

**ITU-D Regional Development
Forums 2010 on NGN and
Broadband for the Arab Region
“NGN and Broadband,
Opportunities and Challenges”
Cairo, Egypt**



**IP Multimedia SubSystem and IP enabled
services (features, functions and services)**

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Cairo, Egypt

13-15 December 2010

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- **General principles of construction and operation of next generation networks**
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- **Economic aspects of the IMS implementation**

General principles of construction and operation of next generation networks

NGN (Next Generation Network) - a network with packet switching, suitable for the provision of telecommunication services and the use of multiple broadband transport technology-enabled QoS, in which service-related functions are independent from underlying technologies are responsible for transportation.

Rec. ITU-T Y.2001



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General principles of construction and operation of next generation networks

Basic principles of NGN creation

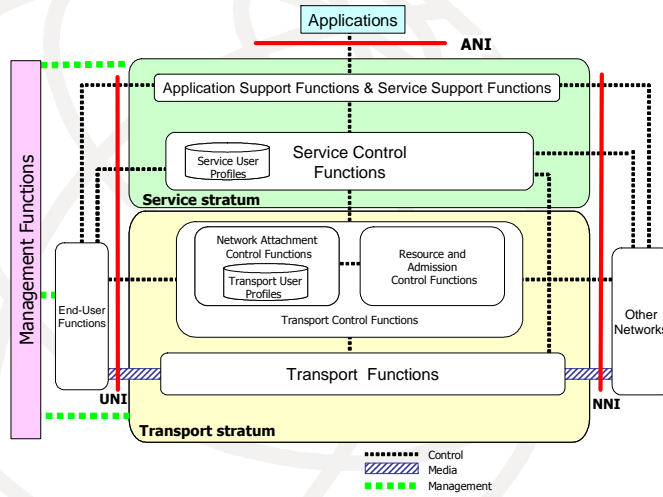
The traditional conception of NGN provide possibility creation of a new multi-service network, which carry out the role of instrument for realizing existing and feature services on one platform (equipment) where call control stratum (Softswitch and IMS) is key element of NGN



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General principles of construction and operation of next generation networks

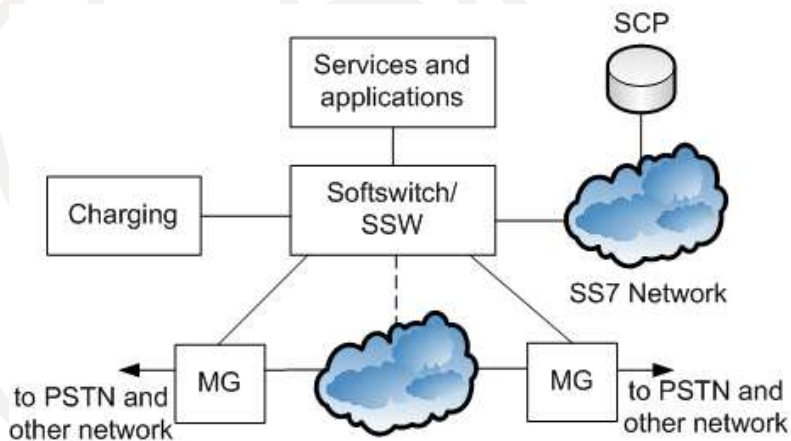
Functional model of NGN network



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General principles of construction and operation of next generation networks

The typical operator's NGN architecture



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General principles of construction and operation of next generation networks

IMS objectives and purpose

Objectives: effective integration of voice and multimedia traffic in a single multi-platform standards-based centralization of operational support and control system of major characteristics of the available services

Purpose: convergence of networks, application development, deployment of new services and reduce costs through the use of open standards, development of new business models (such as "Virtual Service Provider (VSP)")

IMS Standardization

The actual IMS features for standardization

- ✓ multilevel - split levels of transport, management and applications
- ✓ independence of the media access - enables operators and service providers to converge fixed and mobile networks
- ✓ support multimedia personal information exchange in real time (voice, video telephony) and a similar exchange of information between people and computers (games)
- ✓ full integration of multimedia applications, real and unreal time (streaming applications and chat rooms)
- ✓ interoperability of different services
- ✓ ability to support multiple services in a single session or multiple simultaneous synchronized organizing sessions

IMS Standardization

The central standardization organization which develop IMS standards

3GPP

3GPP2

ETSI (European Telecommunication Standards Institute)

ITU (International Telecommunication Union) – FG FN

OMA (Open Mobile Alliance)

TISPAN (Telecoms and Internet converged Services and Protocols for Advanced Networks)

ATIS (Alliance for Telecommunication Industry Solutions)



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IMS Standardization

ITU-T Recommendations, which include requirements to the functionality of IMS solutions and its relationship to the concept of NGN

Y.2001 General overview of NGN

Y.2011 General principles and general reference model for Next Generation Networks

Y.2012 Functional requirements and architecture of next generation networks

Y.2021 IMS for Next Generation Networks

Y.2211 IMS-based real-time conversational multimedia services over NGN

Q.3904 Testing principles for IMS on model networks, and identification of relevant conformance, interoperability and functionality tests



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IMS Standardization

List of ETSI/3GPP specification series

№ Series	Title of specification series
21	General requirements
22	Services standardization questions (phase 1)
23	Technical realization (phase 2)
24	Signaling protocol (phase 3). Butt of subscriber equipment-network
25	Radio access questions 3G
26	Codec
27	Data transfer
28	Signaling protocol (phase 3). Butt of radio system - network
29	Signaling protocol (phase 3). Butt of fixed network -IP network
30	Project management. Planning
31	Subscriber Identity Module (xSIM). IC cards
32	IMS service and charging questions
33	Security questions
34	Test specifications for subscriber equipment and cards USIM
35	Algorithm for security
36	LTE Radio technology (Evolved UTRA) и LTE-Advanced
37	Questions of Multiple radio access technology



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Typical aspects on network development under IMS technology

The IMS Functional model

The main functional elements of IMS can be divided into the following groups:

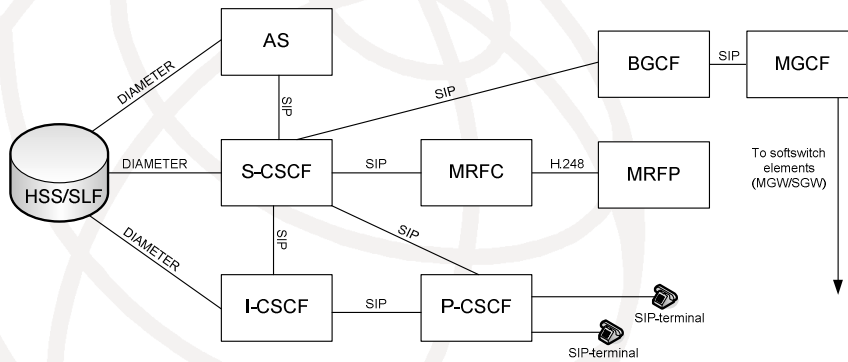
- session control elements - Call Session Control (P,S,I-CSCF)
- database (HSS)
- elements that provide additional services and respond on resource reservation (application server, MRFC, MRFP)
- elements provide interworking with another networks (BGCF, MGCF, IMS-MGW, SGW)
- security elements (PDF)
- elements billing and statistics



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Typical aspects on network development under IMS technology

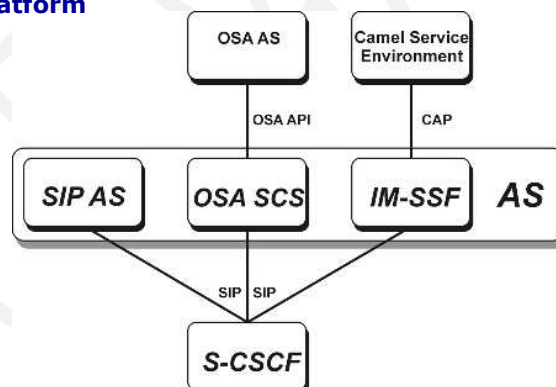
Traditional scheme of operator network based on IMS architecture



Typical aspects on network development under IMS technology

Types of platform for services providing

- **Application Server SIP;**
- **Application server OSA/Parlay;**
- **CAMEL Platform**



Typical aspects on network development under IMS technology

Actual services widely provided to customer via IMS

- **Presence**
- **Instant messaging and Chat**
- **Push to Talk**
- **File Transfer**
- **White board**
- **Games**
- **Converged TV**



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IMS implementation and testing on Model and operator networks

Approaches to IMS testing

Q.3904 ITU-T Recommendation

The scenarios, list and types of tests for TM local and NUT testing for IMS on the Model Network



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IMS implementation and testing on Model and operator networks

IMS Testing methodology

ITU-T Recommendation Q.3904 determine integrated approach for testing IMS solutions include following sequence of tests:

- **check for compliance with standards and specifications for the implementation of basic call and provide additional services**
- **functional testing**
- **testing for interaction (network integration)**

IMS implementation and testing on Model and operator networks

Typical problems identified during testing of system-network IMS solution

Functional checks

Registration statistics from different types of equipment which use during session and include to IMS system-network solution

Identified problems

Lack of detailed call records with mandatory information on the amount of transmitted content (information) for content-oriented services

IMS implementation and testing on Model and operator networks

Typical problems identified during testing of system-network IMS solution on interoperability

Objective

To test the possibility of IMS system-network solution to serve subscriber which is moving to guest network

Identified problems

The subscriber is connected to ISP's P-CSC (guest network), maintain at the S-CSC another network, but can not get the basic telecom services in full

The reason for this problem

The difference in syntax P-Charging-Vector Protocol, SIP IMS, transferred from the P-CSC to the S-CSC, manufacturers support different variants of this parameter which does not determine exactly by the protocol specification



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IMS implementation and testing on Model and operator networks

Compatibility checking

Instance of checking hardware compatibility

S-CSC <-> I-CSC

Objective

To test the possibility of system-network solutions provide correct access to IMS resources after registration SIP-terminal using the URI with the corresponding password, and denial of access when is typed an incorrect password

Identified problem

S-CSC from one vendor supports messaging protocol DIAMETER only using the transport protocol SCTP, and the I-CSC another vendor supports messaging protocol DIAMETER only over TCP. As a result of the use of means of communication, using different transport protocols for messaging protocol DIAMETER can not interact



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IMS implementation and testing on Model and operator networks

Now the decision of the given problems come to application of the corporate standards specifying the international specifications regarding internal functionality demanded to the operator and in case of ISP interworking to the mutual arrangement by a principle of "the minimum expenses"

IMS implementation and testing on Model and operator networks

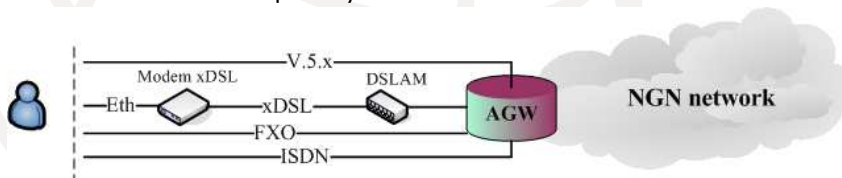
Typical strategy of migration existing networks to IMS technology

Scenarios of transition from the existing telephone network based on TDM network to the NGN/IMS network based on PSN

Access level

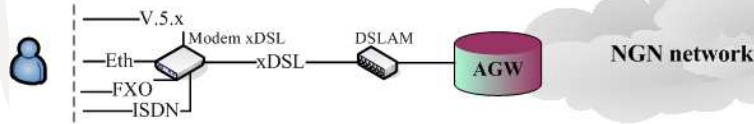
Step1

interfaces V.5.x, analog lines (FXS/FXO) and PRI/ BRI interfaces are connect to the PBX separately

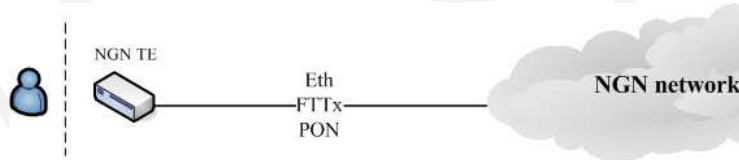


IMS implementation and testing on Model and operator networks

Step 2 Connect all user interfaces directly to a subscriber's xDSL equipment. Using high-speed of 1-10 Mbps symmetrical streams (VDSL, SHDSL)

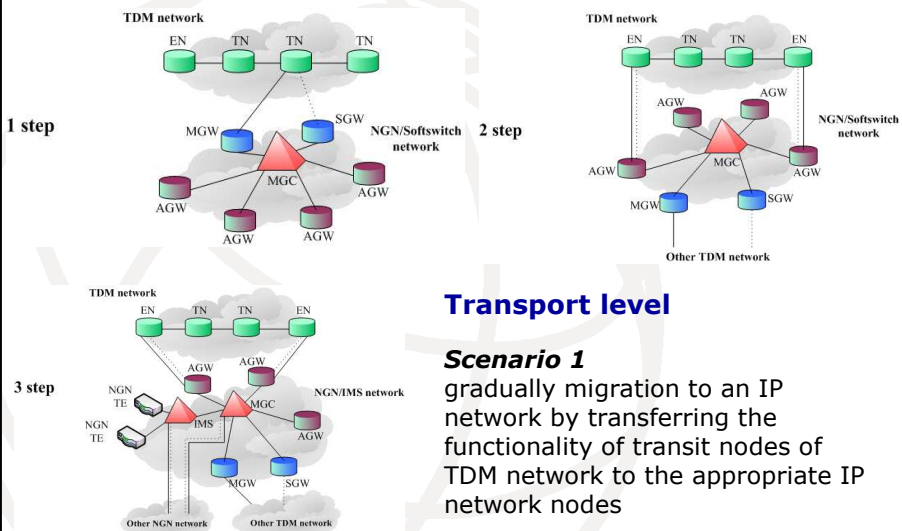


Step 3: Migration to a fully digital network access technologies. Using high-speed and symmetric technologies Ethernet, FTTx, PON, etc.



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IMS implementation and testing on Model and operator networks



Transport level

Scenario 1

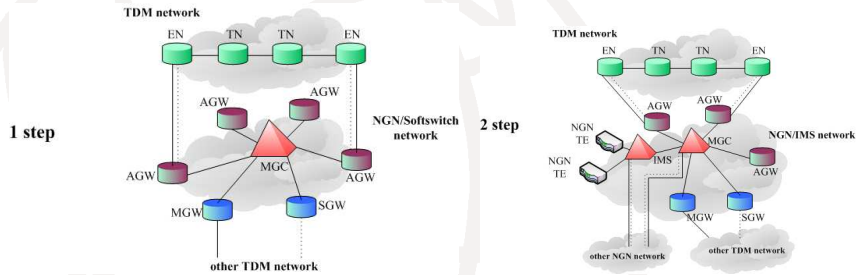
gradually migration to an IP network by transferring the functionality of transit nodes of TDM network to the appropriate IP network nodes



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IMS implementation and testing on Model and operator networks

Transport level



Scenario 2

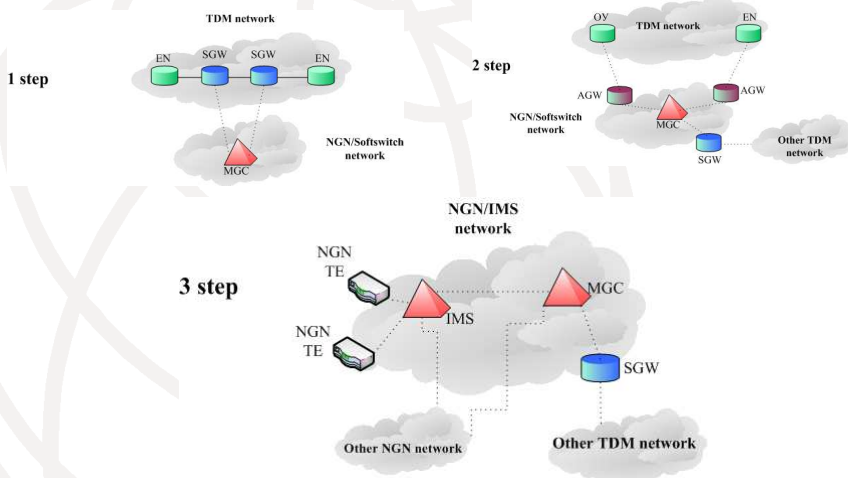
Migration to NGN/Softswitch network by connecting Access Points of TDM network to voice and signaling gateway



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IMS implementation and testing on Model and operator networks

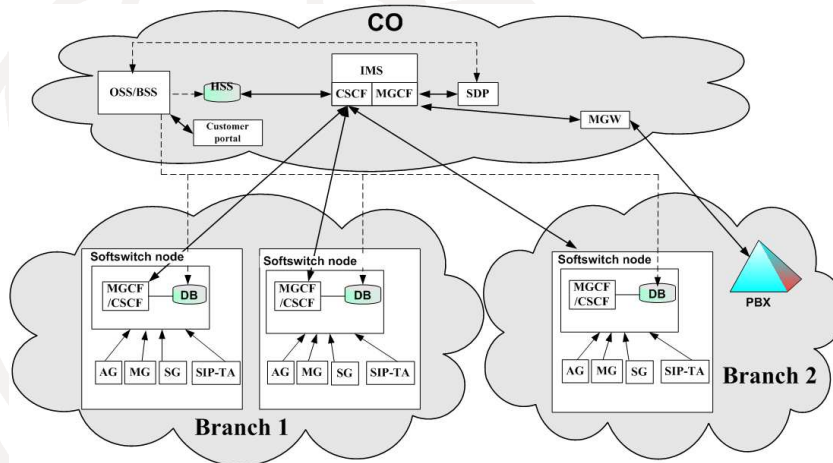
Switch level



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IMS implementation and testing on Model and operator networks

Typical migration to IMS topology (JSC Svyazinvest, Russia)



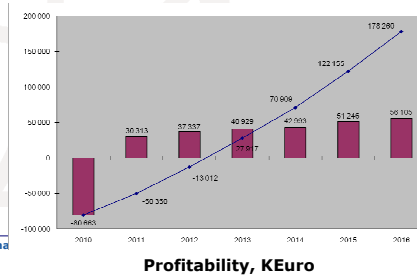
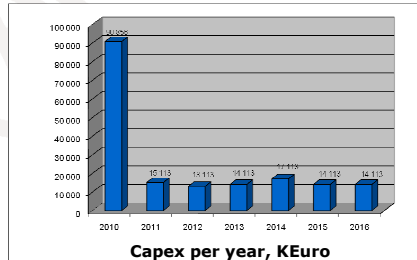
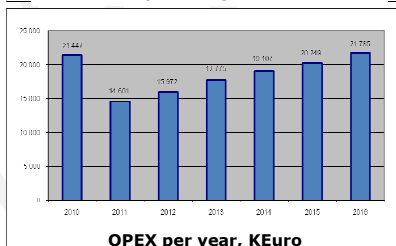
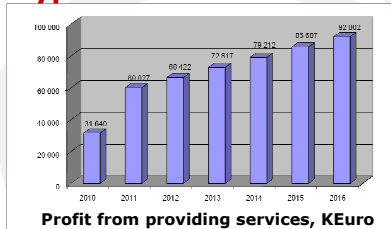
IMS implementation and testing on Model and operator networks

The set of implementing NGN services based on IMS/SDP

- ✓ **VoIP**
- ✓ **UAN and UPT (possibility to use unique number for different TE: fix line, mobile phone, SIP-phone)**
- ✓ **Customer Web-portal (customer possibility to personalize and control services through Internet access)**
- ✓ **IP-Centrex (the set of VAS for corporative customers based on IP networks)**

IMS implementation and testing on Model and operator networks

Typical business model IMS



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IMS implementation and testing on Model and operator networks

Current situation on migration to IMS (Infonetics Research)

- ✓ More than 50% ISP are going to provide in future 12-18 month the video phone services and FMC
- ✓ 80% ISP are going to migrate more part of own customer to IMS for providing basic call services
- ✓ Next two years all ISP concentrate own customers to new service packets (RCS – presence, chat, file sharing and etc.)



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IMS implementation and testing on Model and operator networks

Future telecom forecast on IMS technology (Infonetics Research)

- ✓ Profit of telecommunication service based on SDP are provided on 16 % from operators of a fixed-line telephony, and on 84 % by mobile operators
- ✓ The American ISP based on SDP earned 16 % in 2007 from a world market of services. By the end of 2010 their share has increased to 25 %
- ✓ SDP will lead to a new coil of development of the telecommunication service integrating possibilities of a telephony and the Internet
- ✓ The exist tendency - world leaders (ISP) buying small companies with own product in the SDP field with purpose of creation the advanced decisions under the big brand
- ✓ As an instance of it is recent purchase by manufacturer Motorola of company Leapstone, and BEA Oracle



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Economic aspects of the migration to IMS technology

Evaluating the effectiveness of projects is usually based on the following indicators:

- investment (capital costs)
- operating costs
- proceeds from the sale
- pre-tax profit (profit before tax)
- net profit



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Economic aspects of the migration to IMS technology

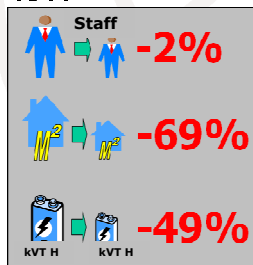
Economic indicators implementing IMS

	Payroll	Number of staff	Wages
Operators leaders	+8,9%	-18,5%	+35,2%
Operators of old Europe (EU15)	-14,8%	-28,5%	+26,1%
Operators of the new Europe (EU15)	-13,2%	-39,7%	+50,3%
All operators	-6,4%	-28,9%	+37,2%

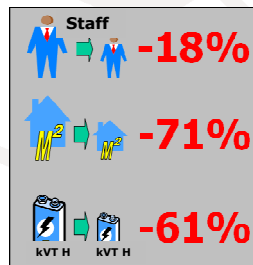
Economic aspects of the migration to IMS technology

The dynamics of changes in operating costs after upgrading the network

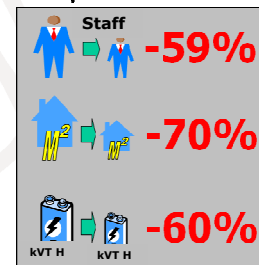
TDM



Softswitch



NGN/IMS



Remote training courses

ITU Centre of Excellence for CIS countries

Training course «IMS: technical and economic aspects of implementation»

September 2010



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