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## ASSESSMENT OF THE EFFECT OF AN EXTRA SHORT ELECTROMAGNETIC PULSE ON A RADIO COMMUNICATION SYSTEM

Based on the specifics of an ultra-short electromagnetic pulse, an approach that analyzes the overlapping of the influence areas of the pulse spectrum and the signal spectrum at the point of reception is necessary to assess the potential impact.

Potentially, the impact can be when a larger area of the spectrum of the useful signal is covered. In fig. 1 shows the spectrum of ultra-broadband, broadband, narrowband communication signals and ultra-short electromagnetic pulse [1, 2]. An ultra-short electromagnetic pulse, given its wide bandwidth and relative to the constant spectral power density, can have different effects on different communication systems with the same characteristics. Taking into account the comparison of spectra, it is possible to come to a disappointing conclusion regarding the following stages of the influence of an ultra-short electromagnetic pulse on the communication system, as its influence decreases:

1. Ultra-broadband means of communication.
2. Broadband means of communication.
3. Narrowband means of communication.

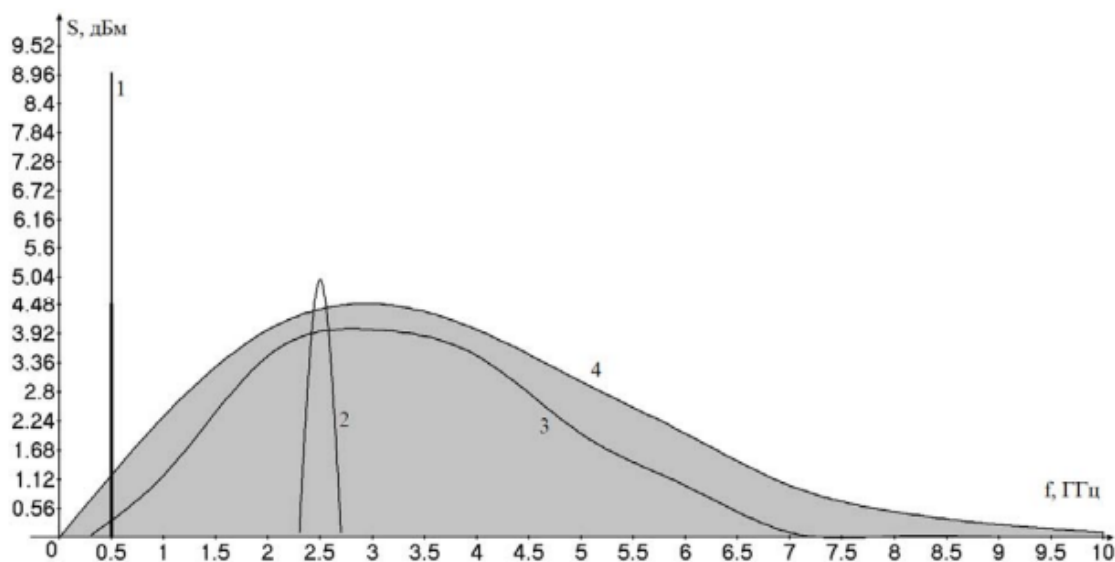


Fig. 1. Conventional signal spectra: 1 - Narrowband communication, 2 - Broadband communication, 3 - Ultra-broadband communication, 4 - Ultra-short electromagnetic pulse

Considering the discrete nature of the sequence of ultra-short electromagnetic pulses, the potential degree of influence on digital means of communication is higher

than on analog ones, while it is necessary to take into account, in addition to the degree of spectral overlap, the overlap in the time interval.

The fact is that when the pulse frequency of broadband interference is lower than the symbol sequence of the modulated signal, the impact will be lower than when the total or higher frequency of pulses of broadband interference. This is due to the integrated capabilities of most means of communication to save the transmission channel with the possibility of re-sending damaged packets of information, while passing a minimum percentage of undamaged packets [3].

As for the impact on the hardware part of the radio communication means under consideration, it is necessary to be guided by the generally known rules for evaluating the quality of shielding or grounding. The calculation of guidance levels depends on the type of radio communication system. The difference in impact may depend only on the quality of shielding and internal clock frequencies of information processing systems. By evaluating the degree of spectrum overlap and the time intervals of following the useful and interfering signals, it is possible to make an approximate assessment of the impact.

It should be taken into account that an important role can be played by the method of modulation and processing of information when it is transmitted by a radio communication channel, which can exclude a complete loss of communication when distorting and destroying a part of the transmitting packets [4]. It should also be noted the high potential of resistance of ultra-broadband communication channels to the influence of an ultra-short electromagnetic pulse with a properly organized method of modulation and processing of the transmitted information.

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#### **ОЦІНКА ВПЛИВУ ЗВЕРХКОРОТКОГО ЕЛЕКТРОМАГНІТНОГО ІМПУЛЬСУ НА СИСТЕМУ РАДІЗВ'ЯЗКУ**

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