Name of the project: AP14869840 «Research and development of ultra-broadband multi-antenna wireless transmission of information between interfaces»

Relevance:

Currently, the most widely used multi-core processors rely on an integrated system with packet switching for data exchange. This is a key factor in CPU performance that determines the performance of internal Crystal networks, and due to scalability issues, a large number of cores becomes a weak point. To solve this problem, it is recommended to use mm-wave wireless connections for internal communication, which support their system-level latency and adaptability due to their low-frequency transmission. This new paradigm can solve the scalability problem of modern multi-core architectures. We can assume that such a configuration provides speeds above 10 Gbit/s and efficiency close to 1pj/bit without misinterpreting the wireless internal channel. This project shows that such forecasts are economically profitable. In this regard, we use the normal nature of the system to design the channel, i.e. we need to optimize its frequency characteristic by carefully selecting the dimensions of the chip body. So, we use the bandwidth of the channel to adapt to it, expanding the efficiency and speed limits through simple parameters at the physical level. Our simulation methods are expected to reduce road losses and delay propagation on a commercial chip by 47 DB and 7.3 times, respectively, providing a wireless connection of more than 11 Gbit / s inside the chip and 3.2 DB from the scattered case.

Purpose:

To study the establishment of wireless communication between interfaces at high speed and high resolution using nanoantennas and to build an optimal mathematical model of the correct expression of the wireless internal channel.

Expected and achieved results:

As a result of the project implementation, the following results will be obtained: 1) Analysis of the results of research on optimizing the parameters of inter-chip and intra-chip communication, analyzes methods for optimizing multi-wire / multi-antenna connections on a chip and a chip, justifies the use of special physical optimization methods, coding and signal processing, develops technical requirements for communication technology. 2) the structure and scheme of a mathematical model for optimizing the communication parameters of an ultra-wideband multi-antenna wireless transmission of information between the built-in antenna interfaces will be developed. 3) algorithm and program for optimizing the parameters of inter- and intra-crystalline coupling of the built-in antenna. 4) Recommendations and requirements will be developed for optimizing the parameters of inter-chip and intra-chip communication, the built-in antenna.

Completion form: Research Report-a scientific publication with a review of at least 35 (thirty-five) percent CiteScore in the Scopus database, as well as at least 1 (one) article in a peer-reviewed foreign or COXON publication; 2) six textbooks were submitted to the Academic Council for publication of monographs, books and (or) chapters in books of foreign and (or) Kazakhstan publishers. Participation in the Annual Scientific Conference of young scientists organized by the science committee was carried out; - the results of the research were reported at international scientific conferences in the near and far abroad;-an application was submitted for participation in regional, national and (or) international scientific and (or) scientific competitions to continue research work in the chosen scientific direction;

During the training, six diploma projects were completed. It is planned to expand international scientific cooperation with the world's leading universities, and an exchange of experience was carried out with the University of Haen in the Spanish.

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