Provocări pentru implementarea NGN din perspectiva operatorilor tradiționali

Ing. Monica PETRE[1]

Rezumat. *Articolul prezintă, pe scurt, definiția rețelelor de generație următoare (NGN) conform recomandărilor ITU-T, elementele care au generat evoluția de la rețelele tradiționale de telecomunicații la retețele de generație următoare, provocările la care trebuie să facă față operatorii de telecomunicații cu putere semnificativă pe piață în procesul de transformare.*

Cuvinte cheie: *rețele de generație următoare, operator de telecomunicații cu putere semnificativă, transformare, migrare.*

Abstract. *The paper presents briefly the definition of next generation network as provided by the International Telecommunication Union, the drivers for migration towards NGN, the challenges the incumbents have to face in the network and business transformation process.*

Keywords: *Next generation networks, incumbents, transformation, migration.*

1. INTRODUCTION

Starting[1] end of 90' the market for information and communications technology has undergone a structural change.

The classic telecommunication networks, planned and implemented for the transfer of specific data such as telephone calls or pure data packages could not face the new realities in the telecommunication industry characterised by the extraordinary expansion of digital traffic (increasing demand for new multimedia services, new applications), demand for mobility, universal services and the need to converge and optimise the telecommunication networks.

The growth in competition, the new requirements for the market and technological developments have changed the traditional developments of the telecommunications industry.

A new concept, taking into consideration the new realities in telecommunication industry was developed and standardised starting early 2000: The next generation networks –NGN.

2. WHAT IS NGN?

The International telecommunications Union has provided the best and most widely accepted definition of NGN. Accordingly to [1], "a Next Generation Networks (NGN) is a packet-based network able to provide Telecommunication Services to users and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent of the underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and services of their choice. It supports generalised mobility which will allow consistent and ubiquitous provision of services to users. "

[1] Institutul Naţional de Studii şi Cercetări pentru Comunicaţii – I.N.S.C.C.

The NGN is characterised by the following fundamental aspects:

● packet-based transfer;

● separation of control functions among bearer capabilities, call/session, and application/service;

● decoupling of service provision from transport, and provision of open interfaces;

● support for a wide range of services, applications and mechanisms based on service building blocks (including real time/streaming/non-real time services and multi-media);

● broadband capabilities with end-to-end QoS and transparency;

● interworking with legacy networks via open interfaces;

● generalised mobility;

● unfettered access by users to different service providers;

● a variety of identification schemes which can be resolved to IP addresses for the purposes of routing in IP networks;

● unified service characteristics for the same service as perceived by the user;

● converged services between fixed and mobile networks;

● independence of service-related functions from underlying transport technologies;

● support of multiple last mile technologies;

● compliant with all regulatory requirements, for example concerning emergency communications and security/privacy.

In order to face the changes and remain on the market as important players, traditional telecommunications operators found themselves confronted with lots of new challenges. The communications landscape started to become dynamic and intensely competitive. The previously successful fixed- network business started decline, the market requested new services. Deregulation, mergers and acquisitions, rapidly evolving technology, and changing customer behavior profoundly impact networks developments.

The operators started to invest in broadband networks, usually overlapping the traditional PSTN networks.

In order to retain the existing subscribers and increase the business, new business models promoting triple play bundled services (voice, Internet and TV) or even quadruple play services (voice, mobile, Internet and TV) were applied. The traditionally market boundaries between fixed networks, mobile telephony and data networks started disappearing more and more quickly.

This new business models required a specific, optimised infrastructure beyond the existing, service dedicated networks. This new networks are Next Generation Networks.

3. DRIVERS FOR MIGRATION TOWARDS NGN

The heterogeneity of the infrastructure, the growing competition and the falling call sales were primary threats to the traditional network operators which were finding themselves forced to rethink their business models and to convert their infrastructure to a fully IP-based platform – the Next Generation Network. The overall business aim was to reduce costs and to create new sources of income, figure 1.

The telecommunications networks of incumbent operators consisted of layered overlapping networks for delivering voice, data and video services. Passive infrastructure was mainly based on copper cables in access networks, optical fibres at regional and backbone level, wireless for geographic areas difficult to reach. Active equipment from different technologies were used separately to deliver a specific function. Separate platforms for delivering each type of service: A digital switches network for delivering voice

services, an IN platform for delivering value added services, TDM transmission equipment for assuring connectivity and offering leased lines services and later on passive or active DWDM or CWDM when the request for connectivity an traffic increased . Each technology developed its own management system. Mobile phone networks development got different approaches: development of total separate networks or partial using resources of existing passive or transmission infrastructure. Due to complexity, the introduction of new services and applications, especially the innovative ones, was slow and expensive. Many functionalities had to be configured manually in order to implement new features.

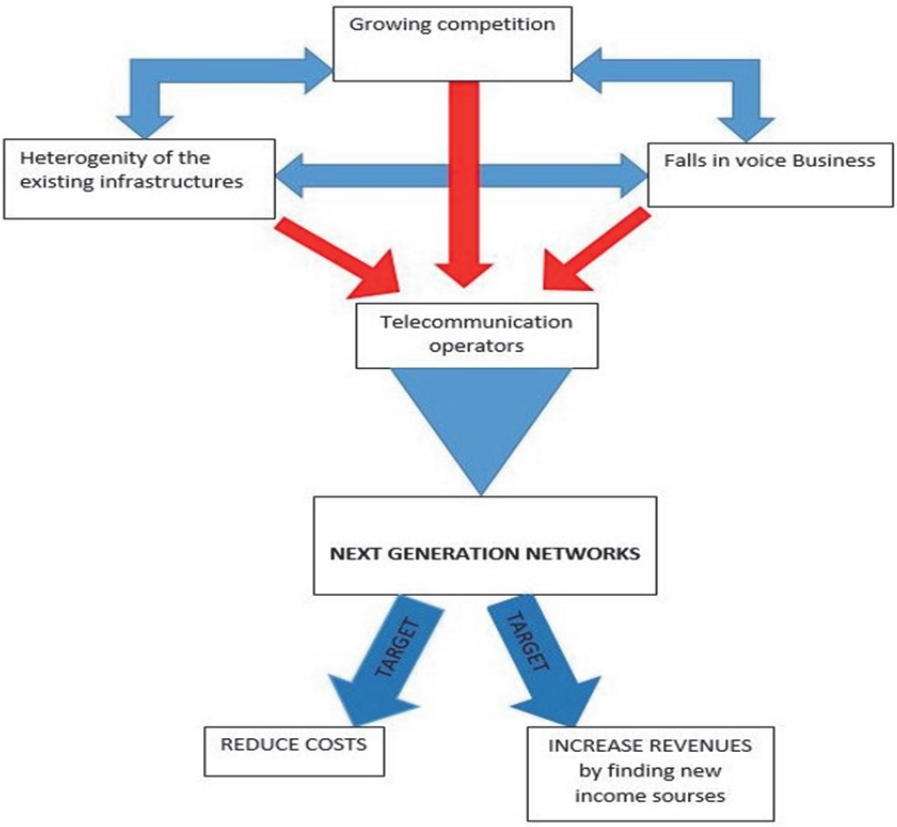


Fig. 1 Reasons for the migration to the Next Generation Network.
Source: [2].

Moreover, the variety of networks and the heterogeneous subscriber end devices make the provision of infrastructure-independent services more difficult.

The growing number of services has led to an increase in the platforms needed to provide them, which in turn has increased the complexity of the overall infrastructure. The problems of interoperability between the various systems became more serious, and this growing complexity was also placing greater demands on staff. Maintaining these platforms involved high annual operating costs for the network operators.

In the early stage of telecommunication transformation, networks such as mobile telephony, data networks and fixed networks were dominated by different suppliers.

With market deregulation, new companies entered in the business. Apart from the fixed-network and mobile operators, companies from other sectors like

cable network operators, utilities operators, internet service providers, portal suppliers with strong brand names entered on this convergent market, planning to penetrate the voice and infrastructure business.

The trend of network convergence was producing virtually inevitable conflicts. The market participants are crowding each other out and defending their positions strongly. In the course of this convergence, the value of the network business had gradually decreased, mainly for voice services therefor, traditional network operators had to rethink their business model. [5]

4. MIGRATION TO NGN

The migration to NGN was the necessary evolutionary step. The Internet Protocol was and is the most significant integration factor because it is available globally and, at least in principle, it can be used to deliver almost all the services and applications in all the networks.

The deployment of NGNs based on IP technology comprise three major interrelated developments [3]:

• **NGN Core:** represented by an IP network built over a solid transport infrastructure based on FO passive infrastructure and DWDM or lately OTN solutions.

• **NGN Access (NGA):** representing, the "last mile" between the network operator's central office and the end-user. This part of the networks has been gradually upgraded, starting with the development of an IP-based broadband access based on ADSL (Asymmetric Digital Subscriber Line) technology, over the physical infrastructure of the traditional copper network and going towards the construction of optical fiber infrastructure closer and closer to the subscriber premises. Once the deployment of the broadband networks evolved, optical infrastructures advanced towards access networks in a FTTC (fiber to the curve), FTTB (fiber to the basement) or FTTH (fiber to the home) architecture.

• **End-user equipment:** that is becoming intelligent and IP-based. A mobile phone today is really an advanced computer, with substantial processing power, memory, and display capabilities. A personal computer has all of the capabilities of a television and a telephone. The evolution of end user equipment towards an intelligent one and the market requests are driving also the NGA developments.

One important challenge for every existing provider of telecommunication service is to ensure business continuity. Therefor they have to adapt a solution and an evolution of networks to NGNs that must allow for the continuation of, and interoperability with, existing networks while in parallel enabling the implementation of new capabilities.

The realisation and deployment of the NGN is an evolutionary process, and not all networks started from the same point, therefore there were a variety of approaches from technical and also business point of view.

The evolution to NGN is not taking place in the same way or at the same time for all operators but it is felt throughout Europe and all over the world.

Some operators decided to upgrade the core first while others have focused on access networks but all are keeping the business perspective: Cost Reductions and New services for business continuity.

5. COST REDUCTIONS

A real business challenge is the overall cost reduction in the same time with big investment in passive and active network changes. The developed infrastructure have to remain competitive in a convergent environment. The cost savings are generally based on reducing the footprint of existing technologies by switching off old technologies, reducing number

of active sites, reducing power consumption through sites and equipment optimization. Reducing technologies is simplifying the network operation and reducing the number and the dimension of the support systems.

A single infrastructure is easier to maintain. The simplification of the technology system is also correlated with a reduction in the maintenance support services volume, spare parts stocks and staff costs reductions.

As part of the effort to reduce capital costs, many telecom providers are turning to network outsourcing and infrastructure sharing, which are becoming mainstream even among Tier-1 providers [6].

Furthermore, the modular structure of the NGN will provide the foundation for the simple and cost-effective development of services. One network developing a multitude of services is bringing the advantage of no longer being necessary to carry out the new development and implementation of networks for specific services. The open interfaces will also allow the rapid implementation of customer-specific solutions.

But all these potential advantages and cost savings will be gradually perceived since there is a period of operating and maintaining of old infrastructures in parallel.

The migration procedure is taking several years, different from one operator to another based on own development strategy. A relatively long period of parallel operation with the already existing, mostly PSTN-based networks will be necessary before they can gradually be replaced by IP. The services provided via traditional networks will have to be provided for a certain period of time through emulation or simulation. Users will be able to continue using their present end devices. Even so, appropriate end devices will have to be developed to use all the functionalities of the forthcoming new services [2].

6. NEW SOURCES OF INCOME

Once the NGN infrastructure started being deployed, more and more innovations with new sales opportunities are expected in the field of value-added services, including standard and high definition television, tele-medicine, tele-learning and teaching, online games, virtual reality, business-to-business services, business TV, videoconferencing, etc. New services are emerging that combine features from various areas such as entertainment, television, etc.

The market for telecommunications services in Europe has developed extremely dynamically in the last years but there are still general doubts about how the successful business models of the future will look.

However, the level of the income has not been proved to be at the level of several years ago estimation. This can be seen in the flat-rate tariffs in the broadband sector. Moreover, emerging market expansion has also begun to falter.

From 2005-2009, revenue growth from telecom services declined 14 percent in the Middle East and Africa, 11 percent in Latin America, 8 percent in Brazil, Russia, India and China (BRIC), 4percent in North America and 1 percent in Europe (excluding Russia) [6].

7. CONCLUSION

Today, the transformation of information and communication technology lasts for more than one decade and impacts our social, economic and political interaction.

"Today the increasing channelling of information into communication networks is turning them into the "synapses" and collectively into "the nervous system "of our modern democracies and economies "[7]

The inclusion of the Digital Agenda for Europe as an EU flagship initiative is a clear evidence that the Europe 2020 strategy has recognised the role of ICT

in the achievements of the objectives of smart, sustainable and inclusive growth [7]

However, the migration to NGN networks has not been finalized for the majority of Europe incumbent operators. They are still facing the challenge of network and business transformation.

The technology is still rapidly changing and if some years we were talking about broadband and fixed-mobile convergence we are talking now about network functions virtualization, software defined networks or internet of things.

The operators have to adapt continuously to the market requirements and find ways to make legacy and emerging networks work together and keep pace with technology challenges.

BIBLIOGRAPHY

[1] ITU-T Recommendation Y.2001 (12/2004), General overview of NGN.

[2] *White Paper Next Generation Network Motivation and Challenges for Incumbents*. T-Systems.

[3] *Next Generation Networks*, Directorate General for Internal Policies – PE 429.973(IP/A/ITRE/ST/2009-10)

[4] *Network evolution – Migration strategies for success*, Frost& Sullivan in collaboration with Tekelec.

[5] *Next Generation Networks in Europe, Broadband in 2011 and beyond* – Arthur D. Little.

[6] *Telco 2015-five telling years, four future scenarios*,IBM Institute for Business Value - Ekow Nelson and Rob van den Dam.

[7] *Guide to High speed broadband investment 2014*, European Commission.