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Effect of Attenuation on Cognitive Radio Network

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Abstract

Saving and resource allocation process is one of the most important processes in network planning in order to exploit the frequency spectrum through cognitive radio technology. The aim of this paper is to assess the impact of the changes that occur on the independent channels by users in terms of noise and Attenuation ratio, which are classified to the user all our primary and secondary spectrum is shown in the results in the form of tables and graphs illustrate the amount of capacity in bandwidth against frequency using MATLAB for system simulation software program. The parameters that were taken into consideration in the investigation are the noise and attenuation effect**.**

Keywords: *Cognitive Radio Network, Attenuation, FCC.*

1. Introduction

Cognitive radio is an emerging technology, which aims to upgrade the spectrum utilization by allowing the secondary users to operate at the spectrum bands vacated by the primary users [1]. Spectrum allocation and management have traditionally followed a 'command-and-control' approach – regulators like the Federal Communications Commission (FCC) allocate spectrum to specific services under restrictive licenses. The restrictions specify the technologies to be used and the services to be provided, thereby constraining the ability to make use of new technologies and the ability to redistribute the spectrum to higher valued services[2]. These limitations have motivated a paradigm shift from static spectrum allocation towards a more 'liberalized' notion of dynamic spectrum management in which non-license holders (i.e., secondary networks/users) can 'borrow' idle spectrum from those who hold licensees (i.e., primaries or primary networks/users), without causing harmful interference to the latter– a notion commonly referred to as dynamic spectrum access (DSA) or open spectrum access [2].

According to the Commission Federal Communications (FCC), is not used for more than 70% of disposable optimally spectrum[3], radio was the cognitive (CR) is the solution to increase the use of the spectrum and thus the network's capacity, resulting in the generation of new sources of income with the highest quality service[6] . With the growing demand for higher capacity in wireless networks due to the rapid growth of new applications [4]. Cognitive radio has the ability to capture images or sense of information from its radio environment. On the basis of interaction with the environment, through the most suitable spectrum bands may be licensed or unlicensed [5].

The objective of this paper is to simulate the basics of cognitive radio that enables dynamic access spectrum. The parameters which were taken into consideration of simulation are the noise and attenuation effect for users. It uses the spectrum efficiently by cognitive users take

priority primary user of the spectrum, while giving secondary to the user if the user first idles. The results were obtained in terms of graphs and tables by using MATLAB software**.**

2. Description

Cognitive radio system works to take advantage of the gaps in the spectrum and enters the secondary user is idle or the user is not the first and there is all this taking into account the lack of interference that affect the work of the network**.**

This process occurs through the spectrum sensor that is using algorithms do the job smallest and fastest time so that corrects or detects the user first has been to exploit the channel in case idle. This algorithms working on the sensor spectrum with high accuracy so that contribute to the success of the cognitive system of radio work and so what It reduces interference and noise attenuation**.**

3. Simulator Parameter

The parameters which were taken into consideration of simulation are shown in table below (1):

Table [1]: Simulator Parameter

Parameter	Value
No of users	20 users
Noise	(5,10,20,40,60,80)dB
Attenuation	(5,10,20,40,60,80)dB

4. Computer Model

The computer model to simulate cognitive radio network is shown in fig (1) below:

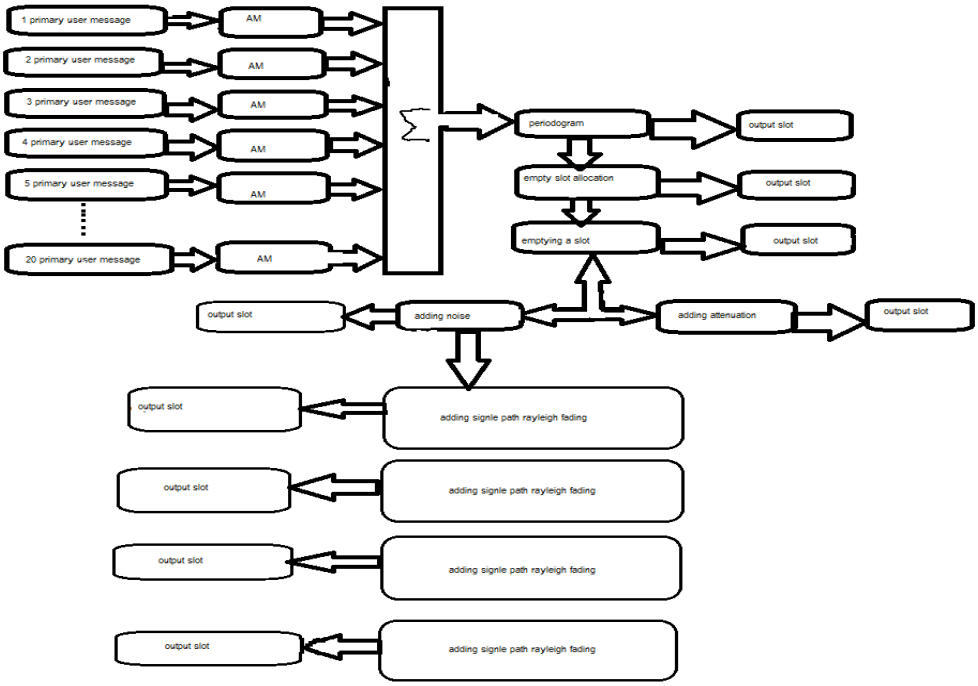

Fig [1]: Computer Model

5. Simulation

The computer model and simulator parameter are implemented using MATLAB software program since it has a good feature of library function and procedure for communication engineer.

6. Results

After execution of the simulator the results were obtained in terms of graphs as shown below

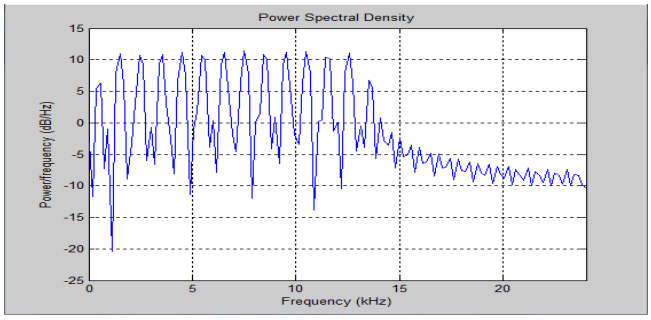

Fig [2]: Frequency spectrum for 20 users

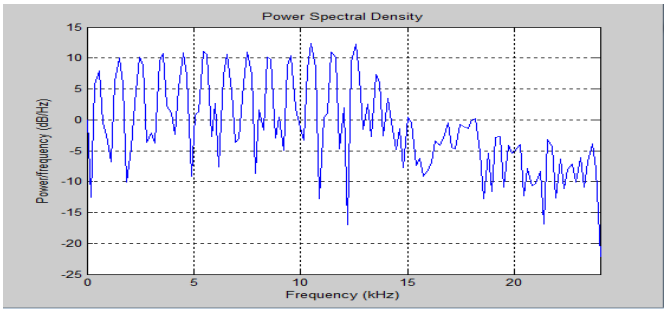

Fig [3]: The noise is 5db with 20 users

Table [2]: The results after the addition of a 5 db noise

User 1 is present.	User 6 is present.	User 11 is present.	User 16 is not present.
User 2 is present.	User 7 is present.	User 12 is not present.	User 17 is not present.
User 3 is not present.	User 8 is not present.	User 13 is not present.	User 18 is not present.
User 4 is not present.	User 9 is present.	User 14 is present.	User 19 is not present.
User 5 is not present.	User 10 is not present.	User 15 is not present.	User 20 is not present.

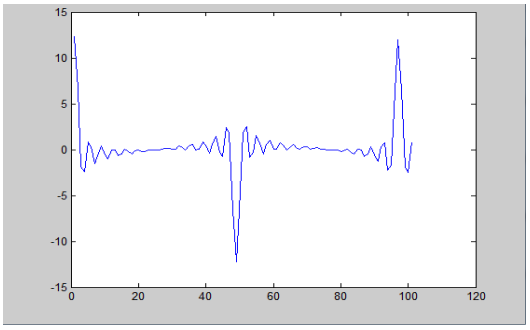

Fig [4]: The Attenuate is 5db with 20 users

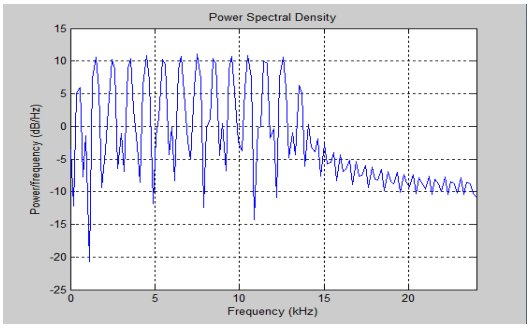

Fig [5]: Influencing the signal after the noise and attenuation process

Table [3]: Table shows the results after the addition of 5 db attenuation

User 1 is present.	User 6 is present.	User 11 is present.	User 16 is not present.
User 2 is present.	User 7 is present.	User 12 is not present.	User 17 is not present.
User 3 is not present.	User 8 is present.	User 13 is not present.	User 18 is not present.
User 4 is not present.	User 9 is present.	User 14 is not present.	User 19 is not present.
User 5 is not present.	User 10 is not present.	User 15 is not present.	User 20 is not present.

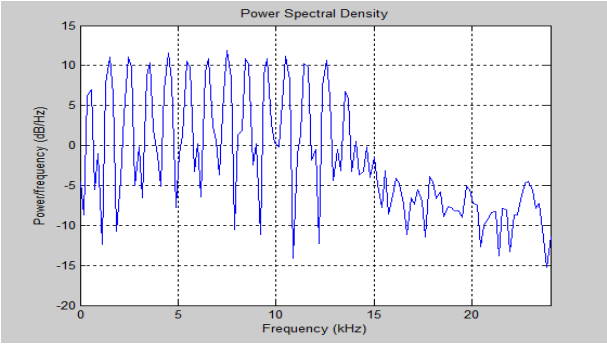

Fig [6]: The noise is 10db with 20 users

Table [4]: the results after the addition of a 10 db noise

User 1 is present.	User 6 is present.	User 11 is present.	User 16 is not present.
User 2 is present.	User 7 is present.	User 12 is not present.	User 17 is not present.
User 3 is not present.	User 8 is present.	User 13 is not present.	User 18 is not present.
User 4 is not present.	User 9 is present.	User 14 is not present.	User 19 is not present.
User 5 is not present.	User 10 is present.	User 15 is not present.	User 20 is not present.

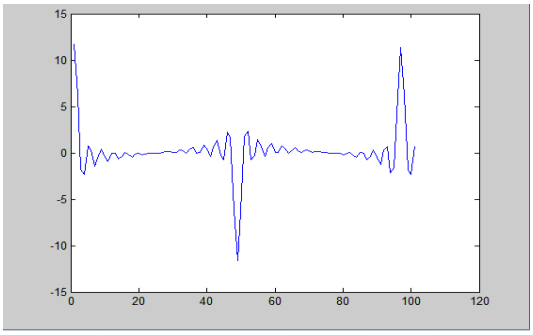

Fig [7]: The Attenuate is 10db with 20 users

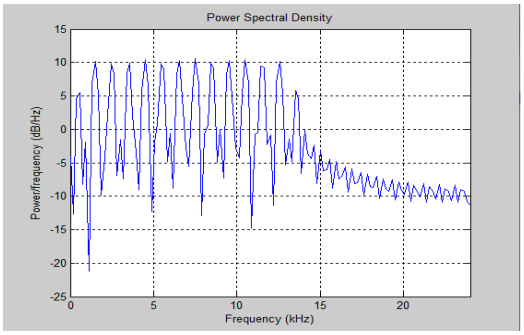

Fig [8]: Influencing the signal after the noise and attenuation process

Table [5]: Table shows the results after the addition of 10 db attenuation

User 1 is present.	User 6 is present.	User 11 is present.	User 16 is not present.
User 2 is present.	User 7 is present.	User 12 is not present.	User 17 is not present.
User 3 is not present.	User 8 is present.	User 13 is not present.	User 18 is not present.
User 4 is not present.	User 9 is present.	User 14 is not present.	User 19 is not present.
User 5 is not present.	User 10 is not present.	User 15 is not present.	User 20 is not present.

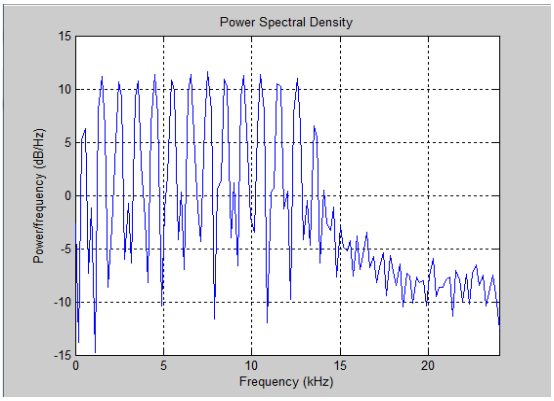

Fig [9]: The noise is 20db with 20 users

Table [6]: The results after the addition of a 20 db noise

User 1 is present.	User 6 is present.	User 11 is present.	User 16 is not present.
User 2 is present.	User 7 is present.	User 12 is not present.	User 17 is not present.
User 3 is not present.	User 8 is present.	User 13 is not present.	User 18 is not present.
User 4 is not present.	User 9 is present.	User 14 is not present.	User 19 is not present.
User 5 is not present.	User 10 is not present.	User 15 is not present.	User 20 is not present.

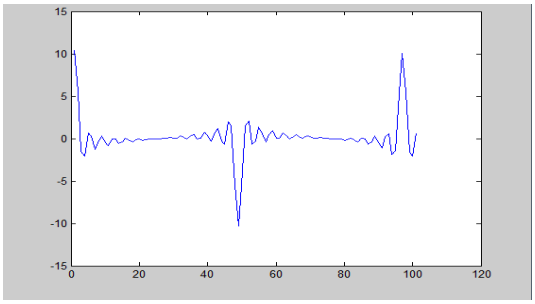

Fig [10]: The Attenuate is 20db with 20 users

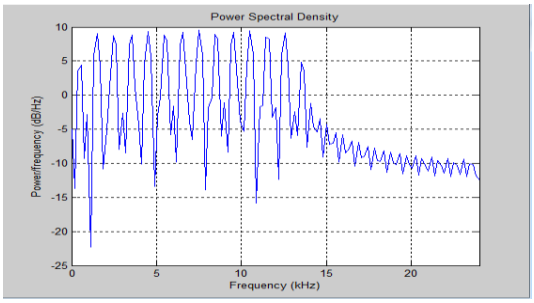

Fig [11]: Influencing the signal after the noise and attenuation process

Table [7]: Table shows the results after the addition of 20 db attenuation

User 1 is present.	User 6 is present.	User 11 is present.	User 16 is not present.
User 2 is present.	User 7 is present.	User 12 is not present.	User 17 is not present.
User 3 is not present.	User 8 is present.	User 13 is not present.	User 18 is not present.
User 4 is not present.	User 9 is not present.	User 14 is not present.	User 19 is not present.
User 5 is not present.	User 10 is not present.	User 15 is not present.	User 20 is not present.

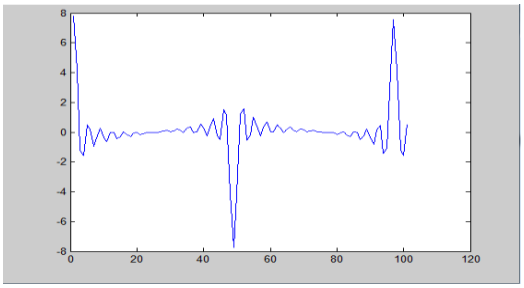

Fig [12]: The Attenuate is 40db with 20 users

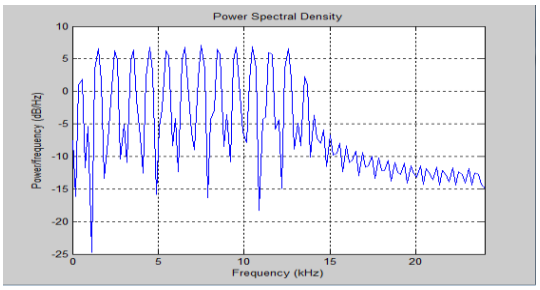

Fig [13]: Influencing the signal after the noise and attenuation process

Table [8]: Table shows the results after the addition of 40 db attenuation

User 1 is present.	User 6 is present.	User 11 is present.	User 16 is not present.
User 2 is not present	User 7 is present.	User 12 is not present.	User 17 is not present.
User 3 is not present.	User 8 is not present.	User 13 is not present.	User 18 is not present.
User 4 is not present.	User 9 is not present.	User 14 is not present.	User 19 is not present.
User 5 is not present.	User 10 is not present.	User 15 is not present.	User 20 is not present.

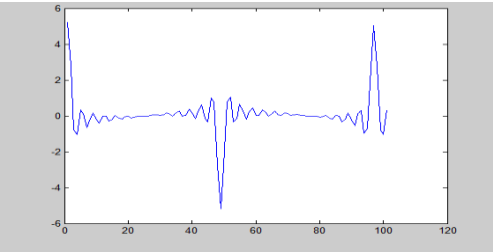

Fig [14]: The Attenuate is 60db with 20 users

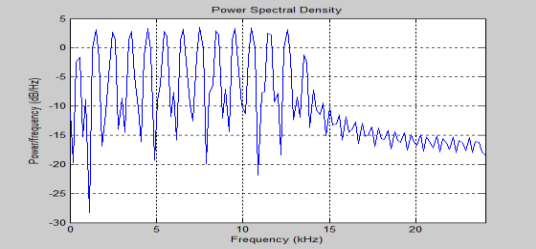

Fig [15]: Influencing the signal after the noise and attenuation process

Table [9]: Table shows the results after the addition of 60db attenuation

User 1 is present.	User 6 is present.	User 11 is present.	User 16 is not present.
User 2 is present	User 7 is present.	User 12 is not present.	User 17 is not present.
User 3 is not present.	User 8 is present.	User 13 is not present.	User 18 is not present.
User 4 is not present.	User 9 is present.	User 14 is not present.	User 19 is not present.
User 5 is not present.	User 10 is not present.	User 15 is not present.	User 20 is not present

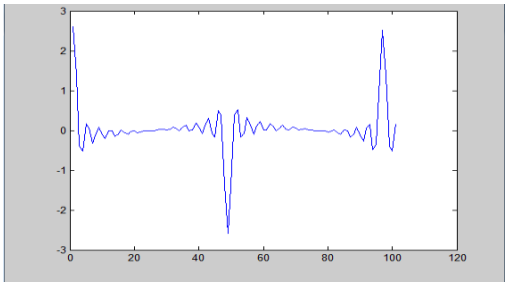

Fig [16]: The Attenuate is 80db with 20 users

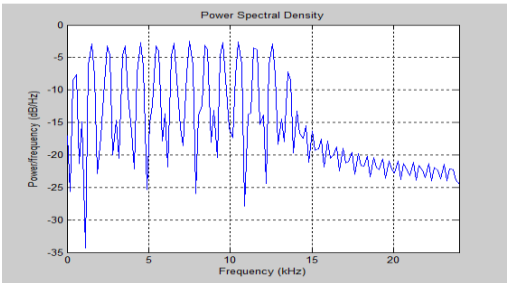

Fig [17]: Influencing the signal after the noise and attenuation process

Table [10]: Table shows the results after the addition of 80 db attenuation

User 1 is not present.	User 6 is not present.	User 11 is not present.	User 16 is not present.
User 2 is not present.	User 7 is not present.	User 12 is not present.	User 17 is not present.
User 3 is not present.	User 8 is not present.	User 13 is not present.	User 18 is not present.
User 4 is not present.	User 9 is not present.	User 14 is not present.	User 19 is not present.
User 5 is not present.	User 10 is not present.	User 15 is not present.	User 20 is not present

7. Results Discussion

Figures (3, 6, 9) show power per bandwidth versus frequency. From the results we observe that number of user in the network that were e affected by noise of (5, 10, 20) dB. While figures (4,7,10,12,14,16) show the number of network users in cognitive affected by attenuation values ranging from (5,10,20,40,60,80) dB .whiles Figures (5,8,11,13, 15,17) and tables (3,5,7,8,9,10) show the result of both noise and attenuation effect on the number of users.

8. Conclusion

The study, analyze, plan and design software program to simulate the impact of noise and attenuation of cognitive Radio network have been done s using MATLAB software program. The results were obtained in terms of graphs for

power per bandwidth versus frequency from the results we observe that the noise have effect into number of user up to 20 dB while the attenuation effect number of user up 80dB.

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