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Research and Analysis of the Effectiveness Multiservice Communication Networks NGN/IMS

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Abstract. *The subject of the study is multiservice communication network using the concept NGN (Next Generation Network) based on the open network architecture IMS (Internet Protocol Multimedia Subsystem), supporting a wide range of services. The purpose of the article is to analyze the existing technical capabilities of the IMS multimedia messaging subsystem and perspective solutions for the functioning of the NGN/IMS network efficiency in providing multimedia services.*

Keywords: *Next Generation Network, Internet Protocol Multimedia Subsystem, Session Initiation Protocol.*

I. INTRODUCTION AND PROBLEM STATEMENT

The subject of the study is multiservice communication network using the concept NGN (Next Generation Network) based on the open network architecture IMS (Internet Protocol Multimedia Subsystem), supporting a wide range of services. The basis of this architecture is the IMS core, consisting of a set of specialized modules responsible for various functions for customer service [1].

The purpose of the article is to analyze the existing technical capabilities of the IMS multimedia messaging subsystem and perspective solutions for the functioning of the NGN/IMS network efficiency in providing multimedia services.

The effectiveness NGN/IMS networks during the establishment of a multimedia session was analyzed and the functional architecture of the IMS multimedia messaging subsystem that determine the interaction of NGN signaling systems an protocols was explored.

Based on the analysis of quality operation of the multiservice NGN/IMS c networks use of systems and protocols SIP (SIP-Session Initiation Protocol) terminals defined the functional architecture IMS which contains the following levels [1, 2]:

1. Access level and transport; 2. Level control of sessions; 3. Service layer and applications.

One of the important requirements for the IMS subsystem is the maintenance QoS (Quality of Service). A mathematical model for estimating the quality of communication services using a system $GI/G/1/N_b$ based on the theory of diffusion approximation is proposed.

On the basis of the model analytical expressions are obtained, which allow evaluating the performance indicators of the Triple Play service.

Therefore, offered MM, describes quality of functioning of the NGN/IMS networks in case establishment of a multimedia session which represents queuing system (QS) of the general type $GI/G/1/N_{bs}$ with limited queue and with possible multirate servicing packets of a signal traffic of the SIP λ_{sip}, Sigtran λ_{sig} and Diameter λ_{dia} protocol in case of critical loading $\rho \le 1$.

In this operation the model of functioning efficiency of the NGN/IMS networks when rendering multimedia services is analyzed, such as voice services with a possibility of activation of multimedia applications.

From the description of the diagram functioning model of service of a traffic on the NGN/IMS network in case establishment of a multimedia session it is visible that the characteristic of a flow of packets of a traffic signaling protocols is described by the following functional dependence:

$$\lambda = W(\lambda_{en.}, \lambda_{ser.}, \lambda_{ref.}, \lambda_{out.}), \quad (1)$$

where $\lambda_{en.}, \lambda_{ser.}, \lambda_{ref.}, \lambda_{out.}$ – respectively, the speed of the entering, serviced, refused and out flow packets traffic protocol of the NGN/IMS networks in case establishment multimedia sessions.

The IMS kernel with use HSS (HSS-Home Subscriber Server)realizes functions request, function of a proxy server and function session management communication. After reception and processing, requests and responses of service by a multimedia subsystem IMS arrive on an application server of services and the media server of service.

From brought above - the described principle action of the NGN/IMS c networks use SIP terminals follows that operation when rendering multimedia services and in case establishment of a session can be considered as single-phase unilinear QS with a finite volume of the buffer storage N_{bs}.

We assume that on an input of the buffer storage (BS) switching nodes of the NGN/IMS network the flow packets of a traffic signaling protocols with certain characteristics arrives. Such model can be analyzed as queuing system of the general type $GI/G/1/N_{bs}$ with limited queue.

On the basis model, for the purpose assessment time response characteristics of the NGN/IMS networks in case establishment of a multimedia sessions the approximate analytical method diffusion approximation which accuracy lies in acceptable limits can be used [1, 2].

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