Softswitches equipments in NGN Architecture and related services

ITU-BDT Seminar on Network Evolution

Sofia, Bulgaria 21-24 January 2003
Changing Scenario (1)

Telecommunication market

- period of dynamic evolution
- increasing demand to deploy innovative services
- technology constantly opening up new horizons
- growing and developing in terms of quantity and quality
- relationships, information and business less and less dependent on the physical location of the people involved

Crucial Point: opportunity to interact by exploiting the wide range of available means of communication, taking advantage of the ability to integrate CONVERGENCE with Multimedia Revolution
Changing Scenario (2)

Convergence means

- **New industrial environment**
  - New professions *(network operators, service providers, content provider access providers, hardware supplier, tool makers, distributors...)*
  - New multiform actors *(system houses, manufactures of final products and systems...)*
  - New various marketing means, tools and prices *(embedded software, role of Internet, price from “sold” to “free of charge”...)*

- **New user’s expectations and possibilities**

New Business Models and New Relationships between different actors are arising
A New Business Model ...

Consumer

Enrolls for and consumes services

Broker

Provides location information

Retailer

Provides the contact point for the consumer and for the SP

Service Provider

Offers any of a Variety of services

Network connectivity provider

Delivers the communication services that transport information (control Plane and/or User Plane). The Service Control Information can be Transported, depending on the business application

Source: ETSI
... and New Relationships

Network Technology

- Circuit based
- Packet Based
- Convergent

Service Model

- Horizontal
- Vertical
- Intelligent Network

Service Assurance

- Centralized
- Distributed
- Portal

Distributed Processing Environment

- High
- Medium
- Low

Multi Service Middleware
Telecommunication is ...

A strategic industry with impact on:

- **Economy**
  - Growth market in different areas not equally distributed neither in type nor in geography.

- **Society**
  - New services, application and content will create new market and new approach to life: will create the Information Society with …

- **Technology**
  - Multi access convergence platform (interactive digital TV, 3G mobile, PC at home …)
  - Broadband (open platform for convergence, Quality, Security …)
The NGN is the Key to open this “Innovative Place”
Multi Service Solutions

Voice - Circuit Switching
TDM endpoints
TDM services
SS7 transport
TDM access
C5

Voice + Data – Packet Switching
IP endpoints
Packet Transport and IP access
services

Softswitch

Legacy TDM Network (B1)
Border elements

Legacy IP Network (B3)

Internet Service Provider Network (B2)

Packet Transport Backbone
Voice + Data + service Packet Switching

IP Access Network (H.323, SIP, H248,...)
Integrated Multi service framework enables all layers and elements to carry all services and maximize network investments.
## The General Evolution of Services point

<table>
<thead>
<tr>
<th>Traditional communication services</th>
<th>Converged services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertically integrated development with service-level functionalities intertwined with underlying connection management capabilities</td>
<td>Horizontal integrated development with an API approach between application and communication infrastructure</td>
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<table>
<thead>
<tr>
<th>+</th>
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<tbody>
<tr>
<td>Optimized for performance and reliability</td>
<td>Complex to develop and difficult to extend or reuse</td>
</tr>
<tr>
<td>Seamless and consistent across networks domains</td>
<td>The development of seamless services requires a deep understanding of the different protocols, data formats, end-user devices and network capabilities</td>
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</tbody>
</table>

- Set of available services different when end-user crosses the boundaries between circuit/packet, wireless/wireline, public network/enterprise domains
NGN Softswitch: driver for implementation

- Independent from media and speed
- Rapid development/deployment
- Creation of services

Interworking with traditional network

Any access

Wireline Access

Broadband Access

Wireless access

+ Operational Integration (Billing & OSS, OAM&P)

Signalling Integration

SS7 Signaling

IN Services

HLR/VLR

Innovative services
Softswitch: More an architecture than a product
A strong battle is fighting ...

- Border Elements towards the “legacy”
- Security
- IP Addressing
- QoS
- New Network Elements (TG, MG, endpoints …)
- New Interfaces between Network Elements
- New Functional Layering (AS, MS, …)

Three perspectives of convergence
Transport, user and service point of view
Legacy TDM and H.323 model

GW decomposition concept

- IN
- PSTN
- TDM endpoint
- Class 5 switches
- Class 4 switches
- MGC
- MG
- SG
- GK
- UP
- Service GK
- SP
- Trunks
- SS7 Signalling
- H.323 endpoint
- H.323
- MGCP/H.248
- SIGTRAN
Legacy TDM and SIP model

GW decomposition concept

- **IN**
- **PSTN**
- **MG**
- **MGC**
- **SG**
- **SP**
- **UP**
- **MS**
- **PSTN Gateway**

**Classes:**
- Class 5 switches
- Class 4 switches

**Protocols:**
- MGCP/H.248
- SIP
- HTTP/SIP

**Technologies:**
- SIGTRAN
- TMN

**Signalling:**
- Trunks
- Signalling

**Agents:**
- SIP Call Agent
- SIP UA

**Endpoints:**
- TDM endpoint
- PSTN endpoint
H.323 and SIP model

- **GK**
- **Service GK**
- **SIP Call Agent**
- **Application Server**
- **PSTN GW**
- **H.323 endpoint**
- **MS**
- **HTTP/SIP**
- **Gateway**

Network Interface (Signalling + bearer)
iMSS Solution architecture Model

- **Traditional C4 / C5**
  - **PSTN**
  - **UP**
  - **PRI V5.x**

- **MG**
  - **Trunks**
  - **H.323**
  - **MGCP**
  - **Service GK**
  - **H.323 endpoint**

- **SG**
  - **Signalling**
  - **IP**
  - **HTTP/SIP**
  - **SIGTRAN**

- **MGC**
  - **GK**
  - **SIP Call Agent**

- **SCP**
  - **INAP Interface**

- **Softswitch**
  - **Open API Parlay**
  - **SIP AS**
  - **Application Server**
  - **Third party Application Server**

- **SP**
  - **O&M Interface**

- **Optional TDM part**
Border Element towards legacy TDM & IP

Enhanced C4 + MGC + SG - Signalling

- H.323 Network
  - MGCP/H248
  - MGCP/H248
  - MGCP/H248
  - MGCP/H248
  - MGCP/H248
  - MGCP/H248

- PSTN/PLMN
  - SS7
  - Trunks

- SIP Network
  - SIP
  - SIP

- IN
  - SS7
  - Trunks

- SIP
  - SG
  - MG
  - MG
  - MGC
  - MGC
  - SG

- Managed IP Network
  - MGCP/H248
  - MGCP/H248
  - MGCP/H248
  - MGCP/H248
  - MGCP/H248
  - MGCP/H248

- SIGTRAN
  - interMGCP (SIP-T)
Border Element towards legacy TDM & IP

Enhanced C4 + MGC + SG - Bearer

H.323 Network

IN

PSTN/PLMN

SS7 Trunks

Signalling

MG

MGC

SG

MG

SIP Network

SIP CA
Key Points - Enhanced Class 4 Solution

Italtel Approach’s benefits:

- Separation of Call Control from bearer level
- Integration & Interoperability with legacy networks
- Single Point to Network Management System
- Support for Multiple Gateway Protocols
- Multi POP geographically distributed, single C4 Softswitch
- TDM and Softswitch capabilities embedded in a single platform

Italtel Multi Service Solution (iMSS) lets:

- Incumbent Operators, fixed and mobile, to gradually upgrade the existing circuit network moving towards NGN infrastructures
- New Operators to start directly with an NGN infrastructure optimising the interconnection with legacy networks
Interconnection of innovative users
Key Points - Class 5 Solution (Softswitch)

Italtel Approach’s benefits:

- Independence of Call Control from User Devices
- Integration & Interoperability with legacy users and services
- Open Interface with a Service Layer for the introduction of new services allowing new application developers and Service Provider going into the service “carrier” value chain

Italtel Multi Service Solution (iMSS) lets the operators to connect Legacy users and new IP based users guarantying the end-to-end interoperability in terms of connectivity and services
What’s a service?

Different Market Perspectives
- Services demand by customers
- Services demand from Service Operator

Different Offering Perspective
- Switched Services (user and network services)
- PVN & VoIP Services (user and network services)
- Intelligent Network
- Multimedia services (VCIP, IPTV, …)
- Internet Based Services (click to talk, emwi, icw …)
- Data services
- ........

Services trends & network requirements

Voice

Traditional

Add-value

Voice and data
Service Offer: Some Key Points

Traditional Services

- Importance to offer voice based services also to innovative users
- New kind “behaviour” for traditional users and call related service model for innovative ones

Add-value Services

- Importance to offer new services also to traditional users
- New kind “behaviour” for innovative users and call unrelated service model for traditional ones

Multi Service Framework

Cuncurrent Services
From STS to VAS towards Service Portals

SERVICES FAMILIES

- Switched Services
- VPN-VoIP Services
- IN&WB Services
- Multimedia Services
- Mobile Services
- Other Services

SERVICES PROFILES

- Basic Services
- VAS Services

- Is it what I really need?
- OK, this is good for me!
- This proposal is very interesting!
- My personal world.

V/H PORTALS

- Horizontal Portal
- Vertical Portal

P-PORTAL

Customized area
Service Offer: New complexity

Call related
- Service Logic 1
- Service Logic 2
- Service Logic n
- Service Logic m
- Service Logic j

traditional
- IN call model
- IN call model

Add-value

Call unrelated

V5 legs
POTS/ISDN legs
H.323 legs
SIP legs
MGCP legs

TDM
ToIP

Voice legs
Data legs

Bearer flow

endpoints
iMSS Solution: Functional Relationship

- **SCP**
  - SOAP server
  - Parlay GW
  - STS
  - IP interface
  - TDM interface
  - Call Handling
  - VAS mediation
  - adaptation
  - SEC
  - MGC
- **FS**
- **SIP Application Server**
- **SOAP server**
- **Parlay GW**
- **SCF**
- **SSF**
- **VAS mediation**
- **MGC**
- **adaptation**

**Protocol Standards**:
- INAP, ISUP, PRI, V5.x
- H.323, SIP
- MGCP, SIGTRAN

**Network Interfaces**:
- Circuit "leg" (TDM, PRI, V5.x)
- Packet "leg" (H.323, SIP)

**Technology Elements**:
- Application Server
- Technology Element
- Service Platform Component
- Signaling Network Element
- Call Control Element

**Signaling Protocols**:
- Fast service/application prototyping and deployment
- 3G network

**Web Self Provisioning/activation (SOAP)**

**Open API**

**Parlay**

**GW**

**Parlay Server**

**Parlay Application Server**

**iMSS softswitch**
iMSS: Services & Applications offer

**IN Services:**
- ARS
- VPN
- Prepaid

**Embedded IN Services:**
- Number Portability
- Free Phone
- Call screening (White&Black List)

**Network Services:**
- Advanced call routing
- Lawful interception
- Network traffic management
- …

**Value Added Multimedia Services:**
- Web Telephony, ICW
- Unified Messaging
- Personal Communic.
- Click to Dial, Mail&Speak

**User Services:**
- Emergency call
- Multi-party conference
- Call forwarding (CFx)
- CLIP/CLIR,
- Call Barring,
Key Points - Services

Separation of Call Control layer from Service layer with Standard, Open interface

Traditional and advanced services, optimizing resources usage and reducing operational costs

Fast deployment and customizing of new services using Service Creation Environment for best time to market

Fast provisioning and simplified access to network services using current and new user friendly terminals (multimedia or not)

Customer Services Profile Management

Service Profiles Evolution Path (soft Profiles upgrades with new

Italtel Multi Service Solution (iMSS) lets the operators to offer legacy users and new IP based users the same bouquet of services enabling all layers and elements of the multi service network to carry all services
NGN: the answer to Service Provider Challenges

- NGN Class 4
- 40-60% of backbone OPEX savings

- NGN Class 5
- Innovative services
- Service bundle
- Efficiency improvement
iMSS Softswitch Functional Model

- **Network & Protocol Handling**
  - ISUP
  - PRI
  - V.5.x
  - H.323
  - SIP
  - MGCP
  - M2PA/SCTP
  - Telephony Physical Interface

- **Signalling Adaptation**
  - I/F HND
  - IPA
  - V.5.x

- **Control**
  - CH
  - STP
  - SSP/SSF/SCF
  - SG
  - AS mediation

- **Service**
  - Telephony Services
    - SL
    - SL
    - SL
  - SCF
    - SL
    - SL
    - SL

- **Operation & Management**
  - Resource APIs
  - Network Capabilities APIs

- **DB**
- **Media Server**
- **MGC**
- **TDM SE**

- **Transport**
  - TDM Users
  - SS7 Signalling
  - Intelligent Network
  - IP Users
  - Media Gateway/Access Gateway
  - Application Server
  - SS7 over IP
  - Other CAs
iMSS Softswitch: POP concept

Single site (centralized)

- POP concept
- SS7 sign.
- Trunks

Multi site (distributed)

- PRI V5.x trunks
- SS7 sign.
- Trunks

- MGCP + SS7 Backhaul
- H.323
- SIP
- SIP-T
- Inter iMSS communication
Voice/Data Integrated Backbone - Pure POP

- PSTN/PLMN
- Core INAP CS1
- Managed IP Backbone
- Universal Gateways (Voice + RAS)
- Media Gateways
- OSS
- iMSS
- ISP/Internet
- PSTN/PLMN
- Local/Transit/MSC Exchange
- Media Gateways
- ISUP-IVS/SIP-T
- SS7
- MGCP/MeGaCo
- H.323/SIP

Network Connections:
- Trunks
- VoIP Gateways
Voice/Data Integrated Backbone - Enhanced POP

- iMSS
- Managed IP Backbone
- Core INAP CS1
- Core INAP CS1
- OSS
- PSTN/PLMN
- iMSS
- Local/Transit/MSC Exchange
- Voice/Data Integrated Backbone
- PRI
- PRI
- MGCP/MeGaCo
- H.323 SIP
- SIP
- MGCP/MeGaCo
- H.323 SIP
- SIP
- MGCP/MeGaCo
Voice/Data Integrated Backbone - Mixed POP

- Managed IP Backbone
- Core INAP CS1
- iMSS
- VoIP Gateways
- SS7 Media Gateways
- Media Gateways
- H.323/SIP
- MGCP/MeGaCo
- SS7
- PRI
- V5
SIP - Innovative Users Interconnection
iMSS Voice/Data IB for Mobile Networks

- MAP to query HLR for roaming number
- PSTN
- Gateway MSC
- iMSS
- HLR/AuC
- MGC/GMSC
- ISUP
- MGCP
- IP
- E1
iMSS H.323 to PSTN Gateway

- PTT PSTN
- Other Operators
- iMSS
- INAP
- MGCP
- Appliance Server
- IP Network (H.323)
- Household
- POTS
- Ethernet
- Building
- Giga Ethernet Ring
- IAD
Access Systems

Fiber Access Solution (Ethernet to the home)

Copper Access Solution (with ADSL & SHDSL)

Wireless Local Loop
Thank you!

Questions ?
ITALTEL Multi-Service Solution (iMSS)

(IN) Core INAP

Application Server

Application Server

MG

MGCP/IP

OpenAPI

SIP/IP

TCAP/SCCP

SIP-T/IP

Call Agent

SIP/IP

MGCP*/IP

MGCP/IP

H.225(H245)/IP

H.323 (IAD)

POTS, ISDN (IAD)

POTS (IAD)

POTS (IAD)

POTS, ISDN

POTS, ISDN (Terminal)

MGCP/IP

MGCP/IP

SIP/IP

SIP/IP

SIP (Terminal)

Trunks

ISUP

MxAA/SCTP

Signalling Gateway

AN

POTS, ISDN

H.225(H245)/IP

POTS, ISDN

POTS, ISDN (Terminal)

POTS (IAD)

SIP (Terminal)

Call Agent

ISDN

ISDN PRA

V5.2

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