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Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS NNI Interworking Test Specifications; Part 1: Test Purposes for IMS NNI Interworking

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

The present document is part 1 of a multi-part deliverable covering the IMS NNI Interworking Test Specifications, as identified below:

Part 1: "Test Purposes for IMS NNI Interworking";

Part 2: "Test Descriptions for IMS NNI Interworking"

Introduction

The IP Multimedia core network Subsystem (IMS) is a key component in the TISPAN NGN architecture. Each IMS consists of multiple functional entities and interfaces. The goal of this work is to provide the interoperability tests for standardized network to network interfaces (NNI) of the IMS core network that are based on SIP messages.

Test purposes defined in the present document have been developed based on the requirements stated in the 3GPP IMS Release 7 IMS specification that TISPAN Release 1 has been derived from.

1 Scope

The present document specifies interoperability Test Purposes (TPs) for IMS NNI interworking based on the IP Multimedia Call Control Protocol based on Stage 3 Session Initiation Protocol (SIP) and Session Description Protocol (SDP) standard, TS 124 229 Release 7 [1] from which ETSI TISPAN IMS Release 1 has been derived. For the assessment of IMS core network requirements related to the ISC interface parts of the supplementary services HOLD [6], CDIV [7], ACR-CB [8], and OIP/OIR [9] have been used.

TPs are defined using the TPLan notation also described in ES 202 553 [4]. Test purposes have been written based on the test specification framework described in TS 102 351 [2] and the interoperability testing methodology defined in TS 102 237-1 [3], i.e. interoperability testing with conformance checking.

The scope of these test purposes is not to cover all requirements specified in TS 134 229 [5]. TPs have been only specified for requirements that are observable at the interface between two IMS core network implementations, i.e. IMS NNI. For the purpose of the present document an IMS core network as a whole - not its components - are considered to be under test.

NOTE: Requirements pertaining to a UE or an AS implementation or IMS core network requirements that can only be observed at the interface between UE and IMS CN are explicitly not within the scope of the present document. The latter requirements have been dealt with from a UE and conformance perspective in TS 134 229 [5].

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

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NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI TS 124 229: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (3GPP TS 24.229 version 7.2.0 Release 7)".
- [2] ETSI TS 102 351: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); IPv6 Testing: Methodology and Framework".

- [3] ETSI TS 102 237-1: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Interoperability test methods and approaches; Part 1: Generic approach to interoperability testing".
- [4] ETSI ES 202 553: "Methods for Testing and Specification (MTS); TPLan: A notation for expressing Test Purposes".
- [5] ETSI TS 134 229: "Universal Mobile Telecommunications System (UMTS); Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Part 1: Protocol conformance specification (3GPP TS 34.229-1 version 7.0.0 Release 7)".
- [6] ETSI TS 124 410: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); TISpan; NGN Signalling Control Protocol; Communication HOLD (HOLD) PSTN/ISDN simulation services; Protocol specification (3GPP TS 24.410 version 7.0.0 Release 7)".
- [7] ETSI TS 124 404: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); TISpan; PSTN/ISDN simulation services: Communication Diversion (CDIV); Protocol specification (3GPP TS 24.404 version 7.0.0 Release 7)".
- [8] ETSI TS 124 411: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); TISpan; PSTN/ISDN simulation services: Anonymous Communication Rejection (ACR) and Communication Barring (CB); Protocol specification (3GPP TS 24.411 version 7.0.0 Release 7)".
- [9] ETSI TS 124 407: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); TISpan; PSTN/ISDN simulation services: Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR); Protocol specification (3GPP TS 24.407 version 7.0.0 Release 7)".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Not applicable.

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3GPP	3 rd Generation Partnership Project
ACR	Anonymous Communication Rejection
AS	(IMS) Application Server
CB	Call Barring
CDIV	Call DIVersion
CF	(Test) ConFIGuration
CN	Core Network
CSCF	Call Session Control Function
DNS	Domain Name System
HOLD	Communication HOLD
HSS	Home Subscriber Server
IBCF	Interconnection Border Control Gateway
I-CSCF	Interrogating CSCF
IMS	IP Multimedia Subsystem
IOI	Inter Operator Identifier
IOP	Inter OPERability
IP	Internet Protocol

IUT	Implementation Under Test
NNI	Network-to-Network Interface
OIP	Originating Identification Presentation
OIR	Originating Identification Restriction
PCO	Point of Control and Observation
P-CSCF	Proxy CSCF
RC	Requirements Catalogue
RQ	ReQuirement
S-CSCF	Serving CSCF
SDP	Session Description Protocol
SIP	Session Initiation Protocol
TP	Test Purpose
TPLan	Test Purpose Notation
TSS	Test Suite Structure
UE	User Equipment
URI	Uniform Record Identifier

4 Test Suite Structure (TSS)

The Test Suite Structure is based on a Requirements Catalogue which was established prior to test purpose specification. This RC extracts all requirements from [1] which are relevant to the scope of this work. The TSS is defined by the groups within the following TPLan specification of test purposes. The numbering is not contiguous so that new TPs can be added at a later date without the need to completely renumber the TSS groups.

NOTE: The requirements catalogue is at this point not accessible as an ETSI document. Requirement identifiers of the catalogue have been replaced in the present document with the location of the requirement in the base specification, i.e. base specification type, identifier, version, clause and paragraph.

EXAMPLE: TS 124 229 [1] (V7.2.0), clause 5.2.6.3, §.66.

The test purposes have been divided into 5 major groups:

- 1) General Capabilities.
- 2) Registration procedures.
- 3) Dialog procedures.
- 4) Messaging procedures.
- 5) Supplementary services.

These groups have been further divided into subgroups according to IMS components as follow:

- Group 1: IMST1 NNI IOP
- Group 1.1: General Capabilities
- Group 1.2: Registration procedures
 - Group 1.2.1: Registration at P-CSCF
 - Group 1.2.2: Registration at S-CSCF
 - Group 1.2.3: Registration at I-CSCF
 - Group 1.2.4: Registration at IBCF
- Group 1.3: Dialog procedures
 - Group 1.3.1: Dialog at P-CSCF
 - Group 1.3.2: Dialog at S-CSCF

- Group 1.3.3: Dialog at I-CSCF
- Group 1.3.4: Dialog at IBCF
- Group 1.4: Messaging procedures
 - Group 1.4.1: Messaging at P-CSCF
 - Group 1.4.2: Messaging at S-CSCF
- Group 1.5: Supplementary service procedures
 - Group 1.5.1: Supplementary services at S-CSCF

5 Test Purposes (TP)

The test purposes have been written in the notation TPLan [8] which has been developed at ETSI to express test purposes in a more formal manner. All TPLan TPs have been converted into a symbolic tabular presentation format which is shown in this clause. TPs in the standardized textual TPLan syntax are collected in archive ts_06027_1v020000.zip that is included in annex A. The two presentation formats, i.e. textual and symbolic tabular, contain the same information and shall therefore be considered equivalent. In the case that there appears to be syntactical or semantic differences between the two then the files in annex A take precedence over the following tables. Configurations that are referenced by test purposes are shown in annex A.

5.1 The tabular symbolic TPLan presentation format

Each table contains header fields and a description part. The header fields identify the TP, list the related clause reference the base specification that the TP was derived from, introduce the TP with a short summary, references the related test configuration and test case in the ATS. Identifiers starting with the string "RQ_229_" indicate requirements within the internal requirement catalogue.

The description part presents the TP using two sections:

- a) initial conditions that have to be fulfilled for the test purpose body to be valid; and
- b) the test purpose body which is illustrated with one or more stimulus/response pairs.

Both sections are further substructured with columns for affected entities from the test configurations, i.e. IUT, UE, UE2, IMS (test system component), and AS.

The condition section lists one or more conditions that have to be fulfilled in order for the test purpose body to apply. Each condition has a description and either "✓" or "✗" marks to indicate all the entities affected by this condition. "✓" marks indicates a positive condition, e.g. "A is registered in B", whereas "✗" marks indicate a negative condition, e.g. "B not configured for feature Z". If there is no mark in a column then the condition does not apply for that entity, e.g. entity A is not involved in the condition "B not configured for feature Z". It is assumed that all listed conditions have to be fulfilled in the order listed, i.e. the list reflects an "and" relation.

Table 1 shows an example condition section illustrating all of the above examples.

Table 1: Example TP condition section

Entities		Condition
A	B	
✓	✓	A registered in B
	✗	B not configured for feature Z

The test purpose body section contains one or more steps identified with a number in the first column. Steps belonging to IUT stimuli are shown with a green background whereas steps related to IUT responses are shown with a beige background. All listed steps are assumed to be carried out in increasing step number, i.e. they reflect an "and" relation. "or" relations at the level of entire messages are shown with lowercase letters following the step number identifying the different alternatives, e.g. "2a" versus "2b". Each step indicates the exchange of a message from a source entity (identified by the direction symbols "↳" or "↵"), e.g. entity A sends the message, to a destination entity (identified by the direction symbols "↵" or "↳"), e.g. entity B receives the message. The use of the "||" symbol in combination with the direction symbols, e.g. "||↳", indicates that a particular message shall either not be sent or received by an entity, e.g. entity B did not send the message.

Additional information about valid as well as invalid message content is presented in the "Message" column. First general information about message, e.g. its type, destination, attributes, etc, are shown in bold font. Below this information message headers or parameter content that must be present in that message are listed using "✓" symbols whereas headers or parameter content that must *not* be present are listed using the "✗" symbols. The "→" symbol indicates a valid message parameter value whereas the "→||" symbol indicates an invalid message parameter value. Any content, e.g. header or parameter, which is not explicitly mentioned in a message description of a TP is not restricted by that TP.

Finally, the interface identifier to which a message exchange pertains may be shown in the column labelled "IF".

Table 2 shows an example test purpose body section illustrating all of the above examples.

Table 2: Example TP body section

Step	A	B	Message	IF
1	↳	↵	some request ✓ this header ✓ this one parameter → this value ✓ this other parameter → that value ✗ that parameter ✗ that header	Xx
2a	↵	↳	failure response	Xx
2b	↳	↵	no message	Xx





5.2 General Capabilities





Test Purpose						
Identifier:	TP_IMS_4002_01					
Summary:	IMS CN components shall support SIP messages > 1 300 bytes					
IUT Role:	IMS A					
References:	RQ_229_4002		Config Ref:		CF_INT_CALL	
	Entities				Condition	
	UE A	IMS A	IMS B	UE B		
	✓	✓			UE A registered in IMS A	
			✓	✓	UE B registered in IMS B	
	UE A	IMS A	IMS B	UE B		
Step	Direction				Message	IF
1					MESSAGE addressed to UE B ✓ a Message Body greater than 1 500 bytes	
2					MESSAGE ✓ the Message Body greater than 1 500 bytes	





5.3 Registration Procedures





5.3.1 Registration at P-CSCF





Test Purpose						
Identifier:	TP_IMS_5005_01					
Summary:	The P-CSCF shall support the Path header					
IUT Role:	IMS A					
References:	RQ_229_5005		Config Ref:		CF_ROAM_REG	
	Entities				Condition	
	IMS A	IMS B	UE B			
		✓	✓		IMS B has challenged with a 401 response the REGISTER request of UE B	
	IMS A	IMS B	UE B			
Step	Direction				Message	IF
1					protected REGISTER addressed to IMS B ✓ a Path header	
2					REGISTER ✓ a Path header	

Test Purpose					
Identifier:	TP_IMS_5011_01				
Summary:	The P-CSCF shall forward REGISTER requests received from the UE to the entry point in the home network				
IUT Role:	IMS A				
References:	RQ_229_5011	Config Ref:		CF_ROAM_REG	
	Entities			Condition	
	IMS A	IMS B	UE B		
	x			IMS A not configured for topology hiding	
		✓	✓	user of UE B existing in IMS B	
	IMS A	IMS B	UE B		
Step	Direction			Message	IF
1				unprotected REGISTER ✓ a Security-Client header	
2				REGISTER <ul style="list-style-type: none"> ✓ a Path header ✓ P-CSCF SIP URI of IMS A ✓ a Require header ✓ a path option tag ✓ a P-Charging-Vector header ✓ an icid parameter ✓ a Authorization header ✓ an integrity-protected parameter ➔ no ✗ a Security-Verify header ✗ a Security-Client header a P-Visited-Network-ID header ➔ the visited network at the home network 	

Test Purpose					
Identifier:	TP_IMS_5011_02				
Summary:	The P-CSCF shall forward REGISTER requests received from the UE to the entry point in the home network				
IUT Role:	IMS A				
References:	RQ_229_5011	Config Ref:		CF_ROAM_REG	
	Entities			Condition	
	IMS A	IMS B	UE B		
	x			IMS A not configured for topology hiding	
		✓	✓	user of UE B existing in IMS B	
	IMS A	IMS B	UE B		
Step	Direction			Message	IF
1				protected REGISTER ✓ a Security-Client header	
2				REGISTER <ul style="list-style-type: none"> ✓ a Path header ✓ P-CSCF SIP URI of IMS A ✓ a Require header ✓ a path option tag ✓ a P-Charging-Vector header ✓ an icid parameter ✓ a Authorization header ✓ an integrity-protected parameter <ul style="list-style-type: none"> ➔ yes ✗ a Security-Verify header ✗ a Security-Client header ✓ a P-Visited-Network-ID header <ul style="list-style-type: none"> ➔ the visited network at the home network 	

Test Purpose					
Identifier:	TP_IMS_5203_01				
Summary:	The P-CSCF have received a REGISTER request from the UE and modified a number of headers and forwarded the request to an entry point with no response				
IUT Role:	IMS A				
References:	RQ_229_5203	Config Ref:		CF_ROAM_REG	
	Entities			Condition	
	IMS A	IMS B	UE B		
	✓		✓	UE B having sent an initial REGISTER to IMS A	
	✓	✓		IMS A configured with multiple entry points for IMS B	
	IMS A	IMS B	UE B		
Step	Direction			Message	IF
1				no response	
2				REGISTER addressed to another entry point	

Test Purpose					
Identifier:	TP_IMS_5203_02				
Summary:	The P-CSCF have received a REGISTER request from the UE and modified a number of headers and forwarded the request to an entry point with 3xx				
IUT Role:	IMS A				
References:	RQ_229_5203	Config Ref:		CF_ROAM_REG	
	Entities			Condition	
	IMS A	IMS B	UE B		
	✓		✓	UE B having sent an initial REGISTER to IMS A	
	✓	✓		IMS A configured with multiple entry points for IMS B	
	IMS A	IMS B	UE B		
Step	Direction			Message	IF
1				3xx response	
2				REGISTER addressed to another entry point	

Test Purpose					
Identifier:	TP_IMS_5203_03				
Summary:	The P-CSCF have received a REGISTER request from the UE and modified a number of headers and forwarded the request to an entry point with 480.				
IUT Role:	IMS A				
References:	RQ_229_5203	Config Ref:		CF_ROAM_REG	
	Entities			Condition	
	IMS A	IMS B	UE B		
	✓		✓	UE B having sent an initial REGISTER to IMS A	
	✓	✓		IMS A configured with multiple entry points for IMS B	
	IMS A	IMS B	UE B		
Step	Direction			Message	IF
1				480 response	
2				REGISTER addressed to another entry point	