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Full Length Research Paper

Dependability of congregated next generation network architecture

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The next generation network is a future based network providing next generation services such as internet protocol television (IPTV), online gaming, video on demand etc, based on IP protocol in the presence of core network. This research based paper discusses the architecture of next generation network (NGN), challenges, solutions, reliability, pros and cons. The main objective is to investigate the effectiveness of NGN providing next generation services. Moreover, this paper also discusses the basic customers' needs and futuristic trends. Different technologies providing different services are also reviewed. The term next generation network (NGN) is used to support telecommunication network architecture, supporting technologies and services. In addition to it, conventional public switched telephone network (PSTN) data, voice communication and video services are also supported and discussed on the basis of NGN. The information carried through this network is based on packet switching which is also known as Internet network.

Key words: Next generation network (NGN), internet protocol television (IPTV), mobile, public switched telephone network (PSTN), architecture, packets, WiMax, technology.

INTRODUCTION

With the development of new telecommunication technology, networks are becoming bigger and more complex in nature. In the early 1980s, tremendous changes in the network deployments occurred in order to fulfil the requirement of customer needs and market trends. With the trend analysis and cost benefits, existing companies started to expand the network into large networks to get productivity gain and benefits (Wilkinson, 2001). In the mid-1980s, certain telecommunication companies felt frustration with existing networks which were incompatible with the other network technologies. The problems of network growth planning strategy and network operation management were associated in the development of network expansion. Every new deployed network required its own set of functions and experts. Staffing requirement was an important factor to manage complex and heterogeneous networks without a network management system. This issue caused for development of an automated network planning strategy and network management tools across a heterogeneous and complex network environment (Cisco Systems, 2003).

Technology progresses with the passage of time and trends do get change. It is an application of knowledge to meet the demand of customer needs and goals. For example, fibre optic cables use single wavelength to carry hundreds of telephone conversations. Technology made it possible for the same fibre optic to carry a significant amount of information through Dense Wave Division Multiplex (DWDM) Wilkinson (2001). Many times, signals are combined on the same fibre optic cable to carry much information by utilising different colour combinations of light.

The development of faster processors made it easier for software engineers to develop high-level languages like Java and many useful tools. The creation of useful tools and high-level programming languages made it possible for the development of complex and heterogeneous

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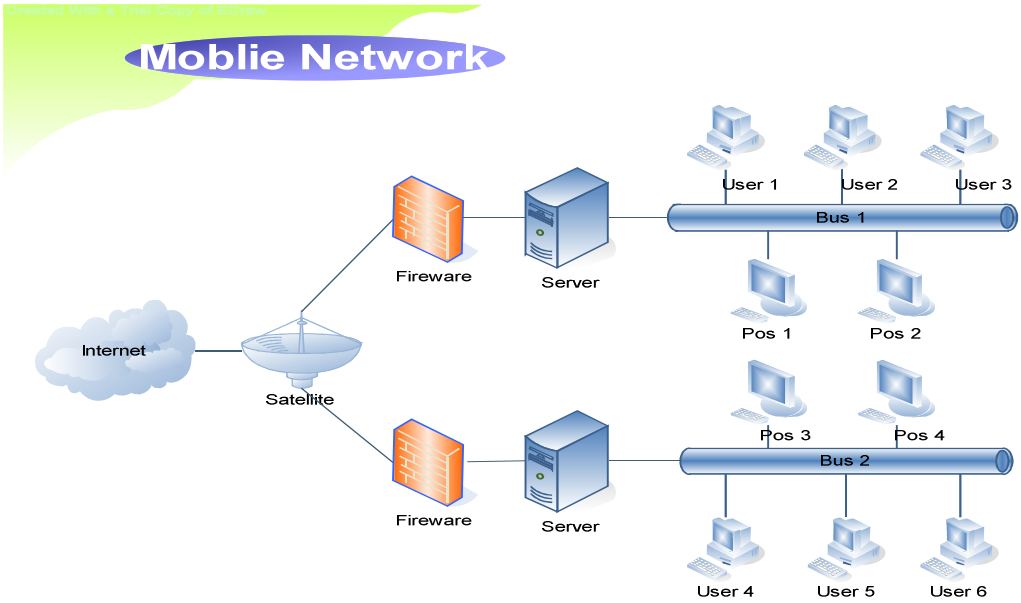

Figure 1. Architecture of mobile network.

systems. There are following different technologies such as circuit switching, packet switching, intelligent networks, mobile networks, access technologies, voice and data convergence are used for the development of next generation network (Wilkinson, 2001).

Next generation network is a network that highly supports online services which are getting popularity of internet users currently. Moreover, with the advancement of technology (software and hardware) communication and communicational channels need to have efficient and faster networks for higher data rate and for bigger bandwidth. The architecture of next generation network is also discussed in this research along with its usability to the users.

NETWORK TOPOLOGIES AND TECHNOLOGIES

Mobile next generation networks

Future trends in telecommunications are going to be changed with the development of new technologies and services. Mobile Next Generation Networks played a pivotal role to reach the goal of truly ubiquitous computing [Huber, 2004]. The changed wired telephony services into database services, changed homogenous networks into complex heterogeneous networks, changed non-intelligent devices into personal digital assistants, and mobile computers created a big threat for the network service provider to accommodate the customer's needs and market trends [Huber, 2004]. Here, Figure 1 shows the architecture of a mobile next generation network providing the wireless services with better coverage, signal strength, line of sight (LOS) etc. In Figure 2, the architecture of WiMax is shown as a mobile next generation network. WiMax is a high speed wireless network providing a line of sight (LOS), better coverage and best signal strength as compared to other wireless technologies.

WAN technology

A wide area network (WAN) allows the information travelling for longer distances and encounters a variety of physical and logical environments as compared to local area network (LAN). It involves 56 Kbps circuits, ISDN, leased lines and frame relays for transformation of information over longer distances as comparatively local area networks.

In the Figure 3, architecture of wide area network is depicted with the help of different network devices as shown.

Internet technologies

Another emerging technology named as internet technology consists of different gateways, routers, servers and different corporate LANS providing different services and technologies etc. Internet technologies or related networks run on an internet protocol (IP).

New wave of services

At present, a new wave of services is emerging in order to

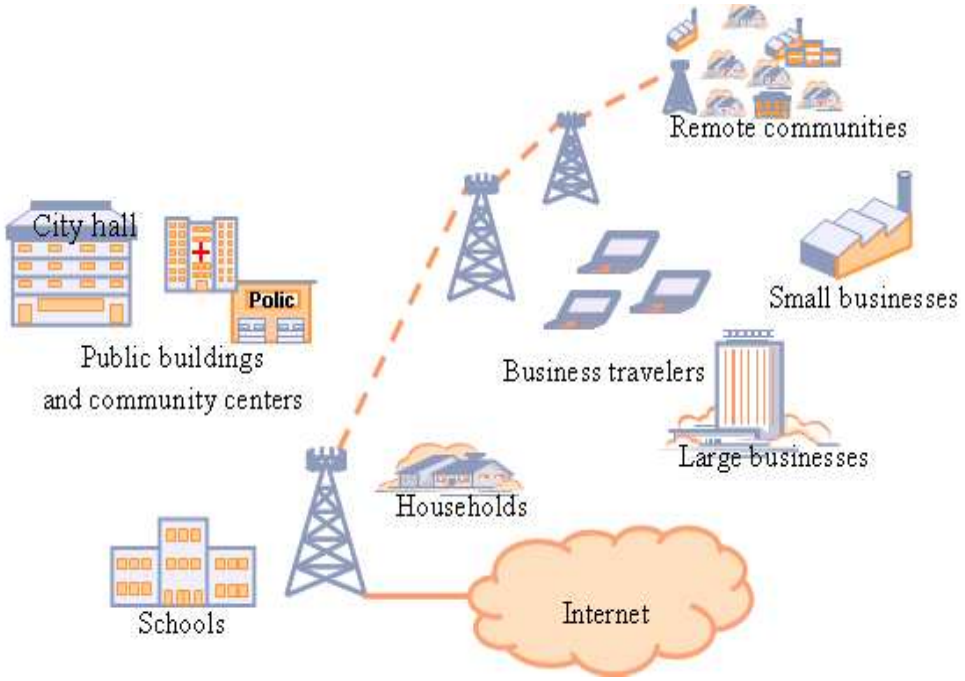

Figure 2. Architecture of mobile next generation network (WiMax). Source: WiMax Forum August (2006).

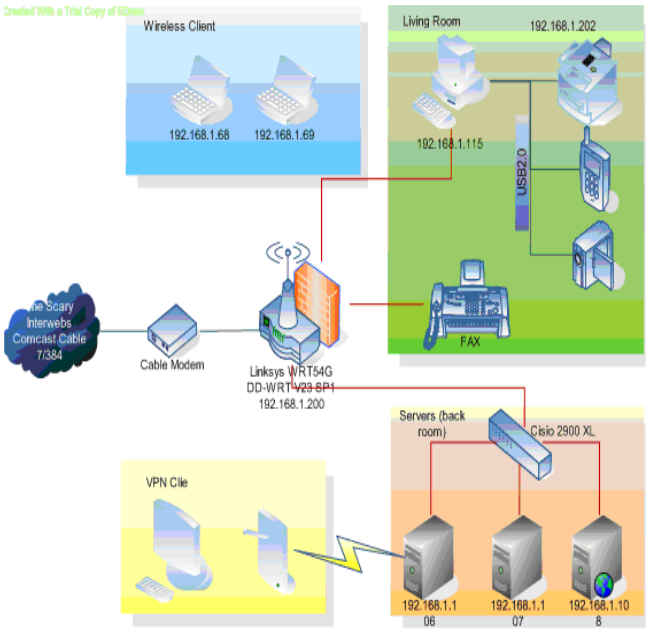

Figure 3. Wide area network architecture.

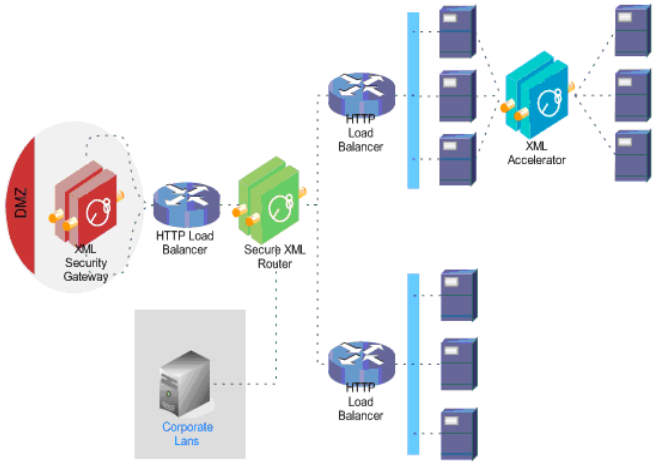

Figure 4. Internet technologies architecture.

satisfy customer needs and to ensure better services with current market trends. Currently, TV, PDA, Smart phone and PC-based browser are being used by next generation services driven by capacity-intensive content that is being delivered by them.

Despite various content sources, commonality of these rapidly evolving services is IP-based. These emerging services are, for example, IPTV for broadcast TV, Video on Demand (VOD), and Voice over IP (VOIP) for telephony and IP VPN for accessing corporate intranet. The other future based services like Over IP Video (OIPV), streamlining demanded video used by mobile devices, Games on Demand and network-hosted Personal Video Recorders (nPVR) are used for the personalized content delivery and storage etc. To capture voice or video for

subscription purposes or location aware service, VOD casting and POD casting are to be used.

NEXT GENERATION NETWORK

According to International Telecommunication Union (ITU):
1. The network used for the provision of end-to-end voice, data and multimedia services in the presence of core network with full quality of service (QoS) capabilities is called next generation network (NGN). The services provided by NGN are based on internet protocol (IP) due to its flexibility and simply integration of new applications [T-Systems, 2007].
2. The next generation network is used for convergence of diverse connecting protocols and provision of voice, video and data services through applications and protocols. It has certain features such as packet based switching and networking with the transport layer separated from the application layer [Parkhi, 2007].
3. A packet-based network used to provide telecommunication services such as multiple broadband, QoS-enabled transport technologies is known as next generation network. Unrestricted access is offered to different service providers through different users. Generalized mobility is provided through this network giving consistent services to the users [EMC, 2006].

Detailed description of NGN

The term next generation network (NGN) is used to support telecommunication network architecture and its technologies and services. Conventional public switched telephone network (PSTN) data and voice communication and video services are to be supported on the basis of NGN. The information carried through this network is based on packet switched form known as internet network [Raatikainen, 2007].

The information in packet forms is marked on the basis of their types such as data, voice and video and then forwarded to other networks based on quality of service (QoS) and security mechanisms. The next generation services, like IPTV for broadcast TV, video on demand, voice over IP (VoIP), online gaming, etc., are to be advertised based on separated transport and service layers of the next generation network [EMC, 2006; Drew and Gallon, 2003]. The Next Generation services can be modified or added through network service provider directly at the service layer without considering the transport technology [EMC, 2006].

Functional architecture of next generation network

Figure 5 shows the functional architecture of next generation network. It describes the different functions, its services and interfaces used for interaction of functions with each other. The three different lines black, dotted black and dotted blues describe the media, control and management services provided to the functions.

Next generation network functions are to be divided into transport and service layers based on separated transport and services functions. Different interfaces are used for connection of different function with each other within NGN. An interface called user-to-network interface (UNI) is used for connection of end-users functions with each other. The other interface known as network-to-network interface (NNI) is used for connection of different networks having different entities. Lastly, the application-network interface (ANI) is used for implementation of third party applications [Raatikainen, 2007].

There are different functions are described separately providing different services as follows.

TRANSPORT FUNCTIONS

All components and physically separated functions within an NGN are to be connected through the use of transport layer functions. An IP protocol is responsible for transportation of different functions within the next generation network. IP connectivity is to be supported to end-user equipments residing outside an NGN and different controllers and enablers within an NGN through the support of transport layer [Raatikainen, 2007].

The transport layer has two separate access and core network with different functionalities. The functions in the transport layer are further divided into sub functions providing different services.

Access functions

This is a sub function of transport functions in the transport layer connecting with end user functions. The functions dependant on access technology supported by the transport layer is used to manage end user access to an NGN network. The access technologies are categorized into cable access, DSL, wireless access, ethernet technology etc [Raatikainen, 2007].

Access transport functions

Access transport functions lie in the category of transport functions in transport layer. Information is to be carried or supported across the access network through the access transport functions. It deals with QoS control mechanisms such as buffer management, queuing, scheduling, packet filtering, traffic classification, marking, policing and traffic shaping having direct relation with user traffic [Raatikainen, 2007].

Edge functions

The edge functions supported by transport layer are

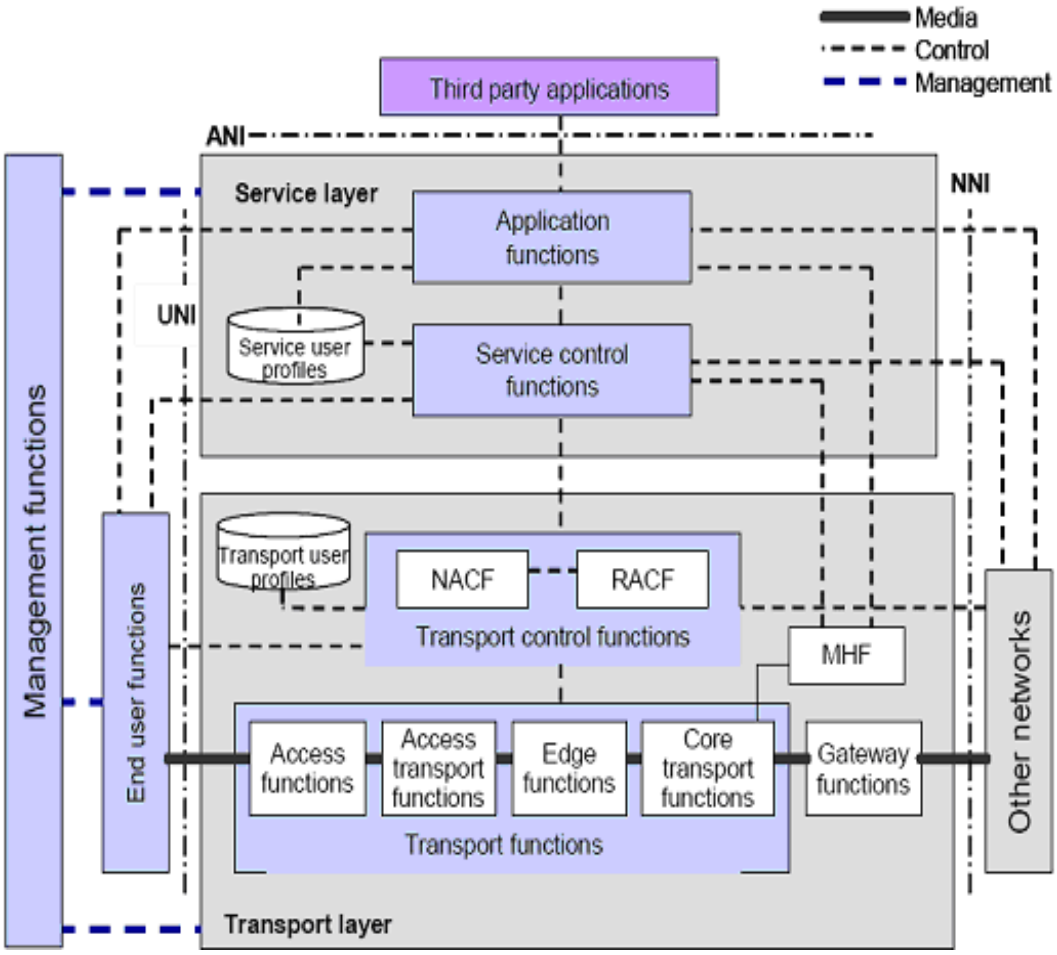

Figure 5. Overview of NGN functional architecture. Source: VTT, Technical Research Centre of Finland (2007).

responsible for traffic processing after merging of access traffic into core network. These functions also have interaction with transport control functions through its own mechanism.

Core transport functions

The core transport functions are responsible for information transportation through the core network in the transport layer. Different parameters are used for differentiation of quality of transport through the interaction with transport control functions. It also handles user traffic directly on the basis of QoS mechanisms such as buffer management, queuing, scheduling, packet filtering, gate control and firewalls etc.

Network attachment control functions

This function is a subcategory of transport control functions residing in the transport layer . It ensures access to next generation services through the provision of registration at the access level and initialization of end-user functions. These functions are supportive for network level identification and authentication, managed IP address space of access network and authentication of access sessions. These functions support end user equipments in registering and starting to use the NGN through the central point of NGN services and application functions to the end users [Raatikainen, 2007].

Resource and admission control function

The network address and port translation control, management of differentiated services field code points are the main functionalities of admission control and gate control respectively supported by the resource and admission control function. Admission control involves authentication and authorisation based checking of user profile, operator specific rules and resource availability [Raatikainen, 2007].

Transport layer functions such as packet filtering, traffic

classification, bandwidth reservation and allocation functions are to be controlled through the interaction of resource and admission control function with the transport function.

Transport user profile function

This comprises of the user and control function for the formation of single “user profile” function in the transport layer. This function may be specified and implemented in any part of next generation network (NGN) as a set of co-operating database [Raatikainen, 2007].

Gateway and media handling function

Gateway functions are used for interaction between more than one networks such as a ISDN/ PSTN based network and the Internet. Media handling functions are responsible for provision of services like tone signal generation, transcoding and conference call bridging [Raatikainen, 2007].

SERVICE FUNCTIONS

The service layer has two sets of functions such as application functions and service control functions providing different services respectively. Next generation network services involve session-based services such as IP telephony, video conferencing and non session-based services like video streaming and broadcasting etc. Network functionalities with existing PSTN/ISDN services are to be supported through NGN services and functions [Raatikainen, 2007]. The services functions are divided into sub categories such as service and control functions, service user profile functions, application functions etc.

Service and control function

These functions involve session control function used as a registration function with the support of authorization and authentication function at the service level.

Application functions

These functions are the sub functions of the service layer providing different services. Third party service providers use trusted or untrusted application functions for NGN service layer capabilities in the service layer. Application functions are needed due to the open APIs supported by next generation network. The third party service providers can create enhanced services for NGN on the basis of open APIs [Raatikainen, 2007].

MANAGEMENT FUNCTIONS

These functions ensure network management by NGN operators with additional required quality, security and reliability. They are provided to each functional entity interacting with different network element management, network management and service management functional entities [Knightson et al., 2005; Modarresi and Mohan, 2000].

The management functions together with charging and billing functions interact for the collection of resource utilization information. Online interactions, such as prepaid services, are made and confirmed through collected charging and billing information.

End user functions

These functions have direct relation with the service control functions as well as application functions through user-to-network interface (UNI) as shown in Figure 5. Customer interface connected to a next generation network cannot be limited through ITU-T specifications. All types of customer equipments range from single telephone to complex networks are to be supported by NGN. These end-user equipments are to be categorised into two such mobile or fixed [Avellaneda, 2006].

IP MULTIMEDIA SUB-SYSTEMS

IP multimedia subsystem is a central part of the next generation network having different functions and entities. Session based services provided in next generation network are to be supported through the IP protocols IP multimedia subsystem. The 3rd generation partnership project was responsible for IMS defined in both mobile networks as well as in NGN. IP multimedia subsystem has partly no concern with network access technology. IMS use session initiation protocol as a signalling protocol used for the creation, modification and termination of the sessions [Knightson et al., 2005; Modarresi and Mohan, 2000].

IMS ARCHITECTURE

IP multimedia subsystem architecture has different functions and entities and it is a central part between both core and access networks. Basically, these two networks are separated by 3rd generation partnership project IMS definitions. More than one radio access network is to be connected to the core network in wireless network model [Hanrahan and Mwansa, 2006].

The radio access network is responsible for the connection establishment between terminal and services in the core network. For IP transport connectivity provision between a user domain and a core transport network, an access network having multiple entities is to be used.

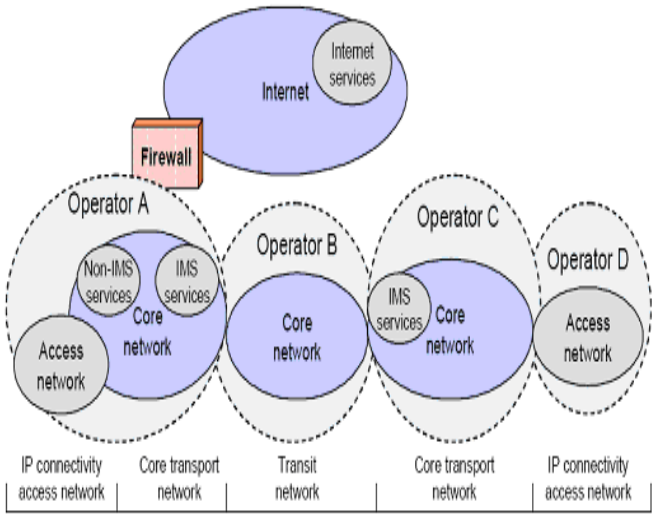

Figure 6. Network Partition on the basis of IMS. Source: VTT, Technical Research Centre of Finland (2007).

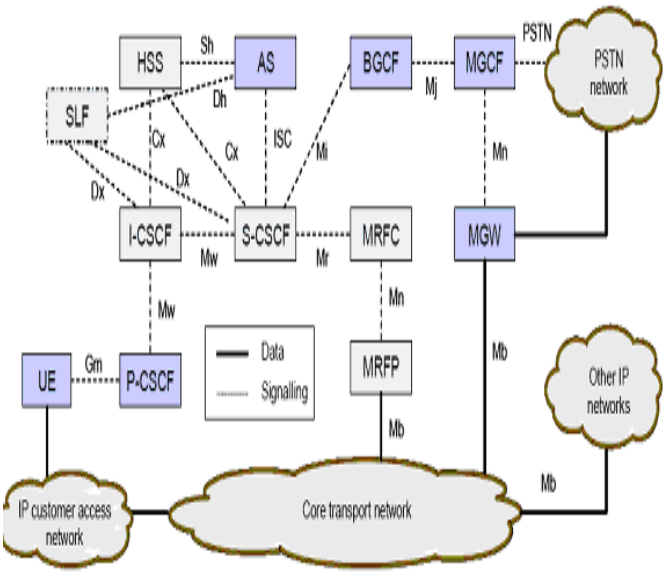

Figure 7. IMS functional entities and reference points. Source: VTT, Technical Research Centre of Finland (2007).

Different access networks are distinguished on the basis of underlying technology, ownership or administrative partitioning. Core network functional entities defined by an IMS are used to provide IP transport connectivity between one or more than one access networks and core transport networks. The core network providing connectivity to service layer entities can be distinguished on the basis of underlying technology, ownership or administrative partitioning [Raatikainen, 2007].

User mobility support is an important feature of IP multimedia subsystem. User mobility is used to ensure distinction between core and access network. In Figure 6, all supported networks such as access, core and transport are shown. In the next generation network environment, a user can move from one access network to other access network maintaining its original core network services.

IMS FUNCTIONAL ENTITIES

An IP multimedia subsystem (IMS) has multiple functional entities having different functionalities. In the Figure 7, there are multiple functional entities and reference points defined by an IMS functional architecture. Each entity has its own set of functions described as follows.

An application server

All IMS service control is to be managed through an application server. The server has its direct connection with session control function (S-CSCF) or open services architecture (OSA) over an ISC reference point based on third party application. All SIP messages are to be carried over an ISC interface to or from an S-CSCF. The AS is used to obtain subscriber profile information through the use of interaction with home subscriber server (HSS) over the -interface. Various telephony services such as call forwarding, number translation, conference control and online charging are to be supported through this application server [Hanrahan and Mwansa, 2006].

A breakout gateway control function

S-CSCF forwarded session requests are to be carried through breakout gateway control function (BGCF) for selection of network with PSTN attachment point. Local MGCF or a peer BGCF in other network is also selected through it. Selection of BGCF in other network requires optimised routing from other visited network to the PSTN. Now, Figure 7 will be described, having IMS functional entities and reference points [Raatikainen, 2007].

Call session control functions (CSCF)

Call session control functions (CSCF) functions are used for managing session features such as routing and resource allocation with the support of other network entities. CSCF routes the SIP invited messages to the called terminal through resource allocation after call initiation by SIP-enabled terminal. CSCF routes SIP messages to the BGCF based on traditional PSTN phone number of the called side. Breakout gateway control function (BGCF) chooses media gateway control function (MGCF) for the signalling conversion [Raatikainen, 2007].

Three types of control functions such as serving CSCF, interrogating CSCF and proxy CSCF as follows:

1. S-CSCF is to be used as a registering function and establishes the relation between user ID and terminal location after accepting SIP register requests [Hanrahan and Mwansa, 2006]. S-CSCF gets a subscriber profile with filter criteria indicating service control to the user through ASs. The S-CSCF interacts with these ASs during the SIP signalling mechanism for supporting service control.
2. C-CSCF monitors the session description protocol (SDP) to make sure of session availability within subscriber's profile boundaries during session establishment. SIP messages are to be routed through S-CSCF on the basis of originating user equipment. It uses the destination name of the terminating subscriber for getting address of an I-CSCF from a domain name server (DNS) and then forwards these requests towards the destination.
3. The S-CSCF forwards the SIP request to a BGCF for routing towards the destination on the confirmation of the terminating subscriber name as a PSTN address. After that, the S-CSCF forwards the SIP requests towards the P-CSCF according to the subscriber's registered location on the basis of destination endpoint. I-CSCF treats the IMS home network as an initial point of contact from the other network [Hanrahan and Mwansa, 2006]. Stateless SIP proxy functions are to be performed by I-CSCF and SIP requests are to be sent towards user assigned S-CSCF.

P-CSCS treats IMS user terminal as an initial point of contact. It sends SIP register requests from the UE to an I-CSCF residing in a home network through the performance of a stateless SIP proxy function. UE provides a home domain name for the finding home network. All subsequent SIP messages from the UE are to be sent towards S-CSCF during the registration procedure [Hanrahan and Mwansa, 2006].

Home subscriber server (HSS)

The home subscriber server supports all IMS-level authentication keeping the IMS subscriber profiles and database. The HSS keeps a record of the currently assigned S-CSCF. The home network having more than one home subscriber servers depends on the number of subscribers, equipment capacity and organization of the network.

Media gateway control function (MGCF)

Inter working between the IMS and the PSTN is to be supported through media gateway control function (MGCF) performs translation between SIP messages and integrated service digital network user part messages [Hanrahan and Mwansa, 2006].

Media resource function controller (MRFC)

Media stream resources of MRFP and media services such as transcoding and conferencing are to be controlled through the media resource function controller.

Subscription locator function

The SLF can be used in a distributed HSS system as a front end. The I-CSCF uses subscription locator function to get the name of the HSS having required subscriber specific data during the registration and session setup. The SLF can be used by S-CSCF during the registration as well as by an AS in relation with the Sh interface. These functions are also used in server farm architecture of HSS environment.

NEXT GENERATION NETWORK RELIABILITY

NGN is a blend of both a circuit switched as well as a packet switched network with next generation services such as online gaming, IPTV, video on demand etc. It is not easy to predict NGN reliability in comparison to conventional PSTN network or the Internet due to the presence of both circuit and switched networks. Here, there will be a discussion of some improvements in NGN to ensure its reliability as compared to Internet or other networks.

Performance concerns

NGN is the IP based same as the Internet technology. There are the following reasons relevant to the NGN performance and its reliability going to be discussed such as:

1. Open and distributed nature;
2. Inherent scarcity of security mechanisms;
3. Complicated network architecture;
4. Presence of mission-critical applications;
5. Deployed before fully established;
6. Less number of expert solutions for efficient management;
7. Time and cost required for NGN integration and configuration.

It is easy for a network provider or application developer to develop NGN applications due to its open architecture. Malicious applications such as end-user or control applications will be difficult to develop due to this issue. It is not easy to locate and eliminate the observed disturbance of a next generation network with a distributed architecture. Modified PSTN functions used in packet switched networks result in the degradation of communi-cation security. For example, modification is required in

numbering scheme (E.164) used for an addressing mechanism. The new telephone number mapping scheme based on internet's domain name server system has the same problems such as distributed denial of service and DNS pollution happened in the present [Raatikainen, 2007].

Banking, medical systems and power station control are the types of mission-critical applications which require error-free transport, short response times and absolute security respectively. There is no surety of IP packet delivery due to packets dropped or delayed through the Internet type of transport data. The reason for packet dropped or delayed is overloaded network. Spoofing techniques such as source routing and flooding are significant problems in next generation network due to its open architecture [Raatikainen, 2007].

Network functionality performance is guaranteed through conventional circuit switched networks redundancy [Raatikainen, 2007]. Packet switched network performance is maintained through less redundancy as compared to circuit switched network on the lower cost. Reliability and availability of next generation services will be available on the establishment of next generation network. The new redundant links, latest network devices and software modules are to be used for the provision of reliability in the NGN. The new network has more complex architecture due to integration of conventional network with all IP-based network technology. The new network implementation is more time consuming and costly due to its more complex structure.

Essential control and management connections will make it possible for networks to be more secure with better performance and stability. The NGN concept will provide a direction for network provider and operator to built secure and coherent network and products. Meanwhile, it will be difficult to predict NGN's performance and reliability to reach the established PSTN used network level.

Next generation network services are provided with better technology in the performance of an IP multimedia subsystem as compared to the Internet. The IMS makes sure of provision of a robust multimedia system with the support of specific profiles and enhancements such as operator control, security, billing etc. IMS needs additionally vertical interfaces to provide following functions:

1. Accounting, security, subscription data and service control require common interface to application servers;
2. Coordinated and enforced QoS;
3. Session-based media gating based on operator control;
4. Services, session and transport layers need correlated accounting and charging;

The aforementioned features are responsible for the formation of an IMS structure. The next generation network can be distinguished from the Internet on the basis of session control point of view. Based on all theoretical views about the NGN complex structure, results come in the more reliability and more controllable [Raatikainen, 2007].

Motivation for NGN

The motivation for next generation network is to provide a central platform through convergence of multiple networks. The aim is to bring all existing networks with different transport and control technologies into a unique, unified and multi service platform based on an internet protocol (IP) [T-Systems, 2007].

Growing trends of telecommunication de-regulation and rapid convergence of distributed computing and communication are the main two factors for the development of this future based network. Overall, the purpose of this new network is to cut costs, to create new income sources and provision of next generation services etc.

In Figure 8, there are three reasons of the establishment of a next generation network such as heterogeneity of telecomm infrastructure, growing competition from other sectors and falling call sales. There will be description for each reason in the development of NGN.

Heterogeneity of telecommunication infrastructure

These days, modern telecommunication involving satellites, mobile phone networks such as GSM/GPRS, wireless LAN, WiMax and Bluetooth provide new services like video on demand, telephony voice over IP, games on demand and content cashing or VOD casting etc [T-Systems, 2007].

NGN has been built up on the heterogeneity concept in the presence of multiple traditional networks such as the fixed PSTN/ISDN, second generation mobile networks and the internet. In Figure 9, multiple networks with different services have converged on the single platform called core network or next generation network.

The NGN infrastructure is divided into different categories such as legacy networks like 2G GSM, 2.5G GPRS, and PSTN/ISDN. Gateways such as signal gateway, media gateway, IVR, trunking gateway, NAS, and GGSN are used for connection establishment between legacy networks and core network. The core network is responsible for the provision of multiple services with the quality of service (QoS) in the presence of packet transport network. The transport layer separates the service and connection control implemented in a soft switch. Whereas the next generation network establishes connection with the existing circuit switched network via signalling, trunking and media gateways [Drew and Gallon, 2003].

The increasing services require their platforms which in return add complexity to the overall structure. To overcome interoperability problems and complexity due to these services, more staff and operating costs are required.

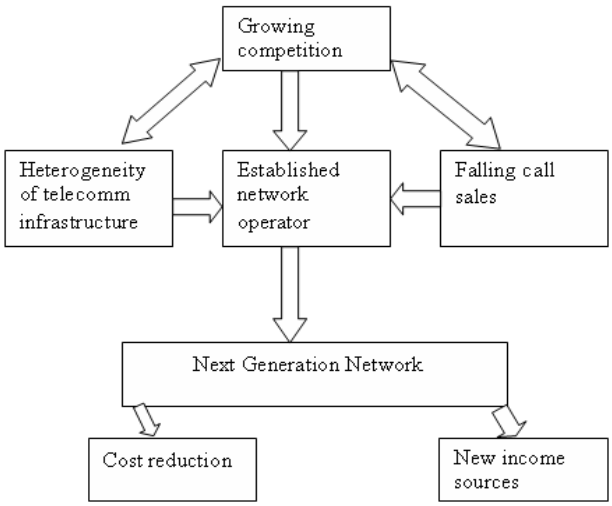

Figure 8. Convergence towards NGN. Source: T-System Enterprise Services (2007).

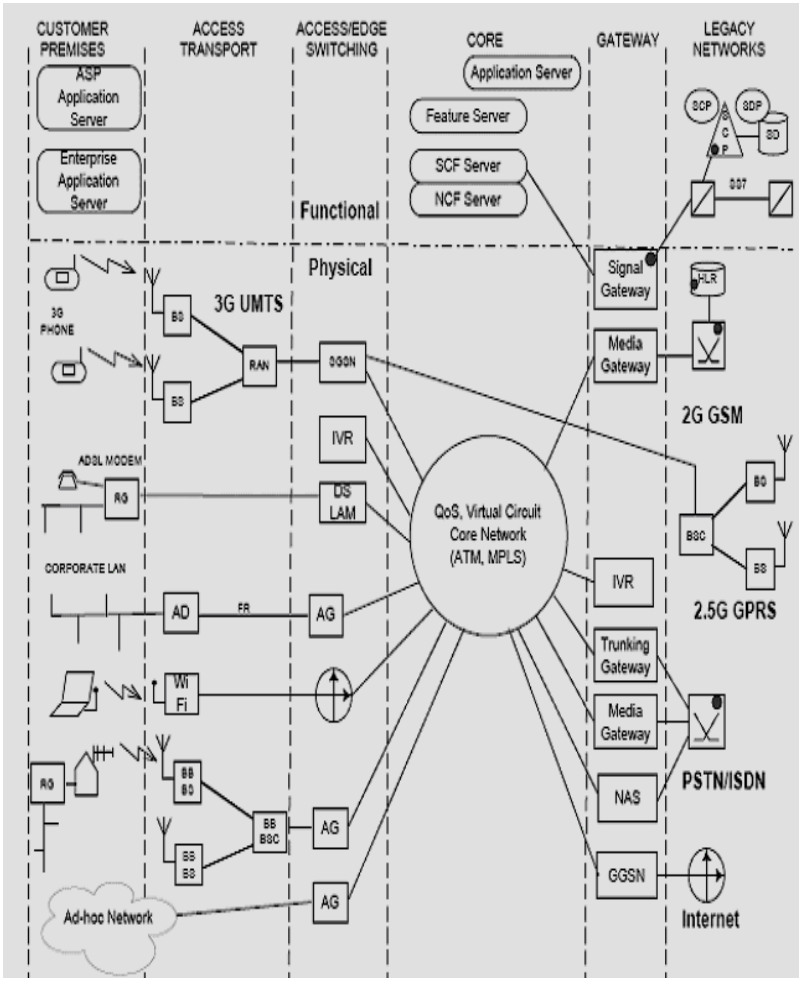

Figure 9. Heterogeneity environment of NGN and relation with legacy network. Source: Centre for Telecommunications Access and Service (2007).

PLANNED TARGETS OF NGN

These days, multiple networks providing different services are converging in a unified, common platform to implement future targets and market trends. There are two main contributions of Next Generation Network made by network operators. Firstly, the optimized network will create the potential for cost saving and the other is to maintain new income resources in future [T-Systems, 2007].

Cost reduction

The network operator makes it possible to make a sustainable infrastructure to meet the challenges of converged network environment in the presence of next generation network. It keeps its interest on cost saving potential through establishment of single technology system. The single technology system will be used to cut down staffing requirements. NGN is based on a modular structure with a simple and cost effective infrastructure [T-Systems, 2007].

New sources of income

A unified and consistent next generation network provides the source of income for established network operators to ensure next generation services. The network operators have expectations in sales opportunities of new emerging value-added services such as online gaming, video on demand, virtual reality, video conferencing and business TV in next generation network [T-Systems, 2007].

Next generation network services

A converged, unified, and data-centric network provides multiple services with different quality and cost parameters under one umbrella or core network called the Next Generation Network. Currently, the existing traditional networks are in the transition phase of transforming their infrastructure to adopt new innovative services with a better quality of service and lower cost. There are many services linked with the existing next generation network platform but some require its advanced control and management features [Drew and Gallon, 2003].

The unified, converged next generation network services are linked with access, transport and routing services. Now, the services offered by NGN re discussed as follows.

Voice telephony

The voice telephony services such as call waiting, call forwarding, 3-way calling, various centrex and various AIN features are to be used by the next generation network. Mostly services are implemented through NGN but it is not compulsory to duplicate each telephony service for it. NGN will concentrate on enhancing voice telephony services according to market trends and customer needs [Drew and Gallon, 2003].

Data (Connectivity) services

Next generation network provides data connectivity services used for real-time connectivity establishment between end-points with the support of value-added features such as bandwidth-on-demand, connection reliability, resilient switched virtual connections, bandwidth management and call admission control etc [Drew and Gallon, 2003].

Multimedia services

The services used by the next generation network (NGN) provide interaction between multiple parties using voice, data and video etc. It uses visual information for conversation between different customers. Collaborative computing and groupware are to done through this service of NGN.

Virtual Private Networks (VPNs)

Interlocation networking capabilities of businesses can be improved through voice VPN technique. Voice VPN provides uniform dialling capabilities to the subscribers of small private organizations [Drew and Gallon, 2003]. Data VPN with extra security and networking features are used to provide shared IP network as a VPN.

Public network computing

These services are used for businesses and consumers to provide public network-based computing services. For example, generic processing and storage capabilities such as storage or maintenance of data files are provided through public network provider. Specific business applications like enterprise resource planning, time reporting and consumer applications such as TaxCut, kitchen remodelling program are provided though the public network provider [Drew and Gallon, 2003].

Unified messaging

This service of NGN ensures the delivery of voice mail, email and fax mail through common interfaces. Users will be accessed and notified of different message types without having any means of access such as wireline or mobile phone.

Information brokering

Consumers with providers matching are done through advertising, finding and information. For example, information can be received on the basis of pre-specified criteria or personal preferences.

E-Commerce

E-Commerce is also a new service provided by next generation network. It involves online transaction processing, payment information verification, security provision and possibly trading based on negotiation of goods between sellers and buyers. Home banking, home shopping, business-to-business applications like supply-chain management and knowledge management applications are also this type of service [Drew and Gallon, 2003].

Call centre service and interactive gaming

This service enables the virtual call centre and subscriber to place a call to an appropriate agent anywhere, anytime by just clicking on the web-page. Next generation network offers this service to establish interactive gaming session for consumers.

CONCLUSION

This paper has clearly focused on an IP-based next generation network that provides a cost effective infrastructure for new network service providers and additionally provides valued added services. The main part of the NGN is an IP multimedia subsystem (IMS) used to provide all session based services with the help of signalling protocol. IMS uses session initiation protocol (SIP) as signalling protocol uses the creation, modification and termination of the sessions. The research shows that NGN and its supporting technologies are dynamic in nature. Moreover, IP based NGN uses an internet protocol as a basic transport mechanism and provides a more complex infrastructure in the presence of existing networks. Further research is still under consideration for finding cost effective solutions provided by NGN.

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