An Capable Mob Sharing Process Based On Genetic Algorithm In Heterogeneous Wireless Network

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ABSTRACT

In Wi-Fi communication era, clients ought to have rich contents not nice thru forced networks however moreover through wireless networks which encompass Cellular, Wi-Fi, and WiMAX. On the alternative hand, but, lack of spectrum property will become a critical trouble for future Wi-Fi networks. To triumph over this hassle, dynamic spectrum get admission to era gets an exceptional deal interest. In this paper, we endorse a totally specific spectrum sharing method based totally on genetic set of recommendations in which a Wi-Fi device fast uses a spectrum band of WiMAX tool in Wi-Fi/WiMAX included networks as a median heterogeneous wireless community. Finally, we verify the effectiveness of the proposed approach through simulation experiments.

INTRODUCTION

The advances in communiqué generation, network services supplied thru the Internet have been extensively varied. Users could have such services now not simplest via harassed networks but also via Wi-Fi networks. In Wi-Fi networks, the bandwidth of cell networks is developing continuously, and the type of Wi-Fi LAN get admission to factors (APs) is developing substantially, as the demand for multimedia services is growing as an entire lot as in careworn networks [1]. On the other hand, there are numerous Wi-Fi systems in practical use which includes Cellular [2], Wi-Fi [3], and WiMAX [4, 5]. Each system makes use of its own spectrum as prescribed through law to avoid radio Interference. In addition, the wireless verbal exchange systems defined above are used independently; due to the

fact the mechanisms of these structures are basically specific. The Federal Communications Commission (FCC) made TV white space (TVWS) channels in the 54-698 MHz frequency range available [2] for secondary unlicensed access after the TV broadcast was switched from analog to digital signal in 2009. Opening up of the TVWS for unlicensed use was the result of a realization that the gap between the demand and supply of wireless spectrum resource is ever increasing and fixed spectrum allocation is causing its severe under-utilization [3]. Strict requirements are however placed on the Secondary Users (SUs) of the spectrum which is otherwise allocated to licensees called primary users (PU), to continuously sense the spectrum and vacate it when the presence of the PU is detected and not to cause them any interference. This type of spectrum access is intuitively called Dynamic Spectrum Access (DSA). Cognitive Radio Network (CRN) is a paradigm that meets precisely these communication requirements and utilizes DSA to enable secondary, unlicensed access to TVWS spectrum bands in an opportunistic and non-interfering basis DSA allows CRNs to ensure that their use of spectrum does not cause interference to PUs while at the same time all spectrum opportunities are utilized to the maximum. Within a CRN, the decision to select a specific channel for DSA is usually made by a central entity such as its base station or in case of an ad hoc CRN, an algorithm that enables all SUs to reach a consensus for choosing specific channel in a distributed manner. IEEE 802.22 wireless regional area network (WRAN) [4] is an example of CRNs with very large transmission ranges (from 30 to 100 kms) in which the base station controls all the operation of the CRN including the choice of spectrum bands for communication. Regardless of how a decision to select a specific channel is made, every entity within the CRN is bound to abide by that decision. On the other hand, there may be multiple collocated CRNs within a geographical region all of which compete for access to the same set of available channels. Sharing of spectrum by collocated CRNs is called self coexistence in the context of CRNs which employ coexistence protocols such as the IEEE 802.22 standard's Coexistence Beacon Protocol (CBP). However without any controlling entity, fair distribution of heterogeneous spectrum resources is non-trivial in the case of multiple collocated CRNs as they may be independently owned and operated by different service providers.

This brings us to the definition of this paper's problem statement for long term coexistence with heterogeneous spectrum, in the following subsection Thus, someone needs to transfer among systems manually. To overcome such an inconvenient situation, the protected community [6, 7], in which those structures interwork, has been designed for the following generation wireless communication system. In such an incorporated network, cellular customers could have seamless, persistent communiqué via the great Wi-Fi verbal exchange device, in keeping with the applications or the conditions of wireless systems. Therefore, its miles possible to offer better communications for mobile customers [8]. However, available spectrum resources are finite, in order that some other method that makes use of radio property greater efficaciously is suitable. As stated above, despite the fact that the quantity of to be had radio spectrum for specific wireless communications is lowering because of the diversity of Wi-Fi networks, the web page traffic call for wireless networks increases with the increase of numerous broadband programs. To overcome this catch 22 scenario, Cognitive Radio [9, 10] receives an awful lot interest. The cognitive radio generation can be categorized into multi-mode device and dynamic spectrum gets admission to (DSA) [11, 12]. Multi-mode device selectively avails of some of wireless structures constant with the communiqué environment of clients and the situation of each wireless system. On the alternative hand, in DSA, a wireless gadget can secondarily avail of the radio frequency spectrum that one-of-a-kind wireless systems are using [13]. Frequency spectrum is used extra green by DSA than through multi-mode device. The authors proposed the approach that shares the spectrum among WiMAX and Wi-Fi by means of manner of using DSA to lessen call blockading opportunity for streaming services in WiMAX/Wi-Fi covered network [14]. However, wireless conversation visitors include no longer simplest QoS traffic which includes multimedia streaming however additionally BE visitors along with document downloading. Thus, on this paper, we endorse a spectrum sharing technique to improve throughput via the usage of DSA in WiMAX/Wi-Fi covered network. To discover a higher spectrum undertaking sample for throughput improvement, we use Genetic Algorithm (GA) [15] that may locate more than one answer in parallel.

2. LITERATURE REVIEW:

2.1. Heterogeneous Wireless Network

Although several wireless structures, such as Cellular, Wi-Fi, and WiMAX, have advanced independently, they ought to be incorporated for seamless get right of entry to from customers. Therefore, in trendy years, the Cellular/Wi-Fi protected network and WiMAX/Wi-Fi protected network had been researched actively. Especially, WiMAX/Wi-Fi included network achieves terrific verbal exchange via using WiMAX and Wi-Fi as complementary access resources. This covered community lets in load balancing among WiMAX and Wi-Fi with the aid of using each machine selectively in reaction to the needs of customers and the state of affairs of each device. However, this blanketed community assumes that every Wi-Fi system makes use of the spectrum band prescribed with the resource of law, in order that notwithstanding the truth that the WiMAX tool has unused spectrum quickly, it cannot be utilized by Wi-Fi systems. To overcome this trouble, cognitive radio gets tons interest.

2.2. Dynamic Spectrum Access

According to [12], DSA strategies can be categorized into 3 models; Dynamic Exclusive Use Model, Open Sharing Model, and Hierarchical Access Model. Dynamic unique use model protects the modern-day spectrum law insurance, which spectrum bands are certified to services for distinctive use. Open sharing version brazenly stocks among peer customers as the idea for handling a spectral vicinity. Hierarchical get entry to version adopts a hierarchical get admission to shape with number one (licenses) and secondary customers.

2.3. Existing Method in WiMAX/WiFi Integrated Network and Problematic Issues

A spectrum sharing method that several WiFi APs quickly makes use of an unused spectrum band of WiMAX in WiMAX/WiFi included network is proposed [12]. It is primarily based on the spectrum overlay described in 2.2.Three. In this idea, as proven in Fig. 1, a applicable manage server named spectrum supervisor (SM) manages the spectrum mission and crucial information for project in a WiMAX base

station (BS) and WiFi APs inside the WiMAX carrier place of the BS. In this paper, we call the WiMAX provider vicinity "place" and the hexagonal area that could be deposited WiFi AP "cellular".

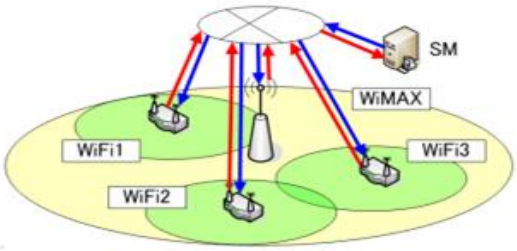
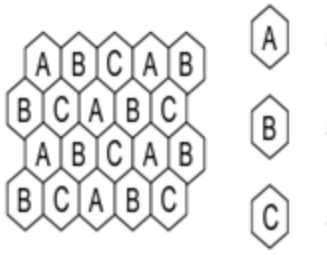


Fig1: Network Model

The coverage location of WiMAX BS, approximately a few kilometers in radius, is so huge that it consists of some WiFi APs. Therefore, the equal spectrum can be time and again utilized by assigning unused spectrum of WiMAX to WiFi AP without inflicting interference a few of the adjacent WiFi APs. If or greater WiFi APs use a spectrum of the WiMAX BS, the spectrum usage performance may be superior for the entire network. [13] Proposed the approach that categorized cells in entire community into three activities of A, B, C as proven in Fig. 2. APs that belong to the same birthday celebration can use the identical spectrum without radio interference. Therefore, all WiFi APs are categorized into three events and the proposed method assigns a spectrum to taken into consideration one of them.



A: Assign Spectrum 1

B: Assign Spectrum 2

C: Assign Spectrum 3

Fig2: Assignment of spectrum to three parties

This method sums up the anticipated style of blocking off calls for every birthday celebration and famous the birthday party with the maximum amount. Then, this method tries to assign a spectrum from WiMAX BS to WiFi APs belonging to the birthday celebration and reevaluates the entire extensive style of blocking off requires the complete network in a sure length time with this configuration. Finally, this method compares the overall range of blockading calls for the entire network in advance than the spectrum assignment and after. If the latter is smaller, this approach carries out the spectrum project and repeats those techniques. It is confirmed that this approach achieves effective use of spectrum adaptively. This technique uses simply three

spectrum undertaking patterns, however, simply so it may miss a higher spectrum assignment sample. In addition, the purpose of this technique is handiest to lessen the call blocking opportunity of QoS communications. Therefore, it does now not take into account the throughput of BE services.

3. SPECTRUM SHARING BASED ON GENETIC ALGORITHM

```
Function SGA O
{
Initialize population;
Calculate fitness function;
WhileTerminationCriteriaNotSatisfied
{
Select parents for reproduction;
perform recombination and mutation;
evaluate population;
}
}
```

Fig:3 Pseudo code of a simple GA

3.1. Overview:

To overcome the problem described in previous section, we propose a method to find WiFi APs to be assigned an additional spectrum based on GA. Here, we use the sum of the load of WiFi AP as a fitness value and disallow to assign the same spectrum to adjacent WiFi APs at the same time as a constraint. Specifically, we assume n cells in an access area of a WiMAX BS as shown in Fig. 4, where each number is treated as a cell ID. We prepare a spectrum assignment list to WiFi AP as shown in Table 1. The index of this list corresponds to cell ID, and the element of the list "1" means that the cell can be an assignment target. We apply this list as an individual in GA.

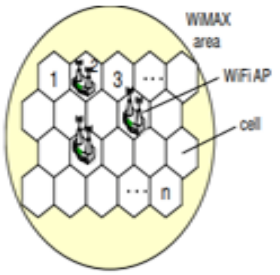


Fig.4. Cell ID

ID	1	2	3	---	n
element	0	1	0	---	1

Table.1. assignment list Spectrum

Fig. 5 shows the flowchart of the proposed method. First, the proposed method generates l individuals and defines the set of them as an initial group. Next, it calculates fitness value of each individual and keeps the individual that has the highest fitness

value as a candidate individual. Then, it makes a crossover for a pair of individuals and calculates the fitness value of each reproduced individual. If this value is higher than that of the candidate individual, this individual is kept as a new candidate individual. Next, it executes a selection process to keep the number of individuals as many as before a crossover. On the other hand, a mutation process is invoked to seek for variety of patterns when all individuals are identical.

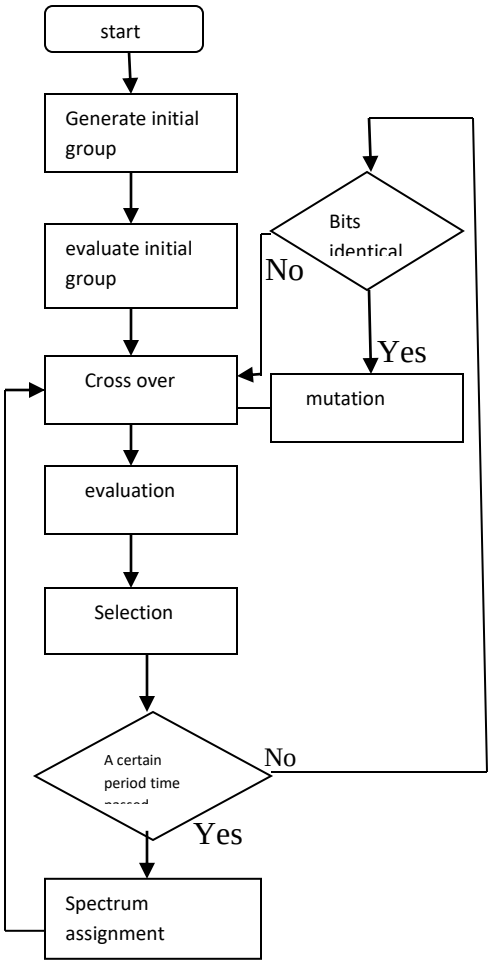


Fig5: Proposed Genetic Algorithm

After repeating the above operation in a certain period of time, the proposed method decides to assign a spectrum to one or more WiFi AP(s) according to the candidate individual with the highest fitness value. Note here that the proposed method does not stop after a certain times of iteration but keeps to seek for better individuals.

SIMULATION RESULTS:

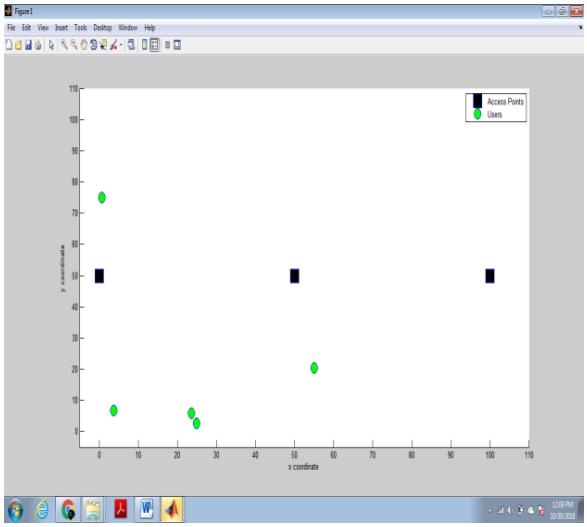


Fig6: Data packets Distribution

In the above figure the users are transmit data packets by accessing different ports at certain points ,by checking the access ports whether they are available for users to transmit data packets or not.

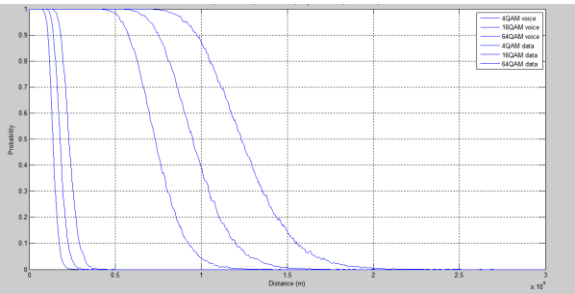


Fig7: Coverage Probability

In the above figure the distance of 4, 16, 64QAM voice signals are lesser than compared to 4, 16,64QAM data signals, here the probability remains constant.

CONCLUSION:

In this paper, we described the advances in wireless communication technologies and the lack of spectrum resources. Next, we have introduced integrated wireless network and DSA technology. To use spectrum more efficiently in WiMAX/WiFi integrated network, we proposed the spectrum sharing method based on GA. In this method, to find WiFi APs to be assigned a spectrum from WiMAX BS, we used the sum of the load of WiFi AP as a fitness value and disallowed to assign the same spectrum to adjacent WiFi APs at the same time as a constraint. Finally, we showed that the proposed method could assign spectrum efficiently and improve user throughput by simulation experiments. As a future work, we enhance the proposed method considered with handoff users.

REFERENCES

[1] K. Kinoshita, M. Nakagawa, K. Kawano, and K. Murakami, "A Fair and Efficient Spectrum Assignment for WiFi/WiMAX Integrated Networks," Proceedings of the 6th International Conference on Systems and Networks Communications (ICSNC 2011), October 2011.

[2] 3GPP, http://www.3gpp.org/.

[3] IEEE 802.11, http://grouper.ieee.org/groups/802/11/.

[4] "Air Interface for Fixed Broadband Wireless Access Systems," IEEE STD 802.16-2004, (Oct. 2004).

[5] "Air Interface for Fixed and Mobile Broadband Wireless Access Systems," IEEE P802.16e/D12}, (Feb. 2005).

[6] S. Hanaoka, J. Yamamoto, M. Yano, "Platform for Load Balancing and Throughput Enhancement with Cognitive Radio," IEICE Transactions on Communications, vol. E91-B, no. 8, pp. 2501-2508, (Aug. 2008).

[7] L. Berlemann, C. Hoymann, G. R. Hiertz, S. Mangold, "Coexistence and Interworking of IEEE 802.16 and IEEE 802.11(e)," Vehicular Technology Conference, vol. 1, pp. 27-31, (May 2006).

[8] O. Khattab and O. Alani, "I Am 4 VHO: New Approach to Improve Seamless Vertical Handover in Heterogeneous Wireless Networks," International Journal of Computer Networks & Communications (IJCNC) Vol.5, No.3, pp. 53-63, May 2013.

[9] J. Mitola III, "Cognitive Radio for Flexible Mobile Multimedia Communications," Mobile Networks and Applications, vol. 6, no. 5, (Sep. 2001).

[10] W. Krenik, A. Batra "Cognitive Radio Techniques for Wide Area Networks," Proceedings of the the 42nd annual Design Automation Conference, pp. 409-412, (Jun. 2005).

[11] M. Nekovee, "Dynamic spectrum access - concepts and future architectures," BT Technology Journal, vol. 24, no. 2, pp. 111-116, (Apr. 2006).

[12] Q. Zhao, B. M. Sadler, "A Survey of Dynamic Spectrum Access," IEEE Signal Processing Magazine, vol. 24, no. 3, pp. 79-89, (May 2007).

[13] E.Z. Tragos, S. Zeadally, A. G. Fragkiadakis, and V. A. Siris, "Spectrum Assignment in Cognitive Radio Networks: A Comprehensive Survey," IEEE Communications Survey & Tutorials, Vol. 15, No. 3, pp. 1108-1135 (2013).

[14] K. Kinoshita, Y. Kanamori, K. Kawano, and K. Murakami, "A Dynamic Spectrum Assignment Method for Call Blocking Probability Reduction in WiFi/WiMAX Integrated Networks," IEICE Transactions on Communications, vol. E94-B, no. 12, pp. 3498-3504, (Dec. 2011).

[15] J. Yoshino, I. Ohtomo, "Study on efficient channel assignment method using the genetic algorithm for mobile communication systems," Soft Computing - A Fusion of Foundations, Methodologies and Applications, vol. 9, no. 2, pp. 143-148, (Feb. 2005).