Chapter 9

Migration to NGN

MIGRATION TO NGN

Telecom Network Operators are in the process of migration to NGN (Next Generation Network), to provide multimedia and innovative value added services to their customers. Presently most of the fixed line subscribers are served by TDM exchanges deployed throughout the country. In this network it is very difficult to implement any new service. Either it is not possible or if possible then it takes lot of time to implement the new service in the network.

In the existing PSTN/ISDN network, subscribers are connected to the main telephone exchange either directly or through access network consisting of RSU/RLU or AN. Typically the signaling between RSU/RLU and main exchange is vendor specific, hence RSU/RLU of one vendor cannot be connected to main exchange of other. However some access networks support V5.2 interface and hence can inter work with the switch of any other vendor. xDSL modems are used at the subscriber's premises for broadband access over existing copper lines. Subscribers are able to select narrowband and broadband access at the same time. Voice traffic is transported over PSTN and controlled by a hierarchy of local exchange (LE) and trunk exchange (TE) circuit switches. All the voice related signaling (ISUP and INAP) is handled by the CCS7 signaling network. Value Added Services are provided either by switches or through the Intelligent Network (IN). The Internet connectivity is provided either through narrowband (PSTN or ISDN) dial-up services or through broadband ADSL (with voice split off) as a separate service.

NGN supports variety of end user equipment, from legacy terminals to sophisticated mobile terminals, IP phones and computers. Various communicating patterns, such as one-to-one, one-to-many, many-to-many and many-to one are possible. Open and standard interfaces and APIs to interconnect within and outside the network is an important feature of NGN.

Migration from PSTN to NGN is required because of following:

• Network convergence – one network for voice, data and video

• OPEX and CAPEX savings

• New service opportunities

• Non availability of spare parts of the exiting TDM exchanges

Migration from PSTN to NGN

There cannot be one general approach for migration. Migration from PSTN to NGN is operator specific depending on market requirements and operator's business strategy.

There may be two possible approaches for migration from PSTN to NGN as explained below. However, these phases are implemented in accordance to business and strategic needs of a service provider.

1. IMS deployment: This is 3GPP standard for evolution of PLMN into NGN. IMS is still in development phase.

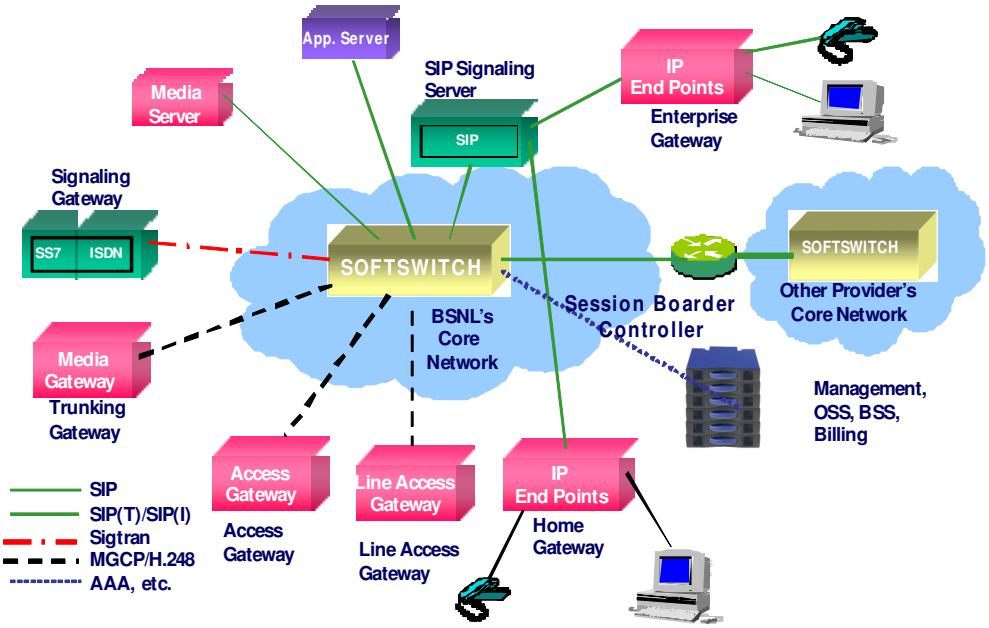
2. Soft switch deployment: In this approach the Soft switch and Gateways are used. This is the approach followed for evolution of PSTN to NGN scenario.
   Further in soft switch approach there are two types of NGN architecture:
   (i) Class -4 NGN Architecture
   (ii) Class -5 NGN Architecture

As the PSTN is organized in a hierarchical manner i.e. in the form of TAX network (Lev-I and Lev-II TAX) and local exchanges. The TAX exchanges are called class-4 switches and NGN based TAX is called Class-4 NGN Architecture. Similarly local exchange is called class-5 switch and NGN concept implemented in access network is called Class -5 NGN Architecture.

For migration the operators may first go for Class 4 NGN Architecture and then Class-5 NGN Architecture or some operators may follow reverse approach. BSNL has adopted the first approach and we have installed Class-4 NGN Architecture i.e. IPTAX. In a phased manner the TAX network will be replace with the IPTAX and simultaneously NGN will also be implemented in the access network.

The soft switch architecture (general consisting of class 4 and class 5) has been shown in Fig.1 below

NGN: Soft Switch Architecture



Soft switch

Also known as Call Agent or Media Gateway Controller:

–Performs Call control, signaling and interworking, Traffic measurement and recording functions

–Provides Addressing, Analysis, routing and charging facilities

Trunk Media Gateway

Performs the functions of

- Voice encoding & Compression
- Packetization of voice channels

Signaling Gateway

Provides interworking function between SS7 network and IP network

Access Gateway

Performs the functions of

• Providing interface to an Access network like DLC, AN RAX, RSUs, ISDN PRI. The interface is based on E1 or STM-1.

Line Access Gateway

Line Access Gateways provide the interface to a single subscriber line. It is a two wire interface.

Central to the NGN architecture is the Soft Switch, which is a call server that allows multiple application services to run concurrently. The Multi-service Gateway facilitates Voice, Video and Data services to be accessed by the customer via the feature rich edge. Typical features include Layer-2 and Layer-3 VPN services, VPLS services, Firewall services and Network Address Translation (NAT) services. The SIP Signaling server provides signaling interface to IP End points in a Broadband environment. The Application and Media servers work in conjunction with the Soft Switch to deliver the specific application and the media related functions (such as an IVRS module) to the customer.

The Operations and Management of the Soft Switch require OSS – BSS systems, which facilitate service provisioning, service assurance and service billing. These are implemented alongside the Soft Switch.

NGN can almost revolutionize the service delivering capability over multimedia (i.e. voice, video and data), but an important aspect is to integrate existing investments in voice dominated Public Switched Telephone Network (PSTN) with NGN in a transparent way so that the overall service offerings are not perceived as being sourced from two networks – one a superior modern network and another that is a legacy. This is made possible through Media Gateways that form the intermediaries between the TDM based PSTN and the IP-based NGN. Media Gateways can broadly be classified into Trunking Gateways and Access Gateways. The Trunking Gateways provide connectivity to the Local Switches through standard SDH interfaces, typically over E1 or STM-1 lines. The Access Gateways provide interfaces to customers over TDM links. There is also the Signaling Gateway that connects the SS7 Signaling system in a PSTN Switch to the Soft Switch.

NGN infrastructure set up, site specifications and other details has to be planned to integrate NGN elements at the edge routers of MPLS network.

After commissioning and acceptance testing, voice trunks and signaling links from existing Local Exchanges (LEs) may be shifted to the Trunk Media Gateway (TMG) and Signaling Gateway (SG) respectively in phased manner. Network performance is to be observed continuously as there may be some problem in inter working due to non compatibility between certain new elements added in the network. Finally, the TMG and SG may be loaded up to 80%. The existing new technology TDM TAX exchanges may also continue to work till the life of exchange is expired and spares are available. This approach guarantees full protection of TDM investments, while providing the operator with a fully fledged trunking-over-packet network, as well as continued access to switch based and IN based Value Added Services.

Evolution of Present Networks to NGN: Related Issues

The evolution of networks to NGNs must allow for the continuation of, and interoperability with, existing networks while in parallel enabling the implementation of new capabilities. There are some important issues which are to be addressed properly for migrating from PSTN to NGN. Some important issues are described below:

QoS (Quality of Service)

The basic criterion for QoS evolution is 'subjective user satisfaction', e.g. speed, accuracy, reliability, and security. This involves identification of parameters that can be directly observed and measured at the point at which the service is accessed by users and network providers. Flexibility within the global end-to-end NGN architecture is essential to allow for each recognised operating agency's different regulatory environment, service offerings, geographic span, and network infrastructure. These factors need to be taken into account when agreeing on parameters for, and levels of, QoS for NGN.

Interoperability

Considering that the NGN will involve a broad series of protocols (including various profiles) at both service and network levels, it is essential to ensure interoperability between different systems and networks.

Security

Security is as crucial to the NGN as it is in today's network environment. Within the NGN, security issues interrelate with architecture, QoS, network management, mobility, charging and payment.

Generalized Mobility

NGN will give users and devices the ability to communicate and to access services irrespective of change of location or technical environment. The degree of service availability may depend on several factors, including access network capabilities, service level agreements between the user's home network and visited networks, etc. It includes the ability to communicate from various locations using a variety of terminal equipment, with or without service continuity while in transit or while changing access means.

Sample Questions:-

1) Presently Fixed line subscribers are served by:
a) TDM Exchange
b) NGN
c) Mobile Network
d) Data Network

2) It Takes lot of times to implement new services in the present Network:
a) True
b) False

3) IPTAX is which type of NGN Architecture
a) Class-5 NGN
b) Class-4 NGN
c) Not NGN
d) Sometimes Class-4, Sometimes Class-5

4) BSNL Has adopted NGN Migration with the approach of replacing first:
a) Tax Changes
b) Local Exchanges
c) Has not finalized yet about Migration
d) None of the above

5) In NGN single subscriber line is terminated on:
a) Access Gateway
b) Line Access Gateway
c) Media Gateway
d) SoftSwitch

ANSWER KEY(NGN MIGARTION)

1	**a**
2	**a**
3	**b**
4	**a**
5	**b**

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