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NEXT GENERATION NETWORK ARCHITECTURE AND ADVANTAGES

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Abstract. *This article is devoted to the issues of using wireless technologies in the construction of NGN networks. When writing the article, I looked at information about the architecture of the NGN framework, its elements and their functions released Technologies for constructing transport and subscriber access points of the NGN network were also considered. As a result, the NGN network subscriber issues of using Wi-Max technology in the construction of access sections were analyzed.*
Keywords: *convergence, next generation networks, NGN, H.323.*

In recent years, as a result of the development of information and communication technologies, our country has achieved high results in the field of communication. As a result of modernization of TELECOMMUNICATION networks, application of modern technologies, installation of new digital equipment and their optimization, Uzbekistan is rapidly joining the world information integration process. The use of NGN technology in the communication networks of our republic brings the communication quality indicators to a level that meets the requirements of the world standard.

The network built on the basis of NGN technology is considered a universal network, capable of high-quality, lossless and high-speed transmission of any type of data based on packet switching. The NGN network has the ability to provide all the necessary services for various data channels, that is, it has a high quality of service (QoS-Quality of Service). Theoretically speaking, the NGN network is the same

The currently used public telephone network, data transmission network, electrical communication network is a multiservice network that combines into a perfect single system.

Synonyms of NGN, according to a number of authors, can be the following concepts: adaptive networks (AN - Adaptive Networks), intelligent networks (IN - Intelligent Networks) and multiservice networks (MN - Multiservice Networks). However, the concept of AN can apply equally well to traditional and NGN networks. The IN concept was introduced in 1986 (Ameritech, USA) in connection with the advent of the SS7 signaling system (SS7), and the MN concept reflects the essence of the convergence of networks with circuit and packet switching. From the point of view of data transmission systems, the NGN network is the next generation Internet network based on the IPv6 protocol with its new (and without restrictions) IP address structure. From the standpoint of mobile networks, these are networks of the 3G generation and higher, using subsystems of the OKS-7 model for their control. From the standpoint of classical telephony, this is an IP telephony (IPT) network controlled by a softswitch.

In fact, NGN is based on the concept of a new type of network introduced in rec. ITU-T Y.100 in connection with the task of creating a global information infrastructure (GII - Global Information Infrastructure), which states that in this network "all types of information, including voice, data or video / multimedia, are simply reduced to digital streams bit to transmit them along the distribution path (or over the digital network)". Moreover, it was emphasized that "this does not exclude the possibility of breaking the links between networks and their payloads."The NGN itself "was seen as an implementation of the GII, or at least some of its components".

The second cornerstone is the relationship of the NGN network with the network architecture principles outlined in rec. G.805 (basic functional architecture of transport networks), rec. G.809 (functional architecture of multilayer networks, no connections between layers) and rec.

It is known that rec. G.805 describes the functional architecture of transport networks regardless of technology. This common functional architecture can be used as a basis for harmonizing a set of transport network architectures such as ATM, SDH and PDH, as well as a link for related management recommendations, performance analysis and equipment specifications. Rec. G.809 describes the functional architecture of connectionless transport networks in terms of their ability to carry information. The functional and structural architecture of these networks is described independently of network technologies. This means that these recommendations should be taken as a basis for describing transport networks that do not use pre-connection, but implement a certain technology.

There is a set of transport functions that are responsible for carrying digital information between any two geographically separated points. The transport layer may contain a complex set of multi-layer networks composed of layers 1-3 of the OSI model. Transport functions primarily provide connectivity. In particular, the transport layer facilitates the possibility of the following types of connections: user to user; user to the service platform; service platform to service platform.

In general, all types of network technologies can be deployed in the transport layer, including circuit-switched (CO-CS) and packet-switched (CO-PS) technologies based on pre-established connections, as well as multilayer connectionless packet switching (CLPS) technologies) in accordance with rec. G.805 and G.809. For NGN networks, it is assumed that IP can be considered as the protocol of choice for providing not only NGN services, but legal companion services as well.

Service platforms provide services such as telephony, Web services, and others. A service layer can (generally) cover a range of complex geographically dispersed platforms, and in the simplest case, be limited to the service functions of two end-user sites.

There is a set of application functions related to the service being invoked/activated. The services may include, for example, voice services, data service, video services, or combinations of the above (eg, multimedia services such as video telephony and games).

Each layer spans one or more layers, with each layer conceptually consisting of a data (or user) plane, a control plane, and a management plane. In general, each layer will have its own set of role-playing functions, players, and administrative domains. The roles involved in service provisioning are independent of those involved in transport connectivity. Each layer must be processed separately (from a technical point of view). This is achieved by obligatory splitting of the user's planes into two, placed in two layers. Based on the above, two layers are distinguished in NGN.

Service layer NGN. It is the part of the NGN that provides user functions that transmit service data, as well as functions that manage and administer service resources and network services, thereby implementing user services and applications.

User services can be implemented recursively using the many service layers available in a given layer. The NGN service layer deals with applications and their services that operate between peer entities. For example, services may be associated with applications such as voice, data or video, organized separately or in combination in the case of multimedia applications. From an architectural perspective, any service layer layer is seen as having its own user, control, and management planes.

Transport layer NGN. This part of the NGN provides user functions that transfer data, as well as functions that manage and manage transport resources so as to carry this data between terminal ends/nodes/entities.

The data transmitted in this manner may be user information or management and administration data. Can be dynamically or statically mapped to control or management information passed between such terminations/nodes/entities. NGN layer transport is implemented iteratively by multilayer networks as described in rec. G.805 and G.809. From an architectural point of view, each layer of the transport layer is considered as having its own user, control, and management planes.

User, control and management planes always exist and for each level.

In practice, the control and management planes may be zero for this particular level.

In the NGN network using technologies with a unified control plane, according to rec. G.807/Y.1302, such as ASON (Automatically Switched Optical Network) and GMPLS (Generic Multiprotocol Label Switching), equivalent control plane functions implemented in all layers can be processed within a single protocol.

Resources provide the physical and logical elements that, in turn, provide the service and operation of the network. As with the GII, provisioning resources must be separate from the implementation of functions and services.

Resources can be transport resources that provide, for example, listing (switches, routers, links, etc.), or processing and memory resources, such as processing platforms that can run utilities and applications or databases. to store application content.

The NGN management system is based on solutions that provide network management, implemented on the basis of various technologies (fixed and mobile telephone networks, data transmission networks, signaling, etc.), providing various services and built on equipment from various manufacturers. To organize the management of NGN networks, the interaction of control systems belonging to various operators and service providers is organized on the basis of the TMN concept. To centralize monitoring of the NGN network, they can be combined into integrated subsystems for managing the transport network and services with a higher monitoring and control system.

The modular structure of the control system implies the presence of integrated units that perform various control and monitoring tasks:

- emergency supervision;
- topology management;
- monitoring and security management;
- systems and processes management.

The data integrates the functions of separate control subsystems, for example, displaying alarms from multiple control areas on the same user interface, displaying the entire topology, providing overall security management. Quality control is carried out at the call control level and within the packet network. The superordinate monitoring system above the control subsystems provides centralized management of accidents and network topology.

NGN Next Generation Networks are an “add-on” to existing transport network technologies and provide operators with the flexibility to manage network services by solving the following tasks:

– creation of a unified information environment for a telecom operator;

– formation of distributed transparent and flexible multiservice networks;

– real-time service management;

– optimization of IT infrastructure management;

– provision of multiservice services;

– use of modern call control services;

– support for mobile users;

– monitoring the quality of services provided and the operation of network equipment.

Further development of architecture and protocols for NGN, in our opinion, should focus on the following aspects:

– consideration of the use of reference modeling techniques;

– determining how end-to-end services, call control and user mobility can be supported on heterogeneous networks;

– definition of interaction functions to support operating terminals that are not able to work on NGN;

– determination of the functionality of terminals capable of operating on NGN through a mechanism for updating software, redundancy and evolution of terminals, version coordination and management.

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