

Research of the Quality of Functioning Multiservice Communication Networks When Establishing a Multimedia Session

Bayram Ganimat Ibrahimov¹

¹Azerbaijan Technical University, H.Javid ave 25, Baku, Azerbaijan
AZ 1073 bayram@mail.ru

Arif Hasan Hasanov²

²Azerbaijan Technical University, H.Javid ave 25, Baku, Azerbaijan
AZ 1073 arifhasan2828@yandex.ru

Abstract. Considering the nature of a network traffic systems and the signaling protocols NGN/IMS, the mathematical model of multimedia service considering joint service of the official and useful traffic when rendering multimedia services is offered.

Keywords: protocols NGN/IMS, Internet Protocol Multimedia Subsystem, multiservice communication networks.

I. INTRODUCTION AND PROBLEM STATEMENT

Intensive development of the multiservice communication networks packet switched using the architectural concept NGN requires improving probable time response characteristics of a subsystem of a multimedia communication IMS (Internet Protocol Multimedia Subsystem) in case of establishment connections and when rendering the multimedia services providing QoS packets of a traffic systems and signaling protocols [1, 2].

The system and technical analysis showed [1, 3] that a great number telecom operators, the providing multimedia services, the management systems transmission of the official traffic realizing Triple play services such as voice services with a possibility activation multimedia applications, video telephony, IPTV, voice and high speed Internet access use. Such approach allows to integrate different services, gives ample opportunities personalization and increase in number multimedia services.

For provision telecommunication companies above-mentioned services by operators in multiservice communication networks it is necessary to consider quality of service QoS of the official and useful traffic and perception (Quality of Experience, QoE) which is estimated by several criteria of efficiency [1].

Support quality of service QoS&QoE is the key requirement to a subsystem IMS and an important index efficiency of the NGN/IMS networks in case of establishment of a multimedia session. However, the matter is studied insufficiently well and remains low-probed [1-3].

It is known [1-3] that time connection establishment is the major QoS an index of the NGN/IMS networks and is defined since the moment when the terminal of the calling party was transferred by all message necessary for connection establishment, till the moment when this terminal equipment received a signal of a status of the terminal of the called party.

On the basis of a research it is defined [4, 10] that the considered NGN/IMS network in case of service flows packets of a traffic systems and signaling protocols represents the single-channel queuing system (QS) of type $GI/G/1/N_{bs}$ with limited queue (on Kendall- GI-s designations arbitrary

distribution with independent intervals between arrivals requests).

Considering the nature of a network traffic systems and the signaling protocols NGN/IMS, the mathematical model of multimedia service considering joint service of the official and useful traffic when rendering multimedia services is offered.

Mathematical statement of the task offered mathematical model for assessment indices efficiency of the NGN/IMS networks in case establishment of a multimedia session is described by the following target function:

$$E_{eff}(\lambda_i, \eta_i) = \{[Arg \min_i(T_{i,ust}(\lambda))]\}, \quad i = \overline{1, n}, \quad (1)$$

in case of the following restrictions

$$T_{i,d} \leq T_{i,d.all}, T_{i,fai} \leq T_{i,fai.all}, T_{i,exp} \leq T_{i,exp.all}, \quad i = \overline{1, n} \quad (2),$$

where $T_{i,d}$ – the average time of a time delay by transmission i - th a flow of packets; $T_{i,exp}$ – the average time of waiting in queue in case of service i - th a flow of packets; η_i – coefficient effective use of network resources NGN/IMS by transmission i - th a flow of packets; $T_{i,fai}$ – average values of the time interval of failures between packets of the stream of i - th traffics; $T_{i,d.all}$, $T_{i,fai.all}$ and $T_{i,exp.all}$ – respectively, admissible values temporal indices of the NGN/IMS networks by transmission i - th a flow packets, $i = \overline{1, n}$.

Expressions (1) and (2) define an entity of the considered new approach, based on a mathematical model assessment quality of communication services considering indices efficiency of the NGN/IMS networks and feature methods of diffusion approximation.

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