INTERNATIONAL JOURNAL OF RESEARCH AND DEVELOPMENT IN ENGINEERING SCIENCES
e-ISSN: 2582 - 4201 Volume: 2 | Issue: 3 | Year: 2020

INTELLIGENT SPECTRUM ALLOCATION IN COGNITIVE RADIO NETWORKS

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Abstract- *Cognitive radio is a modern technology that upgrades the usage of spectrum resources. A crucial problem is to effectively assign the unused spectrum to unlicensed users. This is recognized as having a huge potential for solving the radio traffic jam problem. The current network scenario is encountering the huge spectrum shortage problem due to the fixed assignment strategy so in this method huge amount of spectrum remains unused.*

To overcome this limitation the spectrum allocation must be in a dynamic manner. Interference is the most crucial factor that needs to be considered. It limits the possibility of spectrum reuse. Spectrum assignment is one of the mechanisms used to manage interference in the network.

In cognitive radio networks spectrum assignment or spectrum allocation or frequency, an assignment is used to avoid interference. Spectrum allocation is an important technique that averts the interference between cognitive devices and primary users. It upgrades the efficient usage of the wireless spectrum. It proposes Dynamic Allocation besides Static Allocation in Spectrum Allocation in Cognitive Radio Networks.

Index Terms- *Congestion, Interference, Spectrum, Dynamic, Static, Primary, Secondary, Sensing, Allocation.*

1. INTRODUCTION

Cognitive Radio Networks:

Cognitive radio is a radio that can be constructed effectively to use the top wireless channels to avoid interference. Such a radio instinctively detects available channels in the wireless spectrum. It is a key function to avoid interference with licensed primary users. Cognitive Radio technology is developed to overcome the spectrum shortage due to rapid development in wireless networks.

Both primary and secondary users can utilize the spectrum efficiently. Spectrum is allocated dynamically so it extends the spectrum utilization.

The unlicensed users can transmit in the vacant spectrum already assigned to licensed users with a minimum level of interference. It senses the spectrum to find the vacant spectrum and choose the best spectrum which meets the required Quality of Service of the unlicensed users. The secondary users leave the spectrum whenever the licensed primary users return.

Applications:

- The application of Cognitive Radio networks to emergency and public safety communications by utilizing white space.

- The potential of Cognitive Radio networks for performing dynamic spectrum access.
- Application of Cognitive Radio networks to the military such as nuclear attack detection, battlefield surveillance, and targeting.
- They are also proven to help establish Medical Body Area Networks which can be utilized in omnipresent patient monitoring that aids in immediately notifying the doctors regarding vital data of patients such as sugar level, blood pressure, electrocardiogram (ECG), etc.

Challenges:

Spectrum sensing: Cognitive Radio senses the spectrum and regulates the spectrum holes and it records their data.

Spectrum allocation: It is an important technique that avoids the interference between cognitive devices and primary users. It enables efficient usage of the wireless spectrum.

2. EXISTING SYSTEM

Description of Existing System:

Spectrum allocation is a crucial technique that avoids the interference between cognitive devices and primary users. It enables efficient usage of the wireless radio spectrum. I

n the existing system, only primary users can use the spectrum and there is no scope of secondary users to use the spectrum.

Flaws or Drawbacks with Existing System:

- Interference of channel is high.
- Parts of the spectrum are hugely unoccupied mostly.
- Command of spectrum in cellular networks is excessive than expected.
- Modifications of old technologies.

  Example: IEEE 802.22

3. PROPOSED SYSTEM

We propose dynamic allocation so that the secondary users can also use the spectrum when primary users vacate the channel.

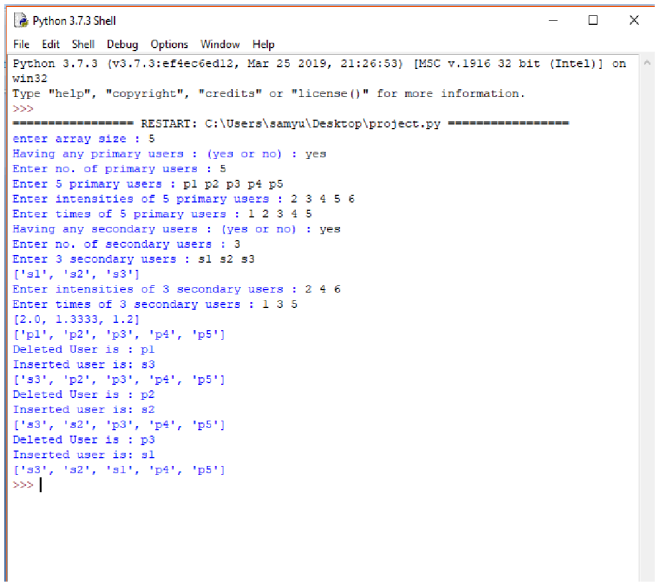
That respective channel is allocated by the secondary users for better utilization of spectrum.

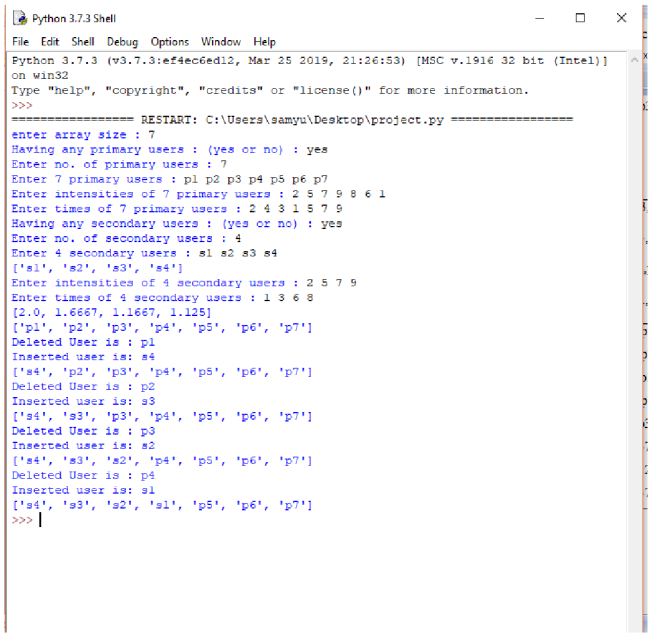
Algorithm Description

Input: Number of primary and secondary users and respective intensity and time.

Step 1: Initialize the population of fireflies (Users).
Step 2: Given intensity associated with time formulated as i/t ratio.
Step 3: The primary users already allocate the channel as per the usage.
Step 4: The secondary users are allocated to the channel by sensing the spectrum.
Step 5: Finally, the secondary users are allocated based on a minimum i/t ratio if the channel is vacant or available.
Step 6: The secondary users are allocated for the better utilization of the spectrum.
Output: Secondary Users are allocated to the spectrum according to their intensity/time ratio precedence.

4. RESULTS





IMPLEMENTATION TECHNOLOGY: PYTHON

Python is a high-level Programming language. It is highly readable. It uses English keywords often. It is easy to learn yet powerful and scripting language, thus used for Application development.

Description:

Input: Array size, Number of primary users, and secondary users, their respective intensity and time.
Output: Secondary Users placed in the spectrum

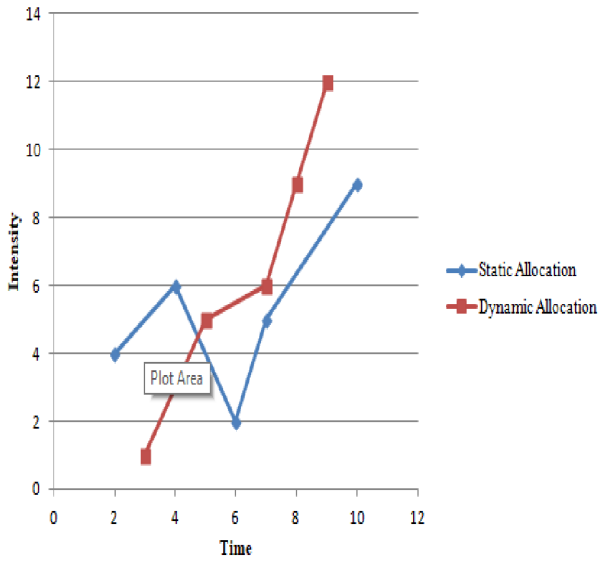


Figure.1: Comparison of static allocation and dynamic allocation in cognitive radio networks

5. FUTURE IMPROVEMENT

Cognitive Radio is a forthcoming technology for future wireless networks. Cognitive Radio utilizes the unused spectrum bands and solves the problem of excess utilization of available bands. It allows the user's to access the unused spectrum. The Cognitive Radio device helps to find the spectrum bands that are not used and it allows to access spectrum bands whenever needed.

The primary objective of cognitive radio is to assign the spectrum bands to avoid interference with the primary users and there is an increase in the performance. Dynamic Allocation is done increasing the utilization of the spectrum which is used in allocating bandwidth in Internet Websites.

6. CONCLUSION

The main aim of this project is focused on allocating the secondary users into the spectrum when it is vacant. Cognitive Radios offer the guarantee of enabling the future wireless world by increasing spectrum efficiency through dynamic spectrum access.

In dynamic spectrum access, the secondary users access the underutilized primary user's spectrum opportunistically.

It is the recent technology for performing dynamic spectrum access: the strategy that conveys the spectrum shortage problem that is experienced in many countries.

Thus, Cognitive Radio is extensively considered as one of the modern technologies for upcoming wireless communications. Spectrum sensing is an important enabler for cognitive radio devices.

It proposes a dynamic allocation to improve spectrum allocation. This has additional features such as allocating the spectrum to the secondary users when the primary users vacate the channel or spectrum.

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