PERFORMANCE ANALYSIS OF SPECTRUM SHARING TECHNIQES IN COGNITIVE RADIO NETWORKS

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ABSTRACT

In today's world of wireless communication, spectrum seems to be an essential factor for capacity improvement. They are variable bands of spectrum available for different applications. Cognitive radio is a special kind of smart radio transceiver hardware that automatically detect all available wireless channels on a spectrum facilitating changes to its reception or transmission parameters which allows the concurrent transmission of multiple additional wireless communications in locating given spectrum. Our project describes different allocation of spectrum by spectrum sharing technique. Then the current spectrum allocation methods are EDA, ADA, MDA, etc. It plays a function for the cognitive radio network. It is efficiently used for maximize of source resource.

Keywords – *Spectrum, Cognitive radio, Wireless communications, Spectrum allocation.*

1.INTRODUCTION

A wireless network is a flexible data communications system, uses wireless media such as radio frequency technology to convey and accept data over the air, minimizing the need for wired connections. Wireless networks are used to supplement slightly than put back wired networks and are most commonly used to provide last few A wireless network is a flexible data communications system, which stages of connectivity between mobile user and a wired network. Wireless networks use electromagnetic waves to communicate information from one point to another without trusting on any physical connection. Radio waves are often referred to as radio carriers because they simply perform the function of delivering energy to a remote receiver. The data being transmitted is covered on the radio carrier so that it can be accurately extracted at the receiving end. Once data is superimposed onto the radio carrier, the radio signal occupies more than a single frequency, since the frequency or bit rate of the modulating information adds to the carrier. Multiple radio carriers can exist in the same space at the same time without interfering with each other if the radio waves are transmitted on different radio frequency. To extract data, a radio receiver tunes in one radio frequency while rejecting all other frequencies.

Over the past five years, the world has become increasingly mobile. As a result, traditional ways of networking the world have proven inadequate to meet the challenges posed by our new collective lifestyle. If users must be connected to a network by physical cables, their movement is dramatically reduced. Wireless connectivity, however, poses no such restriction and allows a great deal more free movement on the part of the network user. As a result, wireless technologies are encroaching on the traditional realm of "fixed" or "wired" networks. This change is obvious to anybody who drives on a regular basics. One of the "life and death" challenges to those of us who drive on a regular basis is the daily gauntlet of erratically driven cars containing mobile phone users in the driver's seat.

2. LITERATURE SURVEY

[1] Shuguang Cui, Fan Wang and Marwan Krunz proposed a Spectrum Sharing in Cognitive Radio Networks. In this paper, a novel joint power/channel allocation scheme that uses a distributed pricing strategy is discussed. According to this scheme, the spectrum allocation problem is modeled as a non-cooperative game. A price-based iterative water-filling (PIWF) algorithm is proposed, which allows users to converge to the Nash Equilibrium (NE).

[2] Yanjiao Chen, YuxuanXiong, Qian Wang, XiaoyanYin, and Baochun Li proposed Ensuring Least Spectrum Necessity in Matching-basedSpectrum Distribution. To enable dynamic spectrum access, service providers with spare spectrum (sellers) trade with those who are in need of additional spectrum (buyers). In a spectrum market, the transaction result is essentially a match between sellers and buyers. Though it is tempting to optimize the matching over certain utility functions, a stable matching is more desirable, since it takes into account a diverse set of preferences of buyers and sellers, and produces a matching result which no participants have incentives to deviate from. While existing works on spectrum matching only consider the maximum number of channels a buyer can purchase, in real-world scenarios, the minimum spectrum requirement should be satisfied to support the proper operation of wireless communication.

[3] Kaur, R., Buttar, A. S., & Anand, J proposed Methods of Fusion Cognitive Radio Network: A Survey.In advanced radio communication systems, most of the radio spectrum remains underutilized. To fully utilize the radio spectrum, an efficient allocation of the scarce and expensive radio resources is most important and challenging. As a solution of this problem using cognitive radio network (CRN).Cognitive Radio (CR) is a form of wireless communication in which a transceiver can intelligently detect which communication channels are in use and which are not, and instantly move into vacant channels while avoiding occupied ones.

[4] Helena Rifa-Pous, JosepRifa proposed Spectrum Sharing Models in Cognitive Radio Networks. Spectrum scarcity demands thinking new ways to manage the distribution of radio frequency bands so that its use is more effective. The emerging technology that can enable this paradigm shift is the cognitive radio. Different models for organizing and managing cognitive radios have emerged, all with specific strategic purposes. In this article we review the allocation spectrum patterns of cognitive radio networks and analyze which are the common basis of each model. We expose the vulnerabilities and open challenges that still threaten the adoption and exploitation of cognitive radios for open civil networks.

[5] Feng hu, Bing chen, and Kunzhu proposed Full Spectrum Sharing in Cognitive Radio Networks toward 5G. It's the next - fifth-generation of mobile internet connectivity promising much faster data download and upload speeds, wider coverage and more stable connections all about making better use of the radio spectrum and enabling far more devices to access the mobile internet at the same time.

There are a number of new technologies likely to be applied - but standards haven't been hammered out yet for all 5G protocols. Higher-frequency bands - 3.5GHz (gigahertz) to 26GHz and beyond - have a lot of capacity but their shorter wavelengths mean their range is lower - they're more easily blocked by physical objects.

3. PROPOSED METHOD

CQI stands for Channel Quality Indicator. As the name implies, it is an indicator carr0ying the information on how good/bad the communication channel quality is. Channel Quality Indicator(CQI) calculation scheme in LTE / LTE-A systems.

SNR-CQI mapping scheme, as well as SINR-CQI mapping schemes. In With the increasing demand of Quality of Service (QoS) inwireless communication system, more aggressive techniques are employed to improve the frequency and time efficiency. Adaptive Modulation and Coding(AMC) is one of the techniques that are applied in real systems to increase the throughput. The calculation algorithms of CQI are numerous. Most of these utilize the SNR-CQI mapping to determine CQIs. Each UE estimates the channel state information (CSI), then extracts channel SNR and applies SNR-CQI mapping to determine CQIs. Based on SNR-CQI mapping algorithm, lots of enhanced schemes have been propose. The CQI feedback in MU-MIMO systems.

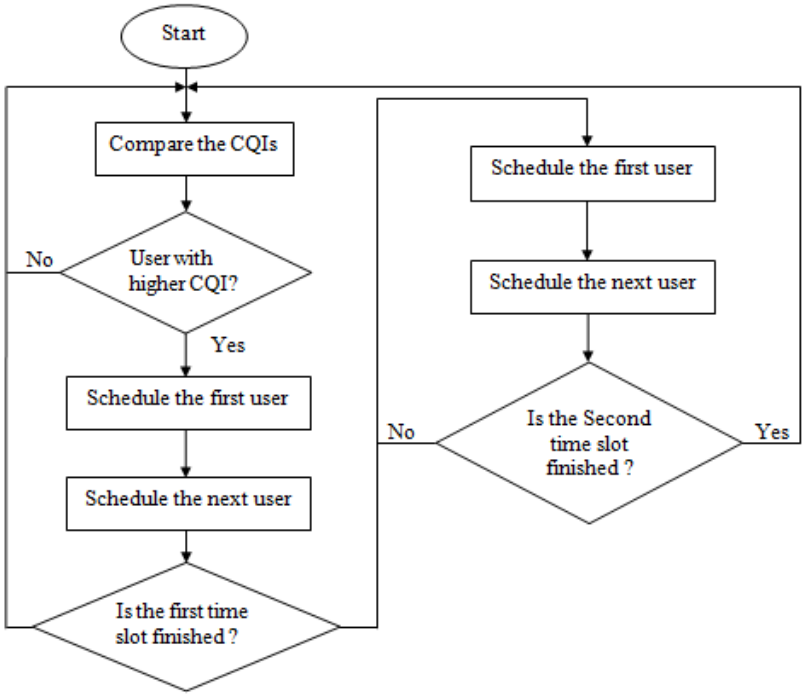

Fig 1- FLOW CHART OF CQI CALCULATION

Generation of SNR & Delay-CQI Mapping

1. Set current *Delay* value *D* equals 0. Set measurement step of *Delay* as Δd.
2. Set current *Delay* value as $D+\Delta d$,obtain the power delay profile of the corresponding channel.
3. Processed transmissions in the channel generated in step 2, and obtain a SNR-CQI mapping as described in Section II.
4. If current *Delay* value is larger than the max value of *Delay* in measurement process, go to step 5.Otherwise, repeat step 2 and step 3.
5. Obtain a group of SNR-CQI mappings corresponding to different *Delay* values, and fit these mappings into a 3-dimension function
CQI = F(SNR; Delay)
6. Output, F

BLER-based CQI Converge Algorithm

Input: Feedback CQI *Q pre*, BLER, SNR *S pre* and *Delay D pre* in the last transmission period, system threshold of BLER current SNR and Delay D
Output: Refined CQI Q

SHANNONS THEOREM:

C=B*log 2(1+S/N)
Where C is the achievable channel capacity
B is the band width of the line, S is the average signal power , N is the average noise power
C=3000*log 2(1001)
Which is little less than the 30 kbps.
Bandwidth B can give maximum symbol rate 2B
Bandwidth=20MHZ, Modulation=64QAM, MIMO=2 x 2
Then for QAM is 6 bits,
Throughput=(20 Mega symbol\sec x 6 Bits s for symbol)

4. RESULT

As Signal Noise Ratio increases the Channel Quality Indicator is also increase. More the SNR, more the CQI also. Both the signal noise ratio and the channel quality Indicator are constantly increases not suddenly. If the SNR is higher, then only the CQI will be good. SNR should be always high for better transmission and it also avoid retransmission. The concept of the SNR is signal should be high than the noise. If the signal strength is high apparently noise is low.

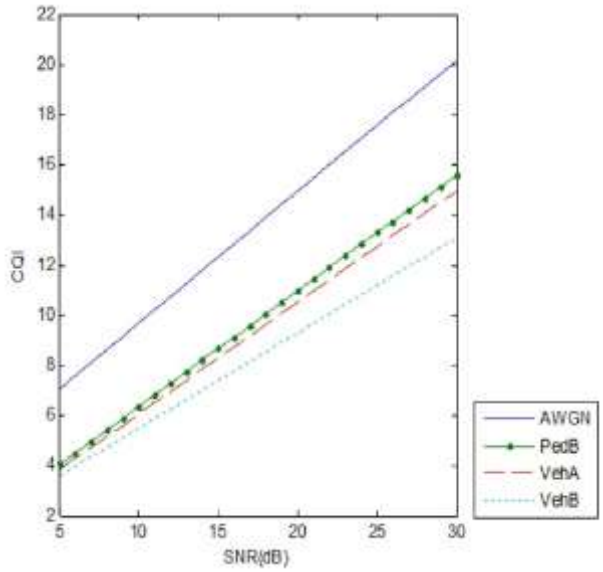

Fig 2- SNR-CQI MAPPING IN DIFFERENT CHANNEL

5. CONCLUSION

The proposed system discussed about the concept and advantages of a particular technique, which constitute one of the promising technique for future networking systems. We have implemented the CQI scheme to improve the efficient usage of network resources. In this project we compared 2 users(Primary and Secondary). CQI method is the efficient method to share the spectrum among the users by comparing the priority need, among the users. CQI method, gives Fairness in Spectrum Sharing. Primary user will get the first efficient spectrum, by this secondary needs same spectrum. CQI plays a vital role to give the efficient spectrum sharing by Priority basis. By this, if Secondary user needs more spectrum which is more important, in that case CQI manage to give the Efficient Spectrum to the secondary user by Spectrum sharing. Due to Spectrum sharing the quality of the network or speed won't be degraded. By this we assuring that CQI will play a major role in this Spectrum Sharing in efficient way based on priority basis without the lag in the system or with neighbor users.

FUTURE WORK - The proposed techniques which has some changes that can be adopted to 5G mobile communication system. In future there will be implementation of such algorithm for 5G mobile communication system.

6. REFERENCE

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