

THE SPECTRUM SENSING AND SHARING USING GAZER NODE FOR HET NET SYSTEMS IN COGNITIVE RADIO NETWORKS

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Abstract: Cognitive networks are programmable and dynamic nature, which help to use the spectrum effectively. In Cognitive Radio, Spectrum sensing, spectrum allocation, and reuse scenarios approaches with the different algorithm improves the utilization of the spectrum. Traditional spectrum allocation technique such as fuzzy logic and harmony search which replace the spectrum with new spectrum scheme. However, the new technique brings more efficiency in achieving spectrum utilization. Still the cognitive in mesh network has the problem of collision between the secondary and primary users. To minimize the effect of collision we introduce a Gazer based cognitive radio network which provides more freedom for frequency sharing paradigm. Initially, all the primary and secondary nodes are scattered. The scattered secondary nodes are grouped based on location it present its referred as zones. Each zone is assigned with a gazer node. The node with maximum connectivity with other nodes is selected as gazer node. The gazer node senses the spectrum that are currently used in network to carry out communication. The best spectrum is chosen by gazer node for other secondary nodes to initiate communication[1]. If the free channel is greater than channel request the direct communication is performed, else the communication was routed through gazer node in TDMA manner.

Keywords: Cognitive radio, Spectrum sensing, Gazer node, Het Net .

1. Introduction

The concept of Cognitive radio network deal with sharing of available spectrum among users to carry out communication. The spectrum management is the process of allocating radio frequencies to users establish communication. In general, the frequency range of spectrum for wireless communication is from 3 KHz to 300 GHz. The available spectrum is a limited resource. Current sensor network such as mobile phone communication establish by dividing a particular location into segments and erecting a base station at these segments. The base stations do not overlap with other base stations coverage area[2]. However, the

approach is not effective for wireless sensor network where the primary and secondary users are in the same location and need to establish Communication.

In wireless sensor network the frequency band are categorized among licensed and unlicensed users. The licensed users or the primary users initially have spectrum allocated to them and will initiate communication whenever necessary. But the secondary users or unlicensed users will not be able to communicate when the primary users have an active communication in the network[3]. In order to provide a communication platform for both primary and secondary users to communicate seamlessly cognitive radio network implemented.

Conventional methods employ algorithms use energy detection technique and rendezvous time to determine the available primary and secondary users in the network and the frequency in which they operate to provide seamless communication between the users in the network. However, the methods fail to provide a smooth operation because the energy detection technique involves communication among nodes to share energy level[25]. The method will increase the data shared between the nodes in the network and time consuming. In addition, the rendezvous time technique provides optimal communication. The communication among the node in the network base on time. The primary and secondary users in the network are allotted time slots to establish communication in generally . However, in critical applications if any user need to transfer a critical data then the user have to wait for time slot to establish communication. To eliminate these drawbacks gazer node scheme is implemented in the cognitive radio networks. The spectrum sharing is the main theme to utilize maximum frequencies to transfer the data from sender to destination nodes. Even though it is more efficient, spectrum sharing technique brings a problem of collision. Cognitive radio, the future technique to transfer data efficiently through sharing of the spectrum in communication devices. Spectrum should be utilized efficiently for effective communication. Today traditional method to command and control spectrum allocation generates uneven network traffic, which leads to overload in network usage. To overcome this paradigm, open spectrum

sharing is implemented in cognitive radio networks. The sharing of the frequency with all the nodes establishing communication at a time also the load will be equally spread in the spectrum ,so unbalance spectrum utilization is avoided[4-6].

2. Existing System

The conventional system in which the cluster based system is followed. The cluster will collect all the information about the subnets without the knowledge of the cluster the subnets will not establish the communication. Time delay will be more. The existing system only for immovable nodes not for movable nodes. The existing nodes cannot establish communication for movable nodes if any present in the system.

And also in the existing system the sensing decision is improved but the connection will be disconnected from secondary system when the primary user required the signal. Then the secondary system start sensing again this full process will takes place. By this throughput will be decreased and the residual energy will be used more [26,28]. There are many techniques applied for spectrum sensing to improve the communication without interfering with the primary user.

3. Related Work

The recent works in cognitive radio mainly based on estimation of errors in cognitive radio networks. The cognitive radio is based on multiple antennas so it should need improved energy detector for better performance. The energy detector recently used instead of conventional energy detector to improve the spectrum efficiency in the cognitive radio networks. In this replacement of detector they derived the false alarm probability and missed detection. The overall performance are monitored and improved by the energy detectors. Here they are minimizing the total error rate by introducing the frame work to derive a closed expression. An efficiency quick spectrum sensing algorithm is proposed which requires fewer than the total number of multiple branches [7].

Cooperative spectrum sensing is primarily improved the situation sensing the empty groups in the cognitive radio systems. The sequential probability ratio test scheme (SPRT) is considered as an intense approach for the sensing and the sensing depends on cooperative spectrum sensing. The parallel sensing conduct is considered in the secondary users (SU),To stay away from the intermittent spectrum sensing data falsification (ISSDF) assault the beta function (BSPRT) is proposed. And furthermore evaluating the secondary user, the added substance discipline and multiplicative rot factors are acquainting with lessen blunders in the cognitive radio networks. The BSPRT scheme will be

successfully utilized as a part of the framework to diminish the assaults in the cognitive radio networks. By surveying the trust estimation of SUs logically, the additional substance teach and multiplicative not factors are familiar with mitigate the dangerous effect of poisonous SUs amid the time spent the fragile decision data blend, and in this way upgrading the exactness of the last distinguishing decision [8-10].

So many works are undergone in the cognitive radio networks related to attacks occurs in the primary and secondary user and also to improve the spectrum usage for secondary user in the network. In recent proposed papers they used clustering method in which the cluster head will be there as a main source. so, without the knowledge of the cluster the transmission cannot happen. The recent works mainly concern about spectrum efficiency and also mainly about the attacks happen in the system.

4. System Model

A. Hetnet(Heterogenous Network)

A heterogeneous system is a system partner PCs and diverse contraptions with different working structures or conceivably traditions. For example, neighbourhood (LANs) that partner Microsoft Windows and Linux based PCs with Apple Macintosh PCs are heterogeneous. The word heterogeneous system is furthermore used as a piece of remote systems using assorted access advancements. For example, a remote system which gives an organization through a remote LAN and can keep up the organization when changing to a telephone orchestrate is known as a remote heterogeneous system. Reference to a HetNet every now and again exhibits the use of various sorts of access centre points in a remote system[13-15].

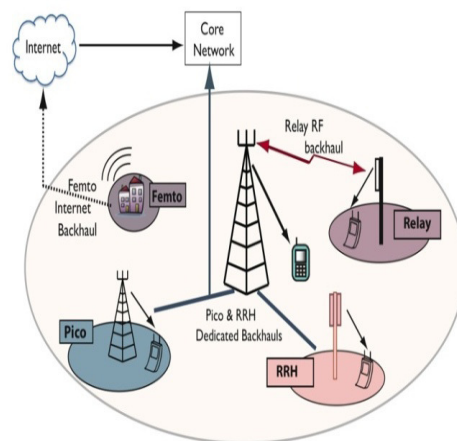


Figure 1. General HetNet system

A Wide Area Network can use large scale cells, Pico cells, and in addition fem to cells in order to offer remote extension in a circumstance with a wide combination of remote degree zones, running from an open outside condition to office structures, homes, and underground zones. Flexible experts portray a HetNet as a system with complex entomb operation between large scale cell, little cell, and once in a while WiFi compose parts used together to give a mosaic of degree, with hand off limit between organize segments. An examination from ARC graph checks that HetNets will help drive the versatile establishment market to speak to nearly \$57 Billion in spending universally by 2017.

Little Cell Forum portrays the HetNet as multi-x condition –multi-advancement, multi-territory, multi-run, multi-executive and multi-dealer. It must have the ability to automate the reconfiguration of its operation to pass on ensured advantage quality over the entire system, and adequately versatile to suit changing customer needs, business targets and supporter rehearses[28]. From a designing perspective, the HetNet can be viewed as fusing conventional full scale radio access sort out (RAN) limits, RAN transport capacity, little cells and Wi-Fi value, that are logically being virtualized and passed on in an operational circumstance where navigate of control joins server cultivate resources related with figure, systems organization and limit.

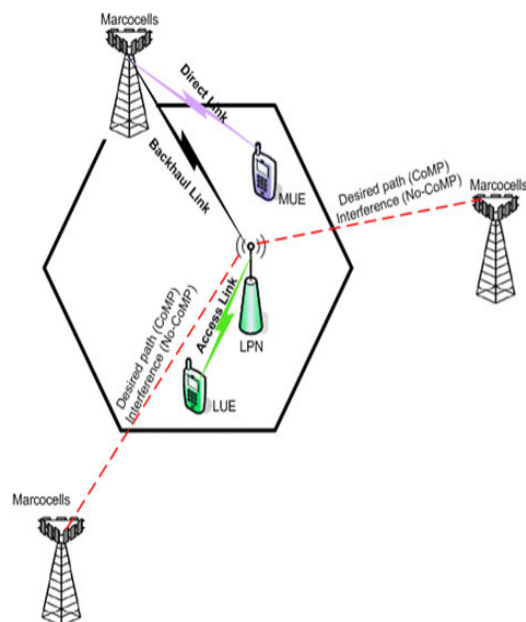


Figure 2. HetNet system with direct and indirect link

In this system, self-streamlining system (SON) helpfulness is principal to engage orchestrate of enormity sort out densification with little cells. Self-

outline or 'fitting and play' reduces time and cost of course of action, while self-upgrade by then ensures the system auto-tunes itself for most outrageous capability as conditions change. Movement ask for, customer improvements and organization mix will all progress after some time, and the system needs to change in accordance with keep pace. These overhauled SON limits will in this way need to consider the creating customer needs, business targets and endorser hones. Altogether, limits related with HetNet operations and organization take earlier SON capacity that may have recently been engaged at a lone zone and in addition development, and develop it to pass on modernized advantage quality organization over the entire HetNet.

B. Gazer Node

Cognitive radio mainly concentrates over the efficient utilisation of spectrum in the network. The gazeer nodes are mainly used for flawless communication with some time delay. Mostly the gazeer node will be establish communication when the node cannot perform direct communication. The nodes are generated and formed as zone[20-24]. For each and every zone the gazeer is chosen which will have all the information about the nodes. The gazeer node is the centre node which monitor and manage the network from occurrence of collision. Gazer nodes connect to each other and transfer the information about the free channels in the network between them.

C. Collision Avoidance Using Gazer Nodes And Zone Formation

The gazeer node in which used for collision avoidance. Cognitive radio mainly concentrates over the efficient utilisation of spectrum in the network. Spectrum sharing and reuse provides maximum throughput for the network. Primary users and Secondary users are the common issues in the network in allocation of free spectrum. To avoid the collision between primary and secondary nodes zones are created. The each and every nodes are assigned to form a zones. Gazer Nodes allocate spectrum to the zones[16]. The fast spectrum allocation work as a shielding between the zones, so spectrum sharing is possible between the zones. The gazeer node communicates with the nodes based on the time slot basis. The gazeer node communicates with particular node with a time delay to avoid collision between nodes. Initially the primary and secondary are initialisation. Then the nodes are segregated as zones. The nodes which have maximum links were selected as a gazeer node, to cover all the nodes in the zones.

Gazer node will transfer data to the nodes indirectly when there is no possibility of direct communication establishment with no loss of data. The gazeer node will check whether the required channel is less than the channel available. If required channel is less direct

communication will establish. If required channel is greater means the communication establish will takes place with gazer node[17-18]. Though this method of creating zones will avoid the collision. The work flow methodology are given below

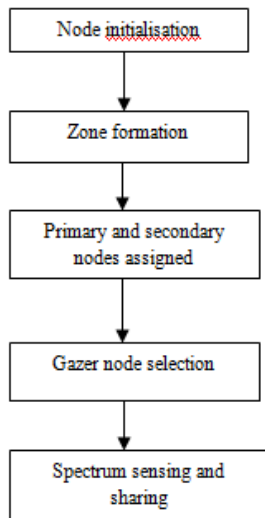


Figure 3. Flow chart of spectrum sensing

Algorithm

Step1:Sensing neighbour nodes to frame zone.
 Step2:primary and secondary nodes are formed.
 Step3: Nodes are splitted into Zones.
 Step4: Node with maximum links is selected as Gazer Node.
 Step5:Gazer node starts spectrum sensing
 Step6:Communication establishment takes place.

5. Result and Explanation

The simulation results are given below are simulated using a NS2 software. Nodes are initialised. Nodes are divided into frames based on location. For each zone primary nodes and secondary nodes are chosen. Then gazer node will starts communication.

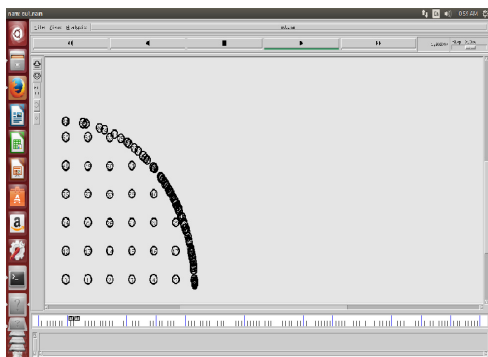


Figure 4. Node generation

The Fig. 4 in which the nodes starts to establishment and then they will be arranged in order according to their location.

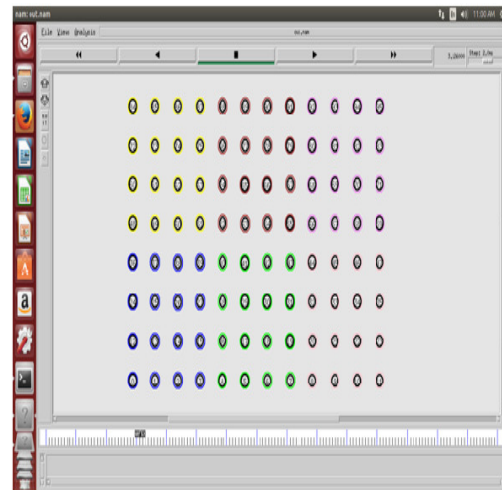


Figure 5. Zone splitting

The Fig. 5 zones are splitted and for each zone the gazer node is assigned. The gazer will be act as head and it will plays a major role in sensing.

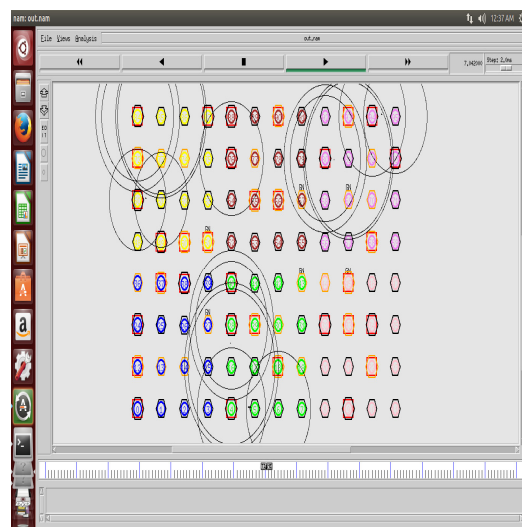


Figure 6. Sensing and communication establishment

The Fig. 6 secondary nodes will sense the nodes and it communicates .The communication establishment will happens once these nodes get arranged and sensing happens.

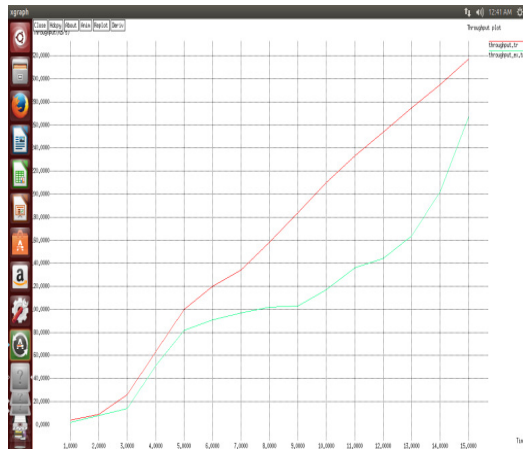


Figure 7. Residual energy graph

The Fig 7 is the graph of residual energy from this technique we get a improved performance with less use of energy.

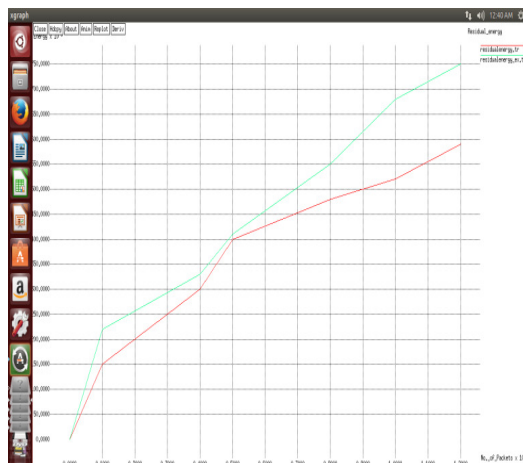


Figure 8. Throughput graph

The Fig 8 is the Throughput graph in which improved throughput can be achieved by this method and performance of the system will be improved and packet loss also improved.

5. Conclusions

In this paper, a cooperative spectrum sharing is used for maximizing the spectrum of the secondary user so the spectrum sensing will be takes place with the help of gazer node The future scope of this work is many zones can be created and efficiency of the secondary spectrum can be improved by implementing new algorithms and more good sensing techniques will be easily implemented. The method can be done in

different modes. This project is done in flat type model. The method can also be done using cluster type with different method handling system .The sensing can done fast in future and time delay can be overcome in future. By this method the efficient communication will be established.

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