A Review on Coexistence of WI-FI and WIMAX Using Simulation OF HMM

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Abstract: *In the past few years the Wireless local area Network (WLAN) has been the most popular selection of communication among users. WLAN that is based on the IEEE 802.11standard additionally referred to as wireless fidelity (Wi-Fi), offers quality and flexibility with a comparatively low value tousers. Additionally, wireless technology is providing easier web access that is too tough and expensive to reach with ancient wired infrastructure. IEEE 802.16, additionally referred to as Worldwide Interoperability for Microwave Access (WiMAX), is another standard with similar general principles as WIFI with the most blessings being it covers bigger area and contains a higher rate. WLAN and WiMax beneath optimum conditions when compared, the quickest WLAN association is 54 megabits/sec whereas WiMAX is regarding 75Mbit/s. WLAN contains vary of regarding 30 meters and WiMAX will cover up to 50 kilometers. Although WiMAX greatly outperforms Wi-Fi, user devices like desktops, laptops and cell phones got to have WiMAX capability to be able to hook up with WiMAX sources. Currently, not several user devices have WiMAX capability; the majority has Wi-Fi capability. This paper describes the approaches for enabling the coexistence of WiFi and wimax in unlicensed ISM spectrum. We will begin with learning HMM (hidden markov model) supported traces of the network. Then comes the estimation of performance of Wi-Fi in presence of interference from WIMAX. In conclusion we are going to develop unique frame management protocol Known as HMM driven white space aware frame management protocol for coexistence of Wi-Fi and wimax.*

Keywords: WiFi, Wimax, coexistence, HMM, white space

1. Introduction

The coexistence in ISM band of different wireless systems is a hot topic. Many related works has been done for coexistence of different wireless systems. "Coexistence," may be defined as ability for many protocols to operate in the same frequency band without significant degradation to either's operation, has recently become a important topic of analysis. The reason may be that Both protocols are expecting rapid growth, and because they both operate in the 2.4 GHz frequency band, the chances for interference between them is high. Wi-Fi could potentially experience interference from WiMax traffic given that while both protocols can transmit on the same channel, WiMax transmissions usually occur at much higher power level.

2. WIMAX

IEEE 802.16 [1] could be a radio standard for WMANs operational within the frequencies between 2 and 11 gigahertz usually brought up as a WiMAX. It specifies four totally different physical layer (PHYs), whereas during this paper the OFDM layer is taken into account solely.IEEE802.16 includes a centralized design provided by a central Base Station (BS) with associated Subscriber Stations (SS). Typically, a SB is connected either directly or Via further BSs to the core network. 802.16offer so associate degree no mandatory mesh preparation that introduces multi-hop connections via relaying BSs. With its centrally controlled, frame primarily based Mack approach802.16 offers warranted multimedia system Quos. 802.16 supports non line-of-sight operation and large coverage areas, that allows a apace deployable infrastructure. WiMAX operates in between ten and sixty six gigahertz Line of Sight (LOS) at a variety up to fifty kilometer (30 miles) and a pair of to 11GHz non Line-of-Sight (NLOS) usually - ten kilometer (4 - 6 miles) Each fastened client premises instrumentation (CPE).Each the fastened and mobile standards embrace the authorized (2.5, 3.5, and 10.5 GHz) and unauthorized (2.4 and 5.8 GHz) frequency spectrum.

3. WI-FI

Wi-Fi[3] stands for "wireless fidelity" but since most of our WLANs area unit supported those standards, the term Wi-Fi is employed usually as a word for LAN. Wi-Fi may be a standard technology that permits any device to exchange and transfer information wirelessly over the network giving rise to high speed net connections. Any device that is Wi-Fi enabled (like personal computers, game consoles, Smartphone, tablet etc.) will connect with a network resource just like the net through a wireless network access purpose. Currently such access points additionally referred to as hotspots have a coverage space of regarding twenty meters inside and even a larger space vary outdoors, this is often achieved by victimisation multiple overlapping access points (Chan,2005),(Intel house,2003).

However with all such options, Wi-Fi additionally suffers from bound shortcomings. Wi-Fi is understood to be less secure than wired affiliations (such as Ethernet) as a result of associate trespasser doesn't want a physical connection. Sites that use SSL area unit secure however unencrypted net access will simply be detected by intruders. As a result of this, Wi-Fi has adopted numerous cryptography technologies. The first cryptography WEP, proved straightforward to interrupt. Higher quality protocols (WPA, WPA2) were supplemental in a while. associate elective feature supplemental in 2007, known as Wi-Fi Protected Setup(WPS) was deployed, however it additionally had a

significant flaw that allowed associate assailant to recover the router's positive identification. The Wi-Fi Alliance has since updated its check set up and certification program to make sure all recently certified devices resist attacks. How ever security remains a significant concern. There are three 802.11 wireless family customary wide used nowadays.
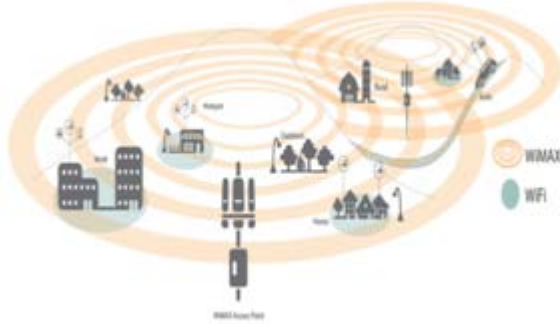

Figure 1

4. White Space

White space refers to the unused broadcasting frequencies within the wireless spectrum. TV networks leave gaps between channels for buffering functions, and this house within the wireless spectrum is analogous to what is used for 4G and then it are often accustomed deliver widespread broad-band net. The Federal Communications Commission (FCC) recently united to guage the legal operation of unaccr-edited devices in "white spaces", i.e., parts of the commissioned TV bands that don't seem to be in active use by incumbent users, like the TV broadcasters[4], [5]. Sub-GHz spect-rum has several properties appropriate for electronic communication. Systems should have a sturdy theme for determining the white-spaces, and second, these systems should have a spectrum-aware protocol that utilizes white-spaces of varied bandwidths The arrival of Wi-Fi frames is very bursty and clustered. We tend to observe that frames square measure clustered at the side of short intervals typically but one ms, whereas the idle periods between clusters square measure considerably longer. The short frame intervals square measure attributed to the layer competition mechanism of 802.11, within which senders go into reverse for a brief random time before every transmission. we tend to outline the interval between frame clusters as inter-cluster space whiles the interval between the frames among identical cluster as intra-cluster space. Moreover, white space hereafter refers to inter-cluster space unless otherwise indicated.
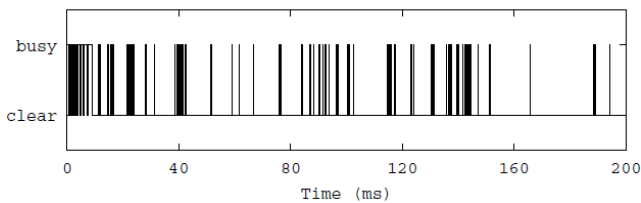

Figure 2

5. HMM (Hidden Markov Model)

We will 1st study the Vilfredo Pareto Model of LAN white area projected in [6], and so we'll propose our advanced HMM model of WiMax white space. Earlier projected Vilfredo Pareto Model of Wi-Fi white area supported the

actual fact that the arrival method of Wi-Fi frame clusters has the feature of self-similarity and consistent with [6], the self-similarity could be a feature of beginning method with heavy-tailed inter-arrival time. Projected model says that each one white space at intervals window follows Vilfredo Pareto distribution: Hear α and β area unit the size and form of Vilfredo Pareto model and x is the time of the white space. They set α to one time unit. In Vilfredo Pareto model, β is about by $\lambda / (\lambda-\alpha)$, wherever λ is that the average inter-onset time of frame cluster. Fig. three shows Associate in Nursing example of HMM. In an HMM, there area unit a collection of states say , every state has Associate in Nursing initial state probability that determines that state would be a lot of possible to be the primary state. And every state contains a probabilistic distribution of its observation vectors. We tend to adopt to explain the parameters of the states distributions. The transition chance matrix M wherever $M_{ij} = Pr(S(t+1)=S_j \mid S(t)=S_i)$ determines however a state may transit to a different state. we are going to 1st study the Vilfredo Pareto Model of LAN white space proposed in [6], and so we'll propose our advanced HMM model of Wi-Fi white space. Earlier projected Vilfredo Pareto Model of Wi- Fi white area supported the actual fact that the arrival method of Wi-Fi frame clusters has the feature of self-similarity and according to [6], the self-similarity could be a feature of beginning method with heavy-tailed inter-arrival time. projected model says that each one white area at intervals window follows Vilfredo Pareto distribution i.e. Hear α and β area unit the size and form of Vilfredo Pareto model and x is that the time of the white area. They set α to one time unit.
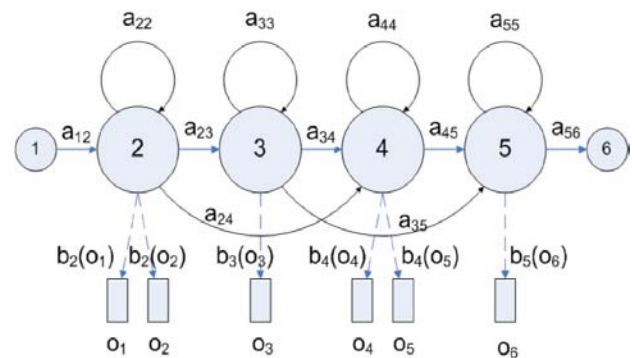

Figure 2: An example of HMM

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within the current network, we are able to learn all the parameters of this HMM model.

6. Conclusion

This paper has bestowed an explicit description of two of the foremost outstanding developing wireless access networks Associate in nursing the even mentioned on however these technologies might collaborate along to create alternatives for implementing last-mile wireless broadband services. Careful technical comparative analysis between the 802.11 (Wi-Fi) and 802.16 (WiMAX) wireless networks that offer various answer to the matter of data access in remote inaccessible areas wherever wired networks aren't value effective has been looked into. This work has verified that the WiMAX commonplace goal isn't to switch WiFiin its applications however rather to supplement it so as to create a wireless network net.

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