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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN –
Testing for NGN networks

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

ITU-T Recommendation Q.3900

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ITU-T Recommendation Q.3900

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

Summary

ITU-T Recommendation Q.3900 describes the main approaches to NGN solutions and technical means testing. This Recommendation gives the basic principles of NGN testing based on model networks and includes the basic methodology of testing and the common architectures of model networks.

Source

ITU-T Recommendation Q.3900 was approved on 29 September 2006 by ITU-T Study Group 11 (2005-2008) under the ITU-T Recommendation A.8 procedure.

Keywords

Model networks, next generation networks, NGN, PSTN, technical means, testing.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Introduction

In the environments of public telecommunication networks conversion from digital circuit-switched to packet switching networks, apart from the aspects regarding networking architecture, quality of service, network management, etc., the issues of NGN equipment testing become of primary importance in respect of both compatibility testing of various vendors' NGN equipment and compatibility testing of new services with the existing ones in the process of NGN equipment operation.

All these is due to:

- 1) the 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) the reduction of new services development and implementation period.

The negative aspects, however, which influence faster introduction of developments are:

- 1) the standardization process delay from the development and implementation processes, increase of the share of corporate standard documentation;
- 2) the testing costs increase compared to the circuit-switched networks testing as the result of a greater complexity of the equipment used.

Taking into consideration the above, it is reasonable to use model networks for the NGN equipment testing and, in the first place, for testing of new protocols as the most complicated elements of NGN.

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

- Testing for conformance;
- Testing for interoperability.

A great amount of standards for testing has been developed by ETSI. The most significant achievements (or contributions) include the specifications for testing methods using TTCN, those on the capabilities of SDL, and those on general testing principles for conformance to ETSI standards.

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

To perform equipment interoperability tests, ETSI has developed a network integral testing approach known as NIT (Network Integration/Interconnection Testing), which is detailed in [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 since the operator should be offered equipment of high quality. However, taking into account rapid growth of new technologies and, as a consequence, the increase in equipment complexity, integral testing performed on operator networks is quite costly and lengthy in view of the arrangement of testing zones. Besides, it would not be reasonable to wait for external events like incidents affecting the operator networks in order to test them.

It seems that the methodology of integral testing may be complemented and updated by the 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.

ITU-T Recommendation Q.3900

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

1 Scope

This Recommendation assumes conformance with the functionality and purpose defined in [ITU-T Y.2001] and [ITU-T Y.2011]. While it defines a network structure to which the testing requirements can be related, it also defines general principles which hold independently of details which may change with further work. Further Recommendations extend these principles into a detailed testing methodology.

Administrations may require operators and service providers to take into account national regulatory and national policy requirements in implementing this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T X.295] ITU-T Recommendation X.295 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Protocol profile test specification.*
- [ITU-T Y.1540] ITU-T Recommendation Y.1540 (2002), *Internet protocol data communication service – IP packet transfer and availability performance parameters.*
- [ITU-T Y.1541] ITU-T Recommendation Y.1541 (2006), *Network performance objectives for IP-based services.*
- [ITU-T Y.2001] ITU-T Recommendation Y.2001 (2004), *General overview of NGN.*
- [ITU-T Y.2011] ITU-T Recommendation Y.2011 (2004), *General principles and general reference model for Next Generation Networks.*
- [ITU-T Y.2012] ITU-T Recommendation Y.2012 (2006), *Functional requirements and architecture of the NGN release 1.*
- [ITU-T Y.2111] ITU-T Recommendation Y.2111 (2006), *Resource and admission control functions in Next Generation Networks.*
- [ITU-T Y.2201] ITU-T Recommendation Y.2201 (2007), *NGN release 1 requirements.*
- [ETSI TR 101 667] ETSI TR 101 667 (1999), *Methods for Testing and Specification (MTS); Network Integration Testing (NIT); Interconnection; Reasons and goals for a global service testing approach.*

[ETSI TS 102 237-1] ETSI TS 102 237-1 (2003), *Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Interoperability test methods and approaches; Part 1: Generic approach to interoperability testing.*

3 Definitions

This Recommendation defines the following terms:

3.1 model network: 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.

3.2 NGN technical means: The NGN basic equipment which serves as a basis for building new generation network solutions, including for application in public telecommunication networks.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

3G	Third Generation
ANI	Application Network Interface
AS	Application Server
ASN	Abstract Syntax Notation
ATM	Asynchronous Transfer Mode
ATS	Abstract Test Suite
BICC	Bearer Independent Call Control
BS	Billing System
CMIP	Common Management Information Protocol
CORBA IDL	Common Object Request Broker Architecture Interface Definition Language
DSS 1	Digital Subscriber System No. 1
DTMF	Dual Tone Multifrequency
FE	Functional Entities
FTAM	File Transfer Access Management
FTP	File Transfer Protocol
GDMO	Guidelines for the Definition of Managed Objects
GK	Gatekeeper
GSM	Global System for Mobile communications
GW	Gateway
GW-LTE	Media Gateway for Legacy Terminal Equipment
HSS	Home Subscriber System
IIOP	Internet Inter-Orb protocol
IMS	IP Multimedia Subsystem

