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ABOUT THE POSSIBILITIES OF THE ELECTRIC ECHO USE FOR THE TECHNICAL INFORMATION SECURITY TASKS

Ovcharenko D.R., Khizhnyak P.P.
Scientific supervisor – Dr. Sci., Prof. Antipov I. E.
Kharkiv National University of Radio Electronics, Dep CRETISS
+38057-702-14-30, e-mail diana.naidonova@nure.ua

Electrical echo is a phenomenon when a speech signal enters from the forward channel to the return one. At all stages of the communication development, the electrical echo was considered exclusively as a hindrance. In this thesis, we try to look at the electrical echo from the point of view of technical information security. It can be assumed that the electrical echo signal contains information about the channel and the remote equipment, as like as a reflected radar signal contains information about the target.

Electrical echo (EE) is a long and well-known phenomenon in telecommunications. There are two types of EE: all-electrical and acoustic-electrical. All-electric echo occurs in due to incomplete balancing of differential systems at the two- and four-wire communication lines junctions. This type of echo can appear in wired telephone networks only. The acoustic-electrical echo occurs when a signal enters to the return channel through the speaker and microphone of the remote device. This type of echo can occur in any telecommunications network. Voice chat and web-conferencing users are familiar with this type of EE when multiple of them have their microphones switched on.

Let's consider what interest EE can be from the point of view of technical information security. One can imagine several situations when, during a phone call, it is necessary to find out at least something about the interlocutor on the other end of the wire, or at least about the communication channel that he uses. Let's look at a few examples.

1. Imagine a situation where you get a call from an unknown number, and a person on the other side of the wire reports a threat - a bank card has been blocked, an accident has occurred, a terrorist attack is being prepared, etc. The situation does not give time and opportunity to contact the emergency services, you need to an immediately react. How to find out about who called at least something? Can he be trusted? Is it possible to find out at least where the interlocutor is?

2. The call forwarding feature, that all telecom operators have, can be misleading about the location of the caller or called party and their numbers. The question arises - is it possible to determine where the forwarding occurs and whether it occurs at all?

3. It can be assumed that with an outside connection to a digital communication channel, intervention in the network configuration and changes in the route of voice traffic, and hence changes in delay, will be required. Can this be

seen from the participants in the conversation?

4. Sometimes, in order to understand the remote subscriber conditions, it is important to know what equipment he uses: a mobile or wired phone, or IP-telephony.

5. Acoustic-electrical echo occurs in due to acoustic feedback between the speaker and the microphone of the remote device, so the echo contains some information about this section of the path as well. We can talk about the frequency characteristics of the returned signal, as well as the anti-echo filter speed and efficiency, which can only be characteristic of certain models of telephones.

Other tasks, such as equipment identification and testing, may also be considered. The measured EE parameters can be: time delay; echo level; its spectral composition; frequency shift; time variation of these parameters, and multiple echo. These characteristics can be individual and to some part characterize the channel and the remote subscriber equipment.

Thus, EE is a signal that has passed through the communication channel to the remote subscriber and back, containing information about the communication channel and therefore of interest for the technical information security.

For the EE practical use, it is necessary to consider and solve some problems:

- it is necessary to identify the relationship between the channel type and the time delay;
- it is necessary to identify the dependence of the EE frequency characteristics and the equipment used type in the communication channel (telephones, headphones, speakerphone functions, etc.);
- ways should be found to quickly and, if possible, imperceptibly measure the EE parameters. It is possible to develop special signals for this.
- it is necessary to find a way to disable, at least for a short time, anti-echo filters, so that the measurements are effective.
- it is necessary to establish a measure of the "uniqueness" of EE for different types of telephone connections, for different mobile terminals, possibly for different telecom operators.

These questions are partially presented in [1] and [2].

References

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