ANALYSIS OF TELECOMMUNICATION NETWORKS BY ENLARGING SIMULATED PARAMETERS

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Proposed in this paper is the new technique of distributed telecommunication networks research. It is based on penetration of parameters, determined analytically, into simulated parameters and vice versa. Introduction of this principle has made analytical and simulation methods widely used. The results obtained allow to: consider the influence of equipment unreliability on transmission capacity; simulate the control of packets routing, ensuring the flat loading of outbound channels; create algorithms of routing methods information support, etc.

Present work is aimed toward the creation of advanced technique on the basis of analytical simulation method.

At the analysis of network operation, specific detail level is fixed, which can be described by elementary time unit. It is usually called simulated time unit.

Analytical simulation concept is based on the use of simulated time matching. That includes summarization of modulated parameters using analytical procedures, as well as parametric design of simulation models, etc. [1-3].

In the present work we have described the system of above-listed procedures.

In order to take the influence of main channels unreliability into account, one should seek the function:

$$\Phi(t) = \Phi\{\mathrm{W(t)}, F_1(\mathrm{t}), F_2(\mathrm{t})\},$$

where: W(t) - function of service time allocation at non-failure channel operation, $F_1(t)$ function of non-failure timing, $F_2(t)$ function of re-establishment timing. Function Φ (t) can be written as follows:

$\Phi(t) = \int_0^t \sum_{k=0}^{\infty} F_2^{*k}(t-x) P_k(x) dW(t)$, where - symbol of Stilties convolution, or: $\varphi(s) = \int_0^{\infty} e^{-st} P(f_1(s), t) dW(t)$, where: $P(z,t) = \sum_{k\geq 0} z^k P_k(t)$; $f_1(s) = \int_0^{\infty} e^{-st} dF_1(t)$.

Using the well known procedures for the special case, when $F_1(t) = 1 - e^{-\lambda_1 t}$, the mean value of total time for the channel being occupied with message transmission is determined as: $\overline{\varphi} = \overline{W}(1+\lambda_1 \overline{f_1})$.

Thus, in the present work we have systematized generalities of telecommunication networks operation. We have determined the scopes for application of analytical and simulation methods of distributed telecommunications research. The methodology of analytical simulation is based on the system of dynamical processes, which take place in telecommunication networks.

Keywords: *simulation modeling, telecommunication networks, method of enlarging simulated parameters.*

References

1. TARASOV, V.N. Design and Modeling of Communication Networks. Moscow: Lan Publishing House, 2019.
2. BOEV, V.D. Simulation Modeling Systems. Moscow: Yurayt, 2018.
3. SHELUKHIN, O.I. Modeling Information Systems. Moscow: Hotline-Telecom, 2014.