Business Purpose Multimedia Network

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Abstract—The Next Generation Networking (NGN) is a widely used term that offers a truly converged packet-based network solution with voice, data and media traffic (along with ISP connectivity) consolidated on a single, robust platform. NGN platform delivers a centralized, fully managed corporate grade VoIP solution to meet business challenges in a cost effective manner with a clear return on investment. Next Generation Networking (NGN) has some key architectural evolutions in telecommunication core and access networks that will be deployed over the next 5-10 years. The general idea behind NGN is that one network transports all information and services (voice, data, and all sorts of media such as video) by encapsulating these into packets, like it is on the Internet. NGNs are commonly built around the Internet Protocol, and therefore the term "all-IP" is also sometimes used to describe the transformation towards NGN.

Keywords—Next Generation Networking (NGN), Telecommunication, VoIP

1. INTRODUCTION

The classic telecommunication networks were planned and implemented for the transfer of specific data such as telephone calls or pure data packages. The recent growth in competition, new requirements for the market and technological developments have fundamentally changed the traditional attitudes of the telecommunications industry. The present industry is characterized by the rapid growth of broadband connections, the convergence processes of various network technologies and the emergence of a uniform IP standard for individual and mass communications. Traditional telecommunications operators find themselves confronted with a host of new challenges. In particular, their previously successful fixed-network business is coming increasingly under pressure. New communication possibilities, such as telephoning via the Internet, and also growing market shares in mobile telephony are causing a great deal of concern. To counteract these losses, the network operators are investing more strongly in the growth driver, broadband. The bundling of phone, Internet and television – known in the telecommunications industry as Triple Play Services – has moved into the limelight of these new business models. The traditionally familiar market

boundaries between fixed networks, mobile telephony and data networks are disappearing more and more quickly. This gives the customer the advantage that he can call on an extremely wide range of services, regardless of his access technology. This development requires a meta infrastructure beyond the existing, subordinated networks – a core network for all the access networks. This new network is called the Next Generation Network. The Internet Protocol is the most significant integration factor because it is available globally and, at least in principle, it can use almost all the services and applications in all the networks.

2. NEXT GENERATION NETWORK

2.1. Definition:

Courtesy by: www.docstoc.com/docs/56289690/NGN [21]
The International Telecommunication Union (ITU) – a global organization dedicated to technical aspects of telecommunications – regards an NGN as a network with an end-to-end service for voice, data and multimedia. The deployed transmission technologies must permit a high quality of service. At the same time, the provided service functions are independent from the basic transmission functions. All the services are based on the Internet Protocol (IP). The advantage of IP networks is their flexibility and the simple integration of new applications.

2.2. System Architecture:

Courtesy by: IP-Based Next-Generation Wireless Networks: Systems, Architectures, and Protocols [1]
The basic premise for NGN is architecture on several

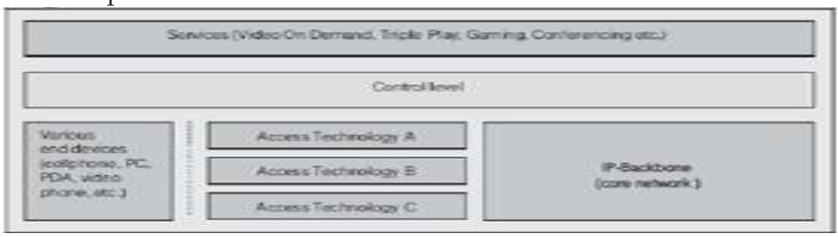

Figure 1 Modular structure of NGN

Independent levels. These include the access area, the core network area, the control level and the service management level. The connection of subscribers and terminals to the NGN can be achieved with various access technologies. The information and transmission formats of the various networks must be converted into information that is comprehensible for the NGN. This calls for Gateways for the connection of business and private customers. The core network of the NGN is an IP network. This is a standardized transport platform consisting of various IP routers and switches. The control level carries out the connection control of the individual components. Standard and value-added services can then be provided via the service management level.

The aim of an NGN is to operate the current wide range of access and communications technologies under a common umbrella in the future network on IP. This convergence allows a transition from a vertical to horizontal service integration. In vertical network structures, services (e.g. phone services, TV services) can only be received with suitable networks and the relevant end devices. With a horizontal approach, on the other hand, users in future will be given the possibility of using the desired services – regardless of the platform and the technology – with a single end device.

3. TECHNOLOGIES FOR SUBSCRIBER ACCESS:

Courtesy by: IP Networking over Next-Generation Satellite Systems [2]

The prerequisite for the efficient use of the NGN is a network access with high bandwidth for the subscriber. It is to be expected that access networks in the future will be able to provide bandwidths of up to 100 MBit/s for private subscribers. For business customers, transmission rates in the gigabyte range are conceivable. The possible options for access to the IP backbone would include copper, cable, fiber-optic and wireless connections. Copper connections: The bandwidth of DSL via copper lines is restricted to 16 MBit/s for ADSL2 (Asynchronous Digital Subscriber Line) and to 52 MBit/s for VDSL

(Very High Speed Digital Subscriber Line). Speeds
decrease in relation to the distance to the access Gateway.

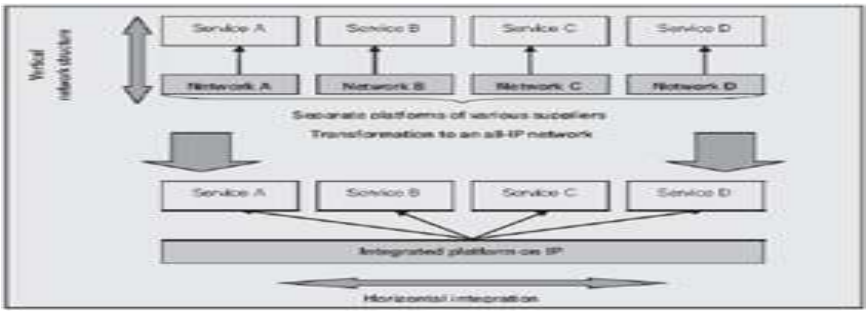

Figure 2 All IP network

The Gateway connects the respective network to the backbone. Cable connections: The Hybrid Fiber Coaxial Networks (HFC) are networks that consist of a mixture of fiber-optic cables and coaxial cables. As a rule, they are networks for cable television. Fiber-optic lines (FTTX): Fiber-optic lines can transport large data volumes at extremely high transmission speeds. In practice, bandwidths up to 155 MBit/s are possible. The different types of fiber-optic connections are referred to generically by the acronym FTTx (Fiber to the x). Wireless connections: Radio Access Networks (RAN) are radio-based access networks. They can be implemented with a wide variety of technologies such as 3GPP, 3GPP2 (UMTS), WiFi or WiMAX.

The following different forms of FTTX are available: FTTH: Fiber to the Home – the fiber optics end at the broadband connection. FTTB: Fiber to the Basement – the fiber optics end at the building (also known as FTTMDU – Fiber to the Multi-Dwelling Unit). FTTC: Fiber to the Curb – the fiber optics end at the street. FTTA: Fiber to the Area – the fiber-optic connection supplies a relatively large area. Thanks to all these access technologies, it is possible for the operators to guarantee services of the next generation, given the appropriate investments. The fiber-optic lines offer the highest possible capacity for the transmissions. In spite of the reduced prices for optical transmission technology, the installation of fibre-optic accesses is not yet profitable for the end subscriber. The high costs for the network operators are due to the laying of the cables and the connection technology. At present, the use of this technology is therefore mainly limited to occasional business customer connections. The provision of comprehensive broadband services

varies from region to region. In urban environments, it may well be economically viable in the future for network operators to offer customers FTTB or even FTTH. In rural areas with a sparse population, on the other hand, the use of fiber optics is not profitable. In regions like that, the best solution will be to use broadband accesses via radio.

4. MOTIVATION FOR NGN:

Courtesy by: www.itu.int/ITU-T/ngn[13]
The heterogeneity of the infrastructure, the growing competition and the falling call sales can be regarded at present as the primary threats to the telecommunications industry. Established network operators are 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 aim is to reduce costs and to create new sources of income.

4.1. Heterogeneity of the Telecommunication Infrastructure:

Courtesy by: Value-Added Services for Next Generation Networks Author by Thierry Van de Velde [9]

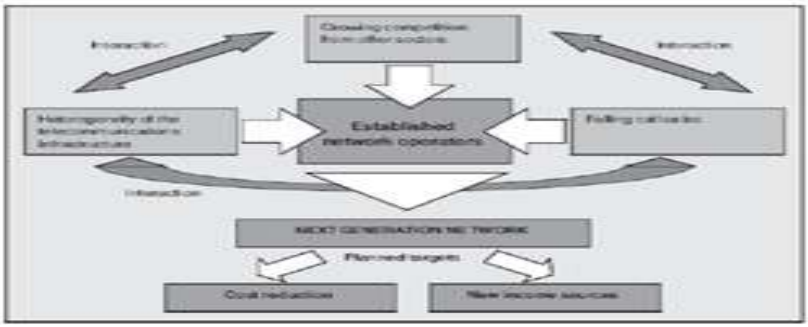

Figure 3 Reason for the migration to the Next Generation Network

The modern telecommunications networks consist of satellite and mobile phone networks such as GSM/UMTS, public phone networks and wireless local traffic networks such as wireless LAN and Bluetooth networks. The latter connect devices in the personal work environments such as PDAs,

laptops and cell phones. There are also cabled fixed networks such as Ethernet and also fiber-optic networks. In the traditional network infrastructure, the introduction of new services and applications can be a difficult and expensive process. For instance, a concept for launching innovative services can take between 6 and 18 months. The process requires high staffing costs. Much functionality in the network has to be configured manually in order to implement new features. Moreover, the variety of networks and the heterogeneous subscriber end devices make the provision of infrastructure-independent services more difficult. As a result, the services can only be used via specific networks and appropriately adjusted end devices such as fixed-network phones, cell phones, televisions, etc. 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 are becoming more serious, and this growing complexity is also placing greater demands on staff. Maintaining these platforms involves high annual operating costs for the network operators. Established network operators often maintain 15 to 20 different platforms with hundreds of central switches, which inevitably leads to extremely high staffing costs.

4.2. Growing Competition from Other Sectors:

Courtesy by: Next generation network services [8]

As a rule, networks such as mobile telephony, different suppliers dominate data networks and fixed networks. Providing services and products in these networks requires an interaction of various, complementary elements. In this sense, it is necessary to differentiate between value-added levels such as hardware, network

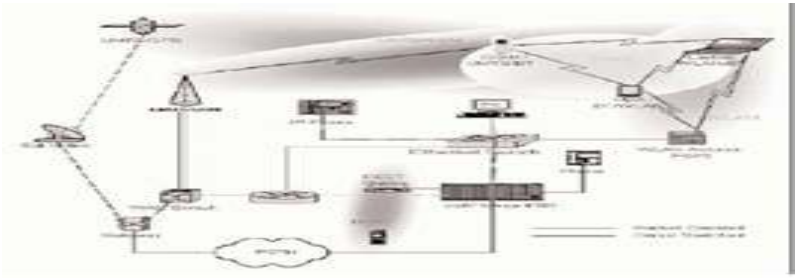

Figure 4 Heterogeneity of the networks

Applications and content. The increased use of IP based networks for the provision of applications and services is allowing the development of new, digital value-added chains.

Visions of the gradual convergence of fixed networks, mobile telephony and the Internet are having a crucial influence on the development of this sector. In the future market, the widest possible range of roles will be available for different players. This will particularly threaten the leading position of the established network operators on the telecommunications market. Apart from the fixed-network and cell phone operators, companies from other access, sectors will also establish themselves in future on this convergent market.

Portal suppliers with strong brand names and powerful financial backing – including Google, MSN, eBay and Yahoo – are planning to penetrate the voice and infrastructure business. Cable network operators and companies that provide media content, such as Microsoft, Kabel Deutschland or Premiere, will also join them. This convergence is therefore producing virtually inevitable conflicts and incompatibilities. Technologies and market forces are colliding with each other. The market participants are crowding each other out and defending their positions strongly. According to the British media watchdog, Ofcom, a basic change in the familiar competitive structures is to be anticipated in the next 5 to 10 years. In the course of this convergence, the value of the network business will gradually decrease and the service range will make a much larger contribution to end-customer sales.

Traditional network operators will have to rethink their business model and also position themselves much more strongly on the upper levels of the value added chains. Visions of the gradual convergence of fixed networks, mobile telephony and the Internet are having a crucial influence on the development of this sector. In the future market, the widest possible range of roles will be available for different players. This will particularly threaten the leading position of the established network operators on the telecommunications market. Apart from the fixed-network and cell phone operators, companies from other sectors will also establish themselves in future on this convergent

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5. THE MARKET – CONVERGENCE APPROACHES THE NEEDS OF THE USER

Courtesy by: www.nextgenerationnetworks.net[18]
www.telecomsacademy.com [19]

5.1.Initial Convergence Approaches :

The market already features individual examples of a general trend toward the convergence of various technologies, communications channels and media. Particularly remarkable is VoIP, which has developed strongly in the last two years, with its use of the Internet for phone calls (which was not actually designed for this purpose). It is not clear to the user that he is using a different network infrastructure from previously for this voice transmission service. This also allows entirely new service features to be offered, such as e.g. the setting up of phone connections from WWW applications. The gradual merging of fixed networks and mobile telephony networks (Fixed Mobile Convergence, FMC) is another essential phenomenon of this convergence. The FMC approach caters for availability at any location – either stationary or mobile – using a single phone number. The IP network is used to provide the stationary use. Moreover, the subscriber has just one voice mailbox and receives a single bill. Ovum estimates the current number of users of such an end device worldwide at less than 100,000. The primary advantage for the user is to save expensive cell phone costs as soon as he is within range of a wireless LAN hotspot. The most topical business model is certainly Triple Play: The customer receives voice, Internet, television and video services in a bundle via a single line. TV cable networks, conventional telephone networks and mobile telephony networks are suitable for this service. High bandwidths with excellent reliability are indispensable for providing this large number of services in parallel. If it is ultimately possible

to link offers with attractive contents and prices with technical innovations that traditional television cannot provide, Triple Play will have the potential to be an extremely profitable business model. At the end of the day, the network convergence will also lead to a convergence of the end devices, depending on the actual needs. Multimedia compatible computers will be given telephone and video communication functions, data services will be available by telephone and Internet access via the television (browsing using an Internet compatible setup box) and the cell phone will be common.

5.2. Market Needs in Terms of Convergent Services:

5.2.1. Beneficial Effects for the Customer:

The interaction of man and technology plays a crucial role in the introduction of previously unknown technologies on the market. The essential prerequisite for the success of innovative information and communications systems is their acceptance by the customers. Characteristics such as the perceived system benefit and the user friendliness of the technology are extremely important. One of the desired goals of NGN is the possibility of adapting the services better to the needs of the customer. Due to the future restriction to a single end device – equipped with a wide range of applications and services – the customer will in many ways enjoy improvements on the current situation. At present, customers expect applications for telephony and conferences. This sort of application should be independent of the network type. Customers also want to have more control over their services. That includes the ability to easily change or add services, regardless of location. Above all, though, the primary focus is on the wish to reduce costs and so there is great interest in package prices. In the past, network operators sold specific end devices and services for every type of telecommunications network, e.g. text messaging (SMS) via mobile telephony or e-mail via the Internet. Due to the integration of telephony, messaging, video communications and other multimedia information services both in fixed and mobile networks, it will probably be possible to offer the customer greater convenience in future. According to the statements of Ovum, the greater control of the customer over his own services, the omnipresence of the network and flexible billing methods will prove to be extremely

advantageous. Control: Current processes require a personal communication with the customer for the activation or deactivation of services. NGNs should give the customer more control over his own service portfolio through online interfaces, such as web pages, for instance. In this way, network operators and service providers will save processing costs and the services will be provided for the customer in real time. Omnipresent: The term "presence" is frequently used in the mobile world and describes the personalization of services. Personalization characterizes the individual customizing of services to a specific user, in contrast to uniform standard services (e.g. the analog telephone service). Moreover, the services should be provided regardless of the location. The network must detect with which end device the user is currently connected to the net and where he is currently located. His subscribed services are then provided to him regardless of his location. Flexible billing methods: It will be possible for network operators to charge for scaled services via the NGN. For instance, the customer could be provided with only "best-effort" broadband services for surfing on the Web, but he could also use a much higher bandwidth with QoS parameters on request, to guarantee the required quality. Additional costs may be incurred when downloading a movie, which are automatically integrated in the customer's bill. It is therefore to be expected that the perceived benefits – especially because of increasing flexibility, mobility and convenience – will grow as convergent services become more widespread. The increasing personalization of the services will also significantly influence the perceived benefits. The information and services provided will be customized to suit each customer's personal context. However, it remains to be seen to what extent applications and services can be used with a single end device without any particular technical knowledge. Real growth spurts can be expected especially once a clear, tangible added value is perceptible without any particular complexities and also the majority of the market segments are being addressed. The user-friendliness is a decisive factor particularly for older people. The variety of services must not be too heavily technical, complex or unclear. In the end, the successful interaction between man and technology often proves to be much more difficult than anticipated.

5.2.2. Market Needs in Europe:

The interest of consumers in convergent services is still split at present. About 26,000 consumers in France, Germany, Italy, Holland, Spain, Poland, Sweden and Great Britain were questioned in a survey by Forrester Research. About 35 percent of the participants answered that they would be interested in package offers of voice, video and data services. However, around 44 percent of the consumers said that they were not interested in Triple Play at all. The demand varied across the different European countries.

6. CONCLUSIONS

The market for telecommunications services in Europe has developed extremely dynamically since being liberalized. However, a weakening of the average annual growth on the various markets is to be expected by the end of the decade. The business with broadband connections is being treated as particularly lucrative in order to compensate for the market-share losses of the fixed network in particular. The network operators are attempting to provide a more efficient and cost-effective provision of services with the current conversion of the entire network infrastructure to IP technology. The aim is to unite fixed, mobile and data networks together and so to provide various services via a transparent network –the so-called Next Generation Network. The core of all communications services will then be a single platform, based on the Internet Protocol. The established network operators in particular are hoping for operating-cost savings of several billion euros per year from the reduction of the many different platforms. Some fixed-network operators are currently presenting initial approaches to personalized communication services, which can be used independently from the network structure, with the Fixed Mobile Convergence business model. The subscriber can then be reached with a single phone number at both stationary and mobile locations. As well as FMC, the business model of so-called Triple Play is also moving more and more into the limelight. The customers receive voice, Internet, television and video services in a bundle via a single line. Two important prerequisites for the transmission of these numerous new services are high bandwidths with excellent reliability. Given investments of several billions, it is primarily the cable-network and DSL operators who are competing with each other on the Triple Play market. While telecommunications companies regard the marketing of Triple Play services

as an important factor for sales and revenue in the medium to long term, analysts such as Forrester and Ovum doubt to what extent increases in sales in this field are really possible. Moreover, the transformation process will have considerable effects on the value-added chain and the competition in the telecommunications industry. Traditionally, the added value in telecommunications has been integrated vertically, but the transfer to all-IP networks will lead to a horizontally integrated value-added structure. Standardized protocols and interfaces will also permit the entrance of new market participants from other sectors on the individual levels of the Value-added chain. New services are emerging that combine features from various areas such as entertainment, television, etc. Thanks to convergence, there are now more suppliers in competition with each other who used to operate in entirely separate sectors. Finally, there are still general doubts about how the successful business models of the future will look. A decisive factor will be the clear superiority of convergent end devices and services compared to the existing offers. The selective positioning of convergent services on the market will be crucially important to convince the customers of the addedValue. The successful development of NGN will presumably depend primarily on the close cooperation between network operators, system manufacturers and research institutions.

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