Direction finder for hardware protection of the cybernetic perimeter of the enterprise

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The means for defending information can be divided into two types: active and passive. The active ones can be attacked: noise generators, scramblers, information masking, etc. A number of outbuildings can be brought up to the passive ones - the managers of such є manifestations of the potential for intrusion at the safe perimeter of the enterprise. Such facilities can include scanning receivers, radio trap detectors and video cameras, video and acoustic listening systems. On this year, there was a new problem of damage to the physical perimeter of the security of the reception by the way of the penetration of UAVs (Unmanned Flying Devices) on the territory. Such penetration can lead to a number of consequences: from the installation of listening equipment, the creation of an access point for traffic overflow (snifing the internal Wi-Fi barrier) to a direct physical attack. Also, the power to defend the perimeter of UAVs and the current tasks of today.

To determine the position of the UAV that is visible to the perimeter, it is possible to choose two types of direction finders - active direction finding and passive direction finding. Direction finding is active, i.e. satisfied with the collapsible and variant task. Let's look at the possibility of inducing a passive direction finder of electromagnetic vibrations of UAVs. For the solution of this problem, the method of correlation interferometer is proposed. The direction-finding system near the safety zone will be composed of the following elements: 1. Antenna systems; 2. Subsidiaries and switches of the antenna-feeder path; 3. SDR receiver 3. Software for correlative processing of signals.

To stimulate the direction finder, it is planned to build an antenna system with subswitches and switches for the antenna-feeder path of the company TCI Model 643 (https://www.tcibr.com/).

To implement the correlation interferometer method, it is recommended to use the SDR (Software Defined Radio) system [1]. To ensure the calculation of the parameters up to the correlation interferometer, the USRP N210 Networked Series system is used, (Fig. 1) Ettus Research's calculations: USRP N210 provides processing with a high throughput building and a high dynamic range. The USRP N210 Networked Series is intended for high-end radio applications that require high performance.

Fig.1. SDR System Ettus Research USRP N210 Platform [2]

The USRP N210 architecture includes a Xilinx® Spartan® 3A-DSP 3400 FPGA, 100 Mv/s drop ADC, 400 Mb/s drop DAC, and Gigabit Ethernet connection for data streaming to/from the computer. The modular design allows the USRP N210 to operate from 20 MHz up to 6 GHz, and the expansion port allows you to synchronize the extension deck in the USRP N210 series and switch them to the MIMO configuration. The retailer can implement its own functions in the FPGA structure or in a built-in 32-bit RISC software kernel. USRP N210 provides more FPGA capacity, lower than USRP N200, for add-ons that require additional logic, memory and resources for digital signal processing. FPGA also has the potential to process up to 100 Ms / s for direct transmission and reception. The FPGA firmware can be changed via the Gigabit Ethernet interface, which means that new solutions will be improved.

The implementation of such a combination of an antenna system with a complex of software-configured radio [3,4] allows solving the problem of a direction finder based on the correlation interferometer method with a guaranteed operating range of 20 MHz - 3 GHz. To give the possibility of a partial solution to the problem of penetration into the physical perimeter of UAV reception and also to improve the cybernetic security of the organization.

References:

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