



International Telecommunication Union



Ministry of information technologies and
communications of the
Russian Federation



Central Research Telecommunication
Institute of the
Russian Federation

The Methodology for NGN Technical Means Testing (Q. 3900 and Resolution 17 of WTDC'06)

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*ITU-D/ITU-T Seminar on Standardization and Development
of Next-Generation Networks for the Arab Region*

Manama (Bahrain) 29 April - 3 May 2007



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3. Principles of NGN Testing
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7. Basic methodology of NGN testing Rec. ITU-T Q.3900
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Introduction

The NGN technical means testing requires some new approaches

The WTSA'04 (Brasilia, Florianopolis, October 2004) opened for SG 11 the new Question Q. 8/11

Some results of SG 11 activity in this direction will be presented

The WTDC'06 (Qatar, Doha, March 2006) resolves that creation of international centers for the implementation and testing of new technologies will be useful

The approach for creation such centre will be discussed

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The reasons of NGN Testing

1. Growth of the manufactured equipment nomenclature and the increase of software product share used in telecommunications technical means realization and a greater openness of the market
2. Reduction of new services development and implementation period
3. Standardization process delay from the development and implementation processes, increase of the share of corporate standard documentation
4. Testing costs increase compared to the circuit-switched networks testing as the result of a greater complexity of the equipment used

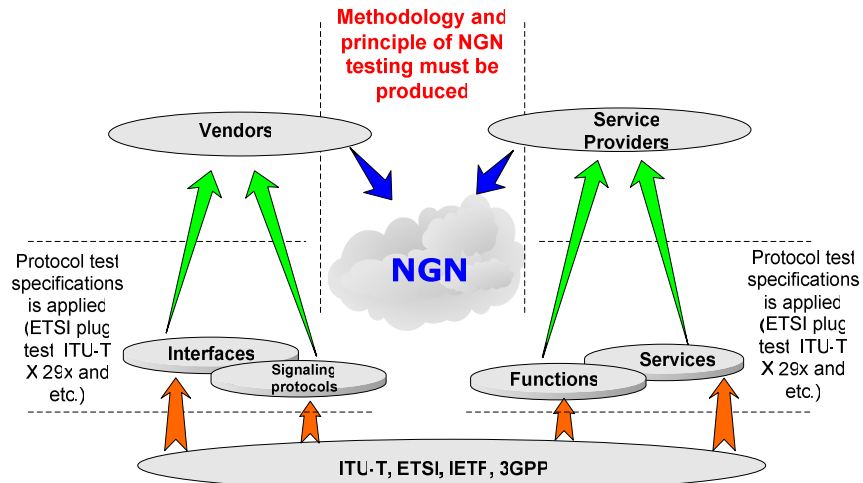
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Complex of NGN technical means testing methods will be used before realizing the NGN solutions on the real public telecommunication networks



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Principles of NGN Testing

At present the process of testing may be divided into the following stages:

- **conformance testing**
- **compatibility testing**
- **interoperability testing**

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Standardization of NGN testing

Present time

TTCN 1 (X.292-1995), TTCN 2 (X.292-1998), TTCN 3 (Z.140-2003)

TSS&TP, PICS/PIXIT proformas for different protocols testing

Goal

To develop the principle, methodology and set of tests for NGN technical means testing basis on the model network

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Network Integration/Interconnection Testing

To perform equipment interoperability tests ETSI has developed a network integral testing approach known as NIT (Network Integration/Interconnection Testing), which is detailed in standard ETSI TR 101 667. NIT comprises two types of basic tests: End-to-End tests and Node-to-Node tests.

The idea of integral testing in itself is fruitful regarding that the operator is offered to operate the equipment of high quality. However, taking into account rapid growth of new technologies and, as a consequence, an increase in equipment complexity, the integral testing performed on the operator networks is sufficiently costly and lengthy considering the arrangement of testing zones. Besides, it is hardly reasonable to use external impacts on the operating networks for test, for example, in the environment of incidental situations.

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Basic approach of NGN testing - Model Network

It seems that the methodology of integral testing may be complemented and updated by creation of model networks to perform equipment compatibility tests, followed by subsequent resource integration of the model networks to ensure full-fledged integral testing taking into account the interworking testing results

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Model network

a network which simulates the capabilities similar to those available in present telecommunication networks, has a similar architecture and functionality and uses the same telecommunication technical means

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Basic methodology of NGN testing Recommendation of ITU-T Q.3900



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Q.3900

(09/2006)

SERIES Q: SWITCHING AND SIGNALLING

**Methods of testing and model network
architecture for NGN technical means testing as
applied to public telecommunication networks**

CAUTION!

PREPUBLISHED RECOMMENDATION

This publication is an unedited version of a recently approved Recommendation. It will be replaced by the published version after editing. Therefore, there will be differences between this publication and the published version.

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Classification of NGN Technical Means to be tested.

- Call Session Control System
 - Media Gateway Controller (MGC)
 - Proxy Server SIP (PS)
 - IP Multimedia Subsystem (IMS)
- Voice and signaling transmit system
 - Media Gateway (GW)
 - Signaling Gateway (SG)
 - Transport Network Environment (TNE)
- Application servers
 - Application Server (AS)
 - Media server (MS)
 - Messaging Server (MeS)
- Management and billing system
 - Management System (MS)
 - Billing system (BS)
- Access Environment
 - NGN Integrated Access Devices (NGN-IAD)
 - Media gateway for Legacy Terminal Equipment (GW-LTE)

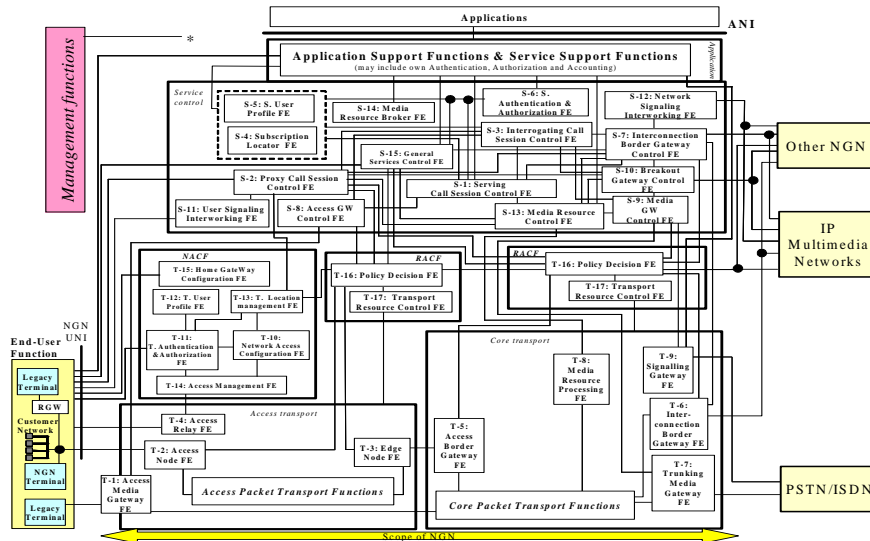
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NGN functional architecture Recommendation of ITU-T Y.2012



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Conformance of NGN Functions to NGN Technical Means to be tested

NGN Technical means	NGN Functionality
Call Session Control System	
Media Gateway Controller (MGC)	S3, S7, S9, S10, S12 T10, T11, T12, T13
Proxy Server SIP (PS)	S2, S3, S7, S11, S12 T10, T11, T12, T13
IP Multimedia Subsystem (IMS)	S1, S3, S6, S7, S8, S10, S12, S13 T10, T11, T12, T13, T14, T15, T16, T17
Voice and signaling transmit system	
Media Gateway (GW)	T7, T8
Signaling Gateway (SG)	T8, T9
Transport Network Environment (TNE)	T5, T6, T8
Application servers	
Application Server (AS)	S4, S5, S6, S14, S15
Media server (MS)	S4, S5, S6, S14, S15
Messaging Server (MeS)	S4, S5, S6, S14, S15
Management and billing system	
Management System (MS)	- error processing management - equipment configuration management
Billing system (BS)	- billing system management - service management - security management
Access Environment	
NGN Integrated Access Devices (NGN-AD)	T2, T4, T3, T5, T15, T14
Media gateway for Legacy Terminal Equipment (GW-LTE)	T1, T2, T3, T4, T5

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Testing process architecture

NGN TM local testing

- Functional testing
- Load&Stress testing
- Conformance testing

Network Under Test (NUT)

- Functional testing
- Interconnect testing
- Services testing
- Ent-to-End testing
- QoS testing
- Mobility&Roaming testing

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NGN TM local testing

- Level 1.1 – Functional testing**
- Level 1.2 – Load&Stress testing**
- Level 1.3 – Conformance testing**

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NUT Testing

- Level 2.1 – Testing of functionality implemented at NUT (NUT functionality testing)**
- Level 2.2 – Interconnect testing**
- Level 2.3 – Service testing at NUT**
- Level 2.4 – End-to-end testing**
- Level 2.5 – QoS testing**
- Level 2.6 – Mobility&roaming testing at NUT**

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Model Network



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Types of model networks

A dedicated model network is a fragment of the public telecommunication network which is not connected to other model networks. The dedicated model network can be connected to a public telecommunication network and/or corporate network. Dedicated model networks are used to perform testing for compatibility and, if possible, for interaction with the technical means employed prior to the NGN development period, which may be part of the model network.

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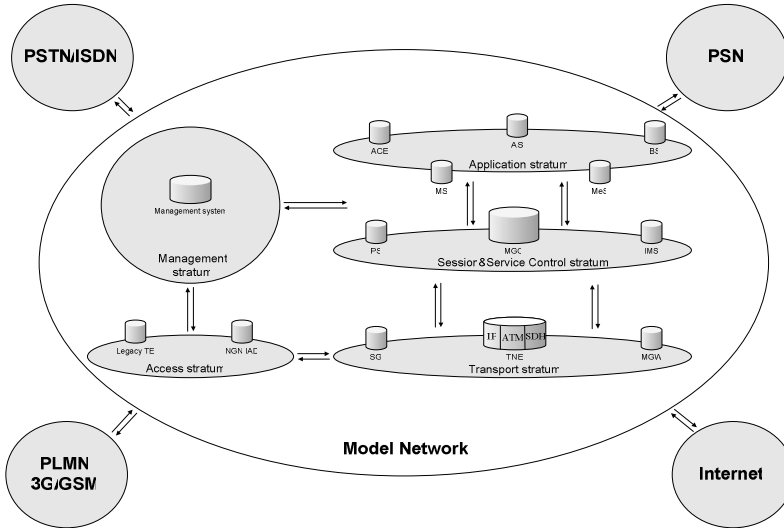


Types of model networks

A distributed model network is composed of several model networks, two as a minimum, interconnected via communication channels and through an Intranet network set up, as a rule, on their basis. The distributed model networks can also be connected to public telecommunication networks and/or corporate networks. The distributed model networks are used to perform complex tests for compatibility and interworking as well as to check quality of service parameters, information security requirements and interworking with the technical means employed prior to the NGN development period.

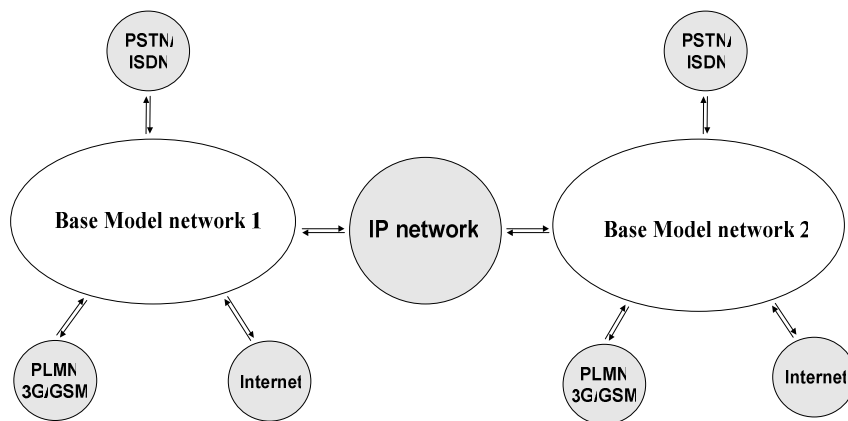
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Basic architecture of a dedicated model network



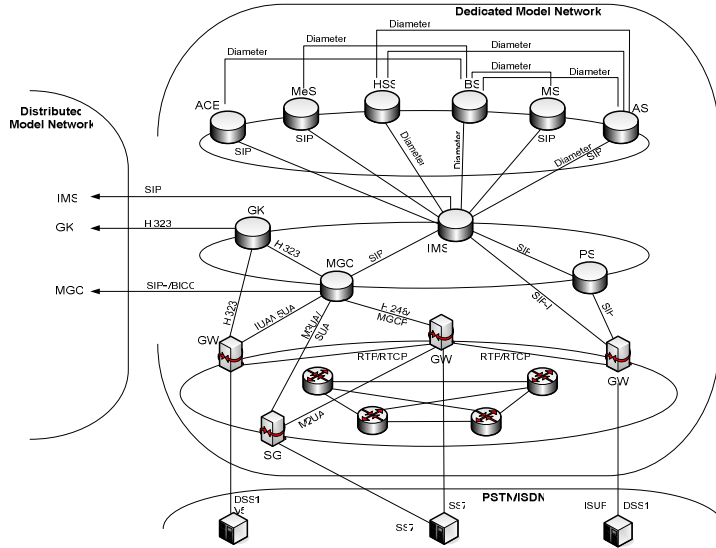
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The architecture of a distributed model network



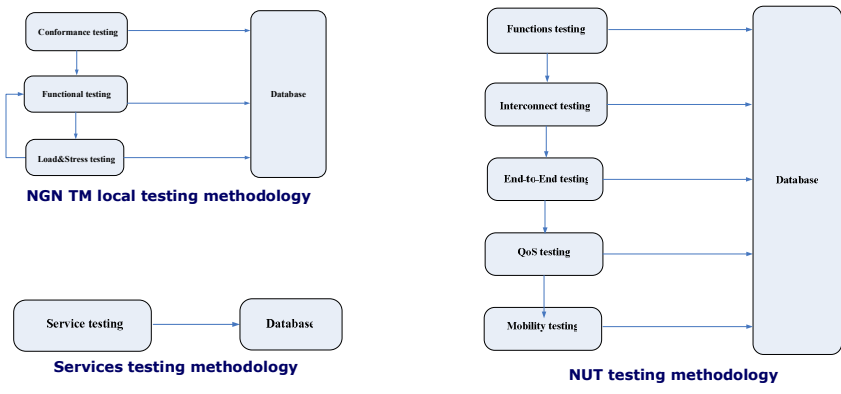
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Model Network configuration



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Methodology of Model Networks testing



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Regional model network

Although creation of model networks appears to be a promising testing method, not all countries are in a position to implement them to the necessary extent desired

Hence, it is reasonable to create regional model networks whose resources could be employed for testing by various countries located in the given region

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Resolution 17 (Rev.Doha, 2006)

Implementation of regionally approved initiatives at the national, regional, interregional and global levels

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CIS regional initiatives

Creation of international centers for the implementation and testing of new technologies

Objectives

To test telecommunication equipment and services; harmonize methods for the provision of new services within a region; harmonize the introduction in one or more regions of telecommunication standards issued by different international organizations; resolve system/network issues associated with the modernization of communication networks, taking account of previous communication network development experience within a given region

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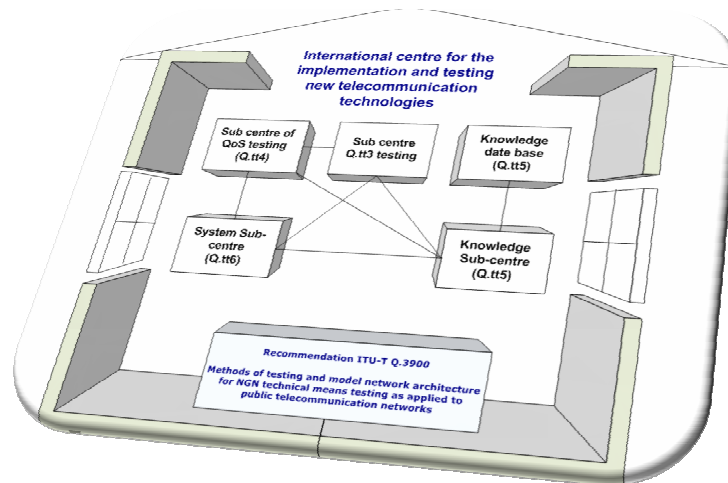
Expected results

- ✓ Standard alternatives for the transition to multiservice networks for networks at different levels of development at the time of elaboration of the recommendations
- ✓ Creation of model networks and a knowledge base on the testing of modern equipment and services
- ✓ Provision of access to the knowledge base and model networks to interested telecommunication administrations and operators
- ✓ Uniform (harmonized) provision of new services within the region
- ✓ Future harmonized functioning of multimode terminals throughout the region's telecommunication landscape
- ✓ Creation of a knowledge base on the standards issued by different international organizations and of recommendations for their application, with a view to achieving the uniform (harmonized)
- ✓ Introduction of standards within the region; prevention of packet disruption between a region's
- ✓ Communication networks through optimized network planning and construction, taking account of previous communication network development experience within the region

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The structure of International centre for the implementation and testing of new technologies



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Conclusions

1. The Model networks is a prototype of present public telecommunication networks based on NGN equipment. By means of Model networks, in order to identify the specific features of the tested equipment's functioning and compatibility, it is possible to perform equipment testing under load and stress, which is of higher quality and objectivity.

Model networks can be used for testing the full list of NGN technical means.

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Conclusions

2. Depending upon their configuration and sphere of application the model networks can be also used for checking:

- Quality of service parameters;
- Information security requirements;
- Interworking with the technical means employed prior to the NGN period.

Conclusions

3. The International centres for the implementation and testing of new technologies could be base for public network modernization to NGN



Thank you for your attention



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