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SERIES Q: SWITCHING AND SIGNALLING

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

Testing topology for networks and services based on NGN technical means

Recommendation ITU-T Q.3901

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4, 5, 6, R1 AND R2	Q.120–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.799
Q3 INTERFACE	Q.800–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	Q.1200–Q.1699
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2000	Q.1700–Q.1799
SPECIFICATIONS OF SIGNALLING RELATED TO BEARER INDEPENDENT CALL CONTROL (BICC)	Q.1900–Q.1999
BROADBAND ISDN	Q.2000–Q.2999
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR THE NGN	Q.3000–Q.3999
General	Q.3000–Q.3029
Network signalling and control functional architecture	Q.3030–Q.3099
Network data organization within the NGN	Q.3100–Q.3129
Bearer control signalling	Q.3130–Q.3179
Signalling and control requirements and protocols to support attachment in NGN environments	Q.3200–Q.3249
Resource control protocols	Q.3300–Q.3369
Service and session control protocols	Q.3400–Q.3499
Service and session control protocols – supplementary services	Q.3600–Q.3649
NGN applications	Q.3700–Q.3849
Testing for NGN networks	**Q.3900–Q.3999**

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T Q.3901

Testing topology for networks and services based on NGN technical means

Summary

Recommendation ITU-T Q.3901 describes the methodology and list of mandatory tests of NGN functions. This Recommendation is based on Recommendation ITU-T Q.3900. It gives a list of tests related to NGN technical means, NGN solutions and NGN services which shall be used in model and operator networks.

Source

Recommendation ITU-T Q.3901 was approved on 23 January 2008 by ITU-T Study Group 11 (2005-2008) under Recommendation ITU-T A.8 procedure.

Keywords

Model networks, next generation networks (NGN), PSTN, service testing, technical means, testing.

FOREWORD

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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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CONTENTS

Recommendation ITU-T Q.3901

Testing topology for networks and services based on NGN technical means

1 Scope

This Recommendation defines the list of checks to be performed during the testing of NGN (NGN TM local testing, NUT and services) in model and operator networks.

This Recommendation defines the tasks for NGN TM, NUT and services testing on NGN for model and operator network, a tests list for model network and operator network, and the reasons for using one or the other network for carrying out the specified test groups.

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 Q.1706] Recommendation ITU-T Q.1706/Y.2801 (2006), *Mobility management requirements for NGN*.

[ITU-T Q.3900] Recommendation ITU-T Q.3900 (2006), *Methods of testing and model network architecture for NGN technical means testing as applied to public telecommunication networks*.

[ITU-T X.290] Recommendation ITU-T X.290 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – General concepts*.

[ITU-T X.292] Recommendation ITU-T X.292 (2002), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – The Tree and Tabular Combined Notation (TTCN)*.

[ITU-T X.295] Recommendation ITU-T X.295 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Protocol profile test specification*.

[ITU-T Y.1540] Recommendation ITU-T Y.1540 (2007), *Internet protocol data communication service – IP packet transfer and availability performance parameters*.

[ITU-T Y.1541] Recommendation ITU-T Y.1541 (2006), *Network performance objectives for IP-based services*.

[ITU-T Y.2011] Recommendation ITU-T Y.2011 (2004), *General principles and general reference model for Next Generation Networks*.

[ITU-T Y.2012] Recommendation ITU-T Y.2012 (2006), *Functional requirements and architecture of the NGN release 1*.

[ITU-T Z.140] Recommendation ITU-T Z.140 (2006), *Testing and Test Control Notation version 3 (TTCN-3): Core language*.

[ETSI TR 101 667] ETSI TR 101 667 V1.1.2 (1999), *Methods for Testing and Specification (MTS); Network Integration Testing (NIT); Interconnection; Reasons and goals for a global service testing approach.* <http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=3202>

[ETSI TS 102 237-1] ETSI TS 102 237-1 V4.1.1 (2003), *Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Interoperability test methods and approaches; Part 1: Generic approach to interoperability testing.* <http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=17051>

[ETSI TS 102 237-2] ETSI TS 102 237-2 V4.1.1 (2003), *Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Interoperability test methods and approaches; Part 2: H.323-SIP interoperability test scenarios to support multimedia communications in NGN environments.* <http://webapp.etsi.org/workprogram/Report_WorkItem.asp?WKI_ID=19707>

3 Definitions

This Recommendation defines the following terms:

3.1 model network: A network which simulates the capabilities similar to those available in telecommunication networks; it has a similar architecture and functionality and uses the same telecommunication technical means.

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

4 Abbreviations

This Recommendation uses the following abbreviations:

ABG-FE Access Border Gateway Functional Entity

AG Access Gateway

AGC Access Gateway Controller

AGC-FE Access Gateway Control Functional Entity

AM-FE Access Management Functional Entity

AMG-FE Access Media Gateway Functional Entity

AN-FE Access Node Functional Entity

AR-FE Access Relay Functional Entity

AS Application Server

AS-FE Application Support Functional Entity

BGC-FE Breakout Gateway Control Functional Entity

BICC Bearer Independent Call Control

DNS Domain Name System

EN-FE Edge Node Functional Entity

FTP File Transfer Protocol

EU-FE	End User Functional Entity
HGW	Home GateWay
HTTP	Hypertext Transfer Protocol
IBC-FE	Interconnection Border Gateway Control Functional Entity
IBG-FE	Interconnection Border Gateway Functional Entity
I-CSC-FE	Interrogating Call Session Control Functional Entity
IN	Intelligent Network
INAP	Intelligent Network Application Protocol
IP	Internet Protocol
ISDN	Integrated Services Digital Network
IVR	Interactive Voice Response
MG	Media Gateway
MGC	Media Gateway Controller
MGC-FE	Media Gateway Controller Functional Entity
MGCP	Media Gateway Control Protocol
MRB-FE	Media Resource Broker Functional Entity
MRC-FE	Media Resource Control Functional Entity
MRP-FE	Media Resource Processing Functional Entity
MS	Media Server
MSC	Mobile Switching Centre
NAC-FE	Network Access Configuration Functional Entity
NAPT	Network Address and Port Translation
NAT	Network Address Translation
NGN	Next Generation Network
NGN TM	Next Generation Network Technical Means
NIT	Network Integration/Interconnection Testing
NNTP	Network News Transfer Protocol
NPF	NAPT Proxy Function
NSIW-FE	Network Signalling Interworking Functional Entity
NUT	Network Under Test
PBX	Private Branch eXchange
P-CSC-FE	Proxy Call Session Control Functional Entity
PD-FE	Policy Decision Functional Entity
PICS	Protocol Implementation Conformance Statement
PS	Proxy-Server (SIP)
PSTN	Public Switched Telephone Network
QoS	Quality of Service

RACF	Resource and Admission Control Function
RGW	Residential Gateway
SAA-FE	Service Authentication and Authorization Functional Entity
S-CSC-FE	Serving Call Session Control Functional Entity
SCTP	Stream Control Transmission Protocol
SDL	Specification and Description Language
SG	Signalling Gateway
SG-FE	Signalling Gateway Functional Entity
SIP	Session Initiation Protocol
SL-FE	Subscription Locator Functional Entity
SMTP	Simple Mail Transfer Protocol
SP	Signalling Point
SS7	Signalling System 7
STP	Signalling Transfer Point
SUP-FE	Service User Profile Functional Entity
SUP-PE	Service User Profile Physical Entity
TAA-FE	Transport Authentication and Authorization Functional Entity
TCAP	Transactional Capabilities Application Part
TCP	Transmission Control Protocol
TE	Terminal Equipment
TMG-FE	Trunking Media Gateway Functional Entity
TSSTP	Test Suite Structure and Test Purpose
TTCN	Tree and Tabular Combined Notation
TUP-FE	Transport User Profile Functional Entity
UDP	User Datagram Protocol
UNI	User Network Interface
URI	Uniform Resource Identifier
USIW-FE	User Signalling InterWorking Functional Entity

5 Testing principles

One should begin testing each component on the so-called NGN TM – locally, as described in clause 5.1. Then one may confidently test a network of NGN TM, as described in clause 5.2. After these tests are complete, service testing may be executed, as discussed in clause 5.3.

5.1 NGN TM local testing methodology

The NGN TM local testing procedure includes several testing stages. The NGN TM local testing scheme is as shown in Figure 5-1. The first stage of NGN TM local testing is based on the methodology described in [ITU-T X.295] and [ETSI TS 102 237-1] and [ETSI TS 102 237-2]. All technical means shall be checked for conformance to ITU-T Recommendations and ETSI standards

under the methodology defined in [ITU-T X.290], especially through the use of TSS&TP and PICS. The following stages shall include NGN TM functional testing, NGN TM functional local testing under load and NGN TM conformance local testing.

A ring scheme is used in the methodology of NGN TM testing. All testing stages depend on the previous testing stage results.

All NGN TM local tests shall be based on the existing and developing methodologies (Figure 5-1). The results of each NGN TM local testing shall be delivered to the global database, whose structure and data format are not defined in this Recommendation.

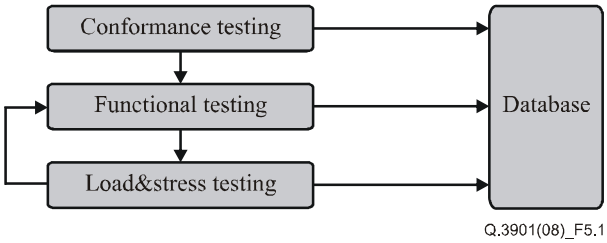


Figure 5-1 – NGN TM local testing methodology

5.1.1 NGN TM functionality testing

Tables 1 and 2 show the NGN TM functional tests list and a short description of each under the list of mandatory functions in the framework of the test described in clause 7.2 of [ITU-T Q.3900]. This Recommendation uses the same designations of the functional entities as shown in Figure 3 of [ITU-T Y.2012].

Table 1 – NGN functions tests list

No.	Tests purpose	Functional entity	Function under test
1.1	The feasibility check to provide interaction between the packet-based transport used in the NGN, and analogue lines or ISDN access.	T-1	**Access transport functions**
1.2	The feasibility check to support dynamic QoS control and firewall function to access NGN network.	T-2	
1.3	The feasibility check to transmit local pre-set configuration information to the user's equipment when necessary.	T-4	
2.1	The feasibility check to transmit and route traffic from access network to the common transport network, according to QoS mechanisms.	T-3	**Edge and access border gateway functions**
2.2	The feasibility check to access gateway between access network and core network.	T-5	

Table 1 – NGN functions tests list

No.	Tests purpose	Functional entity	Function under test
3.1	The feasibility check to support firewall functions to interconnect an operator's core network with another operator's core network supporting the packet-based services.	T-6	**Core transport functions**
3.2	The feasibility check to provide interaction between the packet-based transport used in the NGN and trunk lines from the circuit-switched network.	T-7	
3.3	The feasibility check to provide load processing of packets used in the NGN.	T-8	
3.4	The feasibility check to provide signalling transport interaction between such NGN and existing networks as PSTN, ISDN, IN networks, and signalling system No. 7.	T-9	
4.1	Refer to [ITU-T Y.2011].	T-16	**RACF**
4.2	Refer to [ITU-T Y.2011].	T-17	
5.1	The feasibility check to provide an access network identifier to a terminal.	T-10	**NACF**
5.2	The feasibility check to provide authentication and authorization in the transport stratum.	T-11	
5.3	The feasibility check to register the association between the IP address allocated to the user equipment and related network location information provided by the NAC-FE (e.g., access line identifier).	T-13	
5.4	The feasibility check to translate network access requests issued by the user equipment.	T-14	
5.5	The feasibility check to provide the HGW with additional configuration information (e.g., configuration of a firewall internally in the HGW, QoS marking of IP packets, etc.).	T-15	
6.1	The feasibility check to support subscriber-related data.	T-12	**Transport user profile functions**

Table 1 – NGN functions tests list

No.	Tests purpose	Functional entity	Function under test
7.1	The feasibility check to provide session control, and routing of session messages.	S-1	**Service control functions**
7.2	The feasibility check to act as the contact point to the user terminal for session services.	S-2	
7.3	The feasibility check to provide a contact point within an operator's network for all connections destined to a user of that network operator.	S-3	
7.4	The feasibility check to provide authentication and authorization in the service stratum.	S-6	
7.5	The feasibility check to interwork with other packet-based networks.	S-7	
7.6	The feasibility check to control one or more AMG-FEs to access PSTN or ISDN users and handle registration, authentication, and security for the user.	S-8	
7.7	The feasibility check to control the TMG-FE for interaction with PSTN/ISDN.	S-9	
7.8	The feasibility check to select defined MGC for interworking with defined PSTN breakout.	S-10	
7.9	The feasibility check to provide an interworking for different types of application signalling at the subscriber side (access-to-core).	S-11	
7.10	The feasibility check to provide an interworking for different types of application signalling at the trunk side (inter-operator).	S-12	
7.11	The feasibility check to control the media resource processing functional entity and allocate/assign MRP-FE resources that are needed for such services as streaming, announcements, and interactive voice response (IVR) support.	S-13	
7.12	The feasibility check to act as a contact point for application support and service support functional entities, as well as user terminals.	S-15	
8.1	The feasibility check to query by the S-CSC-FE, I-CSC-FE, or AS-FE to obtain the address of the SUP-FE for the required subscriber.	S-4	**Application/Service support functions**
8.2	The feasibility check to store user profiles, subscriber-related location data, and presence status data in the service stratum.	S-5	
8.3	The feasibility check to assign media server resources for real-time calls coming into the network.	S-14	
9.1	The feasibility check to represent the combination of user information and other control data into a single user profile function in the service stratum.		**Service user profile functions**
10.1	The feasibility check to connect various user terminal equipment to an NGN network.		**End user functions**

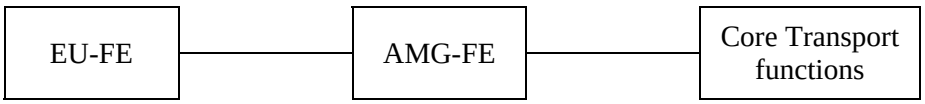
Table 2 – Functional entities' tests list

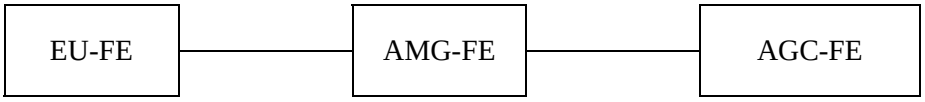
No.	Test name	Functional entity
1.1	Bidirectional media processing functions.	T-1
1.2	PSTN user call control signalling backhaul.	
1.3	ISDN user call control signalling backhaul.	
1.4	Codecs for user plane traffic.	
1.5	Echo cancellation.	
2.1	Packet filtering.	T-2
3.1	IP routing (L2 and L3).	T-3
4.1	Automatic configuration of end-user terminal equipment.	T-4
5.1	Opening and closing a gate.	T-5
5.2	Packet filtering.	
5.3	Network address and port translation.	
5.4	Media relay for NAT traversal.	
5.5	Collecting and reporting resource usage information.	
6.1	Packet filtering.	T-6
6.2	Network address and port translation.	
7.1	Interworking media trunks circuit-switched network with packet-based transport.	T-7
7.2	Codecs for trunk interworking.	
7.3	Echo cancellers.	
8.1	Allocation of specialized media resources.	T-8
8.2	Collection and generation of DTMF signals.	
8.3	Generation of tone signals.	
8.4	Generation of announcements.	
9.1	Signalling interworking with PSTN/ISDN/IN (2CAS, SS7).	T-9
10.1	IP address allocation to terminals.	T-10
11.1	Users or terminals identification in networks.	T-11
12.1	User profiles, subscriber-related location data, and presence status data.	T-12
12.2	Responses to queries for user profiles.	
13	Testing methods for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN specifications.	T-13
14.1	Forwarding of network configuration parameters and authentication and authorization requests.	T-14
15	Testing methods for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN specifications.	T-15
16	Testing methods for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN specifications.	T-16

Table 2 – Functional entities' tests list

No.	Test name	Functional entity
17	Testing methods for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN specifications.	T-17
18.1	Interaction with AS.	S-1
18.2	Registration.	
18.3	Routing messages.	
18.4	Interaction with AGC-FE.	
18.5	Support of services.	
19.1	Forward a register request from the terminal.	S-2
19.2	Forward SIP messages from the terminal to the SIP server.	
19.3	Forward a SIP request to the SIP-terminal.	
19.4	Emergency session establishment requests.	
19.5	Security.	
19.6	NAT traversal.	
20.1	Registration.	S-3
20.2	Session-related and session-unrelated flows.	
21.1	Obtaining of the address.	S-4
22.1	User profile management.	S-5
22.2	Providing access to user data.	
23.1	Rights of end-user.	S-6
23.2	Using policy rules.	
23.3	Mobility management.	
24	Testing methods for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN specifications.	S-7
25.1	Signalling translation and conversion.	S-8
25.2	Providing ISDN supplementary services.	
25.3	Forwarding requests.	
25.4	Forwarding value-added service requests.	
25.5	NAPT proxy function.	
26.1	Forwarding requests.	S-9
27.1	Interworking with different PSTN breakouts.	S-10
28.1	Interworking (access-to-core).	S-11
29.1	Interworking (inter-operator).	S-12
30.1	Media resources allocation.	S-13
31.1	Media server resources control.	S-14
32	Testing methods for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN specifications.	S-15

5.1.1.1 Methods of checking T-1 functionality

Test No.	**T-1_01**
Test Name	**Bidirectional media processing functions**
Status	Mandatory
Test purpose	The feasibility check to provide bidirectional media processing functions for user plane traffic between EU-FE and the NGN.
Configuration	
Initial condition	There is a media session established between the EU-FE and the AMG-FE.
Test procedure	Check whether the EU-FE receives and transmits any media information from/to NGN through AMG-FE simultaneously in the real-time mode.
Expected results	EU-FE receives and transmits media information simultaneously in the real-time mode from/to NGN through the AMG-FE.

Test No.	**T-1_02**
Test Name	**PSTN user call control signalling backhaul**
Status	Mandatory
Test purpose	The feasibility check to transfer PSTN user call control signalling to the AGC-FE for processing.
Configuration	
Initial condition	There is a connection between the PSTN EU-FE and the AMG-FE.
Test procedure	1) Initiate a call from PSTN EU-FE to the AMG-FE. 2) Check whether the AMG-FE backhauls PSTN EU-FE call control signalling to the AGC-FE for processing using the appropriate signalling protocol. 3) Check whether a call has been established between PSTN EU-FE and NGN through the AMG-FE. 4) Release a call from the PSTN EU-FE side. 5) Check whether a call has been terminated.
Expected results	1) AMG-FE backhauls PSTN EU-FE call control signalling to the AGC-FE using the appropriate signalling protocol. 2) A call is established between PSTN EU-FE and NGN through the AMG-FE. 3) A call is terminated.

Test No.	**T-1_03**
Test Name	**ISDN user call control signalling backhaul**
Status	Mandatory
Test purpose	The feasibility check to transfer ISDN user call control signalling to the AGC-FE for processing.
Configuration	
Initial condition	There is a connection between the ISDN EU-FE and the AMG-FE.
Test procedure	1) Initiate a "3.1 kHz" call from ISDN EU-FE to the AMG-FE. 2) Check whether the AMG-FE can backhaul ISDN EU-FE call control signalling to the AGC-FE for processing using the appropriate signalling protocol. 3) Check whether a call has been established between ISDN EU-FE and the NGN through the AMG-FE. 4) Release a call from the ISDN EU-FE side. 5) Check whether a call has been terminated. 6) Repeat steps 1 to 5 for "64 kbit/s" and "speech" ISDN calls.
Expected results	1) AMG-FE backhauls ISDN EU-FE call control signalling to the AGC-FE using the appropriate signalling protocol. 2) A call is established between ISDN EU-FE and the NGN through the AMG-FE. 3) A call is terminated.

Test No.	**T-1_04**
Test Name	**Codecs for user plane traffic**
Status	Optional
Test purpose	The feasibility check to select different types of codecs for payload processing.
Configuration	
Initial condition	There is a connection between the EU-FE and the AMG-FE. ITU-T G.711 (a-law) codec is chosen for payload processing on the AMG-FE.
Test procedure	1) Initiate a call from EU-FE to the AMG-FE. 2) Check whether all EU-FE media information passing through the AMG-FE is encoded via ITU-T G.711 (a-law) codec. 3) Release a call from the EU-FE side. 4) Repeat steps 1 to 3 for ITU-T G.723, ITU-T G.729 and other types of codecs.
Expected results	EU-FE media information is encoded via selected codec.

Test No.	**T-1_05**
Test Name	**Echo cancellation**
Status	Optional
Test purpose	The feasibility check to support echo cancellation for payload processing.
Configuration	
Initial condition	There is a connection between the EU-FE and the AMG-FE. The echo cancellation function on the AMG-FE is switched off.
Test procedure	1) Initiate a call from EU-FE to the AMG-FE. 2) Check the quality of the speech for a call. 3) Release a call from the EU-FE side. 4) Switch on the echo cancellation function on the AMG-FE. 5) Initiate a call from EU-FE to the AMG-FE. 6) Check the quality of the speech for a call.
Expected results	1) An echo occurs during the first call. 2) No echo for the second call.

5.1.1.2 Methods of checking T-2 functionality

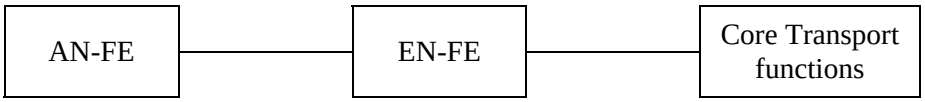
Test No.	**T-2_01**
Test Name	**Packet filtering**
Status	Mandatory
Test purpose	The feasibility check to support firewall function for access to the NGN.
Configuration	
Initial condition	There is an IP route from the EU-FE to the EN-FE provisioned in the AN-FE. There is an IP traffic initiated from the EU-FE to the NGN through the AN-FE. There are no filters applied in the AN-FE.
Test procedure	1) Check whether all IP traffic from the EU-FE to the NGN is passing through the AN-FE and the EN-FE. 2) Set a filter for the particular protocol of the IP traffic in the AN-FE. 3) Check whether any packets of the selected protocol are transported via the common IP traffic from the AN-FE to the EN-FE. 4) Delete a filter from the AN-FE. 5) Check whether all IP traffic from the EU-FE to the NGN is passing through the AN-FE and the EN-FE. 6) Repeat steps 1 to 5 for filters based on the particular port and sender/receiver IP addresses.

Expected results	1) All IP traffic from the EU-FE to the NGN is passing through the AN-FE and the EN-FE. 2) There are no packets of the selected protocol/port/IP address in the common IP traffic. 3) All IP traffic from the EU-FE to the NGN is passing through the AN-FE in the normal way.

Current functionality also requires testing of QoS parameters and mechanisms such as buffer management, queuing and scheduling, traffic classification, marking, policing, shaping, and forwarding.

Methods of testing of QoS parameters and mechanisms will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.1.1.3 Methods of checking T-3 functionality

Test No.	**T-3_01**
Test Name	**IP routing (L2 and L3)**
Status	Mandatory
Test purpose	The feasibility check to aggregate user traffic from an access network and route it to the common transport network.
Configuration	
Initial condition	Several routes from the access network to the common transport network are provisioned in the EN-FE.
Test procedure	1) Initiate the users' IP traffic with different destinations, different values and defined lengths from the AN-FE to the NGN through the EN-FE. 2) Check whether EN-FE has received the IP traffic from different users with defined lengths. 3) Check whether EN-FE has sent the users' IP traffic with defined lengths to the requested destinations of the NGN.
Expected results	1) EN-FE has received the IP traffic from different users with predefined lengths. 2) EN-FE has sent the users' IP traffic with predefined lengths to the requested destinations of the NGN according to provisioned routes.

Current functionality also requires testing of QoS parameters and mechanisms such as buffer management, queuing and scheduling, traffic classification, marking, policing, shaping, and forwarding.

Methods of testing of QoS parameters and mechanisms will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.1.1.4 Methods of checking T-4 functionality

Test No.	**T-4_01**
Test Name	**Automatic configuration of end-user terminal equipment**
Status	Mandatory
Test purpose	The feasibility check to transmit local preconfiguration information to the user equipment when necessary.
Configuration	
Initial condition	The end-user terminal equipment (TE) is connected to the access network. The end-user TE has no local preconfiguration or it is switched off. The NAC-FE stores the local configuration in order to give access to end-user TEs to the service stratum functions.
Test procedure	1) Initiate a request for a local preconfiguration (e.g., IP address of the P-CSC-FE, the addresses of DNS servers, etc.) for the end-user TE to the NAC-FE or switch the end-user TE on. 2) Check whether the NAC-FE has received the request for the local preconfiguration and has sent the current local preconfiguration to the end-user TE through the AR-FE. 3) Check whether the end-user TE has received the local preconfiguration and is able to access the service stratum functions.
Expected results	1) The NAC-FE has sent the appropriate pre-set configuration to the end-user TE through initiation of the request. 2) The end-user TE is able to access the service stratum functions (e.g., can register in the NGN).

5.1.1.5 Methods of checking T-5 functionality

Test No.	**T-5_01**
Test Name	**Opening and closing a gate**
Status	Mandatory
Test purpose	The feasibility check to realize gateway function between an access network and a core network.
Configuration	
Initial condition	There is an IP route from the EN-FE to the core transport functions provisioned in the ABG-FE. The IP traffic from the access network to the core network is prohibited by the ABG-FE (the gate is closed).

Test procedure	1) Initiate the IP traffic from the access network to the core network through the ABG-FE (e.g., make a call from the NGN terminal to the PSTN terminal). 2) Check if the IP traffic from the access network to the core network cannot pass through the ABG-FE. 3) Permit the IP traffic from the access network to the core network at the ABG-FE (open the gate). 4) Initiate the IP traffic from the access network to the core network through the ABG-FE. 5) Check whether the IP traffic from the access network to the core network is passing through the ABG-FE.
Expected results	1) The IP traffic from the access network to the core network cannot pass through the ABG-FE. 2) The IP traffic from the access network to the core network is passing through the ABG-FE since the gate is open.

Test No.	**T-5_02**
Test Name	**Packet filtering**
Status	Mandatory
Test purpose	The feasibility check to filter the IP traffic at the ABG-FE according to the specific criteria.
Configuration	
Initial condition	There is an IP route from the EN-FE to the core network provisioned in the ABG-FE. There is an IP traffic initiated from the EN-FE to the NGN through the ABG-FE. There are no filters applied in the ABG-FE.
Test procedure	1) Check whether all IP traffic from the EN-FE to the NGN is passing through the ABG-FE. 2) Set a filter for the particular protocol of the IP traffic at the ABG-FE. 3) Check whether any packets of the selected protocol are transported via the common IP traffic from the ABG-FE to the core network. 4) Delete a filter from the ABG-FE. 5) Check whether all IP traffic from the EN-FE to the NGN is passing through the ABG-FE. 6) Repeat steps 1 to 5 for filters based on the particular port and sender/receiver IP addresses.
Expected results	1) All IP traffic from the EN-FE to the NGN is passing through the ABG-FE. 2) There are no packets of the selected protocol/port/IP address in the common IP traffic. 3) All IP traffic from the EN-FE to the NGN is passing through the ABG-FE in normal way.

Test No.	**T-5_03**
Test Name	**Network address and port translation**
Status	Mandatory
Test purpose	The feasibility check to realize gateway function between an access network and a core network.
Configuration	
Initial condition	There is an IP route from the EN-FE to the core network provisioned in the ABG-FE. NAPT is enabled in the ABG-FE. IP address that will be used for replacing an initial IP source address (IP address of the EN-FE) is defined in the ABG-FE.
Test procedure	1) Initiate a TCP/UDP session between the EN-FE and some node in NGN through the ABG-FE. 2) Measure IP source address, IP destination address, TCP/UDP source port, TCP/UDP destination port of packets which were transmitted from the EN-FE in the context of TCP/UDP session from step 1. 3) Measure IP source address, IP destination address, TCP/UDP source port, TCP/UDP destination port of packets which were transmitted from the ABG-FE to the NGN's node in the context of TCP/UDP session from step 1. 4) Check whether all checksums (IP header's checksum, TCP/UDP checksum) in IP packets are correct. 5) Check whether IP destination addresses and TCP/UDP destination ports measured in steps 2 and 3 are the same. 6) Check whether IP source address measured in step 3 complies with IP address from initial condition. 7) Check whether the ABG-FE assigns new TCP/UDP source port (see step 3) and this port is the same for all packets transmitted in this direction in the context of TCP/UDP session from step 1. 8) Measure IP source address, IP destination address, TCP/UDP source port, TCP/UDP destination port of packets which were transmitted from the ABG-FE to the EN-FE in the context of TCP/UDP session from step 1. 9) Check whether all checksums (IP header's checksum, TCP/UDP checksum) in IP packets are correct. 10) Check whether IP source address and TCP/UDP source port measured in step 7 complies with IP destination address and TCP/UDP destination port measured in step 2. 11) Check whether IP destination address and TCP/UDP destination port measured in step 7 complies with IP source address and TCP/UDP source port measured in step 2.
Expected results	1) Since they are transmitted through the ABG-FE, IP packets contain correct IP addresses and TCP/UDP port numbers. 2) All checksums (IP header's checksum, TCP/UDP checksum) in IP packets are correct.

Test No.	**T-5_04**
Test Name	**Media relay for NAT traversal**
Test purpose	The feasibility check to realize gateway function between an access network and a core network.
Configuration	
Initial condition	NAPT functions are enabled in ABG-FE.
Test procedure	1) Initiate a call from SIP-terminal to legacy terminal connected through AMG-FE. 2) Check whether information about media sessions that shall be established in the context of the call from step 1 is provided to ABG-FE. 3) Check whether media sessions have been established successfully and end-users are able to receive and transmit voice data.
Expected results	End-users are able to receive and transmit voice data through when NAPT functions are enabled.

Test No.	**T-5_05**
Test Name	**Collecting and reporting resource usage information**
Status	Mandatory
Test purpose	The feasibility check to control resource usage at the border between an access network and a core network.
Configuration	
Initial condition	There is an IP route from the EN-FE to the core transport functions provisioned in the ABG-FE. The resource usage at the ABG-FE is under the control of the PD-FE.
Test procedure	1) Set network bandwidth usage restriction at the PD-FE to a certain value. 2) Initiate the IP traffic from the access network to the core network through the ABG-FE exceeding the maximum value of network bandwidth usage. 3) Check whether all IP packets exceeding the maximum value have been dropped by the ABG-FE. 4) Delete the restriction of the bandwidth usage from the ABG-FE. 5) Check whether the IP traffic from the access network to the core network is passing through the ABG-FE without any losses.
Expected results	1) The IP traffic is restricted at the ABG-FE according to the specified value of the network bandwidth usage. 2) All IP packets from the access network were successfully delivered to the core network through the ABG-FE without any losses.

Current functionality also requires testing of QoS parameters and mechanisms as buffer management, queuing and scheduling, traffic classification, marking, policing, shaping, and forwarding.

Methods of testing of QoS parameters and mechanisms will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.1.1.6 Methods of checking T-6 functionality

Test No.	**T-6_01**
Test Name	**Packet filtering**
Test purpose	The feasibility check to support firewall function between the operator's core network supporting the packet-based services.
Configuration	
Initial condition	There is an IP route from the core network to the Other NGN provisioned in the IBG-FE. There is an IP traffic initiated from the core network to the Other NGN through the IBG-FE. There are no filters applied in the IBG-FE.
Test procedure	1) Check whether all IP traffic from the core network to the Other NGN is passing through the IBG-FE. 2) Set a filter for the particular protocol of the IP traffic at the IBG-FE. 3) Check whether any packets of the selected protocol are transported via the common IP traffic from the IBG-FE to the Other NGN. 4) Delete a filter from the IBG-FE. 5) Check whether all IP traffic from the core network to the Other NGN is passing through the IBG-FE. 6) Repeat steps 1 to 5 for filters based on the particular port and sender/receiver IP addresses.
Expected results	1) All IP traffic from the core network to the Other NGN is passing through the IBG-FE. 2) There are no packets of the selected protocol/port/IP address in the common IP traffic. 3) All IP traffic from the core network to the other NGN is passing through the IBG-FE in the normal way.

Test No.	**T-6_02**
Test Name	**Network address and port translation**
Status	Mandatory
Test purpose	The feasibility check to support firewall function between the operator's core network supporting the packet-based services.

Configuration	
Initial condition	There is an IP route from the core network to the Other NGN provisioned in the IBG-FE. NAPT is enabled in the IBG-FE. IP address that will be used for replacing initial IP source address (IP address of some node in the core network) is defined in the IBG-FE.
Test procedure	1) Initiate a TCP/UDP session between the core network and some node in the other NGN through the IBG-FE. 2) Measure IP source address, IP destination address, TCP/UDP source port, TCP/UDP destination port of packets which were transmitted from the core network in the context of TCP/UDP session from step 1. 3) Measure IP source address, IP destination address, TCP/UDP source port, TCP/UDP destination port of packets which were transmitted from the IBG-FE to the other NGN's node in the context of TCP/UDP session from step 1. 4) Check whether all checksums (IP header's checksum, TCP/UDP checksum) in IP packets are correct. 5) Check whether IP destination addresses and TCP/UDP destination ports measured in steps 2 and 3 are the same. 6) Check whether IP source address measured in step 3 complies with IP address from initial condition. 7) Check whether the IBG-FE assigns new TCP/UDP source port (see step 3) and this port is the same for all packets transmitted in this direction in the context of the TCP/UDP session from step 1. 8) Measure IP source address, IP destination address, TCP/UDP source port, TCP/UDP destination port of packets which were transmitted from the IBG-FE to the core network in the context of TCP/UDP session from step 1. 9) Check whether all checksums (IP header's checksum, TCP/UDP checksum) in IP packets are correct. 10) Check whether IP source address and TCP/UDP source port measured in step 7 complies with IP destination address and TCP/UDP destination port measured in step 2. 11) Check whether IP destination address and TCP/UDP destination port measured in step 7 complies with IP source address and TCP/UDP source port measured in step 2.
Expected results	1) Since they are transmitted through the IBG-FE, IP packets contain correct IP addresses and TCP/UDP port numbers. 2) All checksums (IP header's checksum, TCP/UDP checksum) in IP packets are correct.

Current functionality also requires testing of QoS parameters and mechanisms such as buffer management, queuing and scheduling, traffic classification, marking, policing, shaping, and forwarding.

Methods of testing of QoS parameters and mechanisms will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

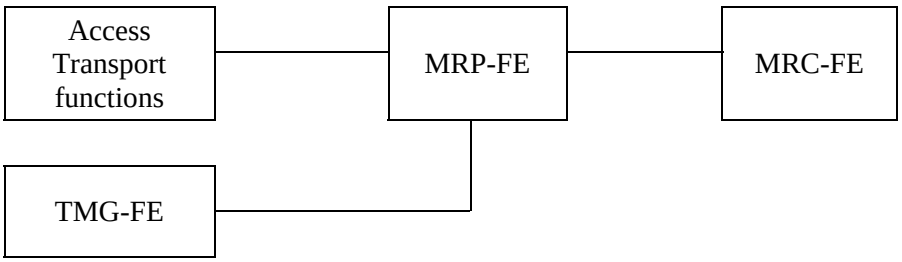
5.1.1.7 Methods of checking T-7 functionality

Test No.	**T-7_01**
Test Name	**Interworking media trunks circuit-switched network with packet-based transport**
Status	Mandatory
Test purpose	The feasibility check to provide interworking between the packet-based transport used in the NGN and trunks from the circuit-switched network.
Configuration	
Initial condition	There is a media session established between the circuit-switched network and the TMG-FE.
Test procedure	Check whether the circuit-switched network could receive and transmit any media information from/to the NGN through TMG-FE simultaneously in real-time mode.
Expected results	The circuit-switched network receives and transmits media information simultaneously in real-time mode from/to the NGN through the TMG-FE.

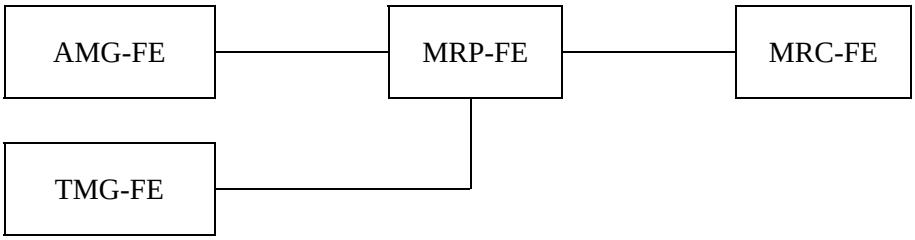
Test No.	**T-7_02**
Test Name	**Codecs for trunk interworking**
Status	Mandatory
Test purpose	The feasibility check to process a payload delivered by the trunk interworking of different codecs.
Configuration	
Initial condition	There is a connection between the circuit-switched network and the TMG-FE. ITU-T G.711 (a-law) codec is chosen for payload processing in the TMG-FE.
Test procedure	1) Initiate a call from the circuit-switched network to the TMG-FE. 2) Check whether all media information from the circuit-switched network passing through the TMG-FE is encoded via ITU-T G.711 (a-law) codec. 3) Release a call from the circuit-switched network side. 4) Repeat steps 1 to 3 for ITU-T G.723, ITU-T G.729 and other types of codec.
Expected results	Media information from the circuit-switched network is encoded via a selected codec.

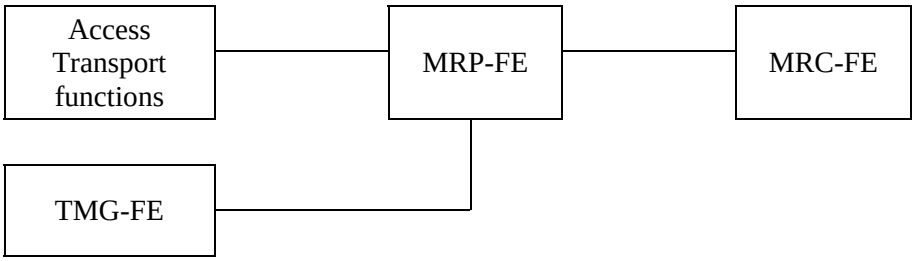
Test No.	**T-7_03**
Test Name	**Echo cancellers**
Status	Mandatory
Test purpose	The feasibility check to process a payload delivered by the trunk interworking of echo cancellers.
Configuration	
Initial condition	There is a connection between the circuit-switched network and the TMG-FE. The echo cancellation function in the TMG-FE is switched off.
Test procedure	1) Initiate a call from the circuit-switched network to the TMG-FE. 2) Check the quality of the speech for a call. 3) Release a call from the circuit-switched network side. 4) Switch on the echo cancellation function in the TMG-FE. 5) Initiate a call from the circuit-switched network to the TMG-FE. 6) Check the quality of the speech for a call.
Expected results	1) An echo occurs during the first call. 2) No echo for the second call.

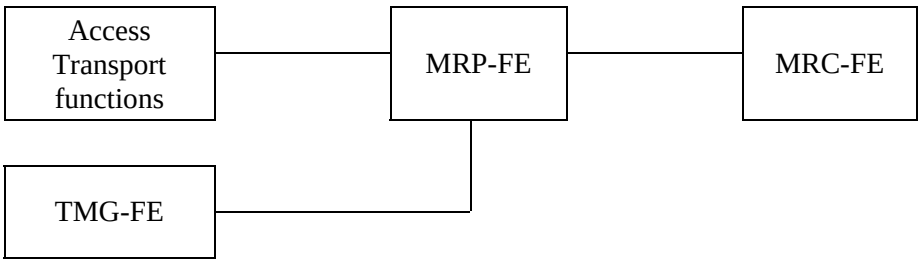
5.1.1.8 Methods of checking T-8 functionality

Test No.	**T-8_01**
Test Name	**Allocation of specialized media resources**
Status	Mandatory
Test purpose	The feasibility check to process a payload delivered by the resources allocation of specialized media.
Configuration	
Initial condition	There are no specialized media resources allocated at the MRP-FE.

Test procedure	1) Initiate a request from the end-user terminal connected to the NGN through the access network or PSTN for a specialized media resource (e.g., special tone), which has a certain ID at the MRP-FE. 2) Check whether the MRC-FE has allocated the specialized media resource at the MRP-FE with the appropriate ID. 3) Check whether the end-user terminal can receive the requested specialized media resource. 4) Check whether, after completion of the specialized media resource, the media session is released.
Expected results	1) The MRC-FE has sent the request to the MRP-FE to allocate the specialized media resource with the appropriate ID. 2) The end-user terminal is receiving the requested specialized media resource. 3) The MRC-FE has sent the request to the MRP-FE to deallocate the specialized media resource with the appropriate ID. The media session is released.

Test No.	**T-8_02**
Test Name	**Collection and generation of DTMF signals**
Status	Mandatory
Test purpose	The feasibility check to process a payload delivered by the collection and generation of DTMF signals.
Configuration	
Initial condition	There are several legacy terminals connected to the NGN through the AMG-FE or PSTN.
Test procedure	1) Initiate a DTMF signals sequence (e.g., number of digits) from the legacy terminal to the NGN. 2) Check whether the MRP-FE has received a DTMF signals sequence and has sent it to the MRC-FE accordingly. 3) Initiate a DTMF signals sequence from the MRC-FE to the legacy terminal through the MRP-FE (e.g., calling line identification functionality for the legacy terminal). 4) Check whether the MRP-FE has received the DTMF signals sequence and has sent it to the legacy terminal accordingly. 5) Check whether the legacy terminal has received the DTMF signals sequence.
Expected results	1) The MRP-FE has received the DTMF signals sequence and has sent it to the MRC-FE accordingly. 2) The MRP-FE has received the DTMF signals sequence and has sent it to the legacy terminal accordingly. 3) The legacy terminal has received the DTMF signals sequence.

Test No.	**T-8_03**
Test Name	**Generation of tone signals**
Status	Mandatory
Test purpose	The feasibility check to process a payload of tone generation.
Configuration	
Initial condition	There are several end-user terminals connected to the NGN through the access network or PSTN.
Test procedure	1) Initiate a request from the end-user terminal for a special tone (e.g., special melody), which has a certain ID at the MRP-FE. 2) Check whether the MRC-FE has allocated the special tone at the MRP-FE with the appropriate ID. 3) Check whether the end-user terminal can receive the appropriate tone. 4) Check whether, after completion of the tone, the media session is released and the resource is deallocated from the MRP-FE.
Expected results	1) The MRC-FE has sent the request to the MRP-FE to allocate the special tone for the current media session with the appropriate ID. 2) The end-user terminal is receiving the requested special tone. 3) The MRC-FE has sent the request to the MRP-FE to deallocate the special tone with the appropriate ID. The media session is released.

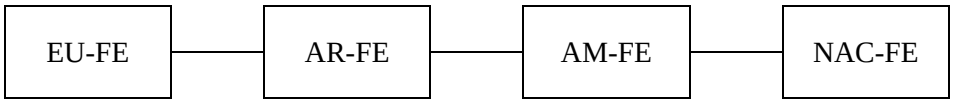
Test No.	**T-8_04**
Test Name	**Generation of announcements**
Status	Mandatory
Test purpose	The feasibility check to process a payload of announcement generation.
Configuration	
Initial condition	There are several end-user terminals connected to the NGN through the access network or PSTN.

Test procedure	1) Initiate a request from the end-user terminal for a special announcement (e.g., "Thank you for your call"), which has a certain ID at the MRP-FE. 2) Check whether the MRC-FE has allocated the special announcement at the MRP-FE with the appropriate ID. 3) Check whether the end-user terminal can receive the appropriate announcement. 4) Check whether, after completion of the announcement, the media session is released and the resource is deallocated from the MRP-FE.
Expected results	1) The MRC-FE has sent the request to the MRP-FE to allocate the special announcement for the current media session with the appropriate ID. 2) The end-user terminal is receiving the requested announcement. 3) The MRC-FE has sent the request to the MRP-FE to deallocate the special announcement with an appropriate ID. The media session is released.

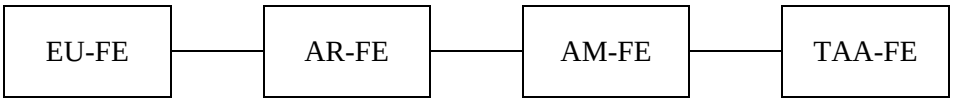
5.1.1.9 Methods of checking T-9 functionality

Test No.	**T-9_01**
Test Name	**Signalling interworking with PSTN/ISDN/IN (2CAS, SS7)**
Status	Mandatory
Test purpose	The feasibility check to provide signalling transport interworking between the NGN and existing networks.
Configuration	
Initial condition	There is a signalling connection between the PSTN/ISDN/IN and the SG-FE.
Test procedure	1) Initiate a call from PSTN/ISDN/IN to the NGN. 2) Check whether the SG-FE can backhaul PSTN/ISDN/IN call control signalling to the MGC-FE for processing using the appropriate signalling protocol. 3) Check whether a call has been established between PSTN/ISDN/IN and the NGN. 4) Release a call from the PSTN/ISDN/IN side. 5) Check whether a call has been terminated.
Expected results	1) SG-FE backhauls PSTN/ISDN/IN call control signalling to the MGC-FE using the appropriate signalling protocol. 2) A call is established between PSTN/ISDN/IN and the NGN. 3) A call is terminated.

5.1.1.10 Methods of checking T-10 functionality

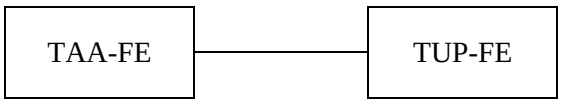
Test No.	**T-10_01**
Test Name	**IP address allocation to terminals**
Status	Mandatory
Test purpose	The feasibility check to provide the terminal an access to the network.
Configuration	
Initial condition	NAC-FE's database contains information about IP addresses in compliance with certain terminals' identifiers.
Test procedure	1) From the terminal, transmit a request for IP address allocation. 2) Check whether this request contains the terminal's identification information. 3) Check whether NAC-FE has transmitted information about IP address allocation in answer to the request from step 1. 4) Check whether this answer contains an IP address that complies with NAC-FE's database (see initial condition), i.e., IP address has been allocated in compliance with the terminal's identification information.
Expected results	IP address has been allocated to the terminal in compliance with the terminal's identification information.

5.1.1.11 Methods of checking T-11 functionality

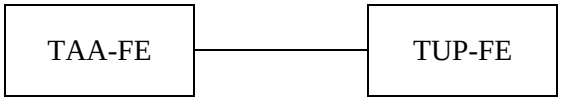
Test No.	**T-11_01**
Test Name	**Users or terminals identification in networks**
Status	Mandatory
Test purpose	The feasibility check to provide authentication and authorization in the transport stratum.
Configuration	
Initial condition	TUP-FE's database contains user profiles with data required for authentication and authorization. EU-FE is configured according to one of the user profiles from TUP-FE's database.

Test procedure	1) From the EU-FE, initiate any procedure that requires authentication and authorization in the transport stratum (e.g., initiate PPP session establishment from an end-user terminal). 2) Check whether TAA-FE has received authentication and authorization request, and if the appropriate information is provided correctly (e.g., correct username and password, IP address and MAC address, etc.). 3) Check whether TAA-FE has retrieved the necessary authentication and authorization data from TUP-FE. 4) Check whether TAA-FE has transmitted the message about successful authentication and authorization to the functional entity that has sent the authentication and authorization request. 5) Configure incorrect identification information on EU-FE (e.g., wrong username and password, IP address and MAC address, etc.). 6) Initiate any procedure that requires authentication and authorization in the transport stratum (e.g., initiate PPP session establishment from an end-user terminal). 7) Check whether TAA-FE has received authentication and authorization request, and if the appropriate information is provided according to step 6. 8) Check whether TAA-FE has retrieved the necessary authentication and authorization data from TUP-FE. 9) Check whether TAA-FE has transmitted the message about unsuccessful authentication and authorization to the entity that has sent the authentication and authorization request.
Expected results	TAA-FE is able to provide authentication and authorization in the transport stratum.

5.1.1.12 Methods of checking T-12 functionality

Test No.	**T-12_01**
Test Name	**User profiles, subscriber-related location data, and presence status data**
Status	Mandatory
Test purpose	The feasibility check to store, update and provide user data.
Configuration	
Initial condition	TUP-FE's database contains at least one user profile (user profile 1) with some data.
Test procedure	1) Initiate a query of the user profile 1's data. 2) Check whether TUP-FE has provided the appropriate information. 3) Initiate an updating of some information in the user profile 1 (e.g., P-CSC-FE address). 4) Initiate a query of the user profile 1's data. 5) Check whether TUP-FE has provided the updated user profile 1's data (e.g., new P-CSC-FE address).

Expected results	1) User profile 1 is stored in the TUP-FE's database. 2) Data from the user profile 1 was updated in accordance with information from step 3 of the test procedure.

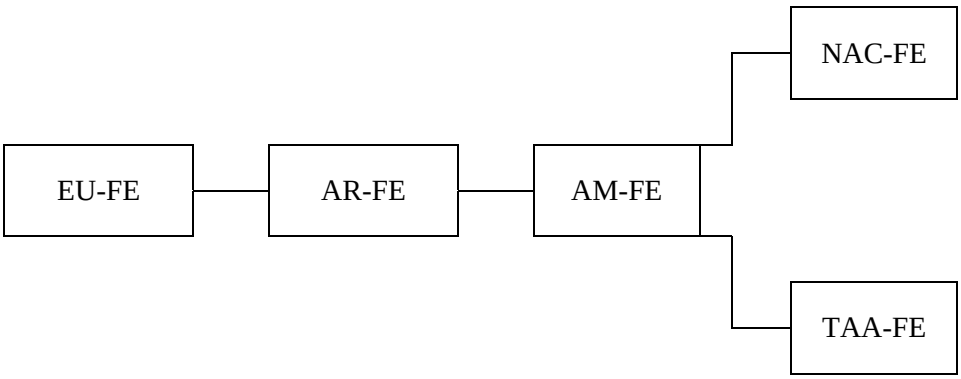
Test No.	**T-12_02**
Test Name	**Responses to queries for user profiles**
Status	Mandatory
Test purpose	The feasibility check to provide access to user data.
Configuration	
Initial condition	TUP-FE's database contains at least one user profile (user profile 1) with some data.
Test procedure	1) Initiate a query of the user profile 1's data from an entity that has rights to access this information. 2) Check whether TUP-FE has provided the appropriate information. 3) Initiate a query of the user profile 1's data from an entity that has no rights to access this information. 4) Check whether TUP-FE has rejected the appropriate request.
Expected results	TUP-FE provides filtered access to the user data.

5.1.1.13 Methods of checking T-13 functionality

Methods of testing for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of NGN roaming and mobility functionality testing specifications.

5.1.1.14 Methods of checking T-14 functionality

Test No.	**T-14_01**
Test Name	**Forwarding of network configuration parameters and authentication and authorization requests**
Status	Mandatory
Test purpose	The feasibility check to forward requests for network configuration parameters and authentication and authorization requests.

Configuration	
Initial condition	There is a EU-FE that is able to request network configuration parameters.
Test procedure	1) From the EU-FE, initiate any procedure that requests network configuration parameters and requires authentication and authorization in the transport stratum. 2) Check whether requests for network configuration parameters were forwarded to NAC-FE by AM-FE. 3) Check whether the authentication and authorization request was sent to the TAA-FE by AM-FE. 4) Check whether network configuration parameters were forwarded to the EU-FE (authentication and authorization procedure shall be successful).
Expected results	1) AM-FE forwards the requests for network configuration parameters to/from the NAC-FE. 2) AM-FE forwards the requests to the TAA-FE to authenticate and authorize the user.

5.1.1.15 Methods of checking T-15 functionality

Methods of testing for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.1.1.16 Methods of checking T-16 functionality

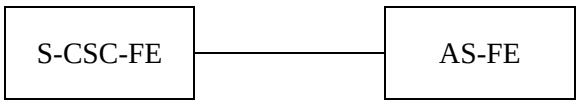
Methods of testing for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.1.1.17 Methods of checking T-17 functionality

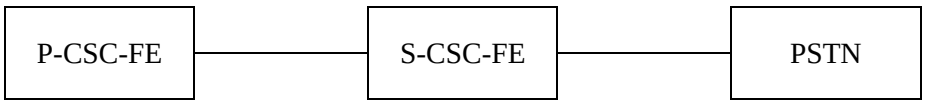
Methods of testing for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.1.1.18 Methods of checking S-1 functionality

Test No.	**S-1_01**
Test Name	**Interaction with AS**
Status	Mandatory
Test purpose	The feasibility check to interact with the application/service support functions to trigger the requested services.

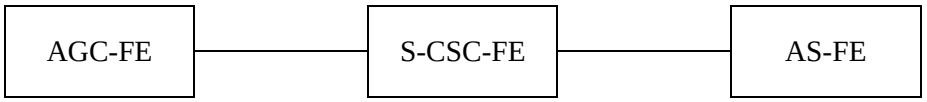
Configuration	
Initial condition	There is a set of specific services (e.g., IN services) implemented at the AS-FE. The S-CSC-FE is configured to detect and forward all specific services requests to the AS-FE.
Test procedure	1) Initiate a request for a service provided by the AS-FE from the EU-FE or PSTN subscriber. 2) Check whether a request for a specific service has been detected by the S-CSC-FE and forwarded to the AS-FE. 3) Check whether the AS-FE has sent an appropriate response to the S-CSC-FE with instructions on handling the request.
Expected results	1) The request for a specific service has been received by the S-CSC-FE and forwarded to the AS-FE. 2) The AS-FE has sent an appropriate response to the correct S-CSC-FE containing instructions for handling a specific service request.

Test No.	**S-1_02**
Test Name	**Registration**
Status	Mandatory
Test purpose	The feasibility check to process requests from users (and terminals) for registration.
Configuration	
Initial condition	There is a SIP-terminal connected to the NGN. It is configured to send all SIP messages through the P-CSC-FE.
Test procedure	1) Initiate a REGISTER request from the SIP-terminal. 2) Check whether a REGISTER request has been received by the I-CSC-FE from the P-CSC-FE and forwarded to the S-CSC-FE. 3) Check whether, after receiving the REGISTER request from the I-CSC-FE, the S-CSC-FE has sent a 401 (Unauthorized) response in order to authenticate the end-user. 4) Check whether, after receiving the second REGISTER request with authorization data from the I-CSC-FE, the S-CSC-FE has updated the specific information about the end-user in the SUP-FE (e.g., its status).
Expected results	1) The S-CSC-FE has received the REGISTER request from a SIP-terminal through the I-CSC-FE. 2) The S-CSC-FE has sent a 401 (Unauthorized) response with the authorization data in the field WWW-Authenticate. 3) The S-CSC-FE has updated the specific information about the end-user in the SUP-FE. 4) The S-CSC-FE has sent a successful registration response to the SIP-terminal in the reverse direction.

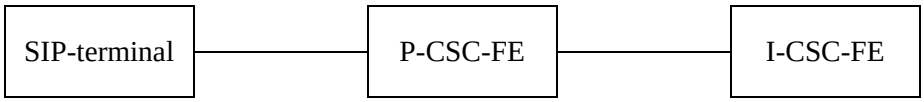
Test No.	**S-1_03**
Test Name	**Routing messages**
Status	Mandatory
Test purpose	The feasibility check to route messages to terminals based on the routing (location) information obtained at registration.
Configuration	
Initial condition	There are two SIP terminals (SIP-1, SIP-2) connected to the NGN and registered on the same S-CSC-FE. One uses the P-CSC-FE No. 1 and the other uses the P-CSC-FE No. 2 accordingly.
Test procedure	1) Initiate a call from PSTN to the SIP-1 terminal. 2) Check whether the S-CSC-FE has received an INVITE message with the Request URI field equal to the SIP-1 URI. 3) Check whether the S-CSC-FE has forwarded the INVITE message to the P-CSC-FE No. 1 based on the routing (location) information obtained at registration. 4) Release the call from the PSTN side. 5) Initiate a call from PSTN to the SIP-2 terminal. 6) Check whether the S-CSC-FE has received an INVITE message with the Request URI field equal to the SIP-2 URI and forwarded the INVITE message to the P-CSC-FE No. 2.
Expected results	1) The S-CSC-FE has received an INVITE message with the Request URI field equal to the SIP-1 URI. 2) The S-CSC-FE has forwarded the INVITE message to the P-CSC-FE No. 1. 3) The S-CSC-FE has forwarded the second INVITE message to the P-CSC-FE No. 2.

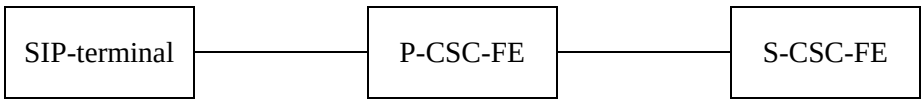
Test No.	**S-1_04**
Test Name	**Interaction with AGC-FE**
Status	Mandatory
Test purpose	The feasibility check to interact with the AGC-FE to communicate with PSTN or ISDN users.
Configuration	
Initial condition	There is a legacy terminal connected to the NGN through the AMG-FE.

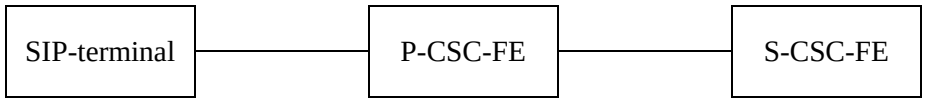
Test procedure	1) Initiate a call from the legacy terminal to the PSTN subscriber. 2) Check whether the S-CSC-FE has received a call establishment request from the AGC-FE. 3) Check whether, after obtaining the address of a contact point in the PSTN from a database, the S-CSC-FE has forwarded the request to the BGC-FE. 4) Check whether all responses from the BGC-FE and the MGC-FE were correctly forwarded to the AGC-FE through the S-CSC-FE.
Expected results	1) The S-CSC-FE has received a call establishment request from the AGC-FE. 2) The S-CSC-FE has forwarded the request to the BGC-FE responsible for the requested PSTN breakout. 3) All provisional and final responses from the BGC-FE and the MGC-FE were correctly forwarded to the AGC-FE through the S-CSC-FE.

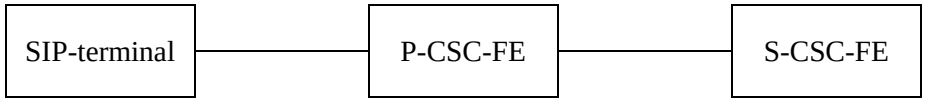
Test No.	**S-1_05**
Test Name	**Support of services**
Status	Mandatory
Test purpose	The feasibility check to maintain a session state as needed by the network operator for the support of the services.
Configuration	
Initial condition	There is a specific service (e.g., voicemail) implemented at the AS-FE. The S-CSC-FE is configured to detect and process all specific service requests under the AS-FE control.
Test procedure	1) Initiate a request for a service provided by the AS-FE (e.g., voicemail) from the EU-FE or PSTN subscriber. 2) Check whether a request for a specific service has been detected by the S-CSC-FE and forwarded to the AS-FE. 3) Check whether the AS-FE has sent a command to the S-CSC-FE to change the current session state. 4) Check whether the S-CSC-FE has changed the current session state (e.g., has connected the end-user to the media resources) and the end-user has received the requested service (e.g., left a message in the voicemail box).
Expected results	1) The request for a specific service has been received by the S-CSC-FE and forwarded to the AS-FE. 2) The AS-FE has sent a command to the S-CSC-FE to change the current session state. 3) The S-CSC-FE has changed the current session state and the end-user has received the requested service.

5.1.1.19 Methods of checking S-2 functionality

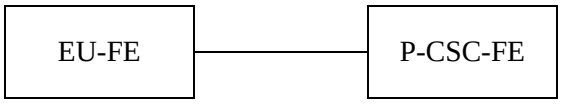
Test No.	**S-2_01**
Test Name	**Forward a register request from the terminal**
Status	Mandatory
Test purpose	The feasibility check to forward a register request received from a terminal to an I-CSC-FE determined to use the home domain name, as provided by the terminal.
Configuration	
Initial condition	There is a SIP-terminal connected to the NGN. It is configured to send all SIP messages through the P-CSC-FE. SIP URI of the terminal is assigned to a specific domain. This specific domain is associated with one of the I-CSC-FEs.
Test procedure	1) Initiate a REGISTER request from the SIP-terminal. 2) Check whether a REGISTER request has been received by the P-CSC-FE. 3) Check whether the P-CSC-FE on receipt of a REGISTER request forwards the message to the correct I-CSC-FE according to the home domain name in the SIP URI.
Expected results	1) The P-CSC-FE has received a REGISTER request from a SIP-terminal. 2) The P-CSC-FE has forwarded a REGISTER request to the I-CSC-FE associated with the domain name in the SIP URI and has received the name of the SIP server (e.g., S-CSC-FE) in a response from the I-CSC-FE.

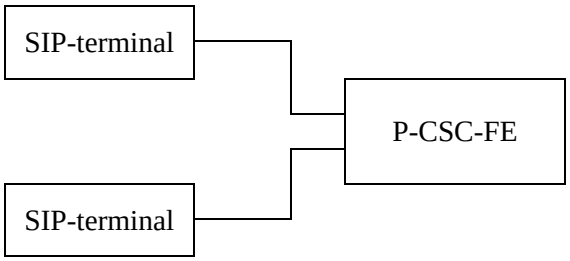
Test No.	**S-2_02**
Test Name	**Forward SIP messages from the terminal to the SIP server**
Status	Mandatory
Test purpose	The feasibility check to forward SIP messages received from the terminal to the SIP server (e.g., an S-CSC-FE) whose name the P-CSC-FE has received as a result of the registration procedure.
Configuration	
Initial condition	There is a SIP-terminal connected to the NGN. It is registered in the P/S/I-CSC-FE. There is a specific S-CSC-FE assigned to a SIP-terminal in the P-CSC-FE.
Test procedure	1) Initiate an INVITE request from the SIP-terminal. 2) Check whether an INVITE request has been received by the P-CSC-FE. 3) Check whether the P-CSC-FE on receipt of an INVITE request forwards the message to the correct S-CSC-FE according to the information on its database.
Expected results	1) The P-CSC-FE has received an INVITE request from a SIP-terminal. 2) The P-CSC-FE has forwarded an INVITE request to the S-CSC-FE assigned to the specific SIP-terminal.

Test No.	**S-2_03**
Test Name	**Forward a SIP request to the SIP-terminal**
Status	Mandatory
Test purpose	The feasibility check to forward SIP requests or responses to the SIP-terminal.
Configuration	
Initial condition	There is a SIP-terminal connected to the NGN. It is registered on the P/S/I-CSC-FE. There is a specific S-CSC-FE assigned to the SIP-terminal on the P-CSC-FE. Also there is a legacy terminal connected to the NGN.
Test procedure	1) Initiate a call from the legacy terminal to the SIP-terminal. 2) Check whether an INVITE request has been received by the P-CSC-FE from the S-CSC-FE. 3) Check whether the P-CSC-FE on receipt of an INVITE request forwards the message to the correct SIP-terminal. 4) Check whether the P-CSC-FE on receipt of a response from the SIP-terminal forwards the message to the S-CSC-FE.
Expected results	1) The P-CSC-FE has received an INVITE request from the S-CSC-FE. 2) The P-CSC-FE has forwarded an INVITE request to the correct SIP-terminal determined in the SIP URI. 3) The P-CSC-FE has forwarded back the response from the SIP-terminal to the same S-CSC-FE.

Test No.	**S-2_04**
Test Name	**Emergency session establishment requests**
Status	Mandatory
Test purpose	The feasibility check to detect and handle emergency session establishment requests.
Configuration	
Initial condition	There is a SIP-terminal connected to the NGN. It is registered in the P/S/I-CSC-FE. There is a specific S-CSC-FE assigned to the SIP-terminal in the P-CSC-FE. The end-user is not allowed to make calls from this SIP-terminal (e.g., user account is blocked because of lack of financial resources). The P-CSC-FE is configured to send all emergency call establishment requests to the S-CSC-FE.

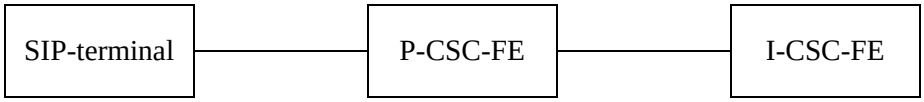
Test procedure	1) Initiate a call from the SIP-terminal to the NGN. 2) Check whether the P-CSC-FE has not forwarded a call establishment request from the SIP-terminal to the S-CSC-FE. 3) Initiate an emergency call from the SIP-terminal (e.g., 112, 911, etc.). 4) Check whether the P-CSC-FE has detected an emergency call and has forwarded an INVITE request to the correct S-CSC-FE.
Expected results	1) A normal call could not be established. 2) An emergency call could be processed.

Test No.	**S-2_05**
Test Name	**Security**
Status	Optional
Test purpose	The feasibility check to maintain a security association between itself and each terminal.
Configuration	
Initial condition	There is an end-user connected to the NGN via the SIP-terminal. It is not registered in the NGN. The SIP-terminal and the P-CSC-FE are configured to establish security associations (SAs) for each session.
Test procedure	1) Initiate a registration from the end-user. 2) Check whether the SIP-terminal has transmitted all security parameters required for SA establishment on the SIP-terminal side to the P-CSC-FE. 3) Check whether the P-CSC-FE has sent the 401 (Unauthorized) response with the security parameters required for SA establishment on the P-CSC-FE side. 4) Check whether the SA has been established between the SIP-terminal and the P-CSC-FE and the SIP messages exchange is provided in secure mode.
Expected results	The SA between the SIP-terminal and the P-CSC-FE has been successfully established.

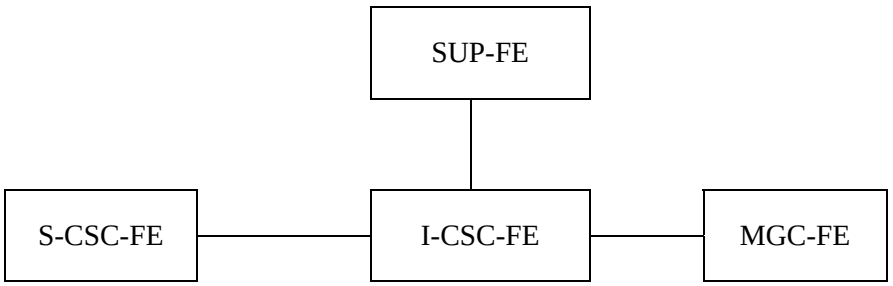
Test No.	**S-2_06**
Test Name	**NAT traversal**
Status	Mandatory
Test purpose	The feasibility check to support an NAPT proxy function (NPF) for network address hiding and remote NAT traversal.
Configuration	

Initial condition	There are two SIP-terminals connected to the NGN. They are registered in the P-CSC-FE and the I-CSC-FE. There is a specific S-CSC-FE assigned to these SIP-terminals in the P-CSC-FE.
Test procedure	1) Initiate a call from the SIP-terminal to another one. 2) Check whether the address binding information was provided by RACF. 3) Check whether the P-CSC-FE modifies the addresses and/or ports contained in the message bodies of SIP signalling messages, according to the information provided by the RACF.
Expected results	1) The address binding information is correct. 2) Signalling messages processed by P-CSC-FE contain the correct address information.

5.1.1.20 Methods of checking S-3 functionality

Test No.	**S-3_01**
Test Name	**Registration**
Status	Mandatory
Test purpose	The feasibility check to assign an S-CSC-FE to a user performing SIP registration.
Configuration	
Initial condition	There is a SIP-terminal connected to the NGN. It is configured to send all SIP messages through the P-CSC-FE.
Test procedure	1) Initiate a REGISTER request from the SIP-terminal. 2) Check whether a REGISTER request has been forwarded by the P-CSC-FE to the I-CSC-FE. 3) Check whether the I-CSC-FE has assigned the S-CSC-FE to a user performing SIP registration and has sent the corresponding name of the S-CSC-FE to the P-CSC-FE.
Expected results	1) The I-CSC-FE has received a REGISTER request from a SIP-terminal through the P-CSC-FE. 2) The I-CSC-FE has stored the address of the S-CSC-FE assigned to the user in the SUP-FE. 3) The P-CSC-FE has received the name of the S-CSC-FE in a response from the I-CSC-FE.

Test No.	**S-3_02**
Test Name	**Session-related and session-unrelated flows**
Status	Mandatory
Test purpose	The feasibility check to obtain from the SUP-FE the address of the currently assigned S-CSC-FE. The feasibility check to forward a SIP request or response to the S-CSC-FE determined by the above step for the incoming sessions.

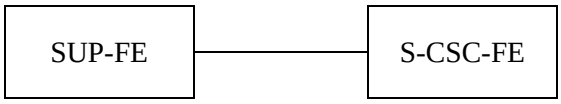
Configuration	
Initial condition	There is a SIP-terminal connected to the NGN. There is a specific S-CSC-FE assigned to the SIP-terminal.
Test procedure	1) Initiate a call from the PSTN subscriber to the SIP-terminal. 2) Check whether the I-CSC-FE has received a call establishment request from the MGC-FE. 3) Check whether the I-CSC-FE has retrieved the address of the S-CSC-FE assigned to the SIP-terminal. 4) Check whether after receiving the S-CSC-FE address from the SUP-FE the I-CSC-FE has forwarded a call establishment request to the corresponding S-CSC-FE.
Expected results	1) The I-CSC-FE has received a call establishment request from the MGC-FE. 2) The I-CSC-FE has received the correct S-CSC-FE address from the SUP-FE. 3) The I-CSC-FE has forwarded a call establishment request to the appropriate S-CSC-FE.

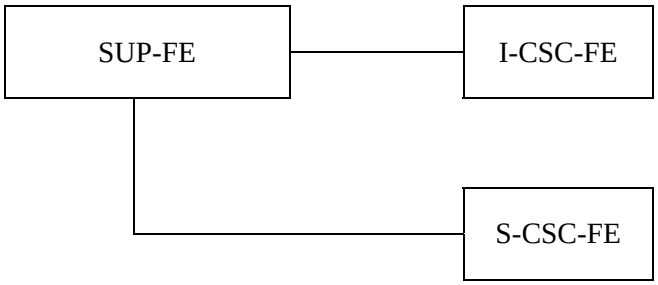
5.1.1.21 Methods of checking S-4 functionality

Test No.	**S-4_01**
Test Name	**Obtaining of the address**
Status	Mandatory
Test purpose	The feasibility check to find the address of the physical entity that holds the subscriber data for a given user identity when SUP-FE consists of multiple physical entities.
Configuration	
Initial condition	There are two minimum physical entities of SUP-FE (SUP-PE-1 and SUP-PE-2) in the NGN. The subscriber data for a user's identifier No. 1 are stored in the SUP-PE-1 and for the user's identifier No. 2 in the SUP-PE-2. The SL-FE contains the addresses of all SUP-PEs.

Test procedure	1) Initiate a registration for an end-user with identifier No. 1. 2) Check whether the S-CSC-FE, in order to find out the SUP-FE which holds subscriber data for the end-user with identifier No. 1, has sent the request to the SL-FE. 3) Check whether the SL-FE has received the request from the S-CSC-FE and returned the response with the address of the SUP-PE-1. 4) Initiate a registration for an end-user with identifier No. 2. 5) Repeat action 2 for the end-user with identifier No. 2. 6) Check whether the SL-FE has received the request with user's identifier No. 2 from the S-CSC-FE and returned the response with the address of the SUP-PE-2.
Expected results	1) The S-CSC-FE has sent the request to the SL-FE with user's identifier No. 1. 2) The SL-FE has returned the response with the address of the SUP-PE-1. 3) For the second request from the S-CSC-FE with user's identifier No. 2, the SL-FE has returned the response with the address of the SUP-PE-2.

5.1.1.22 Methods of checking S-5 functionality

Test No.	**S-5_01**
Test Name	**User profile management**
Status	Mandatory
Test purpose	The feasibility check to perform basic data management and maintenance functions.
Configuration	
Initial condition	There is an end-user terminal connected to the NGN. There is no user profile for this end-user in the SUP-FE.
Test procedure	1) Create user profile for the end-user with a unique identifier and a basic set of services. 2) Check whether the user profile has been successfully stored in the SUP-FE. 3) Check whether the end-user status is 'not registered'. 4) Initiate a registration for the end-user. 5) Check whether the SUP-FE has updated the status of end-user in the user profile by enquiring from the S-CSC-FE. 6) Delete the user profile from the SUP-FE. 7) Check whether the user profile has been deleted from the SUP-FE.
Expected results	1) New user profile has been successfully stored in the SUP-FE. 2) The end-user status is 'not registered'. 3) The SUP-FE has updated the status of the end-user after registration. 4) The user profile has been deleted from the SUP-FE.

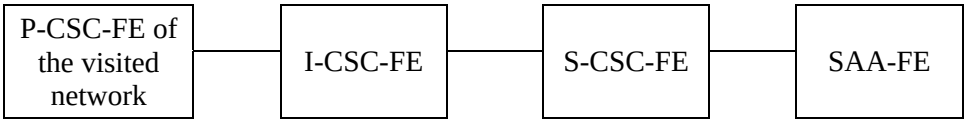
Test No.	**S-5_02**
Test Name	**Providing access to user data**
Status	Mandatory
Test purpose	The feasibility check to respond to queries for user profiles.
Configuration	
Initial condition	There is a user profile for the specific end-user in the SUP-FE. Specific S-CSC-FE is assigned for serving the end-user in the user profile. The end-user is not registered at the SUP-FE.
Test procedure	1) Initiate a registration for the specific end-user. 2) Check whether, after receiving the S-CSC-FE name request from the I-CSC-FE, the SUP-FE has returned the correct S-CSC-FE name. 3) Check whether, after receiving the user profile request from the S-CSC-FE, the SUP-FE has responded with a user profile of the appropriate end-user.
Expected results	1) The SUP-FE has sent the correct name of S-CSC-FE assigned to the end-user to the I-CSC-FE. 2) The SUP-FE has sent the user profile of the requested end-user to the S-CSC-FE.

5.1.1.23 Methods of checking S-6 functionality

Test No.	**S-6_01**
Test Name	**Rights of end-user**
Status	Mandatory
Test purpose	The feasibility check to ensure that the end-user has valid utilization rights for the requested service.
Configuration	
Initial condition	There is an end-user connected to the NGN. The end-user is registered in the NGN. The end-user has the rights for a basic set of services, but has no rights for a specific service (e.g., voicemail).

Test procedure	1) Initiate a request for the basic service from the end-user. 2) Check whether the S-CSC-FE has received the request for a service from the end-user and has transmitted the request for authorization to the SAA-FE. 3) Check whether the SAA-FE, in order to ensure that the end-user has valid utilization rights for the requested service, has sent the user profile request to the SUP-FE. 4) Check whether the SUP-FE has returned the user profile to the SAA-FE. 5) Check whether the SAA-FE, after receiving the user profile, has made a decision to authorize the service request and has sent a successful authorization response to the end-user through the S-CSC-FE. 6) Repeat actions 1 to 4 for a specific service. 7) Check whether the SAA-FE has sent an unsuccessful authorization response to the end-user through the S-CSC-FE.
Expected results	1) The SAA-FE has authorized the end-user request for a basic service. 2) The SAA-FE has not authorized the end-user request for the specific service.

Test No.	**S-6_02**
Test Name	**Using policy rules**
Test purpose	The feasibility check to provide a policy control at the service level by using policy rules contained in a user profile database.
Configuration	
Initial condition	There is an end-user connected to the NGN. The end-user is registered in the NGN. The end-user has the rights for a basic set of services, but with a certain policy (e.g., international calls are denied).
Test procedure	1) Initiate a request for the basic service which meets the requirements of the policy rules from the end-user. 2) Check whether the S-CSC-FE has received the request for a service from the end-user and has transmitted the request for authorization to the SAA-FE. 3) Check whether the SAA-FE, in order to ensure that the end-user has rights for the requested service, has sent the user profile request to the SUP-FE. 4) Check whether the SUP-FE has returned the user profile to the SAA-FE. 5) Check whether the SAA-FE, after receiving the user profile, has made a decision to authorize the service request and has sent a successful authorization response to the end-user through the S-CSC-FE. 6) Repeat actions 1 to 4 for a basic service which does not meet the requirements of the policy rules. 7) Check whether the SAA-FE has sent an unsuccessful authorization response to the end-user through the S-CSC-FE.
Expected results	1) The SAA-FE has authorized the end-user request for a basic service which meets the requirements of the policy rules. 2) The SAA-FE has not authorized the end-user request for the basic service which does not meet the requirements of the policy rules.

Test No.	S-6_03
Test Name	**Mobility management**
Test purpose	The feasibility check to provide access to NGN services in a visited network.
Configuration	
Initial condition	There is an end-user connected to the visited NGN via SIP-terminal. The roaming function is activated for the end-user.
Test procedure	1) Initiate a request for the basic service from the end-user located in the visited network. 2) Check whether the S-CSC-FE in the home network has received the request for a service from the P-CSC-FE of the visited network and has transmitted the request for authorization to the SAA-FE. 3) Check whether the SAA-FE, in order to ensure that the end-user has valid rights for the requested service in the visited network, has sent the user profile request to the SUP-FE. 4) Check whether the SUP-FE has returned the user profile to the SAA-FE. 5) Check whether the SAA-FE, after receiving the user profile, has made a decision to authorize the service request and has sent a successful authorization response to the end-user through the S-CSC-FE. 6) Deactivate the roaming function 7) Repeat actions 1 to 4. 8) Check whether the SAA-FE has sent an unsuccessful authorization response to the end-user through the S-CSC-FE.
Expected results	1) The SAA-FE has authorized the end-user request for the service in the visited network. 2) After deactivation of the roaming function for the end-user, the SAA-FE has not authorized the end-user request for the service in the visited network.

5.1.1.24 Methods of checking S-7 functionality

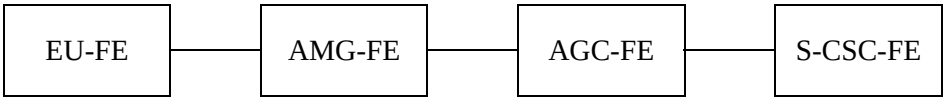
Methods of testing for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.1.1.25 Methods of checking S-8 functionality

Test No.	S-8_01
Test Name	**Signalling translation and conversion**
Status	Mandatory
Test purpose	The feasibility check to provide signalling translation and conversion between up-links and down-links or between SIP and H.248-based control.
Configuration	

Initial condition	There is a legacy end-user terminal connected to the AMG-FE.
Test procedure	1) Initiate a call from a legacy end-user terminal to the NGN. 2) Check whether a call has reached the S-CSC-FE through the up-link from the AGC-FE. 3) Check whether called party number, calling party number, session description parameters were successfully translated from the down-link into the up-link signalling protocols and in the reverse direction.
Expected results	The most call sensitive parameters were correctly translated from the down-link into the up-link signalling protocols and in the reverse direction.

Test No.	**S-8_02**
Test Name	**Providing ISDN supplementary services**
Status	Mandatory
Test purpose	The feasibility check to initiate and terminate UNI protocols in order to provide ISDN supplementary services.
Configuration	
Initial condition	There is a connection between the ISDN EU-FE and the AMG-FE.
Test procedure	1) Initiate a request for a supplementary service from ISDN EU-FE to the AMG-FE using the UNI protocol. 2) Check whether the AMG-FE backhauls initial UNI protocol signalling to the AGC-FE using the appropriate signalling protocol. 3) Check whether a supplementary service request has been received by the AGC-FE and forwarded to the S-CSC-FE for processing. 4) Check whether the appropriate responses have been sent from the S-CSC-FE to the EU-FE through the AMG-FE and the AGC-FE. 5) Check the realization of the supplementary service logic for the ISDN EU-FE.
Expected results	1) The AMG-FE backhauls UNI protocol signalling to the AGC-FE using the appropriate signalling protocol. 2) The S-CSC-FE has sent responses specific to the supplementary service logic through the AGC-FE. 3) The ISDN EU-FE has received the requested supplementary service.

Test No.	**S-8_03**
Test Name	**Forwarding requests**
Status	Mandatory
Test purpose	The feasibility check to process and forward requests and session control flow from the AMG-FE to the S-CSC-FE
Configuration	

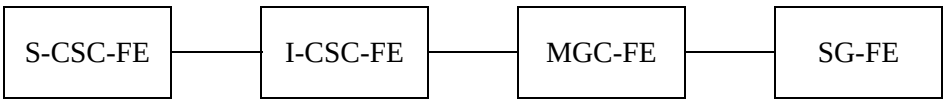
Initial condition	There is a connection between the EU-FE and the AMG-FE.
Test procedure	1) Initiate a call from the EU-FE to the NGN through the AMG-FE. 2) Check whether a call control signalling received from the AMG-FE is processed and forwarded by the AGC-FE to the S-CSC-FE. 3) Check whether, after receiving a call establishment request, the S-CSC-FE sends the appropriate response in the reverse direction through the AGC-FE to the affected AMG-FE. 4) Check whether a call has been established between EU-FE and the NGN through the AMG-FE. 5) Release a call from the EU-FE side. 6) Check whether, after receiving a call termination request, the S-CSC-FE sends the acknowledge response in the reverse direction through the AGC-FE to the affected AMG-FE. 7) Check whether a call has been terminated.
Expected results	1) A request for a call establishment received from the AMG-FE is processed and forwarded by the AGC-FE to the S-CSC-FE. 2) The S-CSC-FE has sent the appropriate response in the reverse direction through the AGC-FE to the affected AMG-FE. 3) A call is established between the EU-FE and the NGN through the AMG-FE. 4) The S-CSC-FE has sent the acknowledge response in the reverse direction through the AGC-FE to the affected AMG-FE. 5) A call is terminated.

Test No.	**S-8_04**
Test Name	**Forwarding value-added service requests**
Status	Mandatory
Test purpose	The feasibility check to process and forward value-added service requests from the AMG-FE to the AS-FE through the S-CSC-FE
Configuration	
Initial condition	There is a connection between the EU-FE and the AMG-FE.
Test procedure	1) Initiate a request for a value-added service (e.g., multimedia 800 service) provided by the AS-FE from the EU-FE. 2) Check whether a request received from the AMG-FE is processed and forwarded by the AGC-FE to the AS-FE through the S-CSC-FE.
Expected results	A request for a value-added service received from the AMG-FE is processed and forwarded by the AGC-FE to the AS-FE through the S-CSC-FE.

Test No.	**S-8_05**
Test Name	**NAPT proxy function**
Status	Mandatory
Test purpose	The feasibility check to support an NAPT proxy function (NPF) for network address hiding and remote NAT traversal.

Configuration	
Initial condition	There is one legacy terminal connected to the NGN through the AMG-FE. Access from NGN to PSTN is configured.
Test procedure	1) Initiate a call from the legacy terminal connected through AMG-FE to one of the PSTN terminals. 2) Check whether the address binding information was provided by RACF. 3) Check whether the AGC-FE modifies the addresses and/or ports contained in the message bodies of application signalling messages, according to the information provided by the RACF.
Expected results	1) The address binding information is correct. 2) Signalling messages processed by AGC-FE contain the correct address information.

5.1.1.26 Methods of checking S-9 functionality

Test No.	**S-9_01**
Test Name	**Forwarding requests**
Status	Mandatory
Test purpose	The feasibility check to process and forward requests from the SG-FE to the S-CSC-FE through the I-CSC-FE.
Configuration	
Initial condition	There is a signalling connection between the PSTN/ISDN and the SG-FE.
Test procedure	1) Initiate a call from the PSTN/ISDN to the NGN. 2) Check whether a PSTN/ISDN call control signalling received from the SG-FE has been processed and forwarded by the MGC-FE to the S-CSC-FE through the I-CSC-FE. 3) Check whether, after receiving a call establishment request, the S-CSC-FE sends the appropriate response in the reverse direction through the I-CSC-FE, the MGC-FE to the affected SG-FE.
Expected results	1) A request for a call establishment received from the SG-FE is processed and forwarded by the MGC-FE to the S-CSC-FE through the I-CSC-FE. 2) The S-CSC-FE has sent the appropriate response in the reverse direction through the I-CSC-FE, the MGC-FE to the affected SG-FE.

5.1.1.27 Methods of checking S-10 functionality

Test No.	**S-10_01**
Test Name	**Interworking with different PSTN breakouts**
Status	Mandatory
Test purpose	The feasibility check to select defined MGC for interworking with defined PSTN breakouts.
Configuration	
Initial condition	There are two PSTN breakouts connected to the NGN. Each PSTN breakout is assigned to a specific MGC.
Test procedure	1) Initiate a call from the NGN to one of the PSTN breakouts. 2) Check whether the BGC-FE has selected the appropriate MGC for current call processing according to the information in its database. 3) Initiate a call from the NGN to another PSTN breakout. 4) Check whether the BGC-FE has selected the other MGC defined for the specific PSTN breakout.
Expected results	1) The BGC-FE has selected the MGC defined for the first PSTN breakout. 2) For the second call, the BGC-FE has selected another MGC defined for the second PSTN breakout.

5.1.1.28 Methods of checking S-11 functionality

Test No.	**S-11_01**
Test Name	**Interworking (access-to-core)**
Status	Mandatory
Test purpose	The feasibility check to provide an interaction for different types of application signalling at the subscriber side (access-to-core).
Configuration	
Initial condition	There is one NGN end-user terminal connected to the NGN UNI.
Test procedure	1) Initiate a call from the NGN end-user terminal to the NGN under tests through the USIW-FE, using the user signalling protocol, which is not specified in the P-CSC-FE. 2) Check whether the USIW-FE has translated the incoming network signalling protocol into one used by the P-CSC-FE and has forwarded the initial call session establishment request to the P-CSC-FE. 3) Check whether the P-CSC-FE has received the incoming request and has answered with the appropriate response, through the USIW-FE to the NGN end-user terminal.

Expected results	1) The USIW-FE has forwarded the initial call session establishment request to the P-CSC-FE in the appropriate format. 2) The USIW-FE has translated and forwarded the call establishment response from the P-CSC-FE to the NGN end-user terminal accordingly.

5.1.1.29 Methods of checking S-12 functionality

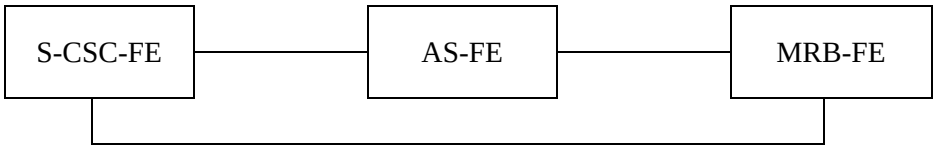
Test No.	**S-12_01**
Test Name	**Interworking (inter-operator)**
Status	Mandatory
Test purpose	The feasibility check to provide an interworking for different types of application signalling at the trunk side (inter-operator).
Configuration	
Initial condition	There is a connection between Other NGN and the NGN under tests.
Test procedure	1) Initiate a call from Other NGN to the NGN under tests through the NSIW-FE, using the network signalling protocol, which is not specified in the IBC-FE. 2) Check whether the NSIW-FE has translated the incoming network signalling protocol into one used by the IBC-FE and has forwarded the initial call session establishment request to the IBC-FE. 3) Check whether the IBC-FE has received the incoming request and has answered with the appropriate response, through the NSIW-FE to the Other NGN.
Expected results	1) The NSIW-FE has forwarded the initial call session establishment request to the IBC-FE in the appropriate format. 2) The NSIW-FE has translated and forwarded the call establishment response from the IBC-FE to Other NGN accordingly.

5.1.1.30 Methods of checking S-13 functionality

Test No.	**S-13_01**
Test Name	**Media resources allocation**
Status	Mandatory
Test purpose	The feasibility check to allocate/assign MRP-FE resources that are needed for services.
Configuration	
Initial condition	There is an end-user terminal connected to the NGN.

Test procedure	1) Initiate a call from the end-user terminal to the NGN, which requires media resource allocation (e.g., a call to a non-existent number or the request for an intelligent service, etc.). 2) Check whether the appropriate S-CSC-FE after detecting a need of media resource allocation has forwarded the specified command to the MRC-FE to allocate an appropriate media resource in the MRP-FE. 3) Check whether the end-user has received the appropriate media information.
Expected results	1) The S-CSC-FE has forwarded the command to the MRP-FE. 2) The end-user has received the appropriate media information.

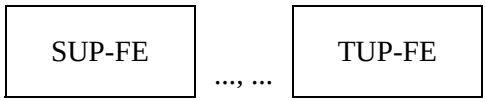
5.1.1.31 Methods of checking S-14 functionality

Test No.	**S-14_01**
Test Name	**Media server resources control**
Status	Mandatory
Test purpose	The feasibility check to assign media server resources for real-time calls coming into the network.
Configuration	
Initial condition	There is a specific service (e.g., ring back tone) implemented at the AS-FE with the use of the MRP-FE. The S-CSC-FE is configured to detect and process all specific service requests under the AS-FE control. The MRB-FE receives the media resource utilization statistics (i.e., MRC-FE and MRP-FE) from the S-CSC-FE in real-time mode.
Test procedure	1) Initiate a request for a service provided by the AS-FE (e.g., ring back tone) from the EU-FE or PSTN subscriber. 2) Check whether a request for a specific service has been detected by the S-CSC-FE and forwarded to the AS-FE. 3) Check whether the AS-FE has sent a media resource assignment request to the MRB-FE. 4) Check whether the MRB-FE has sent the response to the AS-FE with the most idle MRP-FE.
Expected results	1) The AS-FE has sent a media resource assignment request to the MRB-FE. 2) The MRB-FE has sent the response to the AS-FE with the most idle MRP-FE.

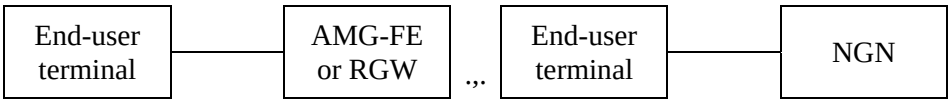
5.1.1.32 Methods of checking S-15 functionality

Methods of testing for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.1.1.33 Methods of checking service user profile function

Test No.	**SUP_01**
Test Name	**Information for user profile**
Status	Mandatory
Test purpose	The check of the possibility to represent the combination of user information and other control data into a single user profile function in the service stratum.
Configuration	
Initial condition	There is a user profile provisioned for a specific end-user in the SUP-FE.
Test procedure	1) Query a user profile for a specific end-user from the SUP-FE. 2) Check whether a user profile contains such user information, as unique user id, user terminal allocation, user terminal description, etc. 3) Check whether a user profile contains also such control information, as authentication data, etc.
Expected results	A user profile for a specific end-user contains both the user information and control data.

5.1.1.34 Methods of checking end user function

Test No.	**EUF_01**
Test Name	**Connected terminals**
Status	Mandatory
Test purpose	The check of the possibility to connect various user terminal equipment to an NGN network.
Configuration	
Initial condition	There are no end-user terminals connected to the NGN.
Test procedure	1) Connect the legacy end-user terminal to the AMG-FE or RGW and set the initial configuration parameters. 2) Initiate a basic call from the legacy terminal to the NGN. 3) Check whether a call has been established and the end-user traffic has been forwarded through the AMG-FE or RGW to the NGN. 4) Release the call and check whether it has been terminated. 5) Repeat actions 1 to 4 for NGN end-user terminals (i.e., SIP, H.323, MGCP, etc.).
Expected results	1) A call has been established for different types of end-user terminals. 2) The end-users traffic has been forwarded to the NGN accordingly.

5.1.2 NGN TM load & stress testing

NGN TM testing under load assumes the check of all the functions, defined in clause 5.1.1, under 50% and 90% TM load and stress.

In this case, all functionality of NGN TM must be realized.

5.1.3 NGN TM conformance testing

Table 3 shows the list of common legacy ITU-T and ETSI protocol profiles which are used during conformance testing.

Table 3 – Protocols & interfaces test profiles

No.	Protocol	References to protocol test specifications		
		PICS	TSS&TP	ATS, PIXIT
1	SIP [b-IETF RFC 3261]	[b-ETSI TS 102 027-1]	[b-ETSI TS 102 027-2]	[b-ETSI TS 102 027-3] (Note 1)
2	MGCP	To be determined		
3	[b-ITU-T H.248]	[b-ETSI TS 101 889-1]	[b-ETSI TS 101 889-2]	[b-ETSI TS 101 889-3] (Note 2)
4	BICC	[b-ETSI TS 186 002-1]	[b-ETSI TS 186 002-2]	
5	[b-ITU-T H.225.0]	[b-ETSI TS 101 804-1]	[b-ETSI TS 101 804-2]	[b-ETSI TS 101 804-3] (Note 2)
6	[b-ITU-T H.245]	[b-ETSI TS 101 890-1]	[b-ETSI TS 101 890-2]	[b-ETSI TS 101 890-3] (Note 2)
7	DSS1	[b-ETSI EN 300 403-3]	[b-ETSI EN 300 403-6]	[b-ETSI EN 300 403-7] (Note 2)
8	ISUP	[b-ETSI EN 300 356-31]	[b-ETSI EN 300 356-32]	[b-ITU-T Q.784], [b-ETSI EN 300 356-33] (Note 2)
		[b-ETSI EN 300 356-34]	[b-ETSI EN 300 356-35]	[b-ITU-T Q.785], [b-ETSI EN 300 356-36] (Note 2)
9	MTP [b-ITU-T Q.701, Q.702, Q.703, Q.704, Q.705, Q.706, Q.707 and Q.708]	[b-ETSI ETS 300 008-2]		[b-ITU-T Q.781], [b-ITU-T Q.782], [b-ETSI ETS 300 336]
10	SCCP [b-ITU-T Q.711 to Q.716]	[b-ETSI EN 300 009-2]		[b-ITU-T Q.786], [b-ETSI ETS 300 009-3]
11	INAP	[b-ETSI ETS 300 374-2]	[b-ETSI ETS 300 374-3]	[b-ETSI ETS 300 374-4]
12	TCAP			[b-ITU-T Q.787]
13	SIP-ISUP/BICC	[b-ETSI TS 186 002-1]	[b-ETSI TS 186 002-2] Profile A and B	To be determined

Table 3 – Protocols & interfaces test profiles

No.	Protocol	References to protocol test specifications		
		PICS	TSS&TP	ATS, PIXIT
14	SIP-H.323	[ETSI TS 102 237-1]		[ETSI TS 102 237-2]
15	SCTP		[b-ETSI TS 102 369]	
16	M3UA		[b-ETSI TS 102 381]	
17	M2UA		[b-ETSI TS 102 380]	
NOTE 1 – Abstract Test Suite in TTCN-2, according to [ITU-T X.292]. NOTE 2 – Abstract Test Suite in TTCN-3, according to [ITU-T Z.140].				

5.2 Methodology of NUT testing

The NUT testing scheme is shown in Figure 5-2. The first NUT testing stage is based on the methodology mentioned in clause 5.1. The following testing stages shall include: solutions under test in accordance with the methodology defined in this Recommendation; interconnection testing under the methods defined in [ETSI TS 102 237-1], [ETSI TS 102 237-2]; end-to-end testing in accordance with the methods defined in [ETSI TR 101 667]; QoS testing in conformance with [ITU-T Y.1540] and [ITU-T Y.1541]; mobility management testing in conformance with [ITU-T Q.1706].

All NUT tests shall be based on the existing methods and the ones under development (Figure 5-2). Each NUT testing result shall be delivered to the global database whose structure and data format are not defined in this Recommendation.

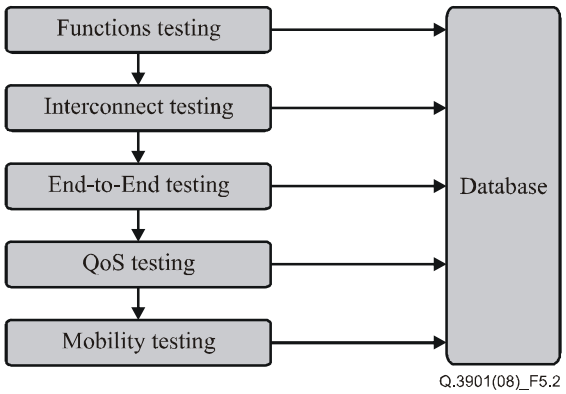


Figure 5-2 – NUT testing methodology

5.2.1 NUT functionality testing

Table 4 shows the list and a short description of NUT basic solutions tests in accordance with the list of mandatory tests described in clause 8 of [ITU-T Q.3900].

Each NUT must consist of different FEs. Before testing, the customer shall define the set of FEs, which are to be tested in the structure of the solution.

Table 4 – Mandatory NUT tests for basic solutions

No. of test	Test description	Basic solutions
1.1	Functions of processing and transferring signalling messages	**Signalling transfer point (STP)**
1.2	Types of numbering systems	
1.3	Accounting system	
1.4	Throughput	
1.5	Operation & Maintenance system	
1.6	Reliability	
2.1	Supported types of services	**Signalling point (SP)**
2.2	Types of supported subscriber lines and types of supported subscriber equipment	
2.3	Types of numbering systems	
2.4	Accounting system	
2.5	Throughput	
2.6	Operation & Maintenance system	
2.7	Reliability	
2.8	Legal intercept	
3.1	Functions of email exchanges by means of SMTP protocol	**Telematic services node**
3.2	Functions of email exchanges by means of POP3 protocol	
3.3	Functions of email exchanges by means of IMAP4 protocol	
3.4	DNS	
3.5	Access to resources by means of HTTP protocol	
3.6	Access to resources by means of NNTP protocol	
3.7	Access to resources by means of FTP protocol	
3.8	Throughput	
3.9	Operation & Maintenance system	
3.10	Reliability	
4.1	Supported types of services	**Distributed private branch exchange (PBX)**
4.2	Types of supported subscriber lines and types of supported subscriber equipment	
4.3	Accounting system	
4.4	Throughput	
4.5	Operation & Maintenance system	
4.6	Reliability	
4.7	Legal intercept	

Table 4 – Mandatory NUT tests for basic solutions

No. of test	Test description	Basic solutions
5.1	Supported types of services	**Mobile switching centre (MSC)**
5.2	Types of numbering systems	
5.3	Accounting system	
5.4	Throughput	
5.5	Operation & Maintenance system	
5.6	Reliability	
5.7	Legal intercept	

5.2.2 NUT interconnect testing

Tests shall be conducted in accordance with [ETSI TS 102 237-1] and [ETSI TS 102 237-2]. Furthermore, methods of testing for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.2.3 NUT end-to-end testing

Tests shall be conducted in accordance with [ETSI TR 101 667]. Furthermore, methods of testing for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.2.4 NUT quality of service testing

Tests shall be conducted in accordance with [ITU-T Y.1540] and [ITU-T Y.1541]. Furthermore, methods of testing for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.2.5 NUT mobility and roaming testing

Mobility management tests shall be conducted in accordance with [ITU-T Q.1706].

Furthermore, methods of testing roaming functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

5.3 NUT service testing

The NUT testing scheme is shown in Figure 5-3. The results of each services testing shall be delivered to the database, whose structure and data format are not defined in this Recommendation.

Testing methods for this functionality will be considered in the context of the other ITU-T Recommendations according to the development of new NGN testing specifications.

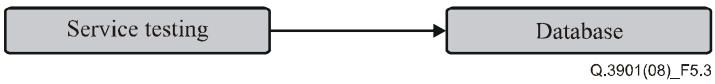


Figure 5-3 – Services testing methodology

Bibliography

[b-ITU-T G.711] Recommendation ITU-T G.711 (1988), *Pulse code modulation (PCM) of voice frequencies*.

[b-ITU-T G.723] Recommendation ITU-T G.723 (1988), *Extensions of Recommendation G.721 adaptive differential pulse code modulation to 24 and 40 kbit/s for digital circuit multiplication equipment application.*

NOTE 1 – The content of the 1988 edition of ITU-T G.723 is now covered by ITU-T G.726.

[b-ITU-T G.729] Recommendation ITU-T G.729 (2007), *Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear prediction (CS-ACELP).*

[b-ITU-T H.225.0] Recommendation ITU-T H.225.0 (2006), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.

[b-ITU-T H.245] Recommendation ITU-T H.245 (2006), *Control protocol for multimedia communication.*

[b-ITU-T H.248] Recommendation ITU-T H.248 (2000), *Gateway control protocol*.

NOTE 2 – ITU-T H.248 was renumbered when revised on 2002-03-29. H.248 main body, Annexes A to E and Appendix I were included in H.248.1. Subsequent annexes were sequentially numbered in the series, e.g., H.248 Annex F became H.248.2.

[b-ITU-T H.323] Recommendation ITU-T H.323 (2006), *Packet-based multimedia communications systems*.

[b-ITU-T Q.70.X] Recommendations ITU-T Q.70.X-series, *Message transfer part (MTP).*

[b-ITU-T Q.71.X] Recommendations ITU-T Q.71.X-series, *Signalling connection control part (SCCP).*

[b-ITU-T Q.781] Recommendation ITU-T Q.781 (2002), *MTP level 2 test specification.*

[b-ITU-T Q.782] Recommendation ITU-T Q.782 (2002), *MTP level 3 test specification.*

[b-ITU-T Q.784] Recommendation ITU-T Q.784 (1991), *ISUP basic call test specification.*

[b-ITU-T Q.785] Recommendation ITU-T Q.785 (1991), *ISUP protocol test specification for supplementary services.*

[b-ITU-T Q.786] Recommendation ITU-T Q.786 (1993), *SCCP test specification.*

[b-ITU-T Q.787] Recommendation ITU-T Q.787 (1997), *Transaction capabilities (TC) test specification.*

[b-ITU-T X.291] Recommendation ITU-T X.291 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Abstract test suite specification.*

[b-ITU-T X.293] Recommendation ITU-T X.293 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Test realization.*

[b-ITU-T X.294] Recommendation ITU-T X.294 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Requirements on test laboratories and clients for the conformance assessment process*.

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[b-ITU-T Z.141] Recommendation ITU-T Z.141 (2006), *Testing and Test Control Notation version 3 (TTCN-3): Tabular presentation format.*

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Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
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