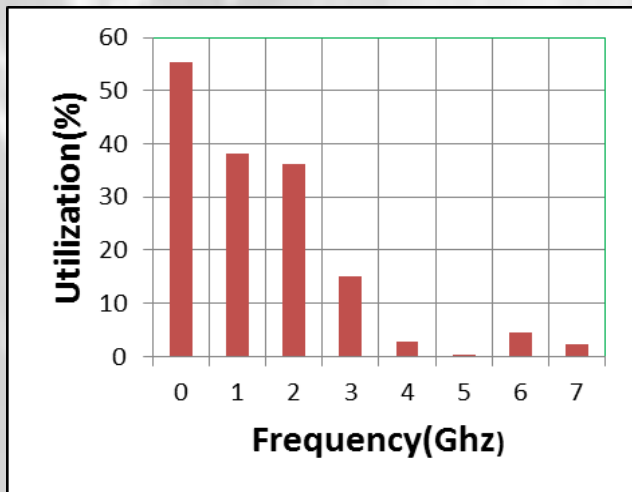
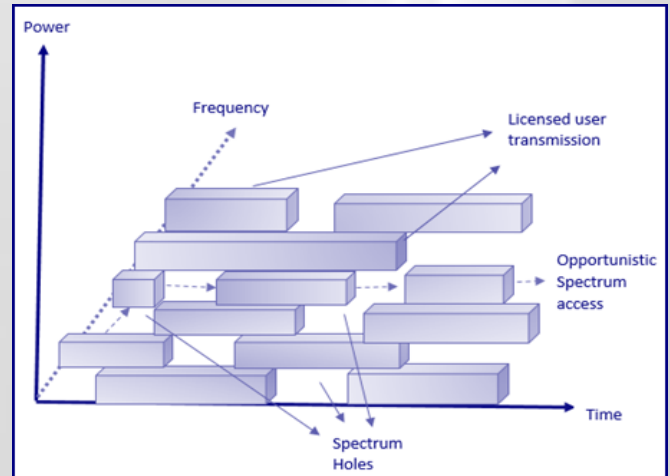


COGNITIVE RADIO NETWORK -A New Paradigm in Wireless Communication

RADIO frequency spectrum is the heart of wireless communication system and its efficacious usage is of uttermost significance. The distribution of this valuable and limited radio frequency resource, as decided by the Federal Communication Commission (FCC), is based on traditional fixed spectrum access policy. This traditional scheme for spectrum assignment divides the frequencies into licensed and unlicensed band. In

Licensed frequency spectrum, exclusive right is provided to a designated user or wireless service provider and other users are not allowed to access this band, even though it is free at particular time and location. It has been pointed out by the Spectrum Policy Task Force. (SPTF) that some portion of licensed spectrum is heavily utilized whereas some

The highest value was 13% at New York City and lowest was 1% at the National Radio Astronomy



are very less or partially occupied at particular location and time. Measurement were taken between Jan 2004 and Aug 2005 by Shared Spectrum Company (SSC) which shows that on the average only 5.2% of the spectrum between 30MHz and 3GHz is in use at 6 different locations in the U.S.A.

Observatory. All these measurements clearly show that large portion of licensed spectrum remains unutilized. Due to fixed nature of traditional spectrum policy, unlicensed users are prohibited from accessing the spectrum band. This low utilization of frequency spectrum increases the cost of bandwidth and degrades performance of wireless communication system.

Unlicensed frequency bands are the portion of spectrum kept aside to access freely by the users. The most widely used unlicensed bands are the 2.4 GHz Industrial, Scientific and Medical (ISM) band, used by IEEE 802.11b/g/n and Bluetooth devices and the 5GHz band Unlicensed National Information Infrastructure (UNII) are used by IEEE 802.11a and European HIPERLAN standard.

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On the other hand, due to new wireless technologies and services like internet, smartphones, social networking sites, these unlicensed bands are getting overcrowded which leads to a problem called spectrum scarcity. The problem is not the spectrum shortage; it is lack of the technology which can effectively access the spectrum.

This inefficient utilization of licensed spectrum and spectrum shortage problem in unlicensed band forces Federal Communication Commission to modify the existing fixed spectrum allocation scheme. FCC decided to make the spectrum flexible by allowing unlicensed user to access licensed spectrum band when it is idle, without any interference with the licensed user transmission.

This new spectrum policy lead to the introduction of a device called COGNITIVE RADIO, which uses Dynamic Spectrum Access (DSA). Software defined radio is the key component and platform for CR in which transmission parameters (frequency of operation, modulation mode, transmission power and protocols) can be coordinated dynamically to Unlicensed frequency bands are the portion of spectrum kept aside to access freely by the users. The most widely used unlicensed bands are the 2.4 GHz Industrial, Scientific and Medical (ISM) band, used by IEEE 802.11b/g/n and Bluetooth devices and the 5GHz band Unlicensed National Information Infrastructure (UNII) are used by IEEE 802.11a and European HIPERLAN standard .



Prof. Nikita Thalia
(Assistant Professor)

“Aim for success, not perfection. Never give up your right to be wrong, because then you will lose the ability to learn new things and move forward with your life. Remember that fear always lurks behind perfectionism.”