Ericsson NGN Solution

Presentation to ALTTC on BSNL Network Modernization
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Ericsson NGN – overview
  – Ericsson’s strategy
  – Next generation network architecture
  – Engine The Soft Switch Solution for Telephony and Multi-media

NGN Solution – ToIP
  – Signalling protocols, compression, interoperability and standards
  – Key issues for Network design – capacity, redundancy, design and dimensioning
  – Carrier class Telephony over IP – just VoIP not good enough
  – Customer Cases
  – Recommendation for BSNL
Ericsson NGN - overview

- Ericsson’s strategy
- Next generation network architecture
- Engine – The Soft Switch solution for telephony and multi-media
Ericsson’s converged systems architecture
Layered architecture based on 3GPP

Convergent Services over common IP core!

POTS and multi-media supplied over one broadband access
Network overview – voice and data
Evolution of telephony and multi-media services

**Current CS/TDM**
- Legacy CS
  - Complicated structure
  - Ageing HW
  - Growing OPEX
- Legacy CS

**Introduction ToIP**
- TeS
- ISUP
- MGW
- ISUP
- H.248
- ToIP

**BB and multi-media services**
- Continued migration class 4 and 5 traffic
- Migrate transit traffic to NGN
- Rehome RSS
- Convert CSS to RSS
- Other Networks
  - VoIP
  - SIP, H.323
- IMS
  - SIP
  - MGCF
  - ISUP
  - TDM
  - CS
  - IP

**Other Networks**
- VoIP
- SIP, H.323
- IMS
- SIP
- MGCF
- ISUP
- TDM
- CS
- IP
Evolution of telephony and multi-media services

BB and multi-media services
Continued migration class 4 and 5 traffic

2 to 1 strategy
Wireline IMS architecture

Telephony provided by IMS also for legacy telephony access
Evolved telephony based on IMS
New wireline architecture

- $\sim 10^1$
- $\sim 10^2$
- $\sim 10^3 - 10^4$
- $\sim 10^6$
Engine

The softswitch solution for telephony and multi-media
Engine Integral - Telephony Softswitch Solution
Solution overview and main building blocks

Separation of call and connection control

Signalling
Connection
Softswitch – Telephony Server (TeS)

Telephony Server (TeS)
- Engine Integral Softswitch
- Call control & call logic
- Uses proven Technology
- Global Class 4 and Class 5 feature set
- Carrier Class HW and SW implementation
Media Gateway – AXD 301

Media Gateway - AXD 301
Media Gateway for telephony services
Multiple IP and TDM interface options
Multiple codec support
Carrier Class HW and SW implementation
PBN – Cisco IP Core and Edge Technology

PBN – Cisco Core & Edge Routers
Cisco 12000 and CRS-1
Provides the IP/MPLS transport
Carrier-class implementation meeting the telephony requirements

Service Control Point (IN)
Telephony Softswitch Solution (TSS)
TeS
Telephony Server
Application Server
Packet Backbone
PBXPBX
Other Networks
PBX
Media Gateway
EAR
LE
TE
Application Server

PBN – Cisco IP Core and Edge Technology
PSTN access node - Engine Access Ramp (EAR)

Engine Access Ramp
Solution for ISDN and PSTN
Copper Concentration
Carrier Class

Telephony Softswitch Solution (TSS)
Service Control Point (IN)

Other Networks

Transit Exchange
Local Exchange
IP-MSAN

PBX

Application Server
Operations and Management – MN OSS

MN-OSS
Network Management and Service Assurance
A complete operational support solution defined specifically for multi-service networks
Designed to improve the solutions performance and reduce cost of operations

Media Gateway
Packet Backbone
TeS
EMS
Billing Mediation
Service Activation
PBX
Local Exchange
Transit Exchange
Other Networks

Operations and Management for TSS

Cisco/Juniper EMS

Management

PBX
Media Gateway
EAR
EMS
TeS
Billing Mediation
Service Activation
Packet Backbone
MGW
MGW
MGW
Engine Multi-Media Softswitch Solution
Engine Multi-Media network solution
3GPP architecture based on IMS

Home Subscriber Server
- Holding user profiles
- Authenticating a user
- Authorising user requests
- Binding a user and a session

Session server (CSCF)
- Routing of SIP messages
- Triggering of services
- Session control function
- Bearer authorisation and policing

The MGC/MGW provides:
Interworking with ISUP/TDM, SIP & H.323 NWs
Engine multi-media solution - 3GPP architecture
Detailed view
Value of Engine Multimedia

**IP Centrex**
- Hosted PBX
- One network for voice and data
- Complete service set for the enterprise
- Easy management of subscribers
- Multimedia services

**IP Telephony**
- First or second line replacement
- Several phone lines
- Video call
- Instant messaging
- Presence
- Buddy lists

**IMS Architecture**
- The only standardized architecture for SIP based multimedia services
- Open architecture – enables multivendor deployment
- Modularity – add functionality
- Fixed mobile convergence – common core network

**Engine Multimedia**
NGN Solution – ToIP

- Signalling protocols, compression, interoperability and standards
- Key issues for Network design – capacity, redundancy, design and dimensioning
- Carrier class Telephony over IP – just VoIP not good enough
- Customer cases
Signalling protocols, compression, interoperability and standards
Signalling overview in Telephony Softswitch Solutions

Basic operation

**Interoperability**

SIP-T "ISUP over IP" well defined by IETF RFC
H.248 being standardised by ETSI/Tispan
ISUP signalling – two basic alternatives

Channel associated signalling

STP - signalling

Secure signalling transport
Redundancy

Reduced need of RPG
Ericsson’s view on signalling in NGN

- SIP-T or BICC for interconnect with other telephony softswitches (Sigtran)
- H.248/SCTP for gateway control
- H.248 access signalling for POTS and SIP for multimedia over a common broadband access.
  - Operators see H.248 as the “next-gen. V5.2” for VoIP
  - Based on operator feedback Ericsson has decided to implement H.248 signaling for POTS, rather than “SIP”
- IP-MSAN (AGW) controlled by H.248 (ETSI Tispan)
  - Implementation in two phases
IP-MSAN in two phases

phase 1

based on the evolving H.248 standardization in ETSI Tispan.

phase 2

IP to IP gateway
Key issues for Network design
Capacity
Redundancy
Design
Dimensioning
Redundancy for transit applications

Partitioning two separate MGW

TeS

MGW

MGW

MGW

MGW

LX

LX

50%

50%

50%

50%

50%

50%

loss

Redundancy

10% 20% 30% 40% 50% 60% 80% 100%
Redundancy for local applications
Two options

Option 1: N+1

- TeS
- MSG
- MSG
- MSG

Advantages
- Cost-efficient, 1 redundant TeS can support may working TeS

Option 2: Mated pair, 1+1

- TeS
- MGW
- MGW
- RSS

Mated pair

Advantages
- "Hot" stand-by, no traffic disturbance in case of a failure
Redundancy for local applications
Two options

Option 1: N+1

Advantages
- Cost-efficient, 1 redundant TeS can support many working TeS

Option 2: Mated pair, 1+1

Advantages
- Hot stand-by, no traffic disturbance in case of a failure
It is not only about IP – it is about **carrier-class IP**

### Guiding principles

**Network architecture**
- Multi-service, Multi-vendor
- Support MPLS/Pure IP
- Several hundreds MGW

**QoS**
- Mouth-to-ear delay < 150 msec
- Voice packet loss < 1%
- MOS-value > 4

**Availability – better than “5 nines”**
- Back-up links
- Link restoration time < 1 sec

**Security**
- Protect the telephony nodes from different kinds of attacks

**Management**
- Proactive monitoring of voice traffic in IP network

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**MOS**=Mean opinion score

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**Carrier class IP is about network design and management!**
Delay budget

Mouth-to-ear budget: 100-150 msec

Our tests average 0.650 ms, 12 hops

Delay contribution from IP-core network could safely be ignored

Allow longer sampling time – if voice quality MOS>4
Engine Softswitch Networks

<table>
<thead>
<tr>
<th></th>
<th>Contracted</th>
<th>In Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Softswitches</td>
<td>103</td>
<td>69</td>
</tr>
<tr>
<td>Media Gateway</td>
<td>316</td>
<td>223</td>
</tr>
<tr>
<td>Customers</td>
<td>33</td>
<td>24</td>
</tr>
</tbody>
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In commercial service

In Service
Network development - Phase 1  
**TeliaSonera**  
ENGINE for the growing interconnect traffic to other operators

![Diagram showing network development phase 1 with TeliaSonera as the engine for growing interconnect traffic to other operators.](image-url)
Network development - Phase 2
Replacement of analogue local switches

TeliaSonera

Max. 125k

New access nodes
ENGINE in Mexico
Starting point

Impossible!

Growth

AN

V5.2

CSS

AXE

E10

PBX

R2

R2

R2

PBX

Telmex PSTN
Engine in Mexico
Step 1 – introduce Engine softswitch
Engine in Mexico
Future steps – expansion and network consolidation

Telmex PSTN

Growth

AN

RSS

CSS ➔ RSS

RSS

MGW

MGW

TeS

E10

PBX

R2

RSS

RSS

RSS

PBX

AE

AE

AE

2006-08-26 39
Engine in Mexico
Future steps – grow with IP-MSAN

Growth with IP-NAM’s, reduced OPEX through node reduction
BT 21C aims

- Revolutionise customer experience
  - Make it easier to buy and use services
  - Enable customers

- Deliver innovative products more rapidly
  - Rapid service creation & implementation
  - With more people creating new services

- Make it simpler to deliver and maintain service
  - Process, systems & network automation

- Transform the cost base of the Company
  - Enabler of whole life cost reduction (Capex & Opex)
What is the overall architecture?

- A converged network based on IP and an MPLS core
- An Intelligence layer that is mobile enabled based on 3GPP concepts
- OSS systems controlling the complete network
- An open applications layer
21st Century Network structure vision

**Today**
- Logical Nodes: ~80,000 PCPs in the Access Network
- Multiservice Access Devices: ~30,000
- Metro Routers: ~100,000
- Core Routers: ~10
- Internet Peering Centre

**Future**
- Logical Nodes: Begin Fibre to the PCP
- Aggregation: ~30,000 Multi-service Access Devices
- Service Edge: ~100 Metro Routers
- Core: ~170 Core Switches (DMSU / NGS)

**International Networks**
- Data Centre: ~100,000 Remote Concs, DLAMS & Data Muxes
- ~170 Core Switches (DMSU / NGS)

**Logical Nodes**
- ~80,000 PCPs in the Access Network
- ~100,000 Remote Concs, DLAMS & Data Muxes
- ~1000 + Voice Switches and Data Cross Connects
- ~170 Core Switches (DMSU / NGS)
Network areas & Selected partners

I-Node: Ericsson

Core: Cisco Systems, Lucent Technologies

Transmission: Ciena, Huawei Technologies

Metro: Alcatel, Cisco Systems, Siemens

Access: Fujitsu, Huawei Technologies
Recommendation for BSNL Network
“Rome was not built in a day”
Recommendations for BSNL Network

- Introducing NGN (TSS) Solution in International Gateway, Class 4 and Tandem Network.
- Migration of BSNL Local Access Nodes (RSS & V5.2 Nodes) to TSS based Network.
- Strengthening the IP access and IP Core Network.
- Increasing the Broadband Penetration.
- Introducing IMS Solution in Class A and Class B cities seeking Multimedia application.
- Evolving the mobile network under IMS umbrella providing feature transparency and true Fixed Mobile Convergence.