NEXT-GENERATION NETWORKS

Boysunov Botir Pulat ogli
2nd year student of the
Tashkent State Technical University named after Islam Karimov,
Faculty of Electronics and Automation,
Department of Radio engineering devices and systems,
UZBEKISTAN

Abstract

Application of next-generation network technology (NGN) to the convergence of modern telecommunication systems in the interests of providing operators with new communication services. Forming proposals for combining deployed transport networks based on a single NGN network platform.

Keywords:

Convergence, next-generation networks, NGN.

Telecommunications networks are complex and conservative technical systems. However, at the same time, the communications industry is one of the most dynamically developing. This contradiction must be taken into account when developing solutions for upgrading existing networks. The effectiveness of such work is largely determined by the correct assessment of the evolutionary processes typical for the communications industry today.

The development processes of the communications industry today should be evaluated from various angles. Both technical and economic indicators are important for an adequate assessment. Research on the development of the telecommunications industry has led to the formation of a new conceptual model for building networks that defines the functionality of these networks for the next few years. The corresponding concept is known by the abbreviation NGN (Next Generation Network) – the next generation Network. The idea of switching to NGN is very attractive for both Telecom operators and the entire telecommunications world as a whole. However, like any new direction of communication development, it is characterized by shortcomings, underestimation of which can have serious consequences for all participants in the telecommunications services market.

Theoretically, any existing telecommunications system can become the foundation for building NGN network. It can be based on public telephone networks, data transmission networks, and cable television networks. When choosing an existing telecommunications network as the basis for creating NGN, a number of important requirements should be taken into account: a large number of subscribers covered, interactive mode support, the availability of modern infrastructure, and the possibility of further development of the existing network.

You should note several processes that occur when deploying NGN network. One of the most important processes is the process of smoothing out differences in the structure of networks based on different technologies, which many communication experts call the "convergence process in the telecommunications system". For example, different network architectures were used at different levels of the hierarchy of networks that are the basis for providing different types of services. In the trunk lines of telephone networks, structures of the "tree" and "star" types found practical application, in data transmission networks – "star" and "bus", in television the "tree" topology was used. The introduction of digital packet data transmission systems has led to the unification of the transport network structure at all levels. Highways of almost all types of networks are made according to the ring topology, and house distribution networks are made according to the "star" topology. In other words, the structures of transport networks have acquired maximum similarity. A similar situation occurred with the convergence of technical building tools and services.

The integration process is designed to reduce the operator's capital and / or operating costs. In addition, the construction of integrated networks and systems often reduces the risks that inevitably arise in the operator's activities. The subscriber is not interested in the method of building the network and the technical means chosen by the operator. Subscribers, as a rule, demand the quality of service and the cost of services. The main idea of NGN is to create a single network to serve all types of traffic. It is generally assumed that the capital cost of a single multiservice network will be less than the investment in creating multiple networks, each of which supports a limited set of services. Therefore, the capital cost of building an NGN network from scratch will be significantly reduced. The same situation is with the savings in operating costs. Some estimates show that the reduction of operator costs in NGN construction can be quite significant.

Some other changes are also taking place parallel to the main processes in the evolution of telecommunications networks. For instance, many Telecom operators currently use different technologies to provide different services, physically using the same transport environment. This means using a single cable with optical fibers, which are used by different transmission systems that differ in packet forwarding technology.

Different approaches can be used to select NGN construction strategy. In any case, it is logical to start by analyzing the main problems inherent in the NGN ideology. One of the significant disadvantages of NGN can be considered those restrictions on its creation, which are due to the use of packet transmission and switching technologies. Operators in a number of developed countries began forming NGNs by upgrading their long-distance telephone network. In fact, the basis for the development of NGN networks can be any network based on the "packet switching" technology.

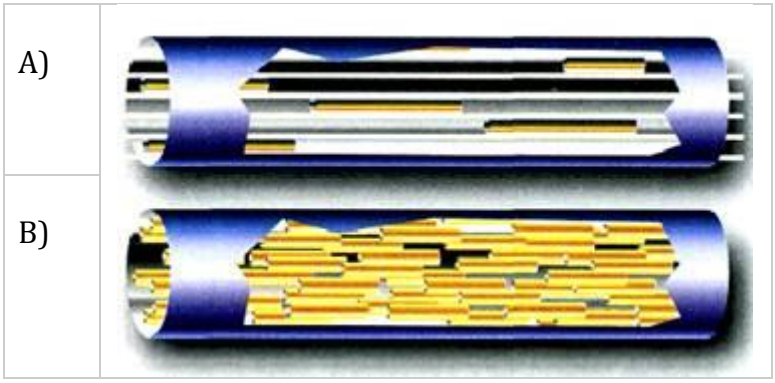

Fig. 1. A) circuit Switching. B) packet Switching.

It will take quite a long time to implement NGN network at all levels of the network hierarchy; so, for a certain period of time, the principles based on" channel switching "and" packet switching " will coexist. Therefore, it is necessary to analyze the boundary of switching technology change right now. As a rule, technology transformation takes place at different points of the network, starting from subscriber devices to the boundaries of IP networks of long-distance Telecom operators.

The integration processes that make up the essence of NGN concept stimulate growth in the capacity of transport resources and the performance of information distribution devices, as well as a significant increase in requirements for traffic quality indicators. When planning to deploy NGN network, you can use the following statements:

- the capacity of transport resources will largely be determined by similar values of the most broadband of all integrated networks;
- the performance of information distribution devices (routers) will usually be calculated based on the requirements of traffic that is most critical to signal delay time and packet loss (for example, video and voice transmission);
- service quality indicators will be more stringent than the same standards adopted for existing networks.

Let's look at each of these statements in more detail.

The main sections of modern transport networks are based on broadband optical cable. Spectral multiplexing systems can be used in such networks to meet NGN requirements in terms of increasing bandwidth. In addition, traditional options are often used to solve this problem: the use of redundant fibers provided at the design stage and the installation of equipment, with the possibility of further increasing the throughput.

The situation is more complicated with access-level networks. There are several approaches to solving this problem. One of them is the construction of networks with the FTTH (Fiber To The Home) architecture, that is, the penetration of the optical segment directly to the subscriber. This decision is reflected in many networks in the USA and Japan. Another approach involves the use of "short copper". That is, reducing the copper segment to a minimum, which allows you to use high-speed xDSL technologies, for example, VDSL.

The performance of routers should be calculated based on the specifics of the "packet switching" technology. The performance of such devices is measured by the number of packets transmitted per unit of time and is found by determining the number of subscribers in peak load and the number of requests from one subscriber. For data communication and video transmission, the number of packets processed becomes very significant. For this reason, the performance of information distribution devices in NGN will radically differ from those indicators that are familiar to the "channel switching" technology.

The use of packet data transmission requires a review of some traffic service quality indicators. Moreover, quality requirements are constantly increasing, regardless of the type of technology used. Packet transmission of information is characterized by the delay time of signal transmission. The delay time is nothing more than a combination of the time of transmission formation and signal processing. As noted above, some new services, such as IPTV and VoIP, are very demanding on the quality of the distribution network. These requirements determine the choice of the transmission medium and methods of noise-tolerant information processing. Therefore, for operators providing such types of services, it is necessary to clearly calculate the critical signal delay time, in order to avoid exceeding the permissible norm for a particular type of service.

One of the most important factors in the deployment of any telecommunications network is to determine its reliability. When evaluating the reliability of the NGN network, it is advisable to distinguish two components: the reliability of switching equipment and the reliability of the IP infrastructure.

When switching to NGN networks, the place of a switching node with "channel switching" is occupied by the so - called "flexible switch"(Softswitch). As a rule, all elements of next-generation networks have sufficient fault tolerance, but the switching node functions are performed not only by flexible switches, but also by servers, gateways, controllers, etc., as a result of which the reliability of the system as a whole decreases (since the overall coefficient is the result of multiplying the coefficients of individual devices). Currently, hardware manufacturers are constantly improving signal processing and transmission algorithms in their devices, so this problem is likely to be fixed in the near future.

Today, hardware manufacturers solve this problem by providing redundancy for all active network elements. Telecom operators often use the possibility of redundancy with geographical separation of active elements, which allows you to observe one of the basic principles of building fault-tolerant communication networks – the absence of a "single point of failure"in the structure.

Undoubtedly, the construction of NGN networks is the most important direction in the development of the telecommunications services market. The operator can increase its profit both by introducing additional services and, consequently, increasing revenues, and by minimizing capital and operating costs. The experience of operating such networks in the near future will help to assess all the advantages and disadvantages of this network construction concept.

Refrences

1. Sokolov N. A. [Features of modern evolutionary processes in telecommunications]. - Vestnik svyazi No. 4 ' 2008.
2. Sokolov N. A. Processes of convergence integration and consolidation in the modern telecommunication system. – «Connect! Mir svyazi", October 2007.
3. Subbotin M. Yu., Kolpakov I. A. Features of the implementation of optical transport environment in the construction of networks with the FTTB/FTTH architecture. - "Cable guy", 2007, №5 (19).
4. Sokolov N. A. Ways of converting telephone networks into NGN-networks. – «Connect! The world of communication", no. 5, 2007.
5. B. S. Goldstein. Switching systems. - St. Petersburg, "BHV-St. Petersburg", 2003.
6. V. A.Names. Reliability of communication networks during the transition to NGN. – "Journal of communication", №9,2007.