# Self-motivated Frequency Selection method for Mobile Security

**A.Farithkhan, R.Ramasamy, M.Vasim Babu**

***Abstract:*** ***The recent scenario in wireless communication, the frequency tapping danger grows bigger and the frequency security is also important issue. Dynamic frequency selection (DFS) technique has the strength in frequency security because it uses variable frequency. In this paper, we investigate DFS technique in IEEE 802.22 standards for environment of Cognitive radio (CR) foundation for the security. To use frequency more powerfully, we propose some DFS techniques for variable bandwidth, limitation of candidate set and verify these through the result of the simulations.***

***Index Terms: Mobile security, Cognitive radio, Dynamic frequency selection***

## I. INTRODUCTION

Recent day's a frequency can allocated conveniently in wireless communication technique. In this frequency tapping danger grows larger and the frequency security is required more. DFS (dynamic frequency selection) is a technique which is included in CR (cognitive radio). It supports an unvarying communication by authorized in the region of ambiance in wherever and any instant to use successful band allocation [2]. FCC anticipated the CR system that approach in recent times to solve a deficiency predicament of the rate of recurrence [1] ~ [3]. IEEE 802.22 Standard cluster is prepared to extend a cellular communication arrangement set and accomplish aggressive regularity [4]. In addition, DFS has the strength at the security. The communication using a channel can be exposed. However, DFS doesn't have probability of exposure because of changing channels frequently. It is because frequency is changed again in spite of being tapped at any moment [8]. That is determined the competent DFS method which assign band allocation erratically, used for IEEE standard 802.22 wireless regional area networks environment (WRAN) applied the Mobile Security concept, and applies a method limiting candidate set[6]. The projected scheme investigated in Cognitive radio movable surroundings by the way of easily movable surroundings [11]. The replication calculated DFS techniques recital as distorted the control pace of the major user which have the precedence in relation to frequency.

**Revised Manuscript Received on July 10, 2019.**

**A.Farithkhan,** Faculty, Department of ECE, Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology Chennai, India.

**R.Ramasamy,** Faculty, Department of ECE, Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology Chennai, India.

**Dr.M.Vasim Babu,** Faculty, Department of ECE KKR and KSR Institute of Technology and Sciences, Vinjanampadu, Guntur, Andhra Pradesh - 522017

We investigate DFS technique which uses frequency to be changed at any time, to prevent the tapping in IEEE 802.22 area. A merit of DFS technique is the strength at the security as well to use frequency efficiently[9]. In this chapter, we introduce IEEE standard 802.22 WRAN atmosphere for pertain a frequency allocation method and DFS technique for the Mobile Security concept.

## II. PROPOSED TECHNIQUE

### A. IEEE standard 802.22 WRAN area

The intention of concern standard IEEE 802.22 is the on the outside town of the Canada and United States or emergent country and afford cellular contact examine from side to side via the CR system in the Television band. IEEE standards 802.22 have lots of behavior. One of the behaviors is a economical than conventional cellular standard. Here some significant substance to appear in BS for CR: a further difficulty, a dimension crisis of a destination antenna in case of using very high frequency band and QoS by means of regular rate of recurrence. In lower layer necessity of IEEE standard 802.22 WRAN, a check 32~100Km and a allocated rate of recurrence band utilize in 450-802MHz band, earlier television bandwidth [5]. Television band is dissimilar in every nation. (ex. 6, 7, 8 MHz) I allocated 10MHz in our proposed method.

### B. Self-motivated frequency selection for Mobile Security concept

Cognitive Radio practice that has intellect the band allocation, dynamically selecting frequency as well as power handle, except we consider with the aim of intellect the spectrum and power handle are wonderful and premeditated DFS technique in our proposed method. DFS help the client among unfilled the rate at which something occurs over a particular period of time and perceive constantly. According to the user's electric signal reaction and information necessity quantity it distribute frequency band provides best performance among the user (QoS). We specified the example about DFS at the Fig. 1. By allocating frequency in DFS revolutionize some time according to a survival of a major client, but allocated frequently to a time honor. In addition, although frequency of the one any bandwidth is becoming the tapping, the leakage of the information is extremely small because of Frequency to be changed at any time.

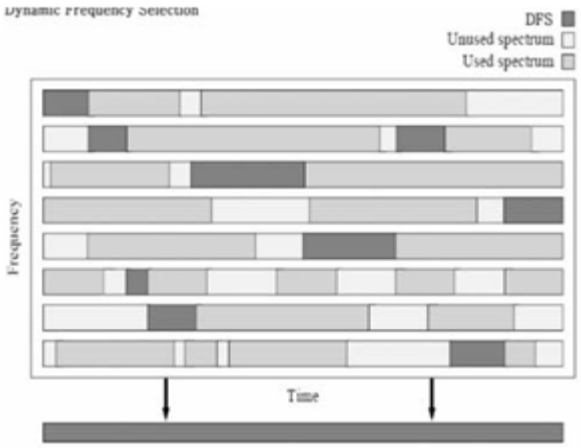



**Fig. 1. Self motivated frequency Selection**

### C. Efficient DFS algorithm for Mobile Security concept

An ultimate goal of DFS is to afford clients by the way of constant band and to construct most excellent efficient band uses. As a result it has to split as well as handle the situation most excellent.

In our proposed method, two kind subjects in DFS algorithm of CR foundation to be proposed will be studied: Variable Bandwidth, which accommodates more users; the limit of a channel candidate set number, which can make processing time of system fast.

### D. Application of variable bandwidth

It is a technique that is utilizing frequency of too much user in restricted frequency space. Recent cellular mobile communications obtain a variety of services on identical bandwidth. Such as, cellular mobiles the communication and receives multimedia service in similar BW. But the BW is much higher than the ordinary contact since it has to replicate the multimedia. The remaining area can vacant the rate of recurrence for other CR mobiles, if it applies the DSA. The band allocation area is determined at own.

### E. The limit of a channel candidate set number

A candidate set is an empty channel which CR devices or primary users don't use. DFS have to manage candidate sets efficiently. If CR devices demand frequency, DFS assigns suitable frequency of candidate sets to CR devices. In conventional algorithm, DFS searches all of empty frequency. At this situation, frequency change can take long. In this paper's algorithm, DFS limits the number of the candidate set and shortens a change frequency time. Frequency not to be used for a while has the priority rank.

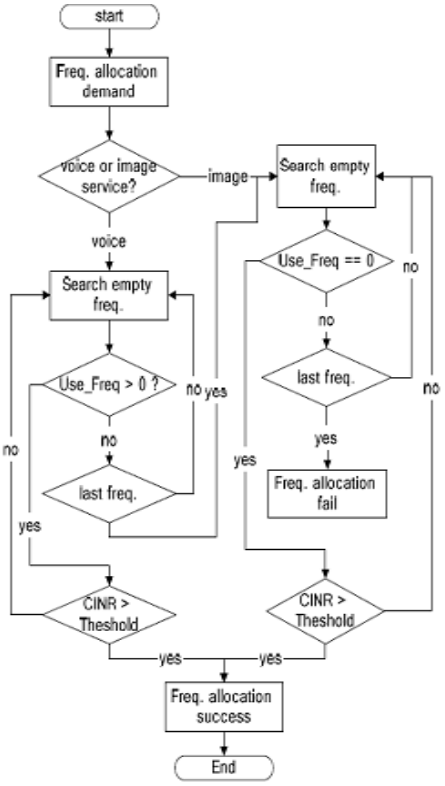



**Fig. 2. Flow chart of proposed DFS algorithm**

Fig. 2.shows the DFS algorithm flow chart. If a frequency allocation demand is a voice service, DFS searches empty frequency and checks whether Use_Freq is 0 or not. Use_Freq is a variable which stores a number of 1MHz frequency bandwidth used per 6MHz frequency bandwidth. If Use_Freq is 0, the frequency is empty and if Use_Freq is 6, all of the frequency is using. So DFS searches frequency which is lesser than 5. If a frequency allocation demand is a image service, DFS searches frequency which is 6. Finally, these algorithm dealings CNIR when the Ues_Freq condition is suitable. The expression to rescue generally the CNIR is as follows [6]:

CNIR= Carrier Power/(Noise+$\sum$ Interference Power)

This algorithm applies Pass Loss-Hata Model[7]

$L_p=-K_1-K_2 \log(f)+13.82\log(h_b)+a(h_m)-[44.9-6.55\log(h_b)]$ $\log(d)-K_0$

This utility object of IEEE 802.22 is the outside of the city of America or Canada, so the fading influence is not relatively sufficient. We skipped consequently a fading environment.

This algorithm checks afterwards the mobility and primary user. If the position of CR devices is more than cell coverage or primary users occur, CR devices have to request frequency again

## III. RESULT AND DISCUSSION

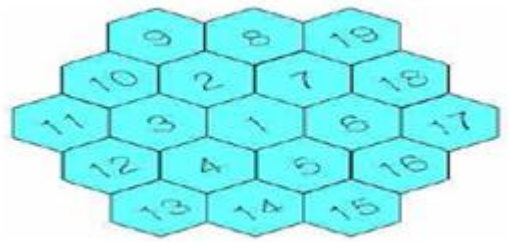



**Fig. 3. Multi-cell arrangement for IEEE 802.22 Environment**

Fig. 3 shows the arrangement of cells in DFS algorithm. Totally 19 cells and s one cell radius assign to the 34km. The frequency range worn in this algorithm is 58 to 358MHz in necessities of IEEE standard 802.22 WRAN PHY. It assigns 1MHz for voice transmission and 2MHz to movie transmission for VB method to be projected. It useful arbitrary velocity between lowest amount 0 km/h(fixing) and highest 125 km/h.

Limit number of candidate set is 20. This value does not appear greatly with the conventional method in the performance difference and this method's processing speed is faster than conventional method.

**Table 1 Parameter**

| Item | Value |
|---|---|
| The total number of cells | 19 |
| A range of a cell | 33km |
| Frequency Range | 58 to 358MHz (VHF/UHF TV Bands) |
| User number per a cell | 100 |
| Allocation bandwidth | 1(voice), 6(image) MHz |
| Limit number of candidate set | 20 |

**Table 2 Modulation Coding set**

| Modulation | Code rate | bps/Hz | Required SNR(db) |
|---|---|---|---|
| QPSK | 01-Feb | 1 | 6 |
| QPSK | 03-Apr | 1.5 | 10.5 |
| 16QAM | 01-Feb | 2 | 13.2 |
| 16QAM | 03-Apr | 3 | 19 |

This algorithm uses as table 2 for measuring CNIR of empty frequency and verifies the performance of various environment in the simulation because required SNR is different according to the modulation type and code rate[8]

**A. The outcome appropriate to Variable Bandwidth**

Fig. 4 is the first result graphs for time and the bandwidth. The band allocation is the uneven or permanent. The accent repair rate of the variable band allocation is 50%. The simulation time specifies in horizontal axis and the frequency allotment unsuccessful rate mentioned in vertical axis. From the graphs, in our proposed work shows the variable band allocation is enhanced than the permanent band allocation. The important motivation is that the greatest number of CR devices allocated six. Each channel allocated to one MHz per channel.

The four directions outcome measuring as change the modulation type and code rate. The performance of QPSK is better than 16QAM and code rate 1/2 is better than 3/4, because required SNR of QPSK and code rate 1/2 is lower. CR devices can use more frequency when required SNR is low.

**B. The result according to limit of candidate set number**

Fig. 5 is the result according to mobility and limit of candidate set number and measured as change the code rate when the modulation type is QPSK

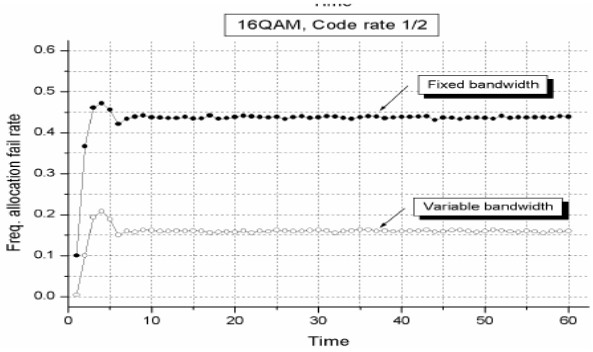
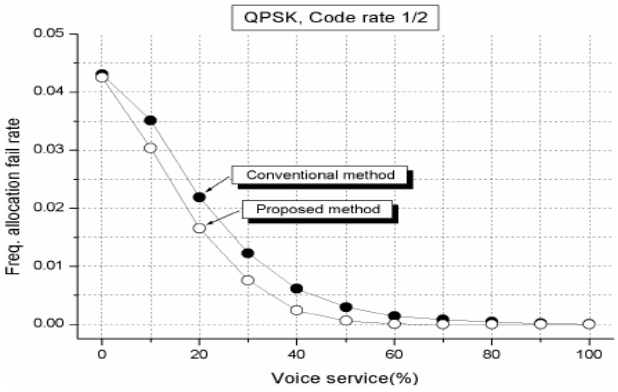
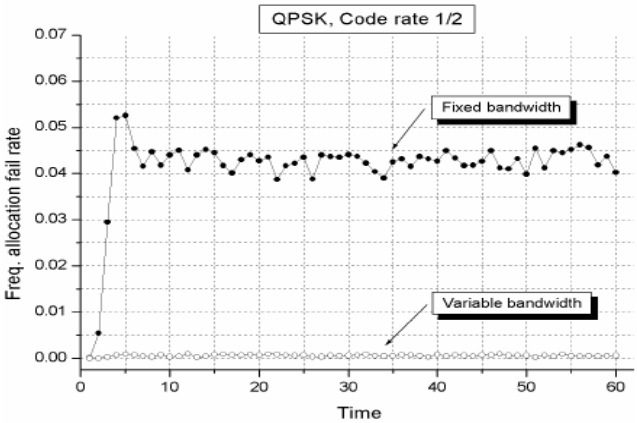



**Fig.4. The outcome consistent with variable bandwidth**



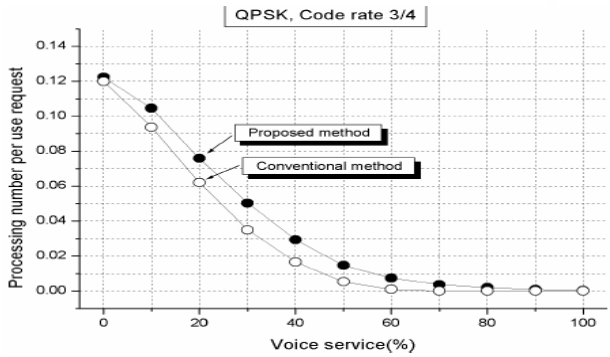
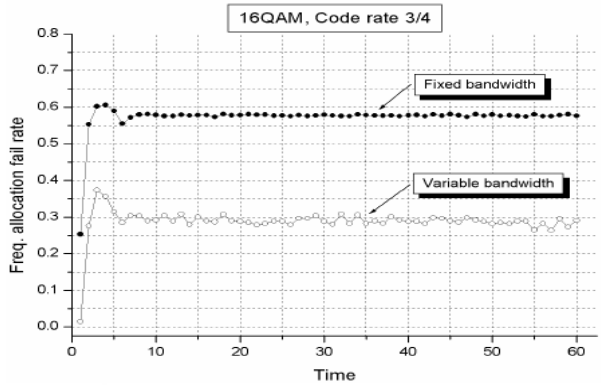



**Fig 5.The The outcome consistent to the rate of voice Service in QPSK**




The vertical axis of the left graph is frequency allotment unsuccessful rate and the right graph is processing number per use request of a CR device. The horizontal axis of both is the rate of voice service. If the rate of voice service is 0%, the system doesn't apply the variable bandwidth. It is fixed bandwidth. In this outcome, the frequency allotment unsuccessful rate lowers when the rate of voice service increases. The reason is that the bandwidth of voice service (1MHz) is smaller than image service (6MHz). The frequency allotment unsuccessful rate is almost close to zero when the rate of voice service is more than 80%.

This algorithm applies limit method of candidate set number. The conventional method is limit method of candidate set number, and proposed method is limitless method. In the right graph, processing number of conventional method is less than 20, but proposed method is almost more than 20. In other words, processing time of the proposed method is shorter. In the left graph, the performance of proposed method is not almost different from conventional method.

## IV. CONCLUSION

In our proposed work explores the proficient DFS technique for Mobile Security concept in IEEE standard 802.22 WRAN. The performance be appropriate a variable bandwidth method is good when the rate of voice service of big. It showed all same patterns though there was the performance difference as the required SNR different. The performance difference doesn't appear a conventional method greatly with the method not to limit candidate set. At the same time, the proposed method reduces the processing time. In the result, the performance will be fine if it applies the method of variable bandwidth. The limit method of candidate set does not have an influence greatly on performance degradation and reduces the processing time.

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## AUTHORS PROFILE

**First Author** A.Farithkhan is an Assistant professor in the Department of Electronics & Communication Engineering at Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology Chennai, India. He Received a Master of Engineering in Electronics & Communication Engineering from Anna University of Technology , Coimbatore . He Received a Bachelor of Engineering in Electronics & Communication Engineering from Anna University, Chennai. His area of interest is in Wireless Sensor Networks, Adhoc network, Internet of Things, Cognitive Radio networks.

**Second Author** R.Ramasamy is an Assistant professor in the Department of Electronics & Communication Engineering at Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology Chennai, India. He Received a Master of Engineering in Electronics & Communication Engineering from Anna University, Chennai. . He Received a Bachelor of Engineering in Electronics & Communication Engineering from Anna University, Chennai. His Research interests are in wireless communication domain.

**Third Author** M. Vasim Babu received his B.E. degree in the discipline of Electronics and Communication Engineering from Sethu Institute of Technology, India, M.E Degree in the discipline of Communication Systems from K.L.N College of engineering, India, Ph.D. degree in the discipline of Information and Communication Engineering from Anna university, India. His area of interest is in Wireless Sensor Networks , Adhoc network, ANFIS , Optical communication and Signal processing. He is active member of The Institute of Engineers, International Association of Engineers, Seventh sense research group, International Association of Computer Science and Information Technology, Universal Association of Computer and Electronics Engineers. Currently he is working as an Associate professor, Department of ECE in KKR and KSR Institute of Technology and Sciences, Guntur, AP.