Ministry of information technologies and communications of the Russian Federation

Central Research Telecommunication Institute of the Russian Federation

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

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International Telecommunication Union

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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 centres 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 NGN technical means testing overview.

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.

Stages of testing.

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

- testing for conformance;
- testing for interoperability.

Equipment testing for the conformance of protocols and interfaces to the international standards is performed as a rule in the factory environment; whereas, for the purposes of compatibility and interworking testing the telecommunications operators' networks are used.

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.

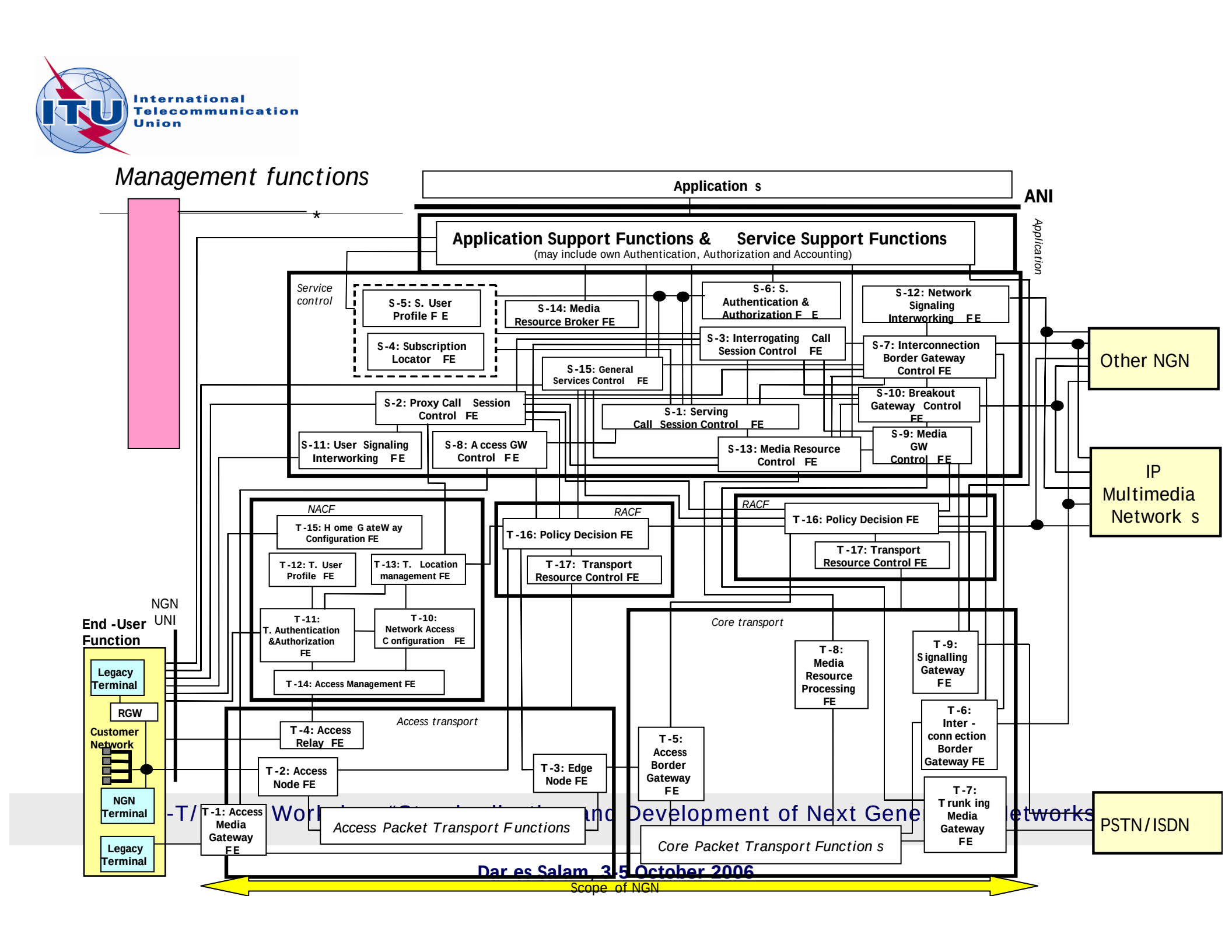
Model network as a possibility approach.

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.

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)


Management functions
Application s
ANI
Application
Application Support Functions & Service Support Functions
(may include own Authentication, Authorization and Accounting)
Service control
S-5: S. User Profile F E
S-4: Subscription Locator FE
S-14: Media Resource Broker FE
S-6: S. Authentication & Authorization F E
S-3: Interrogating Call Session Control FE
S-12: Network Signaling Interworking FE
S-7: Interconnection Border Gateway Control FE
S-15: General Services Control FE
S-10: Breakout Gateway Control FE
S-2: Proxy Call Session Control FE
S-1: Serving Call Session Control FE
S-11: User Signaling Interworking FE
S-8: A ccess GW Control FE
S-13: Media Resource Control FE
S-9: Media GW Control FE
Other NGN
IP Multimedia Network s
NACF
T-15: H ome G ateW ay Configuration FE
T-12: T. User Profile FE
T-13: T. Location management FE
T-11: T. Authentication &Authorization FE
T-10: Network Access C onfiguration FE
T-14: Access Management FE
RACF
T-16: Policy Decision FE
T-17: Transport Resource Control FE
RACF
T-16: Policy Decision FE
T-17: Transport Resource Control FE
NGN UNI
End -User Function
Legacy Terminal
RGW
Customer Network
NGN Terminal
Legacy Terminal
Access transport
T-4: Access Relay FE
T-2: Access Node FE
T-3: Edge Node FE
T-1: Access Media Gateway FE
Core transport
T-8: Media Resource Processing FE
T-9: Signalling Gateway FE
T-6: Inter - conn ection Border Gateway FE
T-5: Access Border Gateway FE
T-7: T runk ing Media Gateway FE
PSTN/ISDN
Access Packet Transport Functions
Core Packet Transport Function s
Scope of NGN

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

Testing procedure.

Level 1 NGN TM local testing
1.1 Functional testing
1.2 Load&Stress testing
1.3 Conformance testing

Level 2 NUT testing
2.1 Functional testing
2.2 Interconnect testing
2.3 Service testing
2.4 End-to-End testing
2.5 QoS testing
2.6 Mobility & Roaming testing

NGN TM local testing.

Level 1.1 — Functional testing

Level 1.2 — Load&Stress testing

Level 1.3 — Conformance testing

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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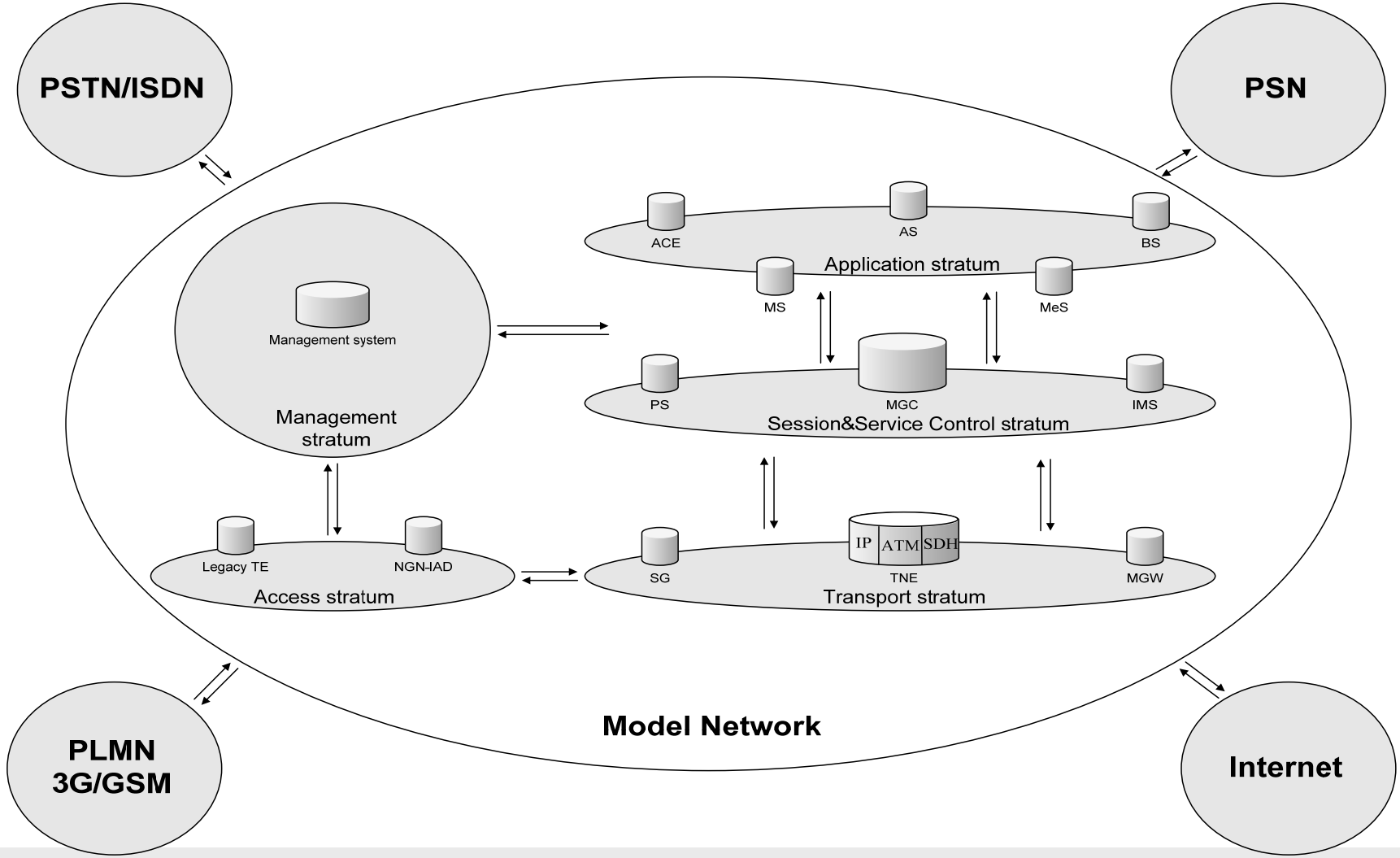
Types of model networks.

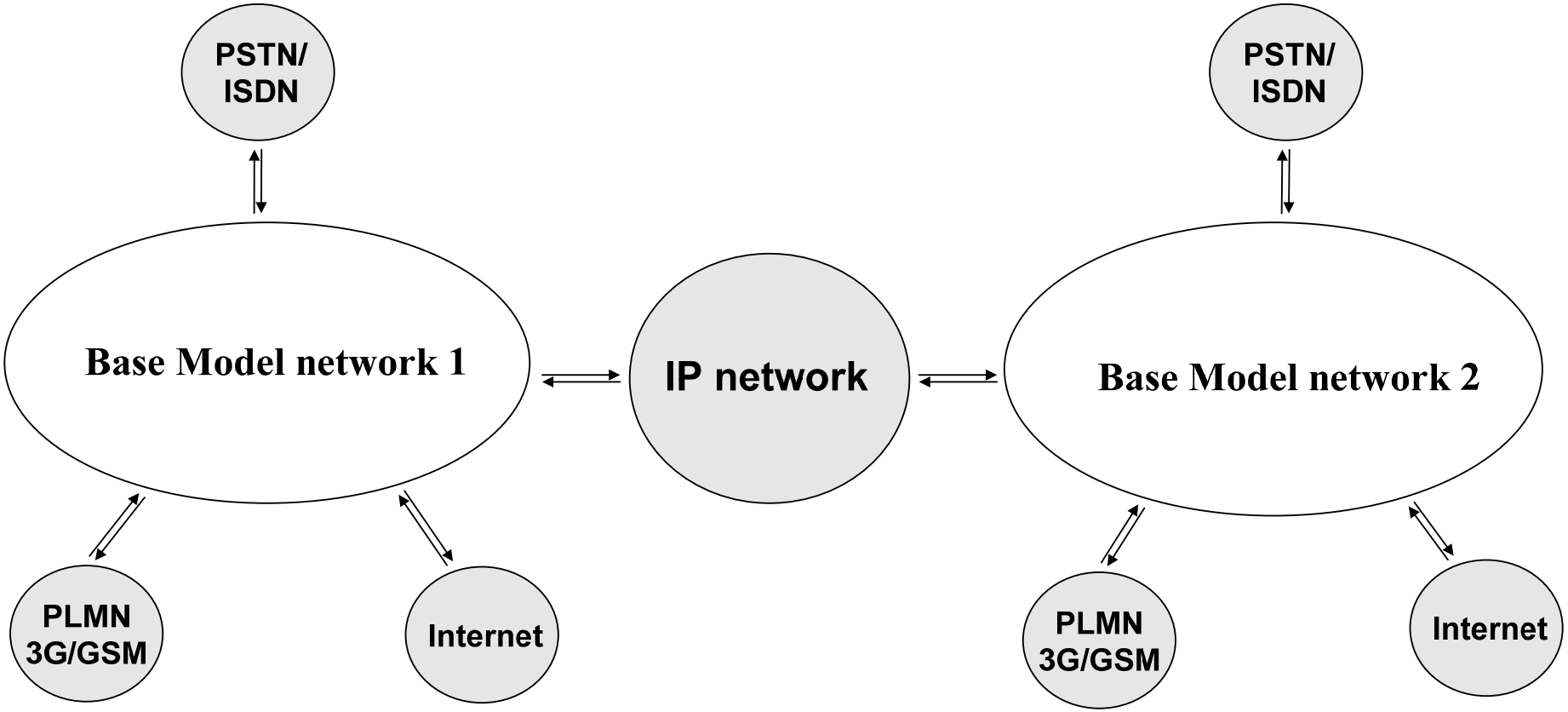
A dedicated model network is a fragment of the public telecommunication network which is not connected to other model networks. The dedicated model network can be connected to a public telecommunication network and/or corporate network. Dedicated model networks are used to perform testing for compatibility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

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.

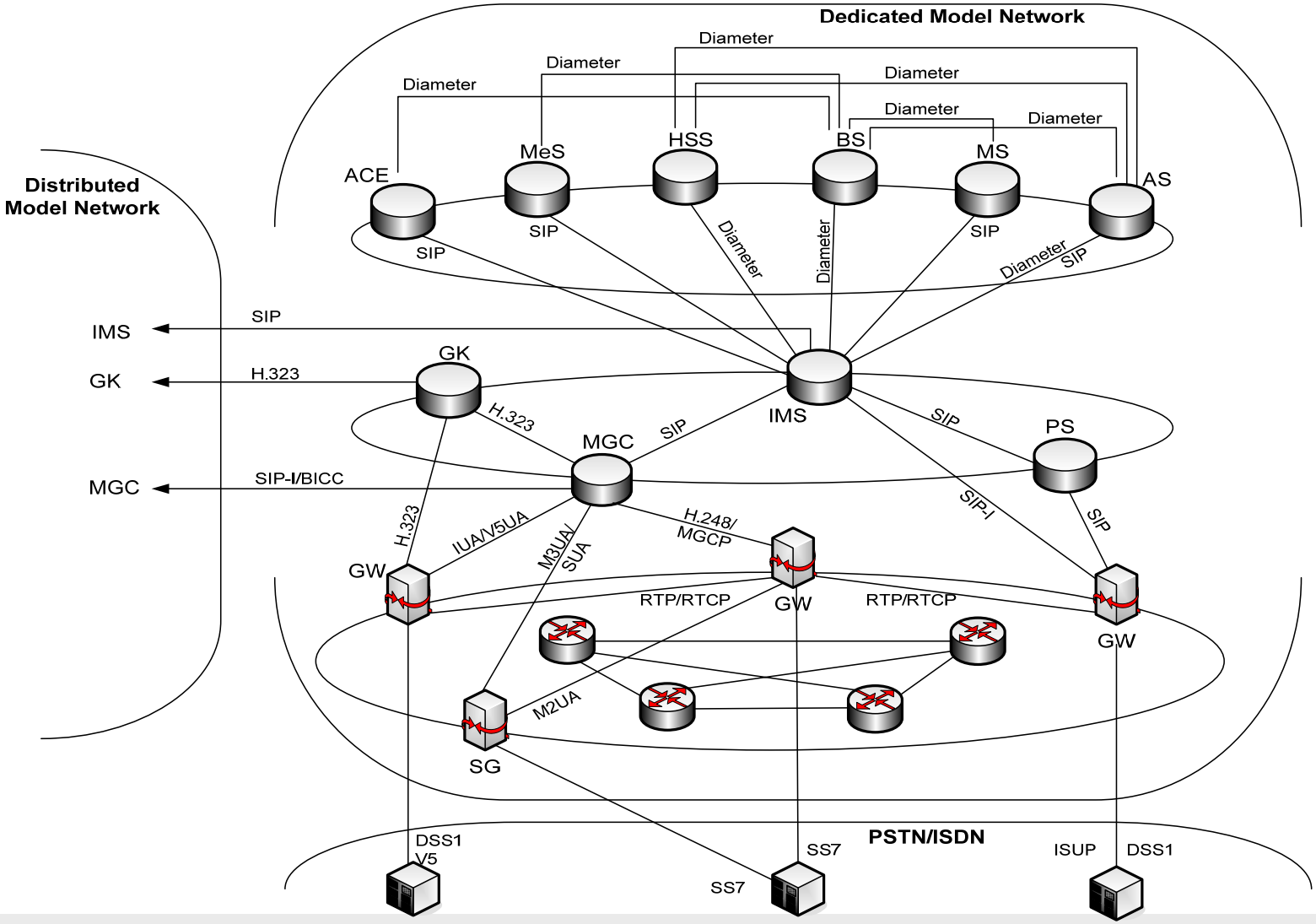
Basic architecture of a dedicated model network.



The architecture of a distributed model network.



Model Network configuration.



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 regionaly approved initiatives at the national, regional, interregional and global levels

CIS regional initiatives.

Creation of international centres 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.

Expected results

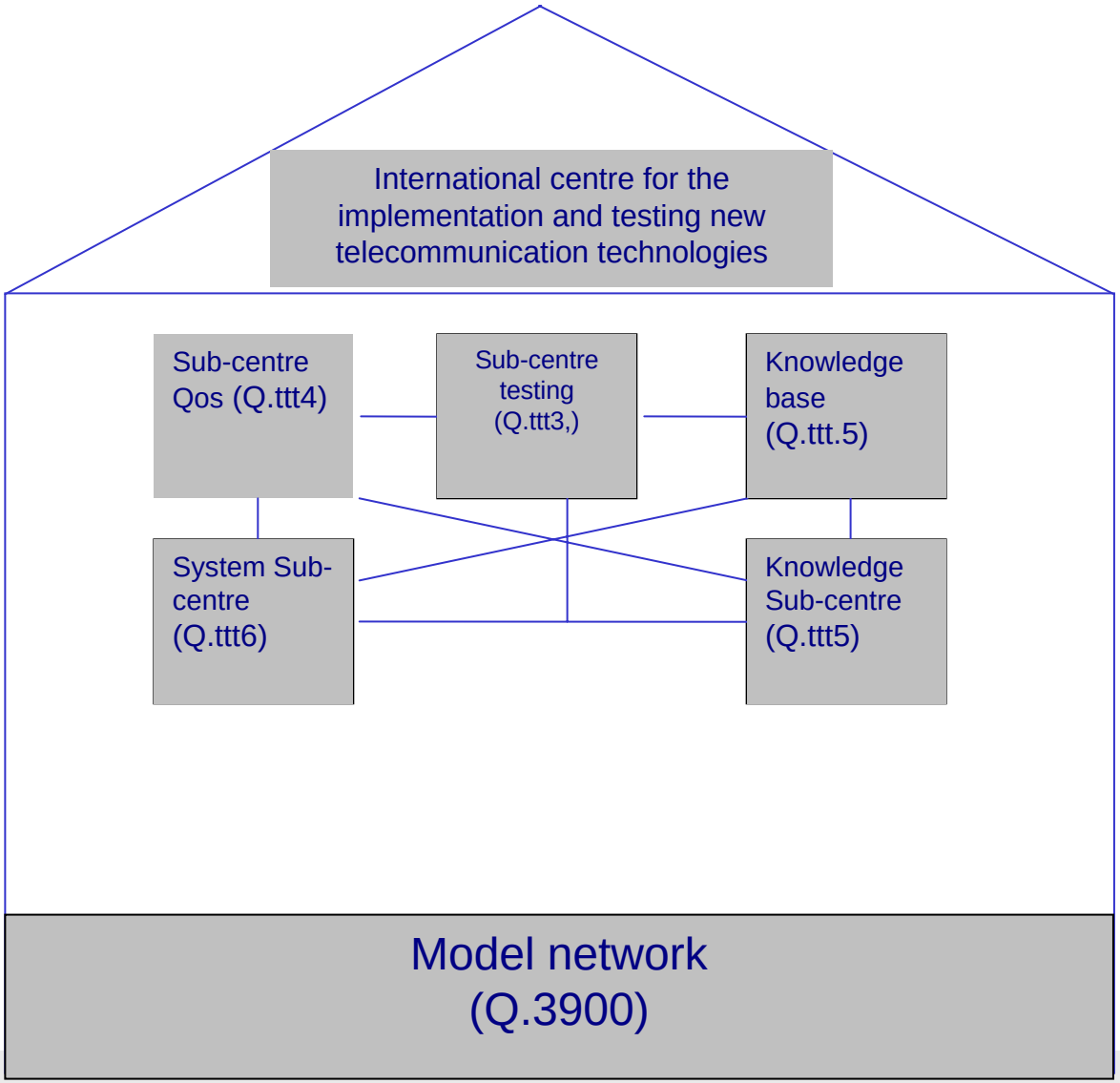
Standard alternatives for the transition to multiservice networks for networks at different levels of development at the time of elaboration of the recommendations; creation of model networks and a knowledge base on the testing of modern equipment and services; provision of access to the knowledge base 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.

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



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.

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.

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