

ABSTRACTS

Kovalchuk Yu. P., Koriyka O. V., Roiko O. O., Tolubko V. B. Forming communication infrastructure // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 5-10.

The article deals with a problems of telecom operator's communication infrastructure modernization. We solve two main tasks: 1) development of the network resources platform architecture, which allows to project a network based on their convergence; 2) the development of architecture platform network service that allows to project telecommunication services so as to allow the client to implement the principle of self-configuration services and receive the full range of modern convergent telecommunication services with consistent quality (QoS).

Platform capability of modern network resources determines the ability of creating network services. Network resources platform are interact with the platform of network services exclusively through signaling processing level. Network services platform interact with the operational processes support platform through network service control level and network services logic within providing telecom services process. Consumption of services amount are transported to the service platform in such interfaces and also activate / deactivate the services on the network.

Keywords: communications infrastructure, network resources platform, platform network services, telecommunication services.

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Kravchenko Yu. V., Polishchuk A. O. Mathematical model of knowledge representation system for environmental monitoring // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 11-15.

Article is devoted to improving the efficiency of regional environmental monitoring systems as subsystems Global National environmental monitoring system. An approach for improving regional environmental monitoring system, which is built on the integrated use of organizational component and hardware-software system using artificial intelligence theory. Underlined that in Ukraine currently no centralized portal monitoring system of environmental information. So actually create a centralized resource for organizing data forming the knowledge base and clearly reflect this region. The scientific objective is to develop the most adequate model of knowledge representation in intelligent regional environmental monitoring system. In this paper, improved mathematical model of knowledge representation system for environmental monitoring, based on the idea of using fuzzy *N*-Arnaud heterogeneous semantic web and semantic networks elementary 1st and 2nd kind. Using the model allows you to create a more complete and accurate knowledge base of any artificial intelligence systems.

Keywords: intelligent, semantic network, fuzzy set, knowledge representation, environmental monitoring, artificial intelligence system

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Rodionov S. S. Estimation of authenticity of channel failure diagnostics of telecommunication network // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 16-21.

The problem of increase authenticity of troubleshooting in communication channel is considered. The method of diagnostics of failures with the use of statistical descriptions of casual processes of change of parameters and state of equipment is considered. Estimation of increase of authenticity (minimisations of probability of skipping of disrepair) due to multiple of verification of elements is given. For the two-staging program of search of disrepair probability of non-detection

of failure for the cycle of verification is determined. Statistical characteristics of processes of evolution parameters and state of checked system are selected as the indicators of reliability of functional elements. There was used probability of non-detection of malfunction is defined as one of indicators of check authenticity upon searching interval of realisation of random process with taking in consideration prior probabilities. Under two-stage search procedure repeated checks of the same element are proposed for increasing authenticity of detection of disrepair. At that it's possible to detect disrepair even it was not detected during the whole cycle of check. The total elapsed time of checks is estimated.

Keywords: telecommunication network, communication channel, failure diagnostic, statistical characteristic, error of 1-st and 2-nd kind, checks multiplicity, probability of non-detection of failure

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Stryhalyuk B. M., Beshley M. I., Kholyavka H. V., Brych M. V. Modelling and testing of management heterogeneous access networks // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 22-31.

With mobile broadband (MBB) growth and evolution of the network, the network is becoming dense and complex, each site can be up to seven bands spectrum, five modes (GSM/UMTS/LTE-FDD/TD-LTE/Wi-Fi), and five layers network architecture (Low-frequency macro coverage layer/ high-frequency capacity layer/ hotspot Micro capacity layer/ indoor Pico layer/ WiFi hotspots). If lack of effective coordination, it cannot effectively use all of the wireless network resources and cannot guarantee user experience. In this paper the concept of heterogeneous network with multi radio access technologies as one of the last fundamental ideas in new generation mobile systems has been proposed. The imitation model of the management system of the heterogeneous network has been developed using OPNET modelling tool. The scenarios of integration of LTE/UMTS networks with Wi-Fi that consider users mobility and types of service has been analysed. The process of optimization of network infrastructure of mobile operator due to redistribution of network resources and load balancing when implementing convergent technologies has been investigated. The imitation statistical model of femto cell as a convergent device at the access level for providing multiservice services with vertical handover realization has been developed.

Keywords: heterogeneous network, load balancing, handover, femtocell, optimization, quality of service

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Kolchenko G. F., Varfolomeieva O. H. Enterprise information system of the telecommunications carrier as the basis for the effective management arrangements // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 32-38.

The paper deals with the creation of integrated information system for the telecommunications carriers and determines the benefits from its implementation. It is shown, that the integrated enterprise information systems incorporating the functions of all functional sub-systems and different levels of management are the most effective. Each of these systems is intended for providing management of the telecommunications carrier enterprise. The integration of data (information), used in all telecommunications enterprise processes, into a common information space and formation on its basis of the recommendations on resource planning and decision-making, will significantly increase the efficiency of the enterprise activity. The special aspects of the enterprise information system formation are studied using the NGOSS methodology which provides a dedicated support structure for the effective telecommunications carrier. The NGOSS methodology provides for the enterprise the required tools for a stable deployment of automation

projects. The paper determines that the information system is a sophisticated one and it is intended for collecting, analysing and processing information in order to obtain the best results for an enterprise.

Keywords: operator telecommunications, telecommunication network, management system, information system, methodology

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Kuzavkov V. V., Haidur H. I., Syerykh S. O. Diagnostic model p - n (n - p) transition to natural radiation method // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 39-43.

The article discusses the new diagnostic model p - n (n - p) transition to natural radiation method. The process of determining the technical state of modern radio-electronic weapons is associated with registration and processing of diagnostic parameters of radio electronic components that are part of it. Using a new method of diagnosis – a method of natural radiation – requires the use of new diagnostic models that reflect the relationship of diagnostic parameters of physical and chemical properties of radio electronic components. The detailed analysis of the dependence of the temperature and current is made. The diagnostic model of p - n (n - p) transition to natural radiation method was proposed. The analysis of this model is performed. Using this model it is possible to determine the diagnostic parameters p - n (n - p) transition as the temperature dependence of current and electro-chemical and physical parameters. It is developed an algorithm for calculating the temperature of the crystal p - n transition depending on the applied voltage to it and physical and chemical properties of the semiconductor.

Keywords: diagnostic model, p - n (n - p) transition, diagnostic parameters, method of natural radiation, contactless inductive method, semiconductor

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Zhurakovskiy B. Yu. A method of approximation of distribution of code combinations curves is with i -multiple errors // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 44-48.

Some possibilities of cyclic codes of different length to find errors are certain. There are brought over experimental data, that characterize find errors possibility of different length and code distance cyclic codes. As a result of approximation probabilities of errors of symbols of P_i and periods of time are determined, on the draught of that symbols are accepted with the indicated probabilities of errors. Using these data the probabilities of reception of code combinations with i -multiple errors at the use of simple and correcting codes are defined. The amount of the not found errors in the different length and different code distance codes is calculated. It is resulted experimental and theoretical the crooked dependences of relative probability of i -multiple errors in combination from the amount of errors. Accordingly, taking into account character of the crooked probabilities of $P_{i,n}$, at binomial distribution of errors, the most exact approximation of experimental curve will be carried out by means of two constituents of $P_{i,n}$ with a maximums at $i = 2$ and 7 . Curves with a maximum at select values and have a next values of error symbol probabilities: $p_1 = 0,167$ and $p_2 = 0,5$. Probability of reception of code combination of long $n = 14$ with i -multiple errors at different values is calculated.

Keywords: approximation method, distribution curve, codewords, probability of error, relative probability, error-correcting codes

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Komarova L. O., Shmatko V. S. Optimal reservation of switch nodes of telecommunication network // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 49-53.

Nowadays the emergence of failures in network switch and terminal nodes is recognized fact. Obvious way to provide necessary reliability of complex and large telecommunication network is reservation the most critical and responsible network nodes. The problem of optimum reservation of switch nodes of telecommunication network given those constraints on resulting expenses of network resources is considered. For overcoming of "curse of dimension" at the decision of tasks of optimum management reliability of telecommunication networks as large and complex systems the method of the dynamic programming is used. That method is based on separation so called "dominating sequence" from general set of possible options of reservation. After that the search optimal option of reservation is completed by the method of sequential scan. Developed procedure is rather simple and fast so it can adapt in real time to variations of parameters and state of telecommunication network. It is shown that the applied method can be easily enough formalised and can be realised as an algorithm for the further computer programming on. The numerical example of calculation of optimum reserve for the model segment of telecommunication network is resulted.

Keywords: telecommunication network, switch node, difficult system, reservation, management reliability, curse of dimension, dynamic programming

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Rodionov S. S., Kondakov O. M. Compensation of hindrances at the spatial selection of adaptive protection of communication network // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 54-58.

Protecting of radio electronic facilities from mutual and industrial hindrances requires the estimations of electromagnetic environment. In the conditions of dynamically changing casual appearance the decision of the task of protection it can be well-to-do on the basis of application of adaptive principles. In the article for providing antijammingness of communication network at influence of hindrance the source of which is not combined on a corner with the source of useful signal and can casual appearance change the angular position, the adaptive method of spatial peak compensation is offered and considered. Estimation of current angular position of source of hindrance, necessary for realization of method, is carried out by determination of equivalent center of radiation from useful and hindrance sources. Displacement of angular position of area of compensation depending on the change of corner of hindrance is carried out the proper regulation of amplification factors basic and compensative receiving ducting.

Keywords: adaptation, index of efficiency, recognition, spatial compensation, equivalent center of radiation of sources, programmatic management

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Semko V. V. Using a method of integrated truncation of variants at the solution of problems of the interaction objects conflict in supervision space // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 59-66.

The question of formal specification of processes of co-operation of objects is considered in space of supervision and search. The generalized model of co-operation of objects is synthesized in space of supervision is synthesized. The model of synthesis of decision in the conditions of the assured decision of task of conflict of co-operation of management object with opened in a number of objects of supervision in the conditions of vagueness of their conduct and unbulge of space of supervision and search is considered . The formal model of decision of task of conflict of co-operation of objects in arbitrary space of supervision and search is offered . The algorithm of

calculation of space of decisions in the conditions of uncertainty of behavior of an open set of objects of supervision is given. The block diagram of system of intellectual control of object of control at the solution of a problem of synthesis of strategy of the solution of the conflict at interaction to an open set of objects of supervision in space of supervision and search is considered. The synthesis algorithm of strategy of control in small at the solution of a problem of the conflict of interaction of objects in space of supervision and search in a method of integrated truncation of options is given .

Keywords: space of supervision and search, space of decisions, object of supervision, object of management, model of interaction of objects, synthesis of the decision, interaction conflict, uncertainty, open set of objects of supervision, not convex restrictions of space of supervision.

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Тkachenko O. M., Hrynkevich H. O., Perepelytca N. L. Simulation of management object // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 67-72.

The problem of simulation of the large organizationally-technical systems is described, as some class of the difficult systems. There are certain the basic properties of the difficult systems: the aim of functioning determines the degree of purposefulness of behavior of model; integrity and complication indicate on that the created model is one integral system, including plenty of component parts (elements) being in a wheel within wheels from each other; system vagueness; an adaptivity as a property of the high-organized system allows to adjust to the different external factors in the wide turn-down of influences of environment; universality of mathematical models; model dirigibility that swims out after a necessity to provide a management from the side of experimenters for the receipt of possibility of consideration of flowing of process under various conditions, that the real imitate. The simulation example of network is considered. It is shown for made an example as passing comes true to the simulation model of management object – discrete situational network (DSN). Functioning of DSN is described. The process of DSN network simulation is analysed.

Keywords: control system, model, simulation, information, node of commutation, discrete situational network, source, flow, decider

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Vysochinenko M. S. Management queries with switching to the stations of wireless networks // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 73-76.

Possibilities of application of methods of the ordered query (polling) terminal nodes are analysed for an exchange by data in the specialized wireless networks. The models of the system of polling and asymptotic descriptions of time of delay during organisation of queries to the networks with control system with feedback by the speed of buffer filling are considered. The model of the polling system with the periodic query of terminal nodes is represented. The system of service is asymmetrical, and alarm and managing information act with the delays, in general case different for every served element. It is shown that such model is described by the system of differential-difference equations (equations with a deviating argument). The simplified expressions for estimations of parameters of a priori distributing on the basis of application of moment generating function are made. For providing of the stationary (or near to him) mode of self-control of length of turn at the non-stationary stream of queries we have developed the modified polling method of with the feedback, the parameters of which are determined not only on results the analysis of size of the filled part of general volume of buffer but also speeds of his filling. Exhaustive, multiple gate and l-limited disciplines of service are considered. At the use of the speed feedback polling system for organisation of queries in a network the stationary and steady mode of self-control of queue length

can take place and at the non-stationary stream of queries. However to provide stability of process of management, it is needed carefully to regulate the coefficients of difference equation, controlling position of poles of system function on z -plane.

In future it is planned to consider the task of current control of parameters of the control system by the ordered query of terminal nodes for providing of stability at the maximally attainable speed.

Keywords: wireless network, polling, function of moments, model of the polling system, organisation of queries, control system, time of delay

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Savenko O. S. Reliability in networks using SDN // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 77-82.

The article defines the problem of reliability in telecommunication networks. Proposes the use of SDN technology to improve the network. There are reviewed the comparative characteristics of traditional architecture and network architecture, which is based on the concept of SDN. Definitions and describes the main functions of the operating system NOS for the network, which is built on the concept of SDN. Concept of SDN involves the transfer of control functions to the central server - the controller, thus replacing the traditional distribution model to a centralized routing. This technology is used to simplify the creation of new routes, efficient using of bandwidth and centralized configuration management of network parameters at the sessions, users, devices and applications. At the same time, it is increasing the possibility of innovation significantly in comparison with the traditional distributed model, which at first must give functionality to a common denominator for interoperability between independent devices.

Keywords: telecommunication network, reliability, control function, bandwidth, configuration, routing, innovation, concept of SDN

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Nikolov K. O. Reflectometry methods of evaluate the state of the optical fibers in communications networks // Телекомунікаційні та інформаційні технології (Telecommunication and informative technologies). – 2015. – №1. – PP. 83-88.

The paper discusses the requirements for the reliability of fiber-optic communication lines using transfer technology with wavelength division multiplexing. It is shown that the use of such technology makes high demands on the reliability of the optical fiber included in an optical cable. The reason is the significant increase of line capacity and consequently loss of information in case of emergencies. The calculation results, which confirm the lifetime of the optical fiber from the tension after installation are shown. It is shown that the level of backscattering in the optical fiber depends on the presence of microcracks inside fiber. Recommendations, according to which the fiber is proposed to identify areas with high tension by measuring the backscatter level in these areas, are proposed. In this case, the measurement can be used by conventional optical pulse reflectometer. It will evaluate the tension in the area to determine the probability of failure and reliability of the optical line.

Keywords: optical fiber, tension, installation, reliability, wavelength division multiplexing, reflectometer