ANALYSIS OF WIMAX NETWORK ARCHITECTURE AND QUALITY ASSURANCE MECHANISMS

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

Автор: Usmonov M.T.,Turdiyeva M.A.,Xurramov S.X.
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Annotation: This article discusses the shortcomings of WiMax technology and its conveniences. The article details the working principles of WiMax technology.

Key words: MAC layer, WiMAX, IEEE 802.16 networks, protocol, WiMAX technology, ALGOLINK connection.

Currently in Ghana, the following wireless technologies are used: GSM (mainly rural areas), 3G (urban areas), WiMAX (mainly used by banks as a backup WAN) and LTE (only for data transmission in the capital - Accra) ... If we talk about the protocol basis for the transmission of user traffic, then the world is developing towards the use of IP networks for the transmission of all types of subscriber loads, but in the operation of operators (including in Ghana) there is still a fairly significant segment of networks of legacy technologies - switched telephony. FR, ATM. This is why technology WiMAX was chosen as the subject of research for this thesis, since in WiMAX, to solve the problem of network access and service access, there are mechanisms for interaction with networks of different technologies due to the presence of the convergence sublevel - CS in the MAC layer.

WiMAX technology and architecture WiMAX (Worldwide Interoperability for Microwave Access) is a telecommunications technology designed to provide universal long-range wireless communications for a wide range of devices (from workstations and laptop computers to mobile phones). Based on the IEEE 802.16 standard, also called Wireless MAN. The WiMAX name was created by the WiMAX Forum, an organization that was founded in June 2001 to promote and develop WiMAX.

General model of the IEEE 802.16 broadband standard The IEEE standard IEEE 802.16-2004 is a carrier-class wireless broadband access technology designed for deployment in urban distributed (regional) wireless networks (Wireless MAN). This is its main difference from the IEEE 802.11 group of standards focused on work in the license-free range. It should be noted that in Europe the ETSI Telecommunications Standards Institute has adopted the continental equivalent of the IEEE 802.16 standard, called ETSI HIPERMAN. HIPERMAN is a subset of IEEE 802.16-it provides for operation in the 2-11 GHz band and only in one of the modes – Wireless MAN-OFDM. The IEEE 802.16 standard describes the principles of building regional networks in the ranges up to 66 GHz, more precisely, their physical and MAC levels. For this, the standard provides for five modes (table 2.1).
Only one of them – Wireless MAN-SC is designed to operate in the 10-66 GHz range. It is aimed at backbone networks (point-to-point, point-to-multipoint) operating in line-of-sight mode, with typical data flow rates of 120 Mbit / s and a channel width of about 25 MHz.

The rest of the modes are designed for bands less than 11 GHz. One of them - Wireless MAN-SCa - is a variation of Wireless MAN-SC (with a number of additional mechanisms). Wireless HUMAN mode (High-speed Unlicensed Metropolitan Area Network) is an adaptation of other methods to work in unlicensed (in the USA) bands. The remaining two modes – Wireless MAN-OFDM and Wireless MAN-OFDMA - are new methods that were previously included in the IEEE 802.16a standard approved in 2003, but have since undergone a number of changes. All modes of the range below 11 GHz are distinguished by three characteristic details - mechanisms for automatic repeat request (ARQ), support for work with adaptive antenna systems (AAS - adaptive antenna system) and space-time coding (STC - space time coding). In addition, in addition to the centralized architecture (point-to-multipoint), the OFDM mode provides support for the Mesh network architecture. Another feature of the standard is that it provides for an operation mode in the unlicensed Wireless HUMAN range. In fact, we are talking about the adaptation of the described methods in the frequency band of the order of 5-6 GHz.
The main differences of Wireless HUMAN are the use of only time duplexing, the dynamic frequency selection (DFS) mode and the mechanism of end-to-end numbering of frequency channels.

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