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Smart Group-Based Work in Cognitive Radio Network

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Abstract— In this paper, consider the multiple channels and group-based cognitive radio network, the secondary users having heterogeneous sensing ability regarding high accuracy for sensing. We use cooperative spectrum sensing (CSS) scheme for cooperating secondary users in multiple workgroups such that different workgroup is responsible for sensing different channel. The group-base CSS scheme use in workgroup we share the channel in same cooperating users are in multiple rounds.In this work, we propose adaptively assigning that the heterogeneous Co-operating secondary users to different groups to maximize the throughput efficiency while maintaining a predefined sensing accuracy. In Cognitive Radio Network is detected by channel are use or not, if not the avoid are there but sometimes a lot of constraints & challenges, also issues are there it gets the amount of busy server. The PU users get not possible to provide network then use SU smartly.It provides a network to group-based with the help of different sensing round. The Heterogeneous group based channel shares CSS scheme. It is Adaptive Secondary Users solve the problem about Heterogeneous Group user and achieve that the maximize throughput efficiency & low computational complexity significantly that can be as compared with existing non-adaptive assignment and sequential CSS scheme.

Keywords— Cognitive Radio, Cooperative Spectrum Sensing (CSS), Sensing Accuracy, Sensing Overhead, Cognitive Radio Network (CRNs).

I. INTRODUCTION

Cognitive radio & application of them with trainable, adaptive radio system to enable intelligent connection amongst various group user. The cognitive radio network is used for wireless communication with the help of node changing its transmission or sensing parameter to communicate Primary User (PU) & Secondary User (SU) for the adaptive group, efficiently avoiding interference with authorized and unauthorized users [1],[2]. The change of parameter is based on active monitoring of various factors in both external & internal radio environment including radio frequency spectrum. The Cognitive radio network work as two-layer architecture, the second layer transmit the signal on the frequency band assigned to the first layer by sensing the radio frequency band to avoid the interference towards the first layer. The cognitive network enables the user to focus on content and context rather than configuration and management of the network for group user. The Cognitive Radio Network (CRNs) use the several work group that can be channel get allocate. This channel is either be primary or secondary. Firstly, PU channel allocates several user workgroups, but this channel cannot be possible to allocate all users in that group then we help with SU channel allocation. The channel gets allocate different sensing rounds by handling with non-adaptive grouping and sequential CSS scheme.

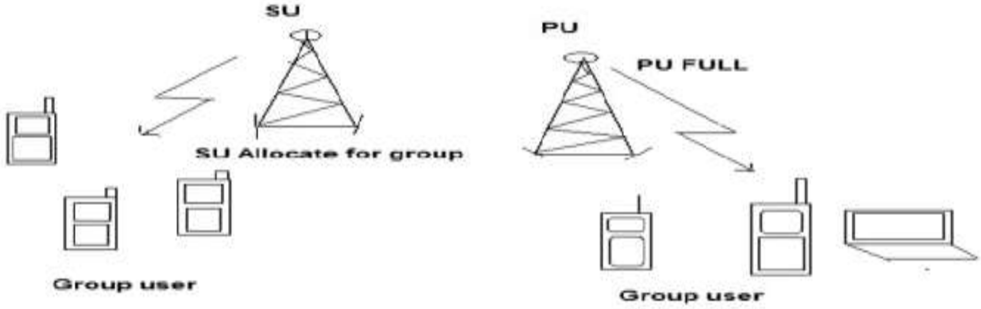


Fig.1.Work Group Based Cognitive Radio Network

The non-adaptive grouping and CSS scheme, SU get assign random channel but not specifically sort in a certain order in the sequential scheme. The SU get sense same channel in each sensing period, but mainly aim is to improve sensing accuracy of PU. The scheme is assigned all user to each group at different each sensing round are there. In the centralized Co-operative spectrum, sensing identifies vacant licensed band and communicate that some method for SU follow geo-location and beacons method states that PU registers relevant data, their location and transmit power in expected duration at the centralized database, these database called fusion center. These get to make combine decision for SU. The SU get transmit the local decision to fusion center error occur then report to the channel for power control and phase shifting technique detection performance of CSS based on OR fusion rule.

The SU have to access database to determine the availability of vacant licensed band in their location and help with the user group. The SU by Identify data, Access data & Control data with the Beacons Method [2]. It will use additional connectivity in different order for there. The SU can Automatically detect presence Primary signal & our channel will be are not used by PU. The SU spectrum sensing to determine vacant licensed frequency band and restrict their SU of the empty band by helping nature SU also energy detection will be proper then transmission possible low computational and implementation complexity & prior knowledge of PU signal is needed [3]. To achieve the SU sensing result rise error affect accuracy, then the most important factor is improved network co-operative SU spectrum sensing measurement. The operation will be handle that scheduling for sensor node is ON/OFF order network [4],[5].

SUs improve cooperative spectrum sensing ability for the network because it depends on accuracy. The SU fusion center is there for making the combine local decision; an error will be reported to the channel for regular propose efficient data fusion for power control and phase shifting detection performance of CSS base OR rule[7],[8].Channel can be sense one-by-one for CSS; order gets maximize thought can achieve sort channel in descending order ratio to required sensing time. A sensing period will be sequential algorithm were develop to maximize discovery to spectrum access & minimum delay. The SU discover all available channel, it allows for sensing different channel that select randomly or through negotiation SU but identify a maximum number of vacant channel. The number of group & number of CSS in SU in the group the trade-off between sensing accuracy & efficiency achieve user group Trade-off between throughput efficiency and sensing accuracy [9].We design novel adaptive user group assignment algorithms for group-based CSS to achieve a trade-off between the throughput efficiency and sensing accuracy[10]. In contrast to the work, we consider that the cooperating SUs have heterogeneous sensing ability regarding the sensing accuracy which introduces new challenges to the group-based CSS [11]. We analyze the scenario when channel state information is available, and SUs can adapt their transmission rate according to the channel quality. Then we have to achieve better efficiency with low computational complexity without any interference.

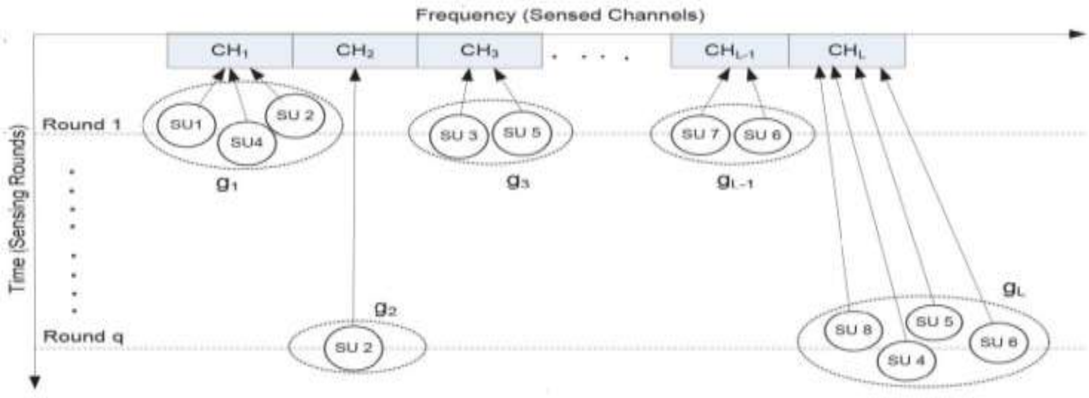


Fig.2.Group-based Cooperative Spectrum Sensing (CSS) With Different Sensing Round[19].

SYSTEM MODEL

A. ON/OFF Model

It gets the important model to ON/OFF for PU channel for public safety band is there. There is two modes ,ON is used for PU, and another OFF mode is used for SU. The SUs can utilize the OFF period of the primary user channel to transmit their own data. We consider the operation of SUs on a frame by frame basis work done by proper management.

B. Discrete Rate-Adaptive Modulation

It is needed that time-varying features of the channel ,an SU can adapt transmission rate according to channel quality is there then use adaptive modulation. If some noise detects the transmission rate SU determine physical layer and parameter is one-by-one mapping.The Transmission rate for SU according to Shannon's theory for channel rate and received rate the relationship by-

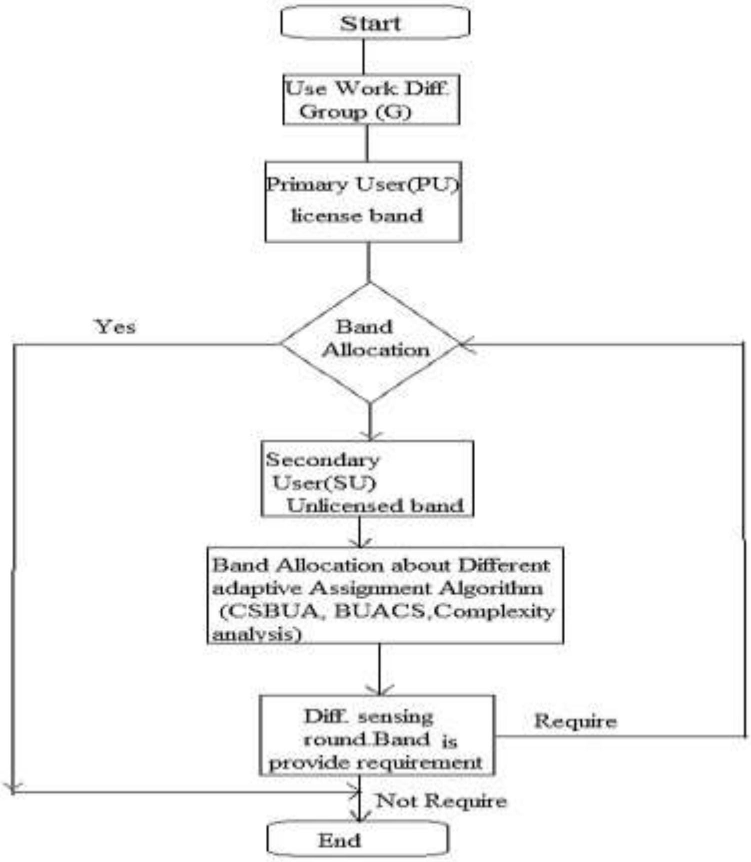
$$Rm = W \log2(1 + SNRm)$$

C. Energy Detection:

The information cannot be an exchange about PU and SU; each SU needs to perform spectrum sensing non-cooperative.The energy detection require no information about PU signal, which is more practical in energy model detect the presence of PU is equivalent to distinguishing between two follow hypothesis-

$$Xk(n)=\begin{cases} Vk(n) & ;H0 \\ hks(n)+Vk(n) & ;H1 \end{cases}$$

FLOW OF WORK



EQUATIONS FOR REDUCE BIT ERROR PROBABILITY

We have to analyze that proposed three assignment algorithm Channel selection Best User Assignment (CSBUA), Best User Assignment for Channel Selection-1(BUACS1) & Best User Assignment for Channel Selection2 (BUACS2) performing with non-adaptive grouping and sequential CSS scheme.

The BUACS2 algorithm has the higher computational complexity to compared other CSBUA & BUACS1 Algorithm; it causes by imperfect reporting channel between heterogeneous user and fusion center in our group based CSS. In SU scheme the error reduce was taken formula by-

The probability of false alarm for each group as-

$$P_F(gi) \quad =\sum_{x=n'}^{K}\sum_{Jk\in A(x)}\prod_{k=1}^{K}(\varepsilon i.k)^{jk}\,(P_{f,k}^{fci})^{\varepsilon 1,k,jk}(1-P_{f,k}^{fci})^{\varepsilon i,k(1-jk)}$$

Similarly, the probability detection for each group-

$$P_D(gi) \quad =\sum_{x=n'}^{K}\sum_{Jk\in A(x)}\prod_{k=1}^{K}(\varepsilon i.k)^{jk}\,(P_{d,k}^{fci})^{\varepsilon 1,k,jk}(1-P_{d,k}^{fci})^{\varepsilon i,k(1-jk)}$$

Now, investigate different counting rule propose adaptive assignment algorithm for compare average probability detection and a false alarm in group 'i' (over 1000 simulation run) the different number is assigned to group satisfies OR and majority voting (MV) fusion rule. To achieve the desired sensing accuracy, Pd for the group using MV rule, we need to considerably increase the number of cooperating users in this group (provided a sufficient number of users *K* are available for cooperation) compared to the OR rule. Which will, in turn, result in more number of sensing rounds and higher average sensing overhead. The CSBUA, BUACS1 and BUACS2 algorithms assign users to a group in descending order of their probability of detection on this group, using the OR fusion rule, we can achieve higher probability of detection compared to the MV rule for the same number of users in a group on the expense of higher probability of false alarm. We can achieve the desired sensing accuracy, Pd for the group using MV rule, we need to considerably increase the number of cooperating users in this group the fusion center uses the OR fusion rule to combine the decisions from the set of cooperating SUs in each group.

Conclusions

In this group-based CSS scheme, channels sharing the same Co-operating users are scheduled to sense in different sensing rounds. The cooperating secondary users to different groups to maximize the throughput efficiency while maintaining a predefined sensing accuracy.The Group users optimal performance with low computational complexity and can also improve the throughput efficiency significantly compared to the existing non-adaptive assignment and sequential CSS scheme.

The proposed assignment algorithms have low computational complexity and their performance is within 2.6%–4.7% of that of the exhaustive search for $|G| = 2$ with BUACS2 algorithm providing the best performance and CSBUA algorithm providing the lowest computational complexity for using analyze different workgroup and sensing round overhead.

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