ABSTRACTS

Berkman L. N., Varfolomeieva O. G., Chumak N. S., Pokhabova I. E. Algorithm of optimal reception of broadband aggregate signals // Телекомунікаційні та інформаційні технології **(Telecommunication and informative technologies). – 2015. – №2. – PP. 5-12.**

In wireless telecommunications, multipath propagation is one of the main causes leading to the interferences. To overcome such effects is advisable to use broadband with aggregate signals with large bandwidth-duration products. This makes possible to deal with effects of multipath propagation and use it to increase the accuracy of data transmission. According to the general theory of communication, significant redundancy is a common trait of aggregate signals. Signal reception in such cases can be done on the whole or by the elements. Separate reception in multipath propagation can be done only during processing the aggregate signals. So, nowadays, development of algorithms of broadband aggregate signals processing is really important. This will allow properly assess and study aggregate signals and signal reception.

Methods of broadband aggregate signals receptions are formed like combinations of relevant reception methods on the whole towards the rays and aggregate signal elements. In this article presented classification scheme of the interaction of methods of aggregate signals receptions. Studied algorithms of noise immunity by dint of methods of coherent reception and incoherent reception with coherent additions of the rays. Defined the algorithm of optimal broadband aggregate signals processing and presented the schemes of relevant demodulators.

Keywords: telecommunication network, aggregate signal, broadband, coherent reception, incoherent reception, frequency function, error probability

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Kopiyka O. V. Building a unified information platform of telecom operator // Телекомунікаційні та інформаційні технології **(Telecommunication and informative technologies). – 2015. – №2. – PP. 13-17.**
The article solves the problem of information and communication systems synthesis of the telecommunications operator based on the unified information platform, which provides automatization of production and management processes, operations activities, and transport and system-wide infrastructure. Improved elements of Frameworx industry's concepts are offered for forming the platform, which are a TM Forum's sets of developments, based on the best practical solutions, methodologies and information technology. Frameworx is standardized at the international level. The aim of Frameworx is building of business support systems and operations OSS / BSS.

Keywords: information and communication systems, synthesis, unified information platform, telecommunications operator

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Popoff A. A. Algorithms and units of *L*- and *R*-estimators forming on the base of *L*-group operations // Телекомунікаційні та інформаційні технології **(Telecommunication and informative technologies). – 2015. – №2. – PP. 18-26.**
The approach to *L*- and *R*-estimators description on the basis of *L*-group operations is suggested. Algorithms and units of *L*- and *R*-estimators forming have been gotten as a result of such approach. Definition of the sample space with *L*-group properties is brought. It is shown that the use of such a definition permits, on the one hand, essentially to expand algebraic properties of considered sample space, and on the other hand, to describe the algorithms of signal processing on the base of lattice binary operations, thus obtaining new units of signal parameter estimation. There are obtained the variants of ordered sample forming on the base of lattice binary operations using systolic array algorithms. The known definitions of *L*- and *R*-estimators are brought. On the base of these definitions, new algorithms and units of *L*- and *R*-estimators forming, functioning in sample

space with L-group properties, are obtained. There are brought the relationships that are used for carrying out the further comparative analysis of the efficiency of *L*- and *R*-estimators. The values of absolute and relative asymptotic efficiency of location parameter estimation have been shown, by which the given units of *L*- and *R*-estimators forming are characterized on a wide class of measurement error symmetric distributions.

*Keywords***:** sample space, *L*-group, *L*-estimator, *R*-estimator, systolic array, estimation efficiency, measurement error distribution

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Savchenko Yu. H., Kovalenko A. P. Using a signaling for real-time monitoring and control of the technical state of the telecommunications network // Телекомунікаційні та інформаційні технології **(Telecommunication and informative technologies). – 2015. – №2. – PP. 27-32.**

Reliabilityof telecommunication network is an essential aspect of its work. This is due to the huge economic losses that may arise in the event of even partial disability network, alss this will affect the reputation of the owner of the network, which can reduce the amount of current and potential users. Therefore, there is a very urgent task in the development of auxiliary tools to improve the efficient maintenance of the network. Using these tools can provide operators, that monitor the state of network, operational information about equipment operability, the intensity of traffic and the real quality of service to consumers.

As this instrument is proposed monitoring system SS7, which by passive connection to links of the network will monitor and analyze traffic signal of that network. Moreover, this system should operate in close to real time, it will not only respond quickly to problems, but also to anticipate unwanted events such as overload attacks, circled signaling traffic. Selection of key parameters and algorithms for calculating parameters of quality and efficiency of the network is an important part of the overall problem of successful operation of the network SS7. The system should be flexible,that the operator be able to put the individual settings, which must be observed during each separate network or link. This monitoring system is necessary for the successful maintenance, as can not onlyefficiently inform, but also to warn about problems in the telecommunications network.

*Keywords:*monitoring system, signaling traffic, support of maintenance of the network, network efficiency parameters

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Bondarenko V. E. Inductive reasoning for knowledge processing systems // Телекомунікаційні та інформаційні технології **(Telecommunication and informative technologies). – 2015. – №2. – PP. 33-39.**

The paper describes the concepts, their sets and properties that appear in inductive reasoning. After entering the necessary definitions, axioms are formed, linking concepts and their properties on which theorems are proved. These theorems are necessary to automation of part inductive reasoning. The paper develops an algorithm of part inductive reasoning, intended for realization in systems of processing knowledge to supplement the knowledge base of new knowledge which are a generalization of knowledge existing in the database. This algorithm, analyzing and summarizing data processed during each consultation, given by the expert system finds new regularities and according to them, creates new rules of knowledge base.

We consider two variants of the practical algorithm of part inductive reasoning. The first variant is based on solving the optimization problem of Boolean programming, and the second variant is based on the method of statistical analysis.

*Keywords***:** inductive reasoning, problem of Boolean programming, knowledge base

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Semko V. V. Solving the problem of conflict by method of integrated truncation of variants // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №2. – PP. 40-50.

Calculation algorithms of the decisions space, space implementation of combined management by object management and synthesis of strategy chains for solving the problem of conflict of object interaction management with an open set of observed objects of uncertain behavior by the method of integrated truncation of variants are proposed and investigated. The supervision and search space has arbitrary system of restrictions which may be not convex and open. The process of synthesis of chains management by object management with a method of integrated truncation of variants for solving the problem of interaction conflict with the objects of supervision in two-dimensional Euclidean space of supervision and search in conditions of constraints and uncertainties are discussed in a result of simulation experiment which was conducted at a hypothetical example. Space of implementation combined management is synthesized for individual chains of synthesized strategies management by object management. The process of convergence of solving the problem of the conflict in small is investigated according to the chosen selection criterion of synthesized management strategies by object management.

*Keywords***:** space of supervision and search, space of decisions, object of supervision, object of management, model, interaction conflict, solution to the conflict, uncertainty, open set, restrictions of space of supervision

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Dikarev O. V. Ring code specifiers // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №2. – PP. 51-55.

This paper presents the justification and finding components- specifiers used to identify code words, as well as for checking and correcting channel errors. It is shown that any code word can be represented by its vector of the shift indexes or by its specifiers. Each specifier is obtained by mathematical transformation of vector elements of shift indexes. The main types of specifiers were considered: the sum of the vector elements of the shift indexes, as well as three other specifiers. It is shown that each ring code and its source vector can produce not one but a whole family of its own kind of ring codes, which can be obtained simply by adding the new null characters at the end of the original vector of the base ring code. Moreover, the representatives of the family have the same kind of vector of shift indexes as that of the base ring code. One element having a value equal to the multiplicity of units in the original vector is added or removed in the vector of shift indexes with adding or removing null character in the ring code respectively. It provides a simple method for identifying such codes: index of the whole set of family is transferred once, and then only length of each new code word is transmitted. Ring codes families with such properties are useful at entropy coding of information.

Keywords: a ring code, the identifier, a code word, vector, checking characters

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Zingaieva O. I. Frequency characteristics of photodiodes with different surface states // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №2. – PP. 56-60.

Photodetectors are characterized by a variety of purposes, structures and application conditions. They are intended for receiving and converting the energy of the optical emission. Photodetectors are essential elements of any optic-electronics devices. They connect optical and electronic systems in hardware. Photodetectors behaviors are described with set of characteristics and parameters, expressing the dependence of current or voltage of the signal and the noise at the output on various factors: the power of spectral composition and the modulation frequency of the exciting emission, ambient temperature, supply voltage, the presence of background noise, and others. Characteristic of each photodiode, as the basic structure of photodetectors, is generally determined by photodiode design, such as: characteristics of material used, configuration of electric fields,

mobility of charge carriers, width of the space charge. Furthermore, the photodiode characteristics are determined by external applied voltage and the wavelength of the received optical emission. In the case of its absorption only in the space charge area (SCA) and depreciatingly small distances around it, for example, in pin-photodiode, the frequency characteristics will be determined primarily by the transit time of the charge carriers generated through the SCA.

Since the frequency response of the photodiode is one of the main determining the quality and ability of each individual photodiode, the task of accurate assessment of these characteristics seem relevant to modern electronic technology, in particular for the design of semiconductor photodiodes. From the theoretical analysis of photodiodes characteristics the following conclusion was done: that inertia PD can be substantially controlled by varying surface conditions. This article presents the calculations for the experimental study and validation of the main theory results of influence the surface on the kinetics of photodiodes. Perspective of using photodiodes in fiber-optical transmission systems is also presented.

Keywords: photodiode, kinetics of photodiodes, optical communication, band bending, surface condition, surface recombination

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Bondarenko T. G., Zeniv I. O. Calculation of sensitivity of the device for an Q-estimation of the quartz resonator of a solid-state wave gyroscope // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №2. – PP. 61-66.

In proposed article the theoretical estimation of sensitivity of the equipment intended for measurement of Q of quartz and sapphire resonators of wave gyroscopes is spent. Sensitivity is limited by thermal noise. Resonator Q is measured by time of its "ringing". For realization of this method it is offered to use capacitor sensor, which formed by the condenser with plates, lying in one plane.

Calculation formulas for the modulation factor of the sensor capacitance, which caused by change the distance between the capacitor plates and the dielectric and also for the values of thermal noise of the input circuits of apparatus. Using this obtained formulas allows us to substantiate the requirements for measuring equipment. Calculated theoretical value of the amplitude oscillation of the resonator, which can be detected by the proposed device.

Keywords: solid state wave gyroscope, quartz resonator, sapphire resonator, resonator Q, thermal noise, modulation factor, hardware requirements

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Galkin P. V. Features simulation of wireless sensor networking standard IEEE 802.15.4 // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №2. – PP. 67-79.

This article analyzes the simulation tools and features of carrying out simulation experiments on simulation of wireless sensor networks (WSN) constructed on the basis of the standard IEEE 802.15.4. The analysis protocol ZigBee, WirelessHART, MiWi, Z-Wave to identify their features for simulation.

The main feature with simulation network protocol ISA100.11a from similar - is its use in the industry, which imposes requirements on the reliability of data transmission, immunity and security. The special features of simulation networks built on ZigBee protocol should include the use or absence of lighthouses, the account level stack that need to be modeled, and must also describe the profile of ZigBee, which is selected for modeling.

The special features of simulation FSU built on Z-Wave protocol should include the need to consider the algorithm SRA, as well as the presence of several different types of units that have introduced in order to reduce the cost of the network. Also conducted an analysis of modern simulation GloMoSim, Castalia, NS-2, NS-3, NetSim, OMNET ++, Open-ZB, OPNET Modeler, TOSSIM for adequate simulation experiments.

An analysis of the simulation showed that in general, most funds only implement the standard IEEE 802.15.4 MAC layer and PHY and therefore allows you to simulate only the two lower-level model OSI. Protocols based on IEEE 802.15.4 must often implement their own.

*Keywords***:** wireless sensor network, simulation, simulation model, GloMoSim, Castalia, NS-2, NS-3, NetSim, OMNET ++, Open-ZB, OPNET Modeler, TOSSIM

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Shevchenko S. M. Study features of mathematical discipline in technical university in direction of information and communication technologies // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №2. – PP. 80-86.

The problem of mathematics education in higher educational establishments in direction of information and communication technologies (ICT) is discussed in the article. Being based on research in psychological and pedagogical literature, the question of the importance of mathematics for future ICT experts and especially the study of mathematical disciplines by the students of IC technology has been analysed. The need to modernise content and methods of teaching mathematics in higher technical educational establishments has been confirmed. A methodical system of teaching mathematical disciplines and ways of its implementation in the educational process has been proposed.

Keywords: mathematical discipline; technical university; information and communication technologies; content of teaching mathematics; methods of teaching mathematics

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Zinchenko O. V. The method of compensation of disturbances on the accuracy of the phase locked iterative in steady state // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №2. – PP. 87-90.

The main requirement for iterative phase-locked system is driven to reject the value of the desired value as in the transition and in steady state operations were as little as possible. The more complete the system offset the impact of storms and accurately reproduced asking influence, the more perfect system. In general, the physical nature of task management is compensation of disturbances on the controlled value in achieving independence from disturbances and ensures accurate reproduction asking influence. In basic outline iteration of the phase locked affect different kinds of disturbances that impair its quality. Thus, there is a need to clarify the quantitative impact assessment of these storms and to find ways to compensate for their effects.

This article concerns and solve the problem of assessing the impact of disturbances which act as the main and control circuit for a further iteration of the phase locked and the method to eliminate the effect of disturbances iterative precision of the phase locked in steady state. In the iteration of the phase locked due to the presence of additional control circuit compensation of disturbing influences slowly changing, which applied at an arbitrary point the main control circuit, so additional control circuit to provide practical invariance system in relation to exposure.

Keywords: iterative phase-locked system, phase error, synthesis, obstacle, main circuit control

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Radzivilov G. D., Belyakov R. O. Method of increase of fast-acting and dynamic exactness of the automatic control system of orientation diagram of active phased array // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №2. – PP. 91-99.

The quality of electronic systems largely depend on the properties of structural and electrical parameters of antenna and feeder. Recently increasing importance in the use of radio perspective complexes of various purpose (Air Force, Navy military) complex of active phased antenna arrays (APAA), forming a given chart at fast scan direction at the same time in a wide range of frequencies.

In the works of predecessors offered ways to improve quality indicators transients automatic control systems. A synthesis of open communication and synthesis of the combined system of differential relations that are made in accordance with the terms of reducing dynamic, mean square error and improve the system of automatic control. The research results can be used to assess performance in the construction of APAA. Using existing methods and the proposed method the authors estimate the extent of a system of automatic control (SAC) diagram direction (DD) was obtained APAA calculated values. Thus, the above mentioned methods may be used to develop methods to improve performance and dynamic control systems accuracy DD APAA.

The technique to improve performance and dynamic accuracy of the automatic control diagram direction APAA allows gradual control parameters of the system depending on the degree of satisfaction to the maximum signal / noise ratio for repeaters.

Keywords: active phased antenna array, system of automatic control, diagram direction, transition process, mean square error