Автор: Usmonov M.T.,Turdiyeva M.A.,Xurramov S.X.
21.04.2021 10:41 -

# IMPROVING THE QUALITY OF SERVICE IN WIMAX NETWORKS BASED ON SPECTRUM SHARING

***Usmonov Makhsud Tulqin o'g'li***

*Karshi branch of Tashkent University of Information Technologies named after*

*Mohammed al-Khwarizmi Uzbekistan, Karshi 3rd year student*

***Turdiyeva Munira Abdishukur qizi***

*Tashkent university of information technologies*

*Karshi branch student 3rd course*

***Xurramov Shohboz Xurram o'g'li***

*Tashkent university of information technologies*

*Karshi branch student 2nd course*

**Annotation:** This article evaluates the efficiency of WiMAX networks that use spectrum sharing or work with relay nodes in their operation. To this end, UL transmission scenarios were simulated using spectrum sharing or relay nodes.

**Key words:** Spectrum sharing concept, WiMAX, IEEE 802.16 networks, protocol, WiMAX Spectrum Sharing, ALGOLINK connection.

Spectrum sharing concept

Spectrum sharing can be said to be a systematic approach to the use of the same frequency spectrum by network operators by mutual agreement. There are two main categories of spectrum use:

a. exclusive use based on any form of ownership of the frequency bands (portion of the spectrum), and

b. non-exclusive use based on licensing of certain types of use or classes of users - for example, public mobile radio communications - or without spectrum licensing - for example, 2.4 ... 2.4835 GHz bandwidth, used by Wi-Fi and Bluetooth (ISM band) and similar.

The term "radio frequency spectrum" refers to that portion of the electromagnetic continuum that is subject to some form of regulated use. At the low-frequency end, this range includes ultra-low frequencies (several kilohertz) used for communications that span the entire globe and propagate in the surface layers of earth and water. The high-frequency end reaches submillimeter waves, which correspond to frequencies of 300 GHz or more. There are different types of spectrum allocation: on a primary and on a secondary basis. These allocations are subdivided into types of “services”; for example, mobile services or radar services. The use of the radio frequency spectrum has brought about tremendous changes in the way people and organizations communicate - communicate, run their business and play. With the advent of new uses and the increasing importance of new applications such as remote control, scientific observation, in particular in radio astronomy, telemetry, etc., spectrum sharing has developed rapidly. Given the demand for even wider bandwidth from an increasing number of applications, it is believed that there is a shortage of spectrum and measures should be taken to address this issue.

However, practice is different from theory. Despite significant asymmetries between government-controlled spectrum and “civilian” spectrum, there is no shortage as such. However, there is a strong desire on the part of many players in this field to collectively fill the most attractive spectrum range between 30 and 3000 MHz. In this frequency range, the propagation is generally good and the bandwidth is sufficient for most purposes. Therefore, the use of this spectrum must be shared in some way. Some, such as Calabrese and Benker, argue that advanced technologies such as cognitive radio will allow this spectrum to be shared without prior agreement. But selfish interests, as well as theory and practice, show that these attractive projects are not feasible. The spectrum sharing problem is primarily a technical problem of the efficiency of the channel capacity in various environments (which limit the effective channel capacity (by the Shannon-Hartley theorem), in the desert or at sea), i.e. under different propagation conditions of radio waves, which vary with location, time of day, weather conditions, etc.

Progress in spectrum sharing can be viewed from a user, regulator and industry perspective. In

this study, we will look at it from an industry perspective. The wireless industry has developed and implemented a variety of spectrum sharing schemes, ranging from in-band and out-of-band emission limits based on cellular spectrum limiters to carrier-based multiple access schemes used in wireless LANs. All of these schemes are more focused on optimizing the system itself rather than generally improving spectrum sharing. This policy is quite relevant given that current radio regulations are selective rather than collaborative. However, this study proposes a different approach in which excess frequency resources will be used when one of the operators' network is congested.

Several coexisting, inconsistent mechanisms can be implemented in WiMAX systems. When the system starts up, the base station (BS) selects the appropriate operating channel. The choice of the channel should depend on the requirements for working in the given range. If the group contains specific spectrum users (SSUs), the BS must use a protocol called "DFS" dynamic frequency selection to try to find a channel that is free of the SSU. If the group does not contain an SSU (on IEEE 802.16 networks or not on IEEE 802.16 networks), the BS uses Dynamic Channel Selection (DCS) protocol to find the best channel to work with. In some control modes, it may be sufficient to be able to manually coordinate between operators for channel selection. If a group contains both SSUs and non-SSUs (IEEE 802.16 networks or other networks), then both DFS and DCS are used together. DFS is used to avoid interfering SSUs by releasing channels on which SSUs are detected, and DCS is also used to select the best channel from the available channel set to be freed up for DFS.

**REFERENCES**

1. 3GPP TS 23.107., « Quality of Service (QoS) Concepts and Architechture».

2. Г. КАРШИ ПРИНЦИПЫ РАБОТЫ ТЕХНОЛОГИИ WIMAX ст -40-42 / ФЭ Кодиров, ЮК Шониёзова, НБ Шодмонова - … НАУКИ И ТЕХНИКИ: МЕХАНИЗМ ВЫБОРА И …, 2019

3. А. Е. Рыжков, В. Воробьев, А. С. Слышков, М. А. Сиверс, А. С. Гусаров и Р. В. Шуньков, LTE and WIMAX стандарты и сети радиодоступа 4G, Санкт-Петербург: Издательство, 2012.

4. IEEE 802.16-2004, IEEE standard for Local and Metropolitan Area Networks- Part 16: Air Interface for Fixed Broadband Wireless Access Systems, Oct. 2004.