APPROACHES FOR THE DEVELOPMENT OF LOW-BUDGET ANALYZERS OF THE SPECTRUM SENSOR NETWORKS 2.4-2.5 GHZ

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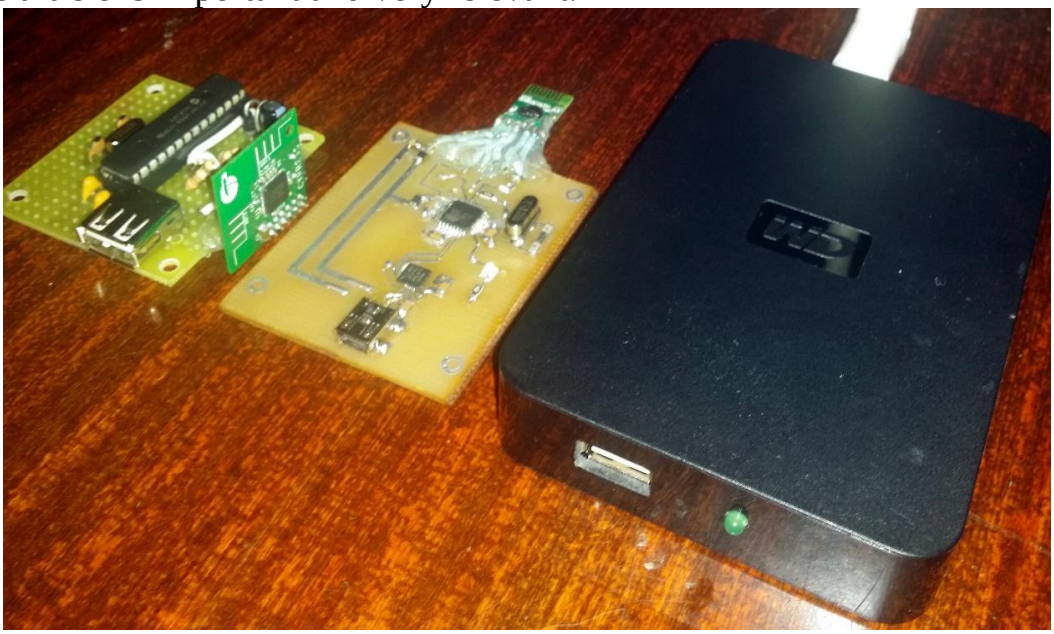
In Ukraine, more and more new home and industrial networks are being built with full or partial use of wireless technologies. Over the past few years, such technologies have become the de facto standard. The number of networks is increasing because of their affordability and ease of use, the emergence of industrial roaming systems, a wide range of antenna equipment and permissions fixed at the legislative level. When designing a wireless network, it is not possible to anticipate all the nuances: re-reflection, shading, directionality of the antennas of the receivers, etc., so after the construction of a real system, you need to check it and reduce the impact of negative factors. Spectrum analyzers help solve this problem.

Spectrum analyzers do not increase the availability of information on the network, but contribute to its improvement, through the identification of weaknesses, the occupancy of the spectrum by other networks (collision avoidance/interference). Unlike the standard tools available on network cards, the spectrum analyzer collects noise levels such as magnetrons (in microwave ovens), can detect stationary interference and other equipment (Bluetooth, ZigBee, radios, toys, video transceivers, video transceivers) medical sensors, etc.). Also, the spectrum analyzer “sees” not only service packets, which assess the signal level in network cards, but also all other packets. Therefore, the topic of the article is important and very relevant.



Spectrum Analyzer is a device for scanning and analyzing a specific frequency band, allowing you to detect and communicate wireless capabilities of

wireless networks, access points and client devices. For example, using a frequency scanner allows you to identify the names of detected radio networks, their signal strength, the type of data encryption used, and other parameters. The most common spectral Wi-Fi analyzers can be found in the arsenal of professionals whose professional activity is related to the deployment and configuration of 802.11 a/b/g/n/ac wireless networks

The article presents the results of designing and manufacturing spectrum analyzers on pre-made components (ICs for IEEE 802.15.4 / ZigBee). The process of designing, manufacturing of printed circuit boards, collecting devices and programming of microcontrollers is described in detail. Tested and made improvements to existing devices. The wiring of the board revealed the dependence of the quality of work of the device on the quality of its assembly, the presence of electromagnetic screen and antenna type. The article uses third-party software, as well as software developed for information and cyber security for the analysis of data collected from different spectrum analyzers. After detailed testing of the devices and their verification, we came to the conclusion that a more compact solution for serial production can be made in devices. Possible areas for further research include deeper statistical analysis, improved approaches to information measurement and forecasting. In the future, these devices can be integrated into the software complex of the situational center, which consolidates the work with various low-budget models of analyzers of the spectrum of a given frequency range.

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