ITU WORKSHOP ON NGN CONFORMITY AND INTEROPERABILITY TESTING CENTRE (S) FOR THE AFRICA REGION

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The global of testing approach in ITU

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Features of NGN implementation

- Increase in the number of manufacturers due to increased share of software in implementing the technical means of telecommunication
- Reducing the period of the development and introduction of new technologies and services
- lag standardization process from the process of development and implementation, increase the share of corporate regulatory documents
- The increasing complexity of the compatibility problems of equipment from different manufacturers

Conformance testing on the model networks

Features of NGN implementation

- Testing procedure play an important role
- Changing the testing methodology – creation Model network – as common measurement instrument
- Centralization and cooperative activities in the analysis and evaluation of different solutions

(Knowledge DataBase)

Conformance testing on the model networks

The approach of NGN testing

- **Functional Interop. testing** – verification the functionality on TM (EUT) and system-network solutions (NUT) different vendors for compatibility in accordance with basic ITU-T Recs.
- **Service testing** – testing the services on "end-to-end" scenarios including call flow testing and testing with existent provider's operation systems (Billing, OSS/BSS and etc.)
- **QoS testing** – testing the QoS parameters and RACF functionality

Conformance testing on the model networks

Current situation in testing standardization area in ITU-T

- **Present time**

Conformance testing which includes protocols and interfaces testing ***(TTCN 1 (X.292-1995), TTCN 2 (X.292-1998), TTCN 3 (Z.140-2003)***

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

- **Future**

NGN based on the functional entity which interworks using some protocols

Interoperability testing

(Q.3901 for NGN, Q.3904 for IMS)

NGN testing methods

- **Conformance testing or type testing**
  - The purpose of conformance testing is to determine to what extent a single implementation of a particular standard conforms to the individual requirements of that standard

- **Interoperability testing**
  - Interoperability testing is the activity of proving that end-to-end functionality between (at least) two communicating systems is as required by those base systems' standards

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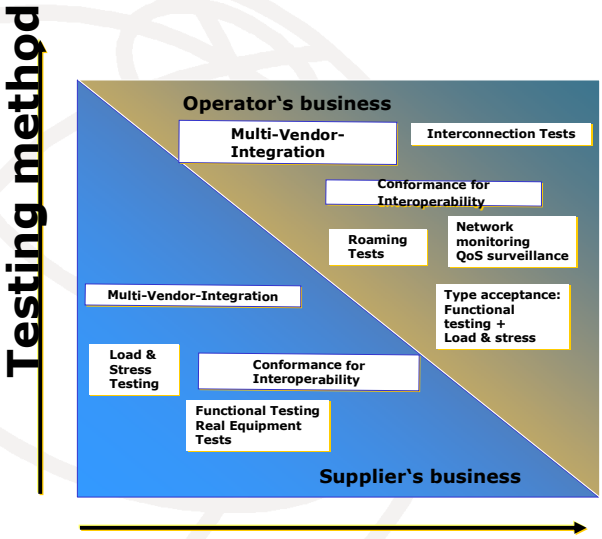
*Note: Martin Brand, Test creation principles, International training seminar 'Testing of System and Network Solutions' ZNIIS, Moscow December 10-11 2009

Conformance testing on the model networks

NGN - Interoperability testing methods

- Network Integration Tests/End-to-End Tests
- Benchmark/Load Tests
- QoS Tests
- Security Tests
- Roaming Tests
- Interconnection Tests
- Functional tests/Real Equipment Tests

Interoperability Testing



Combining Interoperability and Conformance Testing

- **Conformance and Interoperability**
  - both important and useful approaches to the testing of standardized protocol implementations
  - although it is unlikely that one will ever fully replace the other
- **Conformance testing**
  - able to show that a particular system complies with all of the protocol requirements specified in the associated base standard
  - the different Vendors similar systems which is tested on conformance could not be guarantee to be compatible

Combining Interoperability and Conformance Testing

- **Interoperability testing**
  - can clearly demonstrate that two systems will interact and provide the specified end-to-end functions
  - the different Vendors similar systems which is tested on interoperability could not be guarantee that the interact protocol is realized on the associated base standard

ITU-T Rec. Q.3900 as a global approach of testing

Purpose – determination of the Model network as a basic solution for NGN testing

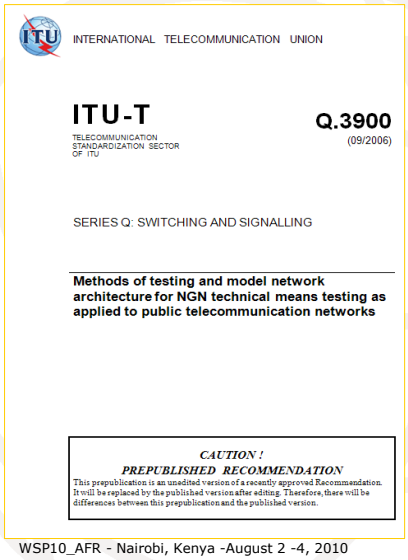
Model network – a network which simulates the capabilities similar to those available in present telecommunication networks, has a similar architecture and functionality and uses the same telecommunication equipment

Contents of Q.3900

- Classification of NGN TM regarding the NGN functionality (Y.2012)
- Determination of testing procedures
- Requirements to the Model network

Model networks for conformance testing

Basic Methodology of NGN testing. ITU-T Recommendation Q.3900 (09/2006)



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION STANDARDIZATION SECTOR OF ITU

Q.3900

(09/2006)

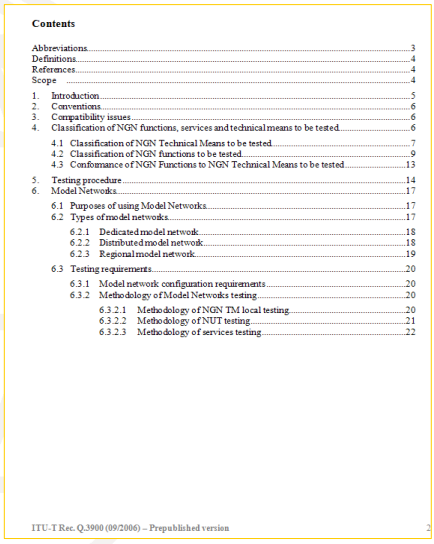
SERIES Q: SWITCHING AND SIGNALLING

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

CAUTION !

PREPUBLISHED RECOMMENDATION

This prepublication 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 prepublication and the published version.



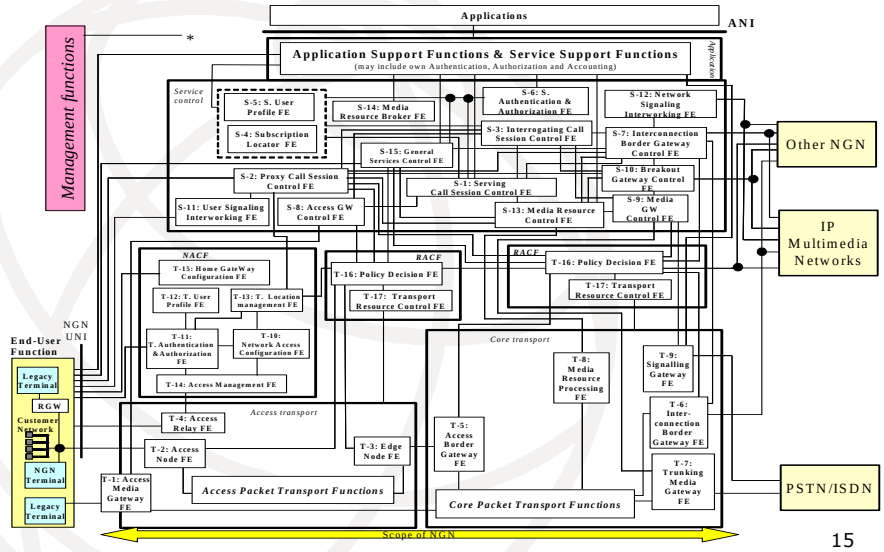
Contents

ITU-T Rec. Q.3900 (09/2006) – Prepublished version

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)

NGN functional architecture Recommendation of ITU-T Y.2012

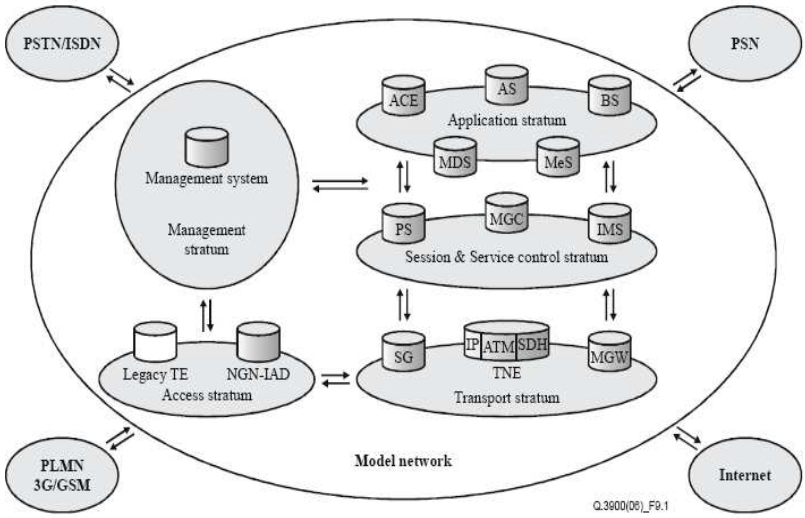


Conformance of NGN Functions to NGN Technical Means to be tested

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) Billing system (BS)	- error processing management - equipment configuration management - 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

Model networks for conformance testing

Architecture of model network

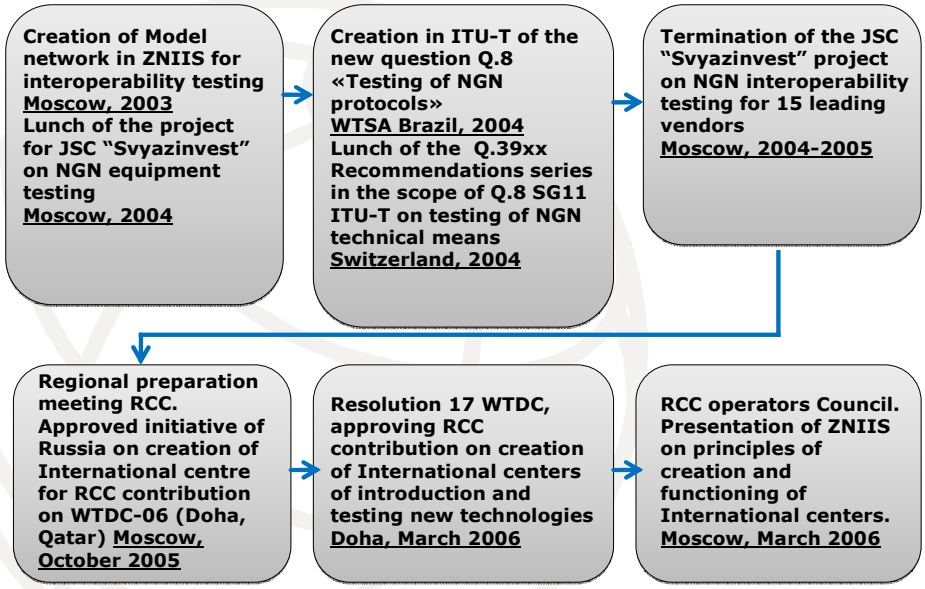


Project for regional Testing Centre

Joint project ITU-ZNIIS ITTC

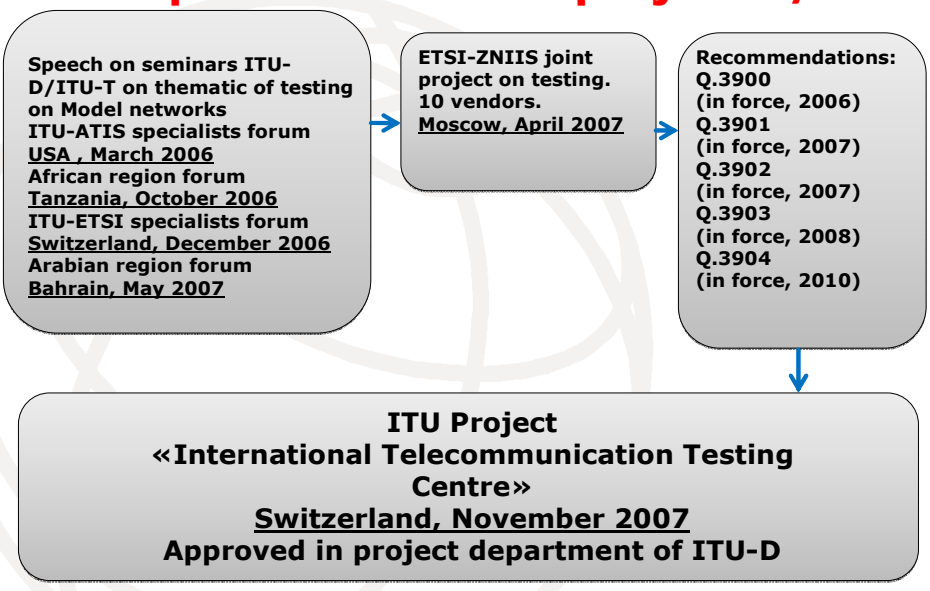
Project for regional Testing Centre

Preparation of ITTC project 1/2



Project for regional Testing Centre

Preparation of ITTC project 2/2



Project for regional Testing Centre

ITTC project

International Telecommunication Union
Telecommunication Development Bureau

Central scientific-research Institute of Communication (ZNIIS)
Russian Federation

Project Title:	International Telecommunication Union – Central Science Research Telecommunication Institute International Telecommunication Testing Centre
Shot project name:	ITTC ITU-ZNIIS
Start data:	January 2008
Deadline:	June 2011
Government agencies, attracted to work:	Administration and the Ministry of Communications
Agency implementing the project :	International Telecommunication Union
Project location:	ITU Regional Representative Office in Moscow
Countries in whose favor a project:	CIS and other developing countries

Project for regional Testing Centre

Project description

In this project, the **ITU** and **ZNIIS** start to cooperate for creation of the **International Telecommunication Testing Centre (ITTC)**, operating in an environment of new technologies, and training for professionals from developing countries in the field of telecommunications. Methodical testing of next-generation networks (NGNs), in particular, planning realized in ITTC through the creation of a model network, through which enables simulation of various network parameters and use a variety manufacturers equipments. The results of these tests will be documented and disseminated.

This project is developed in strict accordance with the recommendations of the 2006 Qatar World Telecommunication Development Conference (WTDC), establishing the International Centre for NGN Testing.

The project purpose

- **Education to test and introduce new technologies for RCC and the developing countries specialists (3 workshops, 3 methodical course of training)**
- **Methodical equipment testing on a model network for RCC and developing countries**

Expected results

- Knowledge DataBase in according with of Q.3903 ITU-T recommendation
- Testing manuals
- Methodology for NGN testing
- New technologies introduction examples on the operators network
- Results archive of technology and communication services testing

Current results

- International Seminar on the system-network solutions testing with the participation of specialists in 10 RCC countries and Europe professionals (November 2008)
- The test methodologies for system-network solutions testing (Softswitch, IMS, Wireline Broad Band Access) (March 2009)
- Functionality and interconnection testing of system-network solutions of different vendors, installed on a model network (test results in agreement with the vendors will be provided in the ITU, in a centralized ITU database). Conducted a training course to the principles of NGN testing (June 2009)
- International Seminar "Testing for compliance with international standards" with the participation of specialists in 10 RCC countries, the ITU administration , ITU-T developers and experts from leading European operators (DT, AT). Designed and launched the first version of the Knowledge Base. At the moment Knowledge Base is filled (November 2009)

Project for regional Testing Centre

Planning events

- Testing QoS parameters for different network solutions and equipment from different vendors (November - December 2010)
- Develop training materials to ensure QoS testing (November 2010)
- International Workshop on the results of QoS testing (February 2011)
- Final version of the Knowledge Base in accordance with the existing ITU-T recommendation Q.3903 (April 2011)
- International Workshop on the testing results of the ITTC project (July 2011)

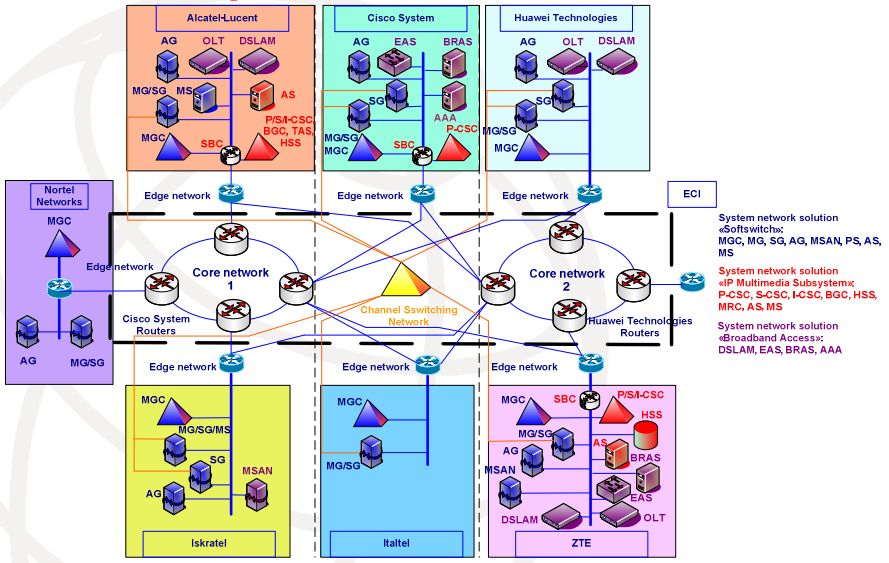
The common directions of the ITTC development

- **Development of recommendations on telecommunications development strategy with national strategies for RCC operators networks**
- **Develop standards for system-network solutions, protocols and services for operators of RCC operators networks**
- **Develop recommendations to ensure quality of service and principles of formation of service level agreements on RCC operators networks**
- **Research of NGN Information Security for RCC operators**

Main ITTC activities

- Joint research
- Provision of model network and knowledge base resources for testing
- Development of analytical reports
- Organization of seminars
- Development of contribution, generalizing and systematizing ITTC experience
- Testing for compliance with standards
- Realized of projects on issues of equipment interoperability
- Assistance in the formation of technical policy
- Accompanying the introduction of new technologies
- Development of basic requirements for equipment
- Development of Service Level Agreement
- Works on adapting equipment
- Consultations on the issue of terms of use of equipment
- Analysis and recommendations on the interaction of equipment from different manufacturers

ITTC practical Model network



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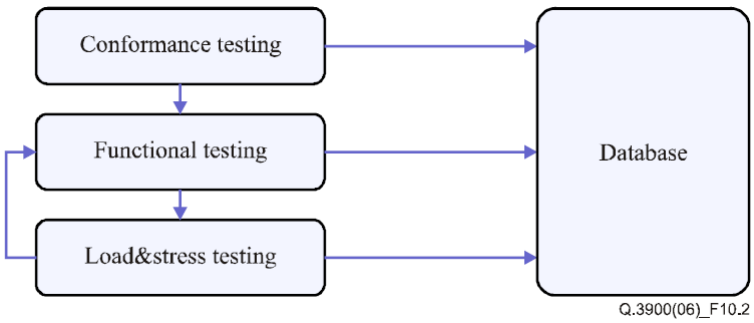
Physical Architecture Model of Communication Network

- linearly cabling infrastructure
- optical transport infrastructure based on xWDM and SDH technology
- transport infrastructure based on IP/MPLS packet-switched
- infrastructure subscriber access, including: MSAN, xPON, xDSL, FTTx, WiFi, WiMax, Ethernet
- Infrastructure of gateways and switched controls
- infrastructure of application servers
- infrastructure support systems, operations and business (OSS / BSS)
- infrastructure of terminal equipment, including wired and wireless types of terminal endings
- infrastructure of remote access, including specialized mobile workplaces
- infrastructure of centralized database of test results, including the storage, processing and reporting
- infrastructure network providing operational processes MN

The composition of the measuring equipment MN

- computer-aided testing specialized software based on **TTCN-3** scripts that implement the generated test procedures for compliance with local and international standards and recommendations
- generation system invariant payload (telephone networks, data networks and supplementary telecommunications services)
- system emulation network fragments (virtual hardware) emulation scenarios passes network traffic data
- system testing parameters and procedures for quality management services, including the possibility of generating traffic
- transmission and analysis of knowingly incorrect messages

Formalization and availability of testing results



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ITU-T Recommendation Q.3903

FORMAT REPRESENTAVE TESTING RESULTS

INTERNATIONAL TELECOMMUNICATION UNION

ITU-T Series Q.3903
STANDARDIZATION SECTOR

SERIES Q: SWITCHING AND SIGNALLING

Recommendation ITU-T Q.3903
FORMALIZED PRESENTATION OF TESTING RESULTS

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Virtual repository

- **Possibility for creation of dedicated area with restricted access to Knowledge Database for storing of different information of Administrations and operators (methodologies, testing reports, network schemes, normative documents and etc.)**
- **Existence of virtual constructor of testing methodic, for development of these documents in the automatic mode using powerful set of libraries of tests of functionalities, conformance and interworking of different technical means, system and network solutions, protocols and services of NGN**
- **Collection and distribution of testing results in the worldwide mode**

Resume on implementing ITTC activities

Reducing of digital gap by sharing experience of introduction and maintenance of new technologies, implemented on the operators networks from developed countries, on the worldwide telecommunication market

Using ITTC as the effective mean of gathering experience and consolidation of high-level specialists and experts in the field of introductions, testing, standardization and maintenance of new telecommunication technologies

Performance of regional initiatives and private initiative projects for network operators in part of development qualifying standards, which determine entire approaches and rules in part of introduction of new technologies on the operator networks

Thank you for attention

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