolutions. Contain good quality time resolution and poor frequency resolution at high frequencies. Contain good frequency resolution and poor time resolution at low frequencies. In addition it is further suitable for limited duration of high frequency and unlimited but longer duration of lower frequency

components. Implementation of hybrid detector in the network: In this proposed work the difference is that we can implement the hybrid detection technique in it, which can give the meritorious detection in the combination of both energy and wavelet based detector. Implementation of OHTP in the network: In this proposed work we can implement the opportunistic hybrid transport protocol in the source node of the network which can give the function of the both window and rate based protocol.

Finally we get the result as the comparison between the energy detector, wavelet detector and hybrid detector in the parameters like throughput, energy and delay with OHTP at source node. All the work of the proposed work is going to be done in NS2 i.e. network simulator 2.

VI. Conclusions

In this paper we clearly get that, this proposed work have advantage that it can improve the channel sensing technique in the cognitive radios. Also in this we are going to implement the opportunistic hybrid transport protocol which can give the better parameters than TFRC, TFRC-CR and TFWC. Gives performance of OHTP to cognitive radio network by means of congestion control. Dynamic Spectrum Management helps to prevent interference. OHTP CRAHN reduces the delay and increase the throughput. After that in this paper we are focus over spectrum sensing techniques as well as different approach used for accessing licensed spectrum by secondary user. In our proposed technique, the energy efficiency and sensing efficiency of the cognitive radios will be improved.

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