

СЕКЦИЯ 2. ОБНАРУЖЕНИЕ КАНАЛОВ УТЕЧКИ ИНФОРМАЦИИ

THE SPEECH INTELLIGIBILITY DETERMINING ALGORITHM FOR INFORMATION SECURITY SYSTEMS

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Speech data protection is one of the most important tasks in general set of activities on data security of a facility or an establishment. One of the most efficient ways of speech data protection from unauthorized audio interception is the active one which provides creation of masking noise in critical points of the premises. Active protection is implemented by different types of jamming devices. The goal of this work was to study the efficiency of different types of interfering signals. Noise efficiency was evaluated through speech intelligibility.

Speech intelligibility evaluation was carried out in the conditions when it is influenced by interfering signal. White noise as well as speech-like interference formed in several ways were used as interfering signals. Bench-scale plant which allows determining speech intelligibility, including speech going through building envelope components, under the influence of interfering signal was designed. This plant presents the analog of a small anechoic acoustic chamber. Plant is made of two parts of metal tube, which are fixed on metal bed, in one of which acoustic system of “closed box”-type is installed and a microphone with microphone preamplifier installed in another one. Acoustic transducer and vibration oscillator are used for interfering signal reproduction. It is vibration insulating material STP Bimast-Bomb and vibration insulating mounts that were used to reduce vibrations influence on measurements results.

Calculation of phrase intelligibility under the influence of interfering signals of different types (white noise, speech-like interference) with different signal-to-noise ratio in case of direct acoustic and vibration channels of speech data leakage was provided. When examining direct acoustic channel, measurements were taken in different points of the room, which were chosen, firstly, according to geometrical sizes of the room, secondly, according to the peculiarities of acoustic wave’s distribution in the room. When examining vibration channel, vibration oscillator was fixed at different points of building envelope. Location of acoustic oscillator in space as well as that of vibration oscillator on building envelope influences intelligibility of speech coming through the structure at constant value of signal-to-noise ratio.

As the result of the work it was determined that the level of speech-like interference can be lower than white noise level by 6-8 dB that will allow providing more comfortable conditions for the users and will provide the necessary level of speech intelligibility.

МЕТОД ИСПОЛЬЗОВАНИЯ OFDM СИГНАЛОВ ДЛЯ ОЦЕНКИ АКУСТИЧЕСКИХ КАНАЛОВ УТЕЧКИ ИНФОРМАЦИИ

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Проблема оценки акустических каналов утечки информации, не смотря на большое число уже существующих методов ее решения, по-прежнему актуальна. Предлагается новый способ оценки, основанный на использовании многочастотных сигналов с ортогональным разделением (OFDM) и оригинальной формулы оценки фазовых соотношений, предложенной в 1953 г. В.А. Зверевым [1]. В современной литературе эта формула носит наименование фазового инварианта Зверева [2–3]. Подобные решения применялись для прецизионного анализа дисперсионности каналов распространения акустических волн [1] и оценки характеристик радиотрактов [4]. Использование OFDM — сигналов позволит производить оценку канала одновременно во всем его диапазоне частот. Разработаны алгоритмы и рабочие программы для моделирования работы предложенного способа в среде Matlab. Рассмотрен пример обработки акустических колебаний в звуковом диапазоне частот. Сделан вывод о перспективности применения предложенного подхода для анализа фазовых характеристик каналов распространения речевых, виброакустических, гидроакустических и электромагнитных сигналов.

Литература

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