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STUDY ON COGNITIVE RADIO NETWORK TECHNOLOGY

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Abstract

A cognitive radio network is which allow the unauthorised user to access specific band frequency are not meant for the user, using dynamic spectrum access to increase the spectrum capability. Because now a days the using of a specific band frequency are getting more crowd while some other frequency are used very less that leads to the spectrum deficiency. But while allow the second user to access the band frequency should not affect the usage of the primary user. Thiscan be achieved by creating a chart of how a specific spectrum is crowed by comparing other spectrum. This main objective of spectrum allocation uses technique called dynamic spectrum access. The dynamic spectrum access is the process of analysing the spectrum band how they are being used more and its normal capacity of using. The dynamic spectrum access (DSA) is one the auspicious way to rack up spectrum adequacy. The dynamic spectrum access does the process of finding the white space in the licensed spectrum to reduce the spectrum scarcity. The software defined radio (SDR) is used for spectrum sensing, the software defined radio is like a brain on the cognitive radio system to find the on deck spectrum render to the environment. They are different types of method of working progress in cognitive radio, by discussing the method of working and flow we can have a clear view on how it's works.

Keywords: Cognitive radio (CR), Dynamic spectrum access (DSA), Software defined radio (SDR).

1. Introduction

The concept of cognitive radio was proposed first by Joseph Mitola III and Gerald Q. Maguire, Jr in the year of 1999. The wireless dissemination is becoming the basis need of modern life cycle, as the communication growing bigger and bigger each day they started to facing the worriment of spectrum scarcity due to over usage of the spectrum while at the same time some other spectrum band frequency are under very less. To overcome this worriment of spectrum

scarcity cognitive radio is used. The spectrum deficiency is the problems that are created by over using of spectrum band frequency over its limitation of using. Basically, it's like the while the mobile spectrum band frequency are becoming used more and more, but at the same time other spectrum band frequency using for television and military purpose are used very low for the capacity they have. To avoid this kind of dislike working, cognitive radio used to allocate this kind of empty band frequency to some of the user (secondary user) from the crowed spectrum band to this under used spectrum band frequency. The process of finding the free spectrum band frequency (white space) and assigning to user are done by process of spectrum sensing and spectrum sharing and they are several internal processes for the white space. By detecting the white space on other spectrum frequency according to usage and environment, this can be accomplish by dynamic spectrum access which sense the spectrum usage of the band frequency that are under used and allow the unauthorised user to use the licensed spectrum that are not assigned for that user (secondary user). This is achieved by using software defined radio (SDR) which is act as brain of the cognitive radio network system. The function of the software defined radio is to allot the user to the spectrum in adequacy way, thus if first receive the signal and compare the spectrum with are available in that area and transfer the signal into the under used band frequency without affecting the primary user of that spectrum.

2. Cognitive Radio

Cognitive radio is the technology that can be to access multiple spectrum band frequency with one radio technology that can be more fixable to change from one spectrum band to another band frequency. This technology is developing for past fifteen year by gradually making it from fully hardware into combing that into the software so it can work more efficiently. By sending radio frequency from the source they are combined into software techniques that done the process for sensing, learning the environment and optimize the radio frequency for changing spectrum band. CR network uses the environment of the area that uses the spectrum band frequency usage and the number of user that uses the band frequency and the frequency band limitation. CR an embodiment of network which deals with the analysing and allocation of band frequency according to how the spectrums are crowded and classifying to availability of white space in the band frequency. The white space on some spectrum band frequency is christen as the unoccupied area of the band frequency which can be utilised for other unlicensed user to access a spectrum efficiency that are not assigned for that user for more reliability and reusing of the band frequency. The insertion of the second user into the unauthorised band frequency to reduce the spectrum scarcity and gives the consumer the best

result without interrupting the legal user of that band frequency. The sensing of the band frequency required a special radio sensing function.
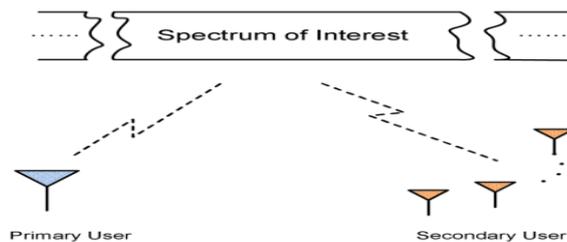

Fig 2. Spectrum insertion.

2.1 Spectrum Sensing

The technique of spectrum sensing will operates the process of making the spectrum band flexible for accepting the unlicensed user. The process spectrum sensing involves many internal working like continuous spectrum access, monitor for alternative empty spectrum and monitor type of transmission.

2.2 Continuous Spectrum Access

It's one of the main process in cognitive radio network to continuously keep tracking of the spectrum band frequency usage, Since we have to make changes for the secondary user when the primary user of the band frequency return to it. So, the continuous spectrum access is the play the important role in CR network.

2.3 Monitor For Alternative Empty Spectrum

As the secondary user that using the spectrum band there will be no change in the frequency band but when the primary user return to spectrum the secondary user should have change spectrum band that he was using before. So for this kind of changing process they should keep track of the both primary user and secondary user.

2.4 Monitor Type Of Transmission

The cognitive radio should determine what type of transmission has to be used for the primary and secondary user for the spectrum band allocation. The spectrum sensing uses different transmission for changing the spectrum for the user so they have to keep the transmission within themselves.

2.5 Dynamic Spectrum Access

As of the fundamental of dynamic spectrum access it does the job of the locating the spots in the under used spectrum band frequency and uses the spectrum in an efficiency way to rack up the spectrum scarcity. As we studying the deep function it uses the software defined radio system for the working progress, the software defined radio(SDR) it does

the core function of the dynamic spectrum access and this deals with the sub process of spectrum enlacing, spectrum partition and etc.,
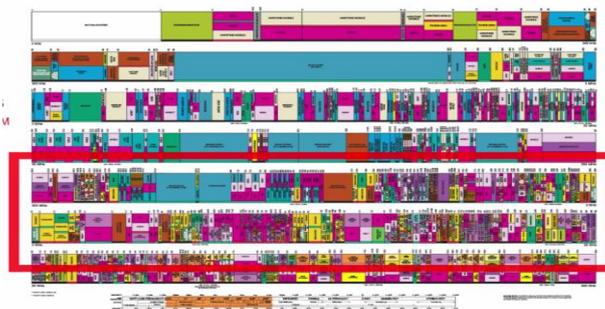

Fig 3(a).crowded spectrum band.

Fig 3(b).under used spectrum band.

As of shown in the fig 3(a) &3(b) the spectrum band frequency are used very less and at the same time some of the other band frequency are much populated as for to overcome this condition the consumer are should be separated and they should give an alternative spectrum band frequency for the consumer to overcome the spectrum deficiency.

2.6 Spectrum Analyics

The spectrum enlacing is the chief progress of the spectrum enlacing and in this spectrum enlacing it finds out which of the spectrum band frequency are used very high and while some other spectrum band frequency are used very less but also while doing this whenever the licensed user come to consume the band frequency it should not affect the primary user usage and also the second user also given the same importance so they second consumer also given alternative spectrum band or the same spectrum band can be divided into different parts and they can be used.
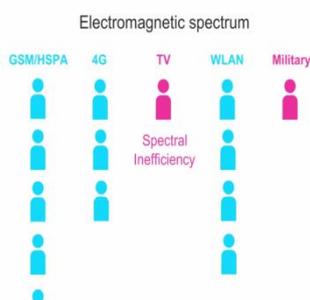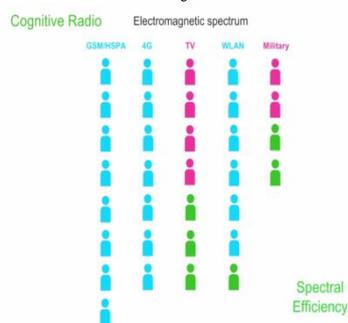

Fig 3.1(a) spectrum band inefficiency.

3.1(b) spectrum band efficiency.

The above fig show that how the cognitive radio is used to divide the spectrum which are not used fully and other spectrum band are used in great numbers.

3. Software Defined Radio

The progress of software defined radio (SDR) is the neural system of the cognitive radio networking system which receive the signal and verify the spectrum band frequency and spotting the white space in the spectrum band and allocating the user to the band. The software defined radio (SDR) are used in many communication materials like amplifier, filters, modulator and demodulator etc. they are used in sectors as TV communication, military, local LAN network.

4. Conclusion

That the cognitive radio is the best solution for usage of spectrum on present scenario and also it will much help full in the future development in the wireless communication area. As the consumer will be keep on increasing on future days the spectrum band frequency are going to get more and more crowd.

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