ON MAINTAINING OPTIMAL CONDITIONS FOR MANAGING INFORMATION FLOWS IN TELECOMMUNICATION NETWORKS

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In the present paper we have found Lapiace-Stiltiece transformation for the time of message delivery to the receiver, as well as its response in the form of appropriate controlling frames. We have obtained the expression for estimation of optimal mean value of scanning period. Boundary conditions of scanning period have been laid down for several routing methods.

In telecommunication networks data streams control is realized using appropriate protocol procedures, whose main purposes are: maintenance of efficient network operation; ensuring of the required resources allocation; network overload protection.

The most of routing algorithms require fixed information interchange between the nodes (in order to choose control strategy), as well as commands interchange (in order to implement this strategy). This work is aimed toward the search of time parameters, which determine resources outlay for maintenance of optimal control conditions packet flows in telecommunication networks.

Protocols of packet streams control provide for categorization of interaction objects into masters and slaves (primary and secondary ones). In order to form routing tables, information is necessary about the instantaneous network state and its traffic.

Routing method, ensuring the better efficiency/cost ratio may be not very dynamical. It depends on information transmission/processing ratio at decisions making. In the process of simulation it has been determined that simple and cheap routing algorithms are better [1-3].

Optimal period of scanning of (i+1)(i+2)...(i+m)-nodes by i-node is determined by minimization of influence of scanning period on the network response time. In order to determine the influence of scanning on response of receiving node, Laplace-Stiltiece transformation has been obtained:

$$r(s) = (1 - e^{-s\tau})\frac{\beta(s\alpha)}{s\tau}, \qquad \text{where: } \beta(s\alpha) = \int_0^\infty e^{-st\left(1+\frac{\sigma}{\tau}\right)} dB(t); \qquad \alpha = 1 + \frac{\sigma}{\tau};$$

σ – scanning cycle time; τ – time interval between the end of i scanning cycle and the beginning of (i+1)-cycle; B(t) – the time of information transmission and processing. Mean value has been determined:

$$M\{R\} = \bar{r} = -\frac{dr(s)}{ds}\bigg|_{s=0} = \frac{\tau}{2} + \left(1 + \frac{\sigma}{\tau}\right)\bar{\beta}, \qquad \text{where: } \bar{\beta} = \int_0^\infty tdB(t) \ .$$

Thus, the results obtained represent the accurate estimate of network "monitoring" by i-node at the constant monitoring level.

Keywords: *control, packet flows, telecommunication networks, Lapace-Stiltiece transform, optimal scanning.*

References

1. SANDERS, K. Package Analysis. Moscow: Williams, 2019.
2. MELNIKOV, D.A.. Systems and Networks of Data Transmission. Moscow: RadioSoft, 2015.
3. TIMOFEEV, A.V. Adaptive Management and Intelligent Analysis of Information Flows in Computer Networks. Moscow: Yurayt, 2012.