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Technical Committee for IMS Network Testing (INT); IMS NNI Interworking Test Specifications; Part 2: Test descriptions for IMS NNI Interworking



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Foreword

This Technical Specification (TS) has been produced by IMS Network Testing (INT).

The present document is part 2 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";**
- Part 3: "ATS & PIXIT".

1 Scope

The present document specifies interoperability Test Descriptions (TDs) for IMS NNI interworking for the IP Multimedia Call Control Protocol based on Stage 3 Session Initiation Protocol (SIP) and Session Description Protocol (SDP) standard, TS 124 229 Release 6 [1]. TDs have been specified on the basis of the Test Purposes (TPs) and test suite structure (TSS) presented in [2]. TP fragments presented in the present document as part of TDs are defined using the TPLan notation [5]. TDs have been written based on the test specification framework described in TS 102 351 [3] and the interoperability testing methodology defined in TS 102 237-1 [4], i.e. interoperability testing with a conformance relation.

The scope of these test descriptions is not to cover all requirements specified in [1]. It has been reduced to cover only requirements which relate to basic IMS call functionality for a minimal interworking IMS CN configuration, i.e. based on a P-CSCF, S-CSCF, I-CSCF, and HSS. Therefore, assessment of, e.g. IMS roaming, topology hiding, etc. at the NNI are not addressed in this test purpose specification. TDs have been only specified for requirements that are observable at the interface between two separate minimal IMS CN implementations, i.e. IMS NNI.

NOTE: Requirements which can only be observed at the interface between UE and IMS CN, i.e. home P-CSCF, 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 134 229-1 [6].

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:
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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 (V6.13.0): "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 6.13.0 Release 6)".
- [2] ETSI TS 186 011-1: "Technical Committee for IMS Network Testing (INT); IMS NNI Interworking Test Specifications; Part 1: Test Purposes for IMS NNI Interworking".
- [3] ETSI TS 102 351: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); IPv6 Testing: Methodology and Framework".

- [4] 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".
- [5] ETSI ES 202 553: "Methods for Testing and Specification (MTS); TPLan: A notation for expressing Test Purposes".
- [6] ETSI TS 134 229-1: "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 Release 6)".
- [7] ETSI TS 123 228 (V6.15.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); IP Multimedia Subsystem (IMS); Stage 2 (3GPP TS 23.228 version 6.15.0 Release 6)".
- [8] ETSI TS 133 203 (V6.10.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); 3G security; Access security for IP-based services (3GPP TS 33.203 version 6.10.0 Release 6)".
- [9] ETSI TS 123 060 (V6.15.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); General Packet Radio Service (GPRS); Service description; Stage 2 (3GPP TS 23.060 version 6.15.0 Release 6)".
- [10] ETSI TS 127 060 (V6.0.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Packet domain; Mobile Station (MS) supporting Packet Switched services (3GPP TS 27.060 version 6.0.0 Release 6)".
- [11] IETF RFC 2617: "HTTP Authentication: Basic and Digest Access Authentication".

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.

- [i.1] ETSI TR 133 978 (V6.6.0): "Universal Mobile Telecommunications System (UMTS); Security aspects of early IP Multimedia Subsystem (IMS) (3GPP TR 33.978 version 6.6.0 Release 6)".
- [i.2] ETSI TR 123 981 (V6.4.0): "Universal Mobile Telecommunications System (UMTS); Interworking aspects and migration scenarios for IPv4-based IP Multimedia Subsystem (IMS) implementations (3GPP TR 23.981 version 6.4.0 Release 6)".

3 Abbreviations

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

3GPP	3 rd Generation Partnership Project
AKA	Authentication and Key Agreement
AS	(IMS) Application Server
ASO	Application Server Origination
AST	Termination at Application Server
CF	(Test) ConFfiguration
CFW	Call FloW
CN	Core Network
CSCF	Call Session Control Function
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
GPRS	General Packet Radio Service
HSS	Home Subscriber Server
I-CSCF	Interrogating CSCF

IMS	IP Multimedia Subsystem
IOI	Inter Operator Identifier
IP	Internet Protocol
IPSEC	Internet Protocol SECure transmission
MO	Mobile Origination
MT	Mobile Termination
NNI	Network-to-Network Interface
PCO	Point Of Control and Observation
P-CSCF	Proxy CSCF
PDP	Packet Data Protocol
PO	POstamble
PR	PReamble
PRACK	Provisional Response Acknowledgement
PSTN	Public Switched Telephone Network
SA	Security Association
S-CSCF	Serving CSCF
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SUT	System Under Test
TB	Test Body
TCP	Transmission Control Protocol
TD	Test Description
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
TP	Test Purpose
TPLan	Test Purpose Notation
TSS	Test Suite Structure
UC	Use Case
UDP	User Data Protocol
UE	User Equipment
URI	Uniform Record Identifier
VoIP	Voice over Internet Protocol
XML	Extensible Markup Language

4 IMS NNI Interoperability Test Specification

4.1 Introduction

The IMS NNI Interoperability Test descriptions (TDs) defined in the following clauses are derived from the Test Purposes (TPs) specified in TS 124 229 [1].

4.2 Test Prerequisites

4.2.1 IP Version

These test specifications are based on the use of IPv4 for SIP message transport throughout all IMS nodes (see TR 123 981 [i.2]).

4.2.2 IP Bearer Establishment

4.2.2.1 3GPP

3GPP bearer establishment procedures imply the creation of a PDP context over GPRS (see TS 123 060 [9] and TS 127 060 [10]).

4.2.3 Authentication and Security

4.2.3.1 3GPP

The current test specification supports standard 3GPP security, namely early IMS (see TR 133 978 [i.1]), full IMS (see TS 133 203 [8]) and optionally allows SIP Digest authentication without key agreement and null authentication. Non-compliance with full IMS security features defined in TS 133 203 [8] is expected to be a problem mainly at the UE side, because of the potential lack of support of the USIM/ISIM interface (especially in 2G-only devices) of the potential inability to support IPSec on some UE platforms. For those reasons, early IMS is the default security configuration in all test descriptions. Tests may be executed with full IMS security if all required IMS nodes support it.

4.2.4 Registration and Subscription

4.2.4.1 SIP Call Flow

This clause describes the registration call flow under the authentication and security scope described in clause 4.2.3.

4.2.4.1.1 Early IMS Registration and Subscription Call Flow

Early IMS security does not allow SIP requests to be protected using an IPSec security association because it does not perform a key agreement procedure. IPSec security associations are not set up between UE and P-CSCF, as they are in the full IMS security solution. For early IMS security, the expected registration and subscription sequence is:

Step	Direction		Message	Comment	
	UE	IMS			
1				The UE establishes an IP bearer as required by its specific access network (optional).	
2	←→			P-CSCF address discovery using DHCP procedures for IPv4 (optional).	
3	→		REGISTER	The UE sends initial registration for IMS services.	Unprotected
4	←		200 OK	The IMS responds with 200 OK.	
5	→		SUBSCRIBE	The UE subscribes to its registration event package.	
6	←		200 OK	The IMS responds with 200 OK.	
7	←		NOTIFY	The IMS sends initial NOTIFY for registration event package, containing full registration state information for the registered public user identity in the XML body.	
8	→		200 OK	The UE responds with 200 OK.	

4.2.4.1.2 Full IMS Registration and Subscription Call Flow

For full IMS security, the expected registration and subscription sequence is:

Step	Direction		Message	Comment	
	UE	IMS			
1				The UE establishes an IP bearer as required by its specific access network (optional).	
2	↔			P-CSCF address discovery using DHCP procedures for IPv4 (optional).	
3		→	REGISTER	The UE sends initial registration for IMS services.	Unprotected
4		←	401 Unauthorized	The IMS responds with a valid Digest AKA authentication challenge and a list of integrity and encryption algorithms supported by the network as defined in the IMS AKA procedure (see TS 133 203 [8]).	
5				Upon receipt of 401 Unauthorized, the UE selects the first integrity and encryption algorithm combination on the list received from the P-CSCF in 401 Unauthorized which is also supported by the UE. If the P-CSCF did not include any confidentiality algorithm in 401 Unauthorized then the UE shall select the NULL encryption algorithm. The UE then proceeds to establish two new pairs of IPSEC security associations (SA1 and SA2).	
6		→	REGISTER	The UE sends another REGISTER with authentication credentials over IPSEC security association SA1.	Protected by SA1
7		←	200 OK	The IMS responds with 200 OK over the same IPSEC security association SA1.	
8		→	SUBSCRIBE	The UE subscribes to its registration event package over the IPSEC security association SA2.	Protected by SA2
9		←	200 OK	The IMS responds with 200 OK over the IPSEC security association SA2.	
10		←	NOTIFY	The IMS sends initial NOTIFY for registration event package, containing full registration state information for the registered public user identity in the XML body, over the IPSEC security association SA2.	
11		→	200 OK	The UE responds with 200 OK over the IPSEC security association SA2.	

4.2.4.1.3 SIP Digest Registration and Subscription Call Flow

For SIP Digest authentication without key agreement and null authentication, the expected registration and subscription sequence is:

Step	Direction		Message	Comment
	UE	IMS		
1				The UE establishes an IP bearer as required by its specific access network (optional).
2	←→			P-CSCF address discovery using DHCP procedures for IPv4 (optional).
3	→		REGISTER	The UE sends initial registration for IMS services.
4	←		401 Unauthorized	The IMS responds with a valid HTTP Digest authentication challenge as defined in TS 123 060 [9].
5	→		REGISTER	The UE sends another REGISTER with authentication credentials.
6	←		200 OK	The IMS responds with 200 OK.
7	→		SUBSCRIBE	The UE subscribes to its registration event package.
8	←		200 OK	The IMS responds with 200 OK.
9	←		NOTIFY	The IMS sends initial NOTIFY for registration event package, containing full registration state information for the registered public user identity in the XML body.
10	→		200 OK	The UE responds with 200 OK.

Unprotected

4.2.5 Supported Options

4.2.5.1 Security

Support for security agreement is optional in case of Full IMS Reg. It shall only be used in case all IMS nodes support it.

4.2.5.2 Signalling Compression

"No sigcomp" is the default signalling configuration in all test descriptions. Tests may be executed with signalling compression if the required nodes support it.

4.2.5.3 Preconditions

"No precondition" is the default SDP configuration in all test descriptions. Tests may be executed with SDP preconditions if the required nodes support it.

4.2.5.4 Reliable Provisional Responses

Reliable provisional responses (100rel) including the use of the PRACK method are the default signalling configuration in all test descriptions.

4.2.5.5 Forking

Not applicable in the current test specification. However, support for forking is a requirement of the IMS specification.

4.3 Test Infrastructure

In these clauses we define the involvement of the various IMS nodes specifically as they pertain to NNI testing. The configuration of the nodes is described. Points of control and observation are identified and static test configurations are described. The Mw interface is the interface under observation for NNI interoperability testing.

4.3.1 Core IMS Nodes

Because the current testing scope excludes IMS roaming and border control functionality, P-CSCF, S-CSCF, I-CSCF, and HSS are considered to be within a "black box" for testing purposes. We refer to this System Under Test (SUT) as "the minimal IMS". Interfaces within the IMS are considered internal and not observable for testing purposes. The use cases and test descriptions described below may be run with IMS roaming without modifications. Due to the limited scope, no test descriptions are available that validate the operation of the Mw interface between the P-CSCF and S-CSCF as an NNI interface, i.e. in a roaming configuration.

4.3.1.1 P-CSCF

4.3.1.1.1 Relevant Interfaces

The P-CSCF constitutes the point of entry for UE signalling into the IMS core. The Gm interface between the P-CSCF and the UE is used as a Point Of Control and Observation (PCO) for NNI interoperability testing purposes. Although considered as internal and not explicitly involved in current NNI test configurations which exclude IMS roaming, it is recommended that the Mw interface between the P-CSCF and S-CSCF be exposed/available for troubleshooting purposes.

4.3.1.1.2 Node Configuration

The P-CSCF should be configured to support the pre-requisites outlined in clause 4.2.

4.3.1.2 S-CSCF

4.3.1.2.1 Relevant Interfaces

The S-CSCF is the core IMS node delivering IMS services to subscribers. The Mw interface between the S-CSCF and either I- or S-CSCF in another domain is used as a point of observation against which NNI interoperability tests are validated. The Mw interfaces between I- and S-CSCFs within the same network are considered as internal IMS interfaces. Although considered as internal and not explicitly involved in current NNI test configurations which exclude IMS roaming, it is recommended that the Mw interface between the P-CSCF and S-CSCF be exposed for troubleshooting purposes.

4.3.1.2.2 Node Configuration

The S-CSCF should be configured to support the pre-requisites outlined in clause 4.2. When applicable based on the specific configuration, the S-CSCF must be provisioned to support required Application Servers (AS) as trusted nodes.

4.3.1.3 HSS

4.3.1.3.1 Relevant Interfaces

The HSS constitutes the repository for IMS subscriber information. The Cx interface between the HSS and the S-CSCF and/or I-CSCF is considered an internal IMS interface.

4.3.1.3.2 Node Configuration

The HSS should be configured within the IMS to interact with CSCFs as required using DIAMETER Cx interfaces. For the purpose of this test specification, "ims-a.net" refers to the domain served by "IMS_A" and "ims-b.net" refers to the domain served by "IMS_B". Users should be provisioned to match the sample profiles listed in table 1. All public identities belong to the same implicitly registered set.

Table 1: HSS sample user profiles for IMS_A

IMS Domain	Private Identity	Public Identity 1 (SIP URI)	Public Identity 2 (Tel URI)	Default Public Identity	Filter criteria
ims-a.net	user_1_priv@ims-a.net	sip:user_1_pub@ims-a.net	na	1	na
ims-a.net	user_2_priv@ims-a.net	sip:user_2_pub@ims-a.net	tel:+33633348273	1	na
ims-a.net	user_3_priv@ims-a.net	sip:user_3_pub@ims-a.net	tel:+33633348274	2	na
ims-a.net	user_4_priv@ims-a.net	sip:user_4_pub@ims-a.net	na	1	terminating_unregistered/INVITE/SESSION_TERMINATED/as-1.ims-a.net
ims-a.net	user_5_priv@ims-a.net	sip:user_5_pub@ims-a.net	na	1	

Table 2: HSS sample user profiles for IMS_B

IMS Domain	Private Identity	Public Identity 1 (SIP URI)	Public Identity 2 (Tel URI)	Default Public Identity	Filter criteria
ims-b.net	user_1_priv@ims-b.net	sip:user_1_pub@ims-b.net	na	1	
ims-b.net	user_2_priv@ims-b.net	sip:user_2_pub@ims-b.net	tel:+44744459384	1	
ims-b.net	user_3_priv@ims-b.net	sip:user_3_pub@ims-b.net	tel:+44744459385	2	
ims-b.net	user_4_priv@ims-b.net	sip:user_4_pub@ims-b.net	na	1	terminating_unregistered/INVITE/SESSION_TERMINATED/as-2.ims-b.net
ims-b.net	user_5_priv@ims-b.net	sip:user_5_pub@ims-b.net	na	1	

4.3.2 External IMS Nodes

4.3.2.1 UE

4.3.2.1.1 Relevant Interfaces

The UE is considered to act as a stimulus node in this test specification. The Gm interface between the P-CSCF and the UE is used as a Point Of Control and Observation (PCO) for NNI interoperability tests.

4.3.2.1.2 Node Configuration

The UE should be configured to support the pre-requisites outlined in clause 4.2. The test descriptions in the present document assume that UEs support reliable provisional responses (100rel) including the PRACK method basic call and messaging functionality, call hold based on UPDATE as well as re-INVITE method, and message transport via UDP as well as TCP. In the case that a UE does not meet one or more of these features, only a selected subset of the test descriptions in this present document should be used for IMS core network interoperability testing, i.e. test descriptions which do not contain any pass criteria related to these features.

4.3.2.2 AS

4.3.2.2.1 Relevant Interfaces

The application server (AS) is considered to act as a stimulus node in this test specification. The ISC interface between the S-CSCF and the AS is used as a Point Of Control and Observation (PCO) for NNI interoperability tests.

4.3.2.2.2 Node Configuration

The AS should be configured to support the pre-requisites outlined in clause 4.2.

4.3.3 Supporting IMS Nodes

4.3.3.1 DNS

4.3.3.1.1 Relevant Interfaces

The Domain Name Service (DNS) is considered as a supporting entity in the present document.

4.3.3.1.2 Node Configuration

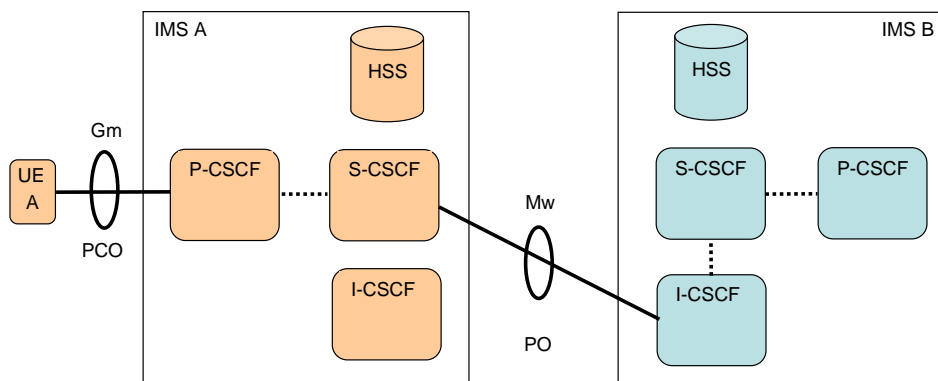
DNS should be configured for appropriate resource record handling as required to support proper resolution of all SIP URIs in Request URIs and Route headers. In addition, DNS must support ENUM functionality in order to resolve Tel URIs into SIP URIs. As an example, DNS_B should have an entry to map E.164 number 44744459384 with user user_2_priv@ims-b.net.

4.3.4 Test Configurations

The following architectural test configurations are referenced in the IMS NNI interoperability TDs in the present document. They are intended to give a general rather than a specific view of the required IMS SUT(s) connectivity and associated UE(s), AS(s), and DNS(s).

The following guidelines are used to describe the test configurations:

- Named based convention defined in TS 123 228 [7], clause 5.5.1.
- Reuse the following abbreviations:
 - SS1: Different network operators performing origination and termination.
 - MO2: Mobile Origination, home. The "Originating Network" of S-S#1 is therefore the home network.
 - ASO: Application Server Origination. The "Originating Network" of S-S#1 is the home network.
 - MT2: Mobile Termination, located in home service area. The "Terminating Network" of S-S#1 is the home network.
 - AST4: Termination at Application Server based on service logic.
- Exclude PSTN, non-IMS endpoints and IMS roaming since these are out of scope.
- Further differentiate IMS NNI observation points based on:
 - IN: initial request/response for a dialog.
 - SU: subsequent requests/responses in a dialog.
 - ST: standalone requests/response.
- And indicate:
 - Observable interfaces as a solid line.
 - Non-observable interfaces as dashed lines.



Precondition:

Different network operators performing origination and termination (SS1), UE_A in Home network A (MO2), UE_A registered, neither AS nor THIG nor IMS-ALG involved

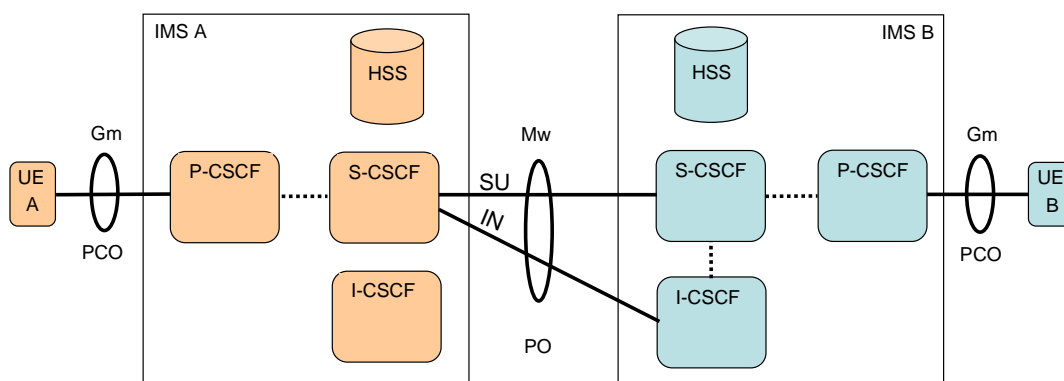
Test configuration for:

Unsuccessful initial requests and responses from UE_A

Example:

Initial INVITE in IMS VoIP voice call from UE_A to non-existing user

Figure 1: CF_MO2-SS1



Precondition:

Different network operators performing origination and termination (SS1), UE_A in Home network A (MO2), UE_B in Home network B (MT2), both UEs registered, neither AS nor THIG nor IMS-ALG involved, in SU case dialog initiated between UE_A and UE_B

Test configuration for:

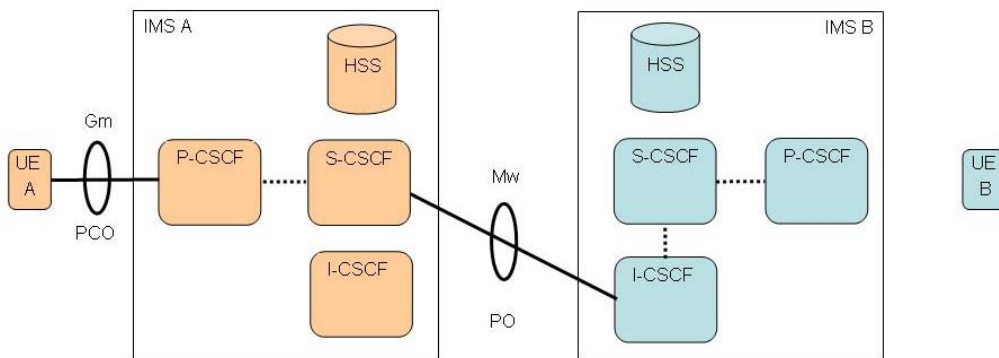
Initial (IN) and Subsequent (SU) requests and responses between UE_A and UE_B

Example:

IN: Initial INVITE in IMS VoIP voice call from UE_A to UE_B

SU: BYE request, UE_B terminates IMS VoIP call towards UE_B

Figure 2: CF_MO2-SS1-MT2

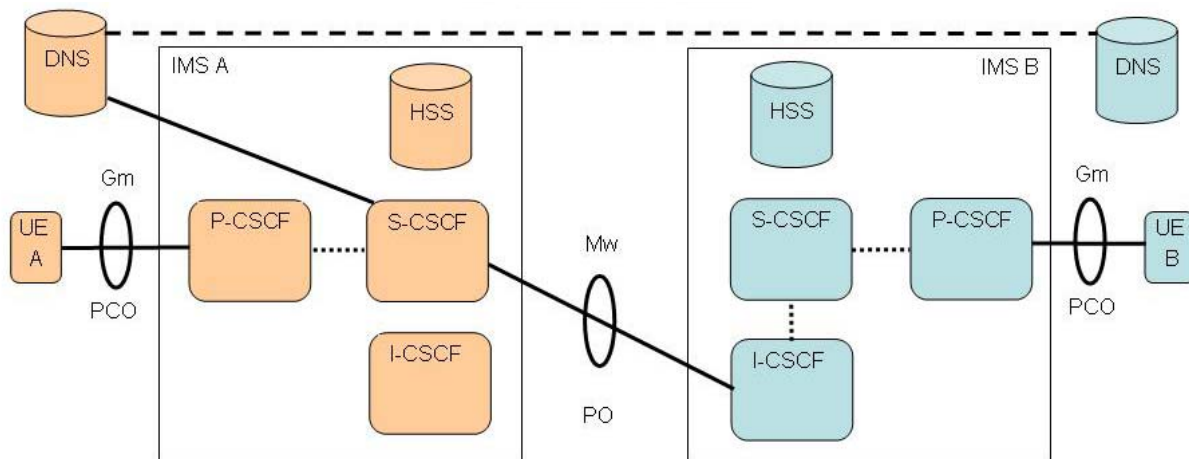


Precondition:
 Different network operators performing origination and termination (SS1), UE_A in Home network A (MO2), UE_B in Home network B (MT2), only UE_A registered, neither AS nor THIG nor IMS-ALG involved, in SU case dialog initiated between UE_A and UE_B

Test configuration for:
 Unsuccessful initial requests and responses from UE_A

Example:
 Initial INVITE in IMS VoIP voice call from UE_A

Figure 3: CF_MO2-SS1-MT2b

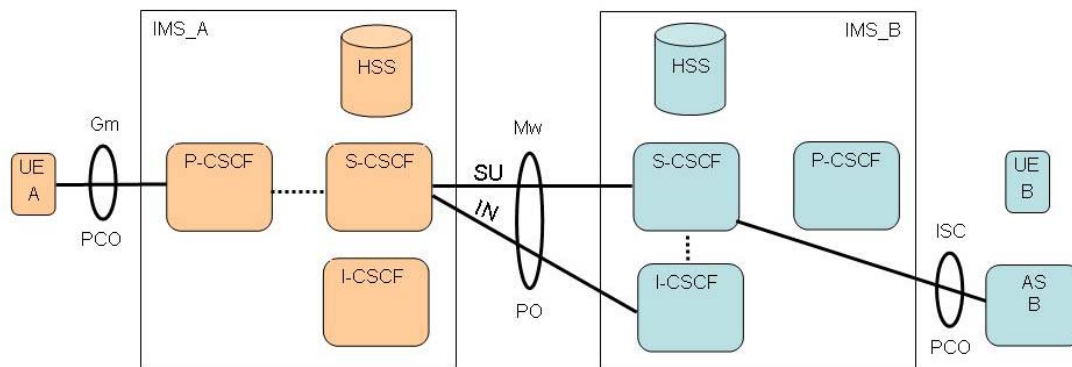


Precondition:
 Different network operators performing origination and termination (SS1), UE_A in Home network A (MO2), UE_B in Home network B (MT2), both UEs registered, DNS server involved in network B, neither AS nor THIG nor IMS-ALG involved, in SU case dialog initiated between UE_A and UE_B

Test configuration for:
 Initial requests and responses between UE_A and UE_B

Example:
 Initial INVITE in IMS VoIP voice call from UE_A

Figure 4: CF_MO2-SS1-MT2c



Precondition:

Different network operators performing origination and termination (SS1), UE_A in Home network A (MO#2), UE_B in Home network B (MT#2), AS_B discovered based on service logic in Home network B (AST#4), only UE_A registered, in SU case dialog initiated between UE_A and AS_B, neither THIG nor IMS-ALG involved

Test configuration for:

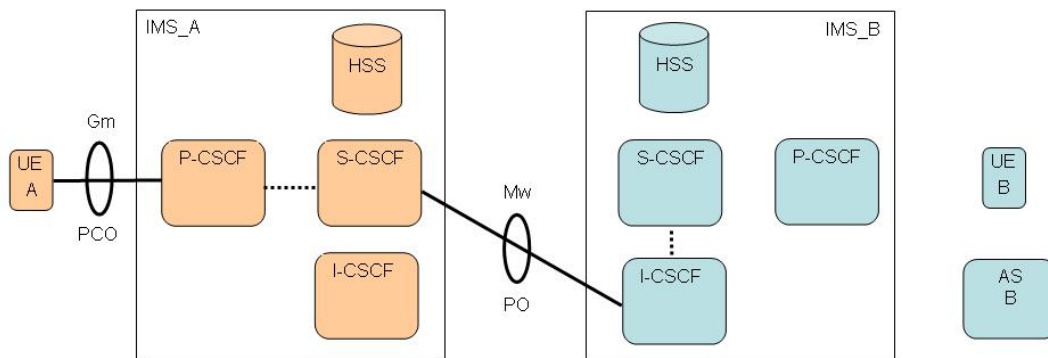
Initial (IN) and Subsequent (SU) requests and responses between UE_A and AS_B

Example:

IN: Initial INVITE, IMS VoIP voice call from UE_A forwarded to AS_B as a result of filter criteria. AS_B acts as routing AS

SU: BYE request, UE_A terminates IMS VoIP voice call towards AS_B.

Figure 5: CF_MO2-SS1-MT2-AST4



Precondition:

Different network operators performing origination and termination (SS1), UE_A in Home network A (MO#2), UE_B in Home network B (MT#2), AS_B discovered based on service logic in Home network B (AST#4), only UE_A registered, AS_B not responding, neither THIG nor IMS-ALG involved

Test configuration for:

Initial (IN) and Subsequent (SU) requests and responses between UE_A and AS_B

Example:

IN: Unsuccessful initial INVITE, IMS VoIP voice call from UE_A forwarded to AS_B as a result of filter criteria but no response.

Figure 6: CF_MO2-SS1-MT2-AST4b

NOTE: The configuration CF_MO2-SS1-MT2-AST4b does not require a physical application server for IMS B. Filter criteria in IMS B should only be set to forward SIP messages to an IP address which does not respond to forwarded SIP messages.

4.4 Use Cases

Use cases are the basis for interoperability test descriptions. Each use case defines both a generic test sequence, i.e. a set of user stimuli and observations for any number of involved IMS external entities (IMS UE, DNS Server, and AS), and a monitor view of all the resulting messages exchanged at the outer IMS core network interfaces, i.e. a call flow for user, Gm, DNS, and ISC interfaces. Test sequence and call flow are correlated using grey shading.

All of the use cases presented in this clause that involve UE interaction assume are assumed to follow one of the registration and subscriptions described in clause 4.2.4 for each UE involved in the test. They are not shown here.

Test descriptions defined in clause 5 then reference and specialize one of these use cases presented in this clause, i.e. generic test sequence and call flow, according to the needs of the one or more test purposes which are associated with a test description.

4.4.1 User-initiated VoIP call setup and release

4.4.1.1 Normal Call

4.4.1.1.1 Description

UE_A places an IMS VoIP call to UE_B. Once the media path is established, the originating user releases the call. We assume support for reliable provisional responses (100rel) and no SDP preconditions. The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2.

The test sequence typically associated with this use case is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User B is informed of incoming call of User A (CFW step 8)
3	User A is informed that UE_B is ringing (CFW step 12)
4	User B answers call (CFW step 19)
5	User A is presented that call in process (CFW step 23)
6	User B is informed that the call is in progress (CFW step 27)
7	User A ends call (CFW step 28)
8	User B is informed that call has ended (CFW step 32)

4.4.1.1.2 UC_01: SIP Call Flow "Normal Call"

For a call with reliable provisional responses (100rel) and no SDP preconditions, the expected sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→				INVITE UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←				100 Trying IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→			INVITE IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←			100 Trying IMS_B I-CSCF responds with a 100 Trying provisional response	
6					→		INVITE IMS_B P-CSCF forwards INVITE to UE_B	
7					←		100 Trying UE_B responds with a 100 Trying provisional response	
8						→	User B is informed of incoming call of User A	
9					←		180 Ringing UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting	
10					←		180 Ringing IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF	
11			←				180 Ringing IMS_A P-CSCF forwards the 180 Ringing response to UE_A	
12		←					User A is informed that UE_B is ringing	
13			→				PRACK UE_A acknowledges the receipt of 180 response by sending PRACK	
14				→			PRACK IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF	
15					→		PRACK IMS_B P-CSCF forwards PRACK to UE_B	
16					←		200 OK UE_B responds PRACK with 200 OK	

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
17				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
18			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
19					←			User B answers call
20					←		200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
21				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
22			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
23		←						User A is presented that call in process
24			→				ACK	UE_A acknowledges the receipt of 200 OK for INVITE
25				→			ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
26					→		ACK	IMS_B P-CSCF forwards ACK to UE_B
27						→		User B is informed that the call is in progress
28		→						User A ends call
29			→				BYE	UE_A releases the call with BYE
30				→			BYE	IMS_A S-CSCF forwards BYE to IMS_B S-CSCF
31					→		BYE	IMS_B P-CSCF forwards BYE to UE_B
32						→		User B is informed that call has ended
33					←		200 OK	UE_B sends 200 OK for BYE
34				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
35			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.4.1.2 Temporarily unavailable

4.4.1.2.1 Description

UE_A places an IMS VoIP call to UE_B. UE_B is not registered. The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2.

The test sequence typically associated with this use case is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User A is informed of User B unreachable (CFW step 8)

4.4.1.2.2 UC_02: SIP Call Flow "Temporarily unavailable"

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→				INVITE UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←				100 Trying IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→			INVITE IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←			100 Trying IMS_B I-CSCF responds with a 100 Trying provisional response	
6				←			480 Temporarily unavailable IMS_B I-CSCF generates error message indicating unavailable user	
7			←				480 Temporarily unavailable IMS_A P-CSCF forwards error response to UE_A	
8		←					User A is informed of User B unreachable	

4.4.1.3 Temporarily unavailable (Application Server)

4.4.1.3.1 Description

UE_A places an IMS VoIP call to UE_B. UE_B is not registered. The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2.

The test sequence typically associated with this use case is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User A is informed of User B unreachable (CFW step 8)

4.4.1.3.2 UC_03: SIP Call Flow "Temporarily unavailable" (Application Server)

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→				INVITE UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←				100 Trying IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→			INVITE IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←			100 Trying IMS_B I-CSCF responds with a 100 Trying provisional response	
6				←			408 Request Timeout or 5xx Response IMS_B I-CSCF forwards S-CSCF error message indicating unreachable AS	
7			←				408 Request Timeout or 5xx Response IMS_A P-CSCF forwards error response to UE_A	
8		←					User A is informed of "not reachable"	

4.4.1.4 Cancelled session setup

4.4.1.4.1 Description

UE_A places an IMS VoIP call to UE_B. The call request will be cancelled by UE_A before the call is answered. The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2.

The test sequence typically associated with this use case is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User B is informed of incoming call of User A (CFW step 8)
3	User A is informed that UE_B is ringing (CFW step 12)
4	User A cancel ringing (CFW step 19)
5	User B informed that call is aborted (CFW step 26)

4.4.1.4.2 UC_04: SIP Call Flow "Cancelled"

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→				INVITE UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←				100 Trying IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→			INVITE IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←			100 Trying IMS_B I-CSCF responds with a 100 Trying provisional response	
6					→		INVITE IMS_B P-CSCF forwards INVITE to UE_B	
7					←		100 Trying UE_B responds with a 100 Trying provisional response	
8					→		User B is informed of incoming call of User A	
9					←		180 Ringing UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting	
10				←			180 Ringing IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF	
11			←				180 Ringing IMS_A P-CSCF forwards the 180 Ringing response to UE_A	
12		←					User A is informed that UE_B is ringing	
13			→				PRACK UE_A acknowledges the receipt of 180 response by sending PRACK	
14				→			PRACK IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF	
15					→		PRACK IMS_B P-CSCF forwards PRACK to UE_B	
16					←		200 OK UE_B responds PRACK with 200 OK	
17				←			200 OK IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
18			←				200 OK IMS_A P-CSCF forwards the 200 OK response to UE_A	
19		→					User A cancel ringing	
20			→				CANCEL UE_A sends CANCEL to abort call	
21			←				200 OK IMS_A P-CSCF responds with a 200 OK response	
22				→			CANCEL IMS_A S-CSCF sends CANCEL to IMS_B S-CSCF	
23				←			200 OK IMS_B S-CSCF responds with a 200 OK response	
24					→		CANCEL IMS_B P-CSCF sends CANCEL to UE_B	
25					←		200 OK UE_B responds with a 200 OK response	
26					→		User B informed that call is aborted	
27					←		487 Request Terminated UE_B confirms cancellation of the INVITE request with a 487 Request Terminated error response	

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
28					→		ACK	IMS_B P-CSCF responds with an ACK to UE_B
29				←			487 Request Terminated	IMS_B S-CSCF sends a 487 Request Terminated error response to IMS_A S-CSCF
30					→		ACK	IMS_A S-CSCF responds with an ACK
31			←				487 Request Terminated	IMS_B P-CSCF sends a 487 Request Terminated error response to UE_A
32			→				ACK	UE_A responds with an ACK

4.4.1.5 Not Found

4.4.1.5.1 Description

UE_A places an IMS VoIP call to UE_B. UE_B is no user of IMS_B. The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2.

The test sequence typically associated with this use case is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User A is informed of User B unreachable (CFW step 8)

4.4.1.5.2 UC_05: SIP Call Flow "Not Found"

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→						User A calls User B
2			→				INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
3			←				100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
4				→			INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
5				←			100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
6				←			404 Not Found or 604 Does not exist anywhere	IMS_B I-CSCF generates error message indicating non-existent user
7			←				404 Not Found or 604 Does not exist anywhere	IMS_A P-CSCF forwards error response to UE_A
8		←						User A is informed of "no such user"

4.4.2 User-initiated call hold and resume

UE_A places an IMS VoIP call to UE_B. Once the media path is established, the originating user puts the call on hold, stopping the media stream. The originating user then resumes the call. The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2. We assume reliable provisional responses (100rel) and no SDP preconditions. Depending on the UE this feature may be implemented either using reINVITE or UPDATE where UPDATE is only an optional feature.

4.4.2.1 User-initiated call hold and resume with reINVITE

4.4.2.1.1 Description

The test sequence typically associated with this use case is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User B is informed of incoming call of User A (CFW step 8)
3	User A is informed that UE_B is ringing (CFW step 12)
4	User B answers call (CFW step 19)
5	User A is presented that call is in progress (CFW step 23)
6	User B is presented that call is in progress (CFW step 27)
7	User A puts call on hold (CFW step 28)
8	User B is informed that call on hold (CFW step 35)
9	User A resumes call (CFW step 42)
10	User B is informed the call is resumed (CFW step 49)
11	User A is informed that call is resumed (CFW step 53)
12	User A ends call (CFW step 57)
13	User B is informed the call has ended (CFW step 61)

4.4.2.1.2 UC_06: SIP Call Flow "call hold and resume" with reINVITE

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response	
6					→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B	
7					←	100 Trying	UE_B responds with a 100 Trying provisional response	
8							User B is informed of incoming call of User A	
9					←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting	
10					←	180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF	
11					←	180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A	
12			←				User A is informed that UE_B is ringing	
13				→		PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK	
14					→	PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF	
15					→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B	
16					←	200 OK	UE_B responds to PRACK with 200 OK	
17					←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
18					←	200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A	
19					→		User B answers call	
20					←	200 OK	UE_B responds to INVITE with 200 OK to indicate that the call has been answered	
21					←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
22			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
23		←						User A is presented that call is in progress
24			→				ACK	UE_A acknowledges the receipt of 200 OK for INVITE
25				→			ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
26					→		ACK	IMS_B P-CSCF forwards ACK to UE_B
27						→		User B is presented that call is in progress
28		→						User A puts call on hold
29			→				INVITE	UE_A sends reINVITE message indicating media stream inactive (Call Hold)
30			←				100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
31				→			INVITE	IMS_A S-CSCF forwards INVITE to IMS_B S-CSCF
32				←			100 Trying	IMS_B S-CSCF responds with a 100 Trying provisional response
33					→		INVITE	IMS_B P-CSCF forwards INVITE to UE_B
34				←			100 Trying	UE_B responds with a 100 Trying provisional response
35								User B is informed that call on hold
36				←			200 OK	UE_B responds to INVITE with 200 OK indicating media stream inactive
37				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
38			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
39			→				ACK	UE_A acknowledges the receipt of 200 OK for INVITE
40				→			ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
41					→		ACK	IMS_B P-CSCF forwards ACK to UE_B
42								User A resumes call
43			→				INVITE	UE_A sends reINVITE message indicating media stream active (Call Resume)
44			←				100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
45				→			INVITE	IMS_A S-CSCF forwards INVITE to IMS_B S-CSCF
46				←			100 Trying	IMS_B S-CSCF responds with a 100 Trying provisional response
47					→		INVITE	IMS_B P-CSCF forwards INVITE to UE_B
48				←			100 Trying	UE_B responds with a 100 Trying provisional response
49								User B is informed the call is resumed
50				←			200 OK	UE_B responds to UPDATE with 200 OK indicating media stream active
51				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
52			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
53								User A is informed that call is resumed
54			→				ACK	UE_A acknowledges the receipt of 200 OK for INVITE
55				→			ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
56					→		ACK	IMS_B P-CSCF forwards ACK to UE_B
57								User A ends call
58			→				BYE	UE_A releases the call with BYE
59				→			BYE	IMS_A S-CSCF forwards BYE to IMS_B S-CSCF
60					→		BYE	IMS_B P-CSCF forwards BYE to UE_B
61								User B is informed the call has ended
62				←			200 OK	UE_B sends 200 OK for BYE

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
63				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
64			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.4.2.2 User-initiated call hold and resume with UPDATE

4.4.2.2.1 Description

The test sequence typically associated with this use case is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User B is informed of incoming call of User A (CFW step 8)
3	User A is informed that UE_B is ringing (CFW step 12)
4	User B answers call (CFW step 19)
5	User A is informed that call is in progress (CFW step 23)
6	User B is informed that call is in progress (CFW step 27)
7	User A put call on hold (CFW step 28)
8	User B is informed that call on hold (CFW step 32)
9	User A resumes call (CFW step 36)
10	User B is informed the call is resumed (CFW step 40)
11	User A is informed that call is resumed (CFW step 44)
12	User A ends call (CFW step 45)
13	User B is informed the call has ended (CFW step 49)

4.4.2.2.2 UC_07: SIP Call Flow "call hold and resume" with UPDATE

The expected sequence:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→				INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
3			←				100 Trying	IMS_A P-CSCFW responds with a 100 Trying provisional response
4				→			INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
5				←			100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
6					→		INVITE	IMS_B P-CSCF forwards INVITE to UE_B
7					←		100 Trying	UE_B responds with a 100 Trying provisional response
8						→		User B is informed of incoming call of User A
9					←		180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
10					←		180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
11			←				180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
12		←						User A is informed that UE_B is ringing

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
13			→				PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
14				→			PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
15					→		PRACK	IMS_B P-CSCF forwards PRACK to UE_B
16					←		200 OK	UE_B responds to PRACK with 200 OK
17				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
18			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
19								User B answers call
20					←		200 OK	UE_B responds to INVITE with 200 OK to indicate that the call has been answered
21				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
22			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
23		←						User A is informed that the call is in progress
24			→				ACK	UE_A acknowledges the receipt of 200 OK for INVITE
25				→			ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
26					→		ACK	IMS_B P-CSCF forwards ACK to UE_B
27						→		User B is informed that call is in progress
28		→						User A put call on hold
29			→				UPDATE	UE_A sends UPDATE message indicating media stream inactive (Call Hold)
30				→			UPDATE	IMS_A S-CSCF forwards UPDATE to IMS_B S-CSCF
31					→		UPDATE	IMS_B P-CSCF forwards UPDATE to UE_B
32						→		User B is informed that call on hold
33					←		200 OK	UE_B responds to UPDATE with 200 OK indicating media stream inactive
34				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
35			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
36		→						User A resumes call
37			→				UPDATE	UE_A sends UPDATE message indicating media stream active (Call Resume)
38				→			UPDATE	IMS_A S-CSCF forwards UPDATE to IMS_B S-CSCF
39					→		UPDATE	IMS_B P-CSCF forwards UPDATE to UE_B
40						→		User B is informed the call is resumed
41					←		200 OK	UE_B responds to UPDATE with 200 OK indicating media stream active
42				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
43			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
44		←						User A is informed that call is resumed
45		→						User A ends call
46			→				BYE	UE_A releases the call with BYE
47				→			BYE	IMS_A S-CSCF forwards BYE to IMS_B S-CSCF
48					→		BYE	IMS_B P-CSCF forwards BYE to UE_B
49						→		User B is informed the call has ended
50					←		200 OK	UE_B sends 200 OK for BYE
51				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
52			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.4.3 S-CSCF initiated session release

4.4.3.1 Release from originating network

4.4.3.1.1 Description

UE_A places an IMS VoIP call to UE_B. Once the media path is established, the session is released by the originating network through a forced user de-registration at the HSS in IMS_A. The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2. We assume provisional responses (100rel) and no SDP preconditions.

The test sequence typically associated with this use case is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User B is informed of incoming call of User A (CFW step 8)
3	User A is informed that UE_B is ringing (CFW step 12)
4	User B answers call (CFW step 19)
5	User A is informed that the call is in progress (CFW step 23)
6	User B is informed that call is in progress (CFW step 27)
7	User B is informed the call has ended (CFW step 30)
8	User A is informed the call has ended

4.4.3.1.2 UC_08: SIP Call flow for Session release from originating network

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→				INVITE UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←				100 Trying IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→			INVITE IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←			100 Trying IMS_B I-CSCF responds with a 100 Trying provisional response	
6					→		INVITE IMS_B P-CSCF forwards INVITE to UE_B	
7					←		100 Trying UE_B responds with a 100 Trying provisional response	
8						→	User B is informed of incoming call of User A	
9					←		180 Ringing UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting	
10				←			180 Ringing IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF	
11			←				180 Ringing IMS_A P-CSCF forwards the 180 Ringing response to UE_A	
12		←					User A is informed that UE_B is ringing	
13			→				PRACK UE_A acknowledges the receipt of 180 response by sending PRACK	
14				→			PRACK IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF	
15					→		PRACK IMS_B P-CSCF forwards PRACK to UE_B	
16					←		200 OK UE_B responds PRACK with 200 OK	
17				←			200 OK IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
18			←				200 OK IMS_A P-CSCF forwards the 200 OK response to UE_A	
19					←		User B answers call	
20					←		200 OK UE_B responds INVITE with 200 OK to indicate that the call has been answered	

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
21				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
22			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
23		←						User A is informed that the call is in progress
24			→				ACK	UE_A acknowledges the receipt of 200 OK for INVITE
25				→			ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
26					→		ACK	IMS_B P-CSCF forwards ACK to UE_B
27						→		User B is informed that call is in progress
28				→			BYE	IMS_A S-CSCF releases the call towards the called user with BYE
29					→		BYE	IMS_B P-CSCF forwards BYE to UE_B
30						→		User B is informed the call has ended
31				←			200 OK	UE_B sends 200 OK for BYE
32				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
33			←				BYE	IMS_A S-CSCF releases the call towards the calling user with BYE
34		←						User A is informed the call has ended
35			→				200 OK	UE_A sends 200 OK for BYE

4.4.3.2 Release from terminating network

4.4.3.2.1 Description

UE_A places an IMS VoIP call to UE_B. Once the media path is established, the session is released by the terminating network through a forced user de-registration at the HSS in IMS_B. The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2. We assume provisional responses (100rel) and no SDP preconditions.

The test sequence typically associated with this use case is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User B is informed of incoming call of User A (CFW step 8)
3	User A is informed that UE_B is ringing (CFW step 12)
4	User B answers call (CFW step 19)
5	User A is informed that the call is in progress (CFW step 23)
6	User B is informed that call is in progress (CFW step 27)
7	User A is informed the call has ended (CFW step 30)
8	User B is informed the call has ended (CFW step 34)

4.4.3.2.2 UC_09: SIP Call flow for Session release from terminating network

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response	
6					→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B	
7					←	100 Trying	UE_B responds with a 100 Trying provisional response	
8							User B is informed of incoming call of User A	
9					←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting	
10				←		180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF	
11			←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A	
12		←					User A is informed that UE_B is ringing	
13			→			PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK	
14				→		PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF	
15					→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B	
16					←	200 OK	UE_B responds PRACK with 200 OK	
17				←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
18			←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A	
19					←		User B answers call	
20					←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered	
21				←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
22			←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A	
23		←					User A is informed that the call is in progress	
24			→			ACK	UE_A acknowledges the receipt of 200 OK for INVITE	
25				→		ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF	
26					→	ACK	IMS_B P-CSCF forwards ACK to UE_B	
27							User B is informed that call is in progress	
28				←		BYE	IMS_B S-CSCF releases the call towards the calling user with BYE	
29			←			BYE	IMS_A P-CSCF forwards BYE to UE_B	
30		←					User A is informed the call has ended	
31			→			200 OK	UE_A sends 200 OK for BYE	
32				→		200 OK	IMS_A S-CSCF forwards 200 OK response to IMS_B S-CSCF	
33					→	BYE	IMS_B S-CSCF releases the call towards the called user with BYE	
34							User B is informed the call has ended	
35					←	200 OK	UE_B sends 200 OK for BYE	

4.4.4 P-CSCF initiated session release

4.4.4.1 Resources missing before session establishment

4.4.4.2 Description

An internal message reports to the P-CSCF the loss of resource (e.g. radio resources). If a dialog initiation is started, but not yet established, then the P-CSCF will CANCEL the requests.

If a UE_A Originated dialog is established then the call will be released by the P-CSCF (in IMS_A). If a UE_B Originated dialog is established then the call will be released by the P-CSCF (in IMS_A). The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2.

The test sequence typically associated with this use case when an established session is released is as follows (CFW step numbers refer the call flow step numbering):

1	User A calls User B (CFW step 1)
2	User B is informed of incoming call of User A (CFW step 8)
3	User A is informed that UE_B is ringing (CFW step 12)
4	Internal a message that resources for UE_A are not available (CFW step 19)
5	User B is informed the call has ended (CFW step 25)

4.4.4.2.1 UC_10: SIP Call flow for Session establishment cancelled

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→				INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
3			←				100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
4				→			INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
5				←			100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
6					→		INVITE	IMS_B P-CSCF forwards INVITE to UE_B
7					←		100 Trying	UE_B responds with a 100 Trying provisional response
8						→		User B is informed of incoming call of User A
9					←		180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
10					←		180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
11			←				180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
12		←						User A is informed that UE_B is ringing
13			→				PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
14				→			PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
15					→		PRACK	IMS_B P-CSCF forwards PRACK to UE_B
16					←		200 OK	UE_B responds PRACK with 200 OK
17					←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
18			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
19							LOSS	Internal a message that resources for UE_A are not available
20					→		CANCEL	IMS_A sends CANCEL to IMS_B

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
22				←			200 OK	IMS_B S-CSCF responds with a 200 OK
23					→		CANCEL	IMS_B sends CANCEL to UE_B
24				←			200 OK	UE_B responds with 200 OK
25					→			User B is informed the call has ended
26				←			437 Request Terminated	UE_B S-CSCF sends 437 Request Terminated to IMS_B
27					→		ACK	IMS_B responds with ACK
28				←			437 Request Terminated	IMS_B sends 437 Request Terminated to IMS_A
29					→		ACK	IMS_A responds with ACK

4.4.4.3 Resources missing on originator network within session

4.4.4.3.1 Description

If a UE_A Originated dialog is established then the call will be released by the P-CSCF (in IMS_A). The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2.

1	User A calls User B (CFW step 1)
2	User B is informed of incoming call of User A (CFW step 8)
3	User A is informed that UE_B is ringing (CFW step 12)
4	User B answers call (CFW step 19)
5	User A is informed that the call is in progress (CFW step 23)
6	User B is informed that call is in progress (CFW step 27)
7	PDF or SPDF sends a message that resources are missing for UE_A (CFW step 28)
8	User B is informed the call has ended (CFW step 31)

4.4.4.3.2 UC_11: SIP Call flow for Session release from originating network

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→						User A calls User B
2			→				INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
3			←				100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
4				→			INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
5				←			100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
6					→		INVITE	IMS_B P-CSCF forwards INVITE to UE_B
7					←		100 Trying	UE_B responds with a 100 Trying provisional response
8					→			User B is informed of incoming call of User A
9					←		180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
10				←			180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
11			←				180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
12		←						User A is informed that UE_B is ringing
13			→				PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
14				→			PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
15				→			PRACK	IMS_B P-CSCF forwards PRACK to UE_B
16				←			200 OK	UE_B responds PRACK with 200 OK
17				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
18			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
19					←			User B answers call
20					←		200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
21				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
22			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
23		←						User A is informed that the call is in progress
24			→				ACK	UE_A acknowledges the receipt of 200 OK for INVITE
25				→			ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
26					→		ACK	IMS_B P-CSCF forwards ACK to UE_B
27								User B is informed that call is in progress
28							LOSS	PDF or SPDF sends a message that resources are missing for UE_A
29				→			BYE	IMS_A P-CSCF sends BYE to IMS_B S-CSCF
30					→		BYE	IMS_B P-CSCF forwards BYE to UE_B
31					→			User B is informed the call has ended
32					←		200 OK	UE_B sends 200 OK for BYE
33				←			200 OK	IMS_B forwards 200 OK response to IMS_A

4.4.4.4 Resources missing on terminating network within session

4.4.4.4.1 Description

If a UE_A Originated dialog is established then the call will be released by the P-CSCF (in IMS_B). If a UE_ The call flow path and node configuration for this use case corresponds to CF_MO2-SS1-MT2.

1	User A calls User B (CFW step 1)
2	User B is informed of incoming call of User A (CFW step 8)
3	User A is informed that UE_B is ringing (CFW step 12)
4	User B answers call (CFW step 19)
5	User A is informed that the call is in progress (CFW step 23)
6	User B is informed that call is in progress (CFW step 27)
7	PDF or SPDF sends a message that resources are missing for UE_B (CFW step 28)
8	User A is informed the call has ended (CFW step 31)

4.4.4.4.2 UC_12: SIP Call flow for Session release from terminating network

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response	
6					→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B	
7					←	100 Trying	UE_B responds with a 100 Trying provisional response	
8					→		User B is informed of incoming call of User A	
9					←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting	
10				←		180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF	
11			←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A	
12		←					User A is informed that UE_B is ringing	
13			→			PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK	
14				→		PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF	
15					→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B	
16					←	200 OK	UE_B responds PRACK with 200 OK	
17				←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
18			←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A	
19					←		User B answers call	
20					←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered	
21				←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
22			←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A	
23		←					User A is informed that the call is in progress	
24			→			ACK	UE_A acknowledges the receipt of 200 OK for INVITE	
25				→		ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF	
26					→	ACK	IMS_B P-CSCF forwards ACK to UE_B	
27					→		User B is informed that call is in progress	
28						LOSS	PDF or SPDF(in IMS_B) sends a message that resources are missing for UE_B	
29				←		BYE	IMS_B P-CSCF sends BYE to IMS_A S-CSCF	
30			←			BYE	IMS_A P-CSCF forwards BYE to UE_A	
31		←					User A is informed the call has ended	
32				→		200 OK	UE_A sends 200 OK for BYE	
33				→		200 OK	IMS_A forwards 200 OK response to IMS_B	

4.4.5 IMS message exchange between UEs in different networks

4.4.5.1 Description

The UE_A sends a MESSAGE to UE_B located in a different network.

The test sequence typically associated with this use case when an established session is released is as follows (CFW step numbers refer the call flow step numbering):

1	User A sends an instant message (CFW step 1)
2	User B is informed about the instant message (CFW step 5)
3	Optional: User A is presented a delivery report (CFW step 9)

4.4.5.2 UC_13: SIP Call flow for IMS Message Exchange

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A sends an instant message	
2			→			MESSAGE	UE_A sends MESSAGE to IMS_A	
3				→		MESSAGE	IMS_A sends MESSAGE to IMS_B	
4					→	MESSAGE	IMS_B sends MESSAGE to UE_B	
5							User B is informed about the instant message	
6					←	200 OK	UE_B sends 200 OK to IMS_B	
7				←		200 OK	IMS_B sends 200 OK to IMS_A	
8			←			200 OK	IMS_A sends 200 OK to UE_A	
9		←					Optional: User A is presented a delivery report	

4.5 Test descriptions

This clause introduces interoperability Test Descriptions (TDs) which realize one or more IMS NNI test purposes (see TS 186 011-1[2]). TDs have been designed to cover as few test purposes as possible. However, due to the limited test execution control in interoperability testing, a number TDs cover more than one test purpose.

Each TD is defined on the basis of one of the generic use cases forms presented in the previous clause. Each test sequence step in a TD includes also a reference to a specific call flow step of the generic use case. Test Preamble (PR) and Preamble (PO) steps in a test sequence only reference call flow steps in a use case. Those call flow steps which are associated with the Test Body (TB) are repeated after each TD and include any modifications necessary to adapt the generic use case. In the adapted call flow steps that are associated with user interactions are shown shaded and steps which have pass criteria are associated with are shown in bold.

Note that the expected test sequence may only show the Call Flow that affects the test.

4.5.1 General Capabilities

4.5.1.1 IMS CN components shall support SIP messages greater than 1 500 bytes

Test description		
Identifier:	TD_IMS_0001	
Summary:	IMS CN components shall support SIP messages greater than 1 500 bytes	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_4002_01	TS 124 229 [1] (V6.13.0), clause 4.2A, ¶ 1
Use Case ref.:	UC_13	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions, and TCP • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A configured to use TCP for message transport • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	UE_A is requested to send an instant message with 2 000 byte file to "user_1_pub@ims-b.net" (CFW step 1)
	2 TB	Verify that UE_B receives the message with 2 000 byte file (CFW step 5)
Conformance criteria:	Check	
	1	TP_IMS_4002_01 in CFW step 3 (MESSAGE): <i>ensure that {</i> <i>when { UE_A sends MESSAGE to UE_B</i> <i>containing a Message_Body bigger than 1 500 bytes "using TCP"</i> <i>}</i> <i>then { IMS_B receives the MESSAGE</i> <i>containing a Message_Body bigger than 1 500 bytes</i> <i>and</i> <i>containing a topmost Via_header</i> <i>indicating TCP</i> <i>and</i> <i>UE_B receives MESSAGE</i> <i>}</i> <i>}</i>

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A sends an instant message	
2			→			MESSAGE	UE_A sends MESSAGE to IMS_A	
3				→		MESSAGE	IMS_A sends a MESSAGE and IMS_B receives the MESSAGE via TCP (2 000 bytes)	
4					→	MESSAGE	IMS_B sends MESSAGE to UE_B	
5							User B is informed about the instant message	
6					←	200 OK	UE_B sends 200 OK to IMS_B	
7				←		200 OK	IMS_B sends 200 OK to IMS_A	
8			←			200 OK	IMS_A sends 200 OK to UE_A	
9		←					Optional: User A is presented a delivery report	

4.5.2 Initial dialog or standalone request procedures

4.5.2.1 Standalone request procedures

4.5.2.1.1 Standalone MESSAGE request procedure

Test description		
Identifier:	TD_IMS_0002	
Summary:	Standalone MESSAGE request procedures	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5061_02	TS 124 229 [1] (V6.13.0), clause 5.2.6.4, ¶ 89
	TP_IMS_5097_06	TS 124 229 [1] (V6.13.0), clause 5.4.3.2, ¶ 1
	TP_IMS_5097_07	TS 124 229 [1] (V6.13.0), clause 5.4.3.2, ¶ 1
	TP_IMS_5117_02	TS 124 229 [1] (V6.13.0), clause 5.4.3.3, ¶ 49
TP_IMS_5118_01	TS 124 229 [1] (V6.13.0), clause 5.4.3.3, ¶ 54	
Use Case ref.:	UC_13	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	UE_A is requested to send an instant message to "user_1_pub@ims-b.net" (CFW step 1)
	2 TB	Verify that UE_B gets the message (CFW step 5)
Conformance criteria:	Check	
	1	TP_IMS_5061_02 in CFW step 7 (200 OK): <i>ensure that { when { UE_B sends a 2xx_response to UE_A } then { IMS_A receives the 2xx_response not containing P-Preferred-Identity_header and containing P-Asserted-Identity_header containing the address "sent in P-Called_Party-ID header of the standalone request" and UE_A receives the 2xx_response } }</i>
	2	TP_IMS_5097_06 in CFW step 3 (MESSAGE): <i>ensure that { when { UE_A sends a MESSAGE to UE_B } then { IMS_B receives the MESSAGE containing a P-Charging-Vector_header containing an icid_value_parameter and UE_B receives the MESSAGE } }</i>

Test description	
3	<p>TP_IMS_5097_07 in CFW step 3 (MESSAGE):</p> <p>ensure that {</p> <p> when { UE_A sends MESSAGE to UE_B }</p> <p> then { IMS_B receives the MESSAGE</p> <p> containing a P-Charging-Vector_header</p> <p> (containing a orig-ioi_parameter</p> <p> indicating ioi of IMS_A and</p> <p> not containing a access-network-charging-info_parameter)</p> <p>and</p> <p> not containing a P-Access-Network-Info_header</p> <p>and</p> <p> UE_B receives the MESSAGE }</p>
4	<p>TP_IMS_5117_02 in CFW step 7 (200 OK):</p> <p>ensure that {</p> <p> when { UE_B sends 2xx_response to UE_A }</p> <p> then { IMS_A receives the 2xx_response</p> <p> containing a P-Charging-Vector_header</p> <p> not containing a access-network-charging-info_parameter</p> <p>and</p> <p> not containing a P-Access-Network-Info_header</p> <p>and</p> <p> UE_A receives the 2xx_response }</p> <p>}</p>
5	<p>TP_IMS_5118_01 in CFW step 7 (200 OK):</p> <p>ensure that {</p> <p> when { UE_B sends 200_response to UE_A }</p> <p> then { IMS_A receives the 200_response</p> <p> containing a P-Charging-Vector_header</p> <p> containing a orig-ioi_parameter</p> <p> indicating ioi of IMS_A and</p> <p> containing a term-ioi_parameter</p> <p> indicating ioi of IMS_B</p> <p>and</p> <p> UE_A receives the 200_response }</p> <p>}</p>

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→						User A sends an instant message
2			→				MESSAGE	UE_A sends MESSAGE to IMS_A
3				→			MESSAGE	IMS_A sends MESSAGE to IMS_B
4					→		MESSAGE	IMS_B sends MESSAGE to UE_B
5						→		User B is informed about the instant message
6					←		200 OK	UE_B sends 200 OK to IMS_B
7				←			200 OK	IMS_B sends 200 OK to IMS_A
8			←				200 OK	IMS_A sends 200 OK to UE_A
9		←						Optional: User A is presented a delivery report

4.5.2.1.2 Standalone MESSAGE request procedure with implicit Tel URI

Test description		
Identifier:	TD_IMS_0003	
Summary:	Standalone MESSAGE request procedures with implicit Tel URI	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5097_08	TS 124 229 [1] (V6.13.0), clause 5.4.3.2, ¶ 1
	TP_IMS_5117_04	TS 124 229 [1] (V6.13.0), clause 5.4.3.3, ¶ 49
Use Case ref.:	UC_13	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_2_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_2_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B implicitly registered public identities include SIP and Tel URIs • UE_A, UE_B default public identity is a SIP_URI 	
Test sequence:	Step	
	1 PR	UE_A is requested to send an instant message to "user_2_pub@ims-b.net" (CFW step 1)
	2 TB	Verify that UE_B gets the message (CFW step 5)
Conformance criteria:	Check	
	1	TP_IMS_5097_08 in CFW step 3 (MESSAGE): ensure that { when { UE_A sends MESSAGE to UE_B not containing a P-Preferred-Identity_header or containing a P-Preferred-Identity_header not indicating a Tel_URI for UE_A } then { IMS_B receives the MESSAGE containing a P-Asserted-Identity_header indicating the default_registered_public_identity of UE_A and containing a P-Asserted-Identity_header indicating a Tel_URI of UE_A and UE_B receives the MESSAGE } }
	2	TP_IMS_5117_04 in CFW step 7 (200 OK): ensure that { when { UE_B sends 2xx_response to UE_A not containing a P-Preferred-Identity_header or containing a P-Preferred-Identity_header not indicating a Tel_URI of UE_B } then { IMS_A receives the 2xx_response containing a P-Asserted-Identity_header indicating the default_registered_public_identity of UE_B and containing a P-Asserted-Identity_header indicating a Tel_URI of UE_B and UE_A receives the 2xx_response } }

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→						User A sends an instant message
2			→				MESSAGE	UE_A sends MESSAGE to IMS_A
3				→			MESSAGE	IMS_A sends MESSAGE to IMS_B
4					→		MESSAGE	IMS_B sends MESSAGE to UE_B
5						→		User B is informed about the instant message
6					←		200 OK	UE_B sends 200 OK to IMS_B
7				←			200 OK	IMS_B sends 200 OK to IMS_A
8			←				200 OK	IMS_A sends 200 OK to UE_A
9		←						Optional: User A is presented a delivery report

4.5.2.1.3 Standalone MESSAGE request procedure with implicit SIP URI

Test description		
Identifier:	TD_IMS_0004	
Summary:	Standalone MESSAGE request procedures with implicit SIP URI	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5097_09	TS 124 229 [1] (V6.13.0), clause 5.4.3.2, ¶ 1
	TP_IMS_5117_06	TS 124 229 [1] (V6.13.0), clause 5.4.3.3, ¶ 49
Use Case ref.:	UC_13	
Pre-test conditions:	<ul style="list-style-type: none"> Static configuration as per clause 4.3 UE_A, UE_B support 100rel, no SDP preconditions UE_A, UE_B have no filter criteria defined in HSS UE_A, UE_B IP bearers established as per clause 4.2.1 UE_A registered using user_3_priv@ims-a.net as per clause 4.2.3 UE_B registered using user_3_priv@ims-b.net as per clause 4.2.3 UE_A, UE_B implicitly registered public identities include SIP and Tel URIs UE_A, UE_B default public identity is a Tel_URI 	
Test sequence:	Step	
	1 PR	UE_A is requested to send an instant message to "user_3_pub@ims-b.net" (CFW step 1)
	2 TB	Verify that UE_B gets the message (CFW step 5)
Conformance criteria:	Check	
	1	TP_IMS_5097_09 in CFW step 3 (MESSAGE): ensure that { when { UE_A sends MESSAGE to UE_B not containing a P-Preferred-Identity_header or containing a P-Preferred-Identity_header indicating a Tel_URI } then { IMS_B receives the MESSAGE containing a P-Asserted-Identity_header indicating the default_registered_public_identity of UE_A and containing a P-Asserted-Identity_header indicating a Tel_derived_SIP_UR of UE_A and UE_B receives the MESSAGE } }

Test description	
2	<p>TP_IMS_5117_06 in CFW step 7 (200 OK):</p> <p><i>ensure that {</i></p> <p style="padding-left: 20px;"><i>when { UE_B sends 2xx_response to UE_A</i></p> <p style="padding-left: 40px;"><i>not containing a P-Preferred-Identity_header or</i></p> <p style="padding-left: 40px;"><i>containing a P-Preferred-Identity_header</i></p> <p style="padding-left: 40px;"><i>indicating a Tel_URI of UE_B }</i></p> <p style="padding-left: 20px;"><i>then { IMS_A receives the 2xx_response</i></p> <p style="padding-left: 40px;"><i>containing a P-Asserted-Identity_header</i></p> <p style="padding-left: 40px;"><i>indicating the default_registered_public_identity of UE_B</i></p> <p style="padding-left: 40px;"><i>and</i></p> <p style="padding-left: 40px;"><i>containing a P-Asserted-Identity_header</i></p> <p style="padding-left: 40px;"><i>indicating a Tel_derived_SIP_URI of UE_B</i></p> <p style="padding-left: 20px;"><i>and</i></p> <p style="padding-left: 20px;"><i>UE_A receives the 2xx_response }</i></p> <p><i>}</i></p>

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→						User A sends an instant message
2			→				MESSAGE	UE_A sends MESSAGE to IMS_A
3				→			MESSAGE	IMS_A sends MESSAGE to IMS_B
4					→		MESSAGE	IMS_B sends MESSAGE to UE_B
5						→		User B is informed about the instant message
6					←		200 OK	UE_B sends 200 OK to IMS_B
7				←			200 OK	IMS_B sends 200 OK to IMS_A
8			←				200 OK	IMS_A sends 200 OK to UE_A
9		←						Optional: User A is presented a delivery report

4.5.2.1.4 Standalone MESSAGE request with DNS/ENUM lookup procedures

Test description		
Identifier:	TD_IMS_0005	
Summary:	Standalone MESSAGE request with DNS/ENUM lookup procedures	
Configuration:	CF_MO2-SS1-MT2c	
References	Test purpose	Specification reference
	TP_IMS_5097_10	TS 124 229 [1], clause 5.4.3.2, ¶ 1
Use Case:	UC_13	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_5_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only • DNS_B is configured with a DNS/ENUM entry mapping UE_B's E.164 number to user_5 SIP URI public identity 	
Test sequence:	Step	
	1 PR	UE_A is requested to send an instant message addressed to the E.164 number of user_5 configured in DNS_B (CFW step 1)
	2 TB	Verify that UE_B gets the message (CFW step 7)
Conformance criteria:	Check	
	1	TP_IMS_5097_10 in CFW step 2 (MESSAGE): <i>ensure that {</i> <i> when { UE_A sends MESSAGE to UE_B</i> <i> containing a Request_URI</i> <i> indicating a Tel_URI }</i> <i> then { IMS_A sends a DNS_Query to DNS_A</i> <i> containing the Tel_URI_E.164_Number }</i> <i> when { IMS_A receives DNS_Response</i> <i> containing a NAPTR_Resource_Record</i> <i> indicating the SIP_URI of UE_B }</i> <i> then { IMS_A sends the MESSAGE to IMS_B</i> <i> containing a Request_URI</i> <i> indicating a SIP_URI</i> <i> and</i> <i> UE_B receives the MESSAGE }</i> <i>}</i>

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	D N S A	I M S B	U E B		
1		→						User A sends an instant message
2			→				MESSAGE	UE_A sends MESSAGE to IMS_A
3				→			DNS QUERY	IMS_A sends DNS QUERY to DNS, verify that the query contains an E.164 telephone URI
4				←			DNS RESPONSE	DNS_A sends DNS RESPONSE containing a NAPTR resource record to IMS_A
5				→			MESSAGE	IMS_A sends MESSAGE to IMS_B, verify that the Request_URI of the MESSAGE indicates a SIP_URI
6				→			MESSAGE	IMS_B sends MESSAGE to UE_B
7						→		User B is informed about the instant message
8					←		200 OK	UE_B sends 200 OK to IMS_B
9				←			200 OK	IMS_B sends 200 OK to IMS_A
10			←				200 OK	IMS_A sends 200 OK to UE_A
11		←						Optional: User A is presented a delivery report

4.5.2.2 Initial INVITE dialog procedures

4.5.2.2.1 Initial INVITE request procedure

Test description																	
Identifier:	TD_IMS_0006																
Summary:	Initial INVITE request procedures																
Configuration:	CF_MO2-SS1-MT2																
References	<table border="1"> <thead> <tr> <th>Test purpose</th> <th>Specification reference</th> </tr> </thead> <tbody> <tr> <td>TP_IMS_5046_01</td> <td>TS 124 229 [1], clause 5.2.6.3, ¶ 4</td> </tr> <tr> <td>TP_IMS_5097_01</td> <td>TS 124 229 [1], clause 5.4.3.2, ¶ 1</td> </tr> <tr> <td>TP_IMS_5097_02</td> <td>TS 124 229 [1], clause 5.4.3.2, ¶ 1</td> </tr> <tr> <td>TP_IMS_5107_02</td> <td>TS 124 229 [1], clause 5.4.3.2, ¶ 49</td> </tr> </tbody> </table>	Test purpose	Specification reference	TP_IMS_5046_01	TS 124 229 [1], clause 5.2.6.3, ¶ 4	TP_IMS_5097_01	TS 124 229 [1], clause 5.4.3.2, ¶ 1	TP_IMS_5097_02	TS 124 229 [1], clause 5.4.3.2, ¶ 1	TP_IMS_5107_02	TS 124 229 [1], clause 5.4.3.2, ¶ 49						
Test purpose	Specification reference																
TP_IMS_5046_01	TS 124 229 [1], clause 5.2.6.3, ¶ 4																
TP_IMS_5097_01	TS 124 229 [1], clause 5.4.3.2, ¶ 1																
TP_IMS_5097_02	TS 124 229 [1], clause 5.4.3.2, ¶ 1																
TP_IMS_5107_02	TS 124 229 [1], clause 5.4.3.2, ¶ 49																
Use Case:	UC_01																
Pre-test conditions:	<ul style="list-style-type: none"> Static configuration as per clause 4.3 UE_A, UE_B support 100rel, no SDP preconditions UE_A, UE_B have no filter criteria defined in HSS UE_A, UE_B IP bearers established as per clause 4.2.1 UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 UE_A, UE_B registered public identities are SIP URIs only 																
Test sequence:	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1 TB</td> <td>Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)</td> </tr> <tr> <td>2 PO</td> <td>Verify that UE_B rings (CFW step 8)</td> </tr> <tr> <td>3 PO</td> <td>Verify that ringback is present at UE_A (CFW step 12)</td> </tr> <tr> <td>4 PO</td> <td>Answer the call at UE_B (CFW step 19)</td> </tr> <tr> <td>5 PO</td> <td>Verify that voice can be exchanged in both directions (CFW step 27)</td> </tr> <tr> <td>6 PO</td> <td>Release call at UE_A (CFW step 28)</td> </tr> <tr> <td>7 PO</td> <td>Verify that call is released at UE_B (CFW step 32)</td> </tr> </tbody> </table>	Step		1 TB	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)	2 PO	Verify that UE_B rings (CFW step 8)	3 PO	Verify that ringback is present at UE_A (CFW step 12)	4 PO	Answer the call at UE_B (CFW step 19)	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)	6 PO	Release call at UE_A (CFW step 28)	7 PO	Verify that call is released at UE_B (CFW step 32)
Step																	
1 TB	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)																
2 PO	Verify that UE_B rings (CFW step 8)																
3 PO	Verify that ringback is present at UE_A (CFW step 12)																
4 PO	Answer the call at UE_B (CFW step 19)																
5 PO	Verify that voice can be exchanged in both directions (CFW step 27)																
6 PO	Release call at UE_A (CFW step 28)																
7 PO	Verify that call is released at UE_B (CFW step 32)																

Test description		
Conformance criteria:	Check	
	1	<p>TP_IMS_5046_01 in CFW step 4 (INVITE):</p> <p>ensure that {</p> <p> when { UE_A sends INVITE to UE_B }</p> <p> then { IMS_B receives the INVITE</p> <p> containing an additional Via_header</p> <p> containing (P-CSCF_via_port_number and</p> <p> (P-CSCF-FQDN_address or</p> <p> P-CSCF-IP_address)) of IMS_A and</p> <p> containing an additional Record-Route_header</p> <p> containing (P-CSCF_port_number "where it awaits</p> <p> subsequent requests from the called party" and</p> <p> (P-CSCF-FQDN_address or P-CSCF-IP_address))</p> <p> of IMS_A and</p> <p> not containing P-Preferred-Identity_header and</p> <p> containing P-Asserted-Identity_header</p> <p> containing an address of UE_A and</p> <p> containing P-Charging-Vector_header</p> <p> containing an icid_value_parameter</p> <p> and</p> <p> UE_B receives INVITE</p> <p> }</p> <p>}</p>
	2	<p>TP_IMS_5097_01 in CFW step 4 (INVITE):</p> <p>ensure that {</p> <p> when { UE_A sends an initial INVITE to UE_B }</p> <p> then { IMS_B receives the initial INVITE</p> <p> containing a P-Charging-Vector_header</p> <p> containing an icid_value_parameter</p> <p> and</p> <p> UE_B receives the INVITE }</p> <p>}</p>
	3	<p>TP_IMS_5097_02 in CFW step 4 (INVITE):</p> <p>ensure that {</p> <p> when { UE_A sends initial INVITE to UE_B }</p> <p> then { IMS_B receives the initial INVITE</p> <p> containing a topmost Record-Route_header</p> <p> indicating the originating S-CSCF_SIP_URI and</p> <p> containing a P-Charging-Vector_header</p> <p> (containing a orig-ioi_parameter</p> <p> indicating IMS_A and</p> <p> not containing a access-network-charging-info_parameter)</p> <p> and</p> <p> not containing a P-Access-Network-Info_header</p> <p> and</p> <p> UE_B receives the INVITE }</p> <p>}</p>

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response	
6					→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B	
7					←	100 Trying	UE_B responds with a 100 Trying provisional response	
8						→	User B is informed of incoming call of User A	

4.5.2.2.2 1xx provisional response to initial INVITE request procedures

Test description		
Identifier:	TD_IMS_0007	
Summary:	1xx provisional response to initial INVITE request procedure	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5055_01	TS 124 229 [1], clause 5.2.6.4, ¶ 15
	TP_IMS_5115_01	TS 124 229 [1], clause 5.4.3.3, ¶ 44
	TP_IMS_5131_01	TS 124 229 [1], clause 5.3.2.1, ¶ 44
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> Static configuration as per clause 4.3 UE_A, UE_B support 100rel, no SDP preconditions UE_A, UE_B have no filter criteria defined in HSS UE_A, UE_B IP bearers established as per clause 4.2.1 UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 UE_A, UE_B registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 TB	Verify that ringback is present at UE_A (CFW step 12)
	4 PO	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
7 PO	Verify that call is released at UE_B (CFW step 32)	

Test description		
Conformance criteria:	Check	
	1	TP_IMS_5055_01 in CFW step 10 (180 Ringing): ensure that { when { UE_B sends a 1xx_response to UE_A } then { IMS_A receives 1xx_response containing Record-Route_header containing the P-CSCF_port_number of IMS_B 'where it expects subsequent requests' and not containing comp_parameter and not containing P-Preferred-Identity_header and containing P-Asserted-Identity_header indicating the address "sent in P-Called_Party-ID header of the initial request" and UE_A receives 1xx_response } }
	2	TP_IMS_5115_01 in CFW step 10 (180 Ringing): ensure that { when { UE_B sends 1xx_response to UE_A } then { IMS_A receives the 1xx_response containing a P-Charging-Vector_header containing a orig-ioi_parameter indicating IMS_A and containing a term-ioi_parameter indicating IMS_B and UE_A receives the 1xx_response } }
	3	TP_IMS_5131_01 in CFW step 10 (180 Ringing): ensure that { when { UE_B sends 1xx_response to UE_A } then { IMS_A receives the 1xx_response not containing a P-Charging-Function-Addresses_header and UE_A receives the 1xx_response } }

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
8						→		User B is informed of incoming call of User A
9					←		180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
10				←			180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
11		←					180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
12	←							User A is informed that UE_B is ringing

4.5.2.2.3 2xx final response and ACK for initial INVITE request procedures

Test description		
Identifier:	TD_IMS_0008	
Summary:	2xx final response and ACK for initial INVITE request procedures	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5055_02	TS 124 229 [1], clause 5.2.6.4, ¶ 15
	TP_IMS_5115_02	TS 124 229 [1], clause 5.4.3.3, ¶ 44
	TP_IMS_5131_02	TS 124 229 [1], clause 5.3.2.1, ¶ 44
	TP_IMS_5107_03	TS 124 229 [1], clause 5.4.3.2, ¶ 49
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 TB	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
	7 PO	Verify that call is released at UE_B (CFW step 32)
Conformance criteria:	Check	
	1	TP_IMS_5055_02 in CFW step 21 (200 Ok): <i>ensure that {</i> <i> when { UE_B sends a 2xx_response to UE_A }</i> <i> then { IMS_A receives 2xx_response</i> <i> containing Record-Route_header</i> <i> containing the P-CSCF_port_number of IMS_B 'where it</i> <i> expects subsequent requests' and</i> <i> not containing comp_parameter and</i> <i> not containing P-Preferred-Identity_header and</i> <i> containing P-Asserted-Identity_header</i> <i> indicating the address "sent in P-Called_Party-ID header of the</i> <i> initial request"</i> <i> and</i> <i> UE_B receives 2xx_response</i> <i> }</i> <i> }</i> <i> }</i>
	2	TP_IMS_5115_02 in CFW step 21 (200 Ok): <i>ensure that {</i> <i> when { UE_B sends 2xx_response to UE_A }</i> <i> then { IMS_A receives the 2xx_response</i> <i> containing a P-Charging-Vector_header</i> <i> containing an orig-ioi_parameter</i> <i> indicating IMS_A and</i> <i> containing a term-ioi_parameter</i> <i> indicating IMS_B</i> <i> and</i> <i> UE_A receives the 2xx_response }</i> <i> }</i>

Test description	
3	TP_IMS_5131_02 in CFW step 21 (200 Ok): <i>ensure that { when { UE_B sends 2xx_response to UE_A } then { IMS_A receives the 2xx_response not containing a P-Charging-Function-Addresses_header and UE_A receives the 2xx_response } }</i>
4	TP_IMS_5107_03 in CFW step 25 (ACK): <i>ensure that { when { UE_A sends ACK to UE_B } then { IMS_B receives the ACK (containing a P-Charging-Vector_header not containing a access-network-charging-info_parameter or not containing a P-Charging-Vector_header) and not containing a P-Access-Network-Info_header and UE_B receives the ACK } }</i>

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
12		←					User A is informed that UE_B is ringing	
13			→				PRACK UE_A acknowledges the receipt of 180 response by sending PRACK	
14				→			PRACK IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF	
15					→		PRACK IMS_B P-CSCF forwards PRACK to UE_B	
16					←		200 OK UE_B responds PRACK with 200 OK	
17				←			200 OK IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
18			←				200 OK IMS_A P-CSCF forwards the 200 OK response to UE_A	
19					←		User B answers call	
20				←			200 OK UE_B responds INVITE with 200 OK to indicate that the call has been answered	
21				←			200 OK IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
22			←				200 OK IMS_A P-CSCF forwards the 200 OK response to UE_A	
23		←					User A is presented that call in process	
24			→				ACK UE_A acknowledges the receipt of 200 OK for INVITE	
25				→			ACK IMS_A S-CSCF forwards ACK to IMS_B S-CSCF	
26					→		ACK IMS_B P-CSCF forwards ACK to UE_B	
27					→		User B is informed that the call is in progress	

4.5.2.2.4 Initial INVITE request procedure with implicit Tel URI

Test description		
Identifier:	TD_IMS_0009	
Summary:	Initial INVITE request procedure with implicit Tel URI	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5097_03	TS 124 229 [1], clause 5.4.3.2, ¶ 1
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_2_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_2_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B implicitly registered public identities include SIP and Tel URIs • UE_A, UE_B default public identity is a SIP_URI 	
Test sequence:	Step	
	1 TB	Initiate an IMS VoIP call on UE_A, addressed to "user_2_pub@ims-b.net" (CFW step 1)
	2 PO	Verify that UE_B rings (CFW step 8)
	3 PO	Verify that ringback is present at UE_A (CFW step 12)
	4 PO	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
	7 PO	Verify that call is released at UE_B (CFW step 32)
Conformance criteria:	Check	
	1	TP_IMS_5097_03 in CFW step 4 (INVITE): <i>ensure that {</i> <i> when { UE_A sends initial INVITE to UE_B</i> <i> not containing a P-Preferred-Identity_header or</i> <i> containing a P-Preferred-Identity_header</i> <i> not indicating a Tel_URI }</i> <i> then { IMS_B receives the initial INVITE</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating the default_registered_public_identity of UE_A</i> <i> and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_URI of UE_A</i> <i> and</i> <i> UE_B receives the INVITE }</i> <i>}</i>

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→						User A calls User B
2			→				INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
3			←				100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
4				→			INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
5				←			100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
6					→		INVITE	IMS_B P-CSCF forwards INVITE to UE_B
7					←		100 Trying	UE_B responds with a 100 Trying provisional response
8						→		User B is informed of incoming call of User A

4.5.2.2.5 1xx provisional response to initial INVITE request procedures with implicit Tel URI

Test description		
Identifier:	TD_IMS_0010	
Summary:	1xx provisional response to initial INVITE request procedures with implicit Tel URI	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5115_03	TS 124 229 [1], clause 5.4.3.3, ¶ 44
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_2_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_2_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B implicitly registered public identities include SIP and Tel URIs • UE_A, UE_B default public identity is a SIP_URI 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_2_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 TB	Verify that ringback is present at UE_A (CFW step 12)
	4 PO	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
	7 PO	Verify that call is released at UE_B (CFW step 32)
Conformance criteria:	Check	
	1	TP_IMS_5115_03 in CFW step 10 (180 Ringing): <i>ensure that {</i> <i> when { UE_B sends 1xx_response to UE_A</i> <i> not containing a P-Preferred-Identity_header or</i> <i> containing a P-Preferred-Identity_header</i> <i> indicating a SIP_URI}</i> <i> then { IMS_A receives the 1xx_response</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating the default_registered_public_identity of UE_B</i> <i> and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_URI of UE_B</i> <i> and</i> <i> UE_A receives the 1xx_response }</i> <i>}</i>

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
8						→		User B is informed of incoming call of User A
9					←		180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
10				←			180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
11			←				180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
12		←						User A is informed that UE_B is ringing

4.5.2.2.6 2xx final response to initial INVITE request procedures with implicit Tel URI

Test description		
Identifier:	TD_IMS_0011	
Summary:	2xx final response to initial INVITE request procedures with implicit Tel URI	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5115_04	TS 124 229 [1], clause 5.4.3.3, ¶ 44
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_2_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_2_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B implicitly registered public identities include SIP and Tel URIs • UE_A, UE_B default public identity is a SIP_URI 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_2_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step _)
	3 PR	Verify that ringback is present at UE_A (CFW step 1é)
	4 TB	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
7 PO	Verify that call is released at UE_B (CFW step 32)	
Conformance criteria:	Check	
	1	TP_IMS_5115_04 in CFW step 21 (200 Ok): <i>ensure that {</i> <i> when { UE_B sends 2xx_response to UE_A</i> <i> not containing a P-Preferred-Identity_header or</i> <i> containing a P-Preferred-Identity_header</i> <i> not indicating a Tel_URI}</i> <i> then { IMS_A receives the 2xx_response</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating the default_registered_public_identity of UE_B</i> <i> and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_URI of UE_B</i> <i> and</i> <i> UE_A receives the 2xx_response }</i> <i>}</i>

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
19						←		User B answers call
20						←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
21				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
22		←					200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
23	←							User A is presented that call in process

4.5.2.2.7 Initial INVITE request procedure with implicit SIP URI

Test description		
Identifier:	TD_IMS_0012	
Summary:	Initial INVITE request procedure with implicit SIP URI	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5097_04	TS 124 229 [1], clause 5.4.3.2, ¶ 1
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_3_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_3_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B implicitly registered public identities include SIP and Tel URIs • UE_A, UE_B default public identity is a Tel_URI 	
Test sequence:	Step	
	1 TB	Initiate an IMS VoIP call on UE_A, addressed to UE_B's TEL URI (CFW step 1)
	2 PO	Verify that UE_B rings (CFW step 8)
	3 PO	Verify that ringback is present at UE_A (CFW step 12)
	4 PO	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
	7 PO	Verify that call is released at UE_B (CFW step 32)
Conformance criteria:	Check	
	1	TP_IMS_5097_04 in CFW step 4 (INVITE): <i>ensure that {</i> <i> when { UE_A sends initial INVITE to UE_B</i> <i> not containing a P-Preferred-Identity_header or</i> <i> containing a P-Preferred-Identity_header</i> <i> indicating a Tel_URI }</i> <i> then { IMS_B receives the initial INVITE</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating the default_registered_public_identity of UE_A</i> <i> and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_derived_SIP_URI of UE_A</i> <i> and</i> <i> UE_B receives the INVITE }</i> <i>}</i>

The expected test body call flow sequence is:

	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B	
1		→					User A calls User B
2			→				INVITE UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
3			←				100 Trying IMS_A P-CSCF responds with a 100 Trying provisional response
4				→			INVITE IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
5				←			100 Trying IMS_B I-CSCF responds with a 100 Trying provisional response
6					→		INVITE IMS_B P-CSCF forwards INVITE to UE_B
7					←		100 Trying UE_B responds with a 100 Trying provisional response
8						→	User B is informed of incoming call of User A

4.5.2.2.8 1xx provisional response to initial INVITE request procedures with implicit SIP URI

Test description		
Identifier:	TD_IMS_0013	
Summary:	1xx provisional response to initial INVITE request procedures with implicit SIP URI	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5115_05	TS 124 229 [1], clause 5.4.3.3, ¶ 44
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_3_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_3_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B implicitly registered public identities include SIP and Tel URIs • UE_A, UE_B default public identity is a Tel_URI 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to UE_B's TEL URI (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 TB	Verify that ringback is present at UE_A (CFW step 12)
	4 PO	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
	7 PO	Verify that call is released at UE_B (CFW step 32)
Conformance criteria:	Check	
	1	TP_IMS_5115_05 in CFW step 10 (180 Ringing): <i>ensure that {</i> <i> when { UE_B sends 1xx_response to UE_A</i> <i> not containing a P-Preferred-Identity_header or</i> <i> containing a P-Preferred-Identity_header</i> <i> indicating a Tel_URI }</i> <i> then { IMS_A receives the 1xx_response</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating the default_registered_public_identity of UE_B</i> <i> and</i> <i> containing a P-Asserted-Identity_header of UE_B</i> <i> indicating a Tel_derived_SIP_URI</i> <i> and</i> <i> UE_A receives the 1xx_response }</i> <i>}</i>

The expected test body call flow sequence is:

	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B	
1		→					User A calls User B
2			→				INVITE UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
3			←				100 Trying IMS_A P-CSCF responds with a 100 Trying provisional response
4				→			INVITE IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
5				←			100 Trying IMS_B I-CSCF responds with a 100 Trying provisional response
6					→		INVITE IMS_B P-CSCF forwards INVITE to UE_B
7					←		100 Trying UE_B responds with a 100 Trying provisional response
8						→	User B is informed of incoming call of User A
9					←		180 Ringing UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
10				←			180 Ringing IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
11			←				180 Ringing IMS_A P-CSCF forwards the 180 Ringing response to UE_A
12		←					User A is informed that UE_B is ringing

4.5.2.2.9 2xx final response to initial INVITE request procedures with implicit SIP URI

Test description		
Identifier:	TD_IMS_0014	
Summary:	2xx final response to initial INVITE request procedures with implicit SIP URI	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5115_06	TS 124 229 [1], clause 5.4.3.3, ¶ 44
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_3_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_3_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B implicitly registered public identities include SIP and Tel URIs • UE_A, UE_B default public identity is a Tel_URI 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to UE_B's TEL URI (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 TB	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
7 PO	Verify that call is released at UE_B (CFW step 32)	
Conformance criteria:	Check	
	1	TP_IMS_5115_06 in CFW step 21 (200 Ok): <i>ensure that {</i> <i> when { UE_B sends 2xx_response to UE_A</i> <i> not containing a P-Preferred-Identity_header or</i> <i> containing a P-Preferred-Identity_header</i> <i> indicating a Tel_URI }</i> <i> then { IMS_A receives the 2xx_response</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating the default_registered_public_identity of UE_B</i> <i> and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_derived_SIP_URI of UE_B</i> <i> and</i> <i> UE_A receives the 2xx_response }</i> <i>}</i>

The expected test body call flow sequence is:

	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B	
12		←					User A is informed that UE_B is ringing
13			→				PRACK UE_A acknowledges the receipt of 180 response by sending PRACK
14				→			PRACK IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
15					→		PRACK IMS_B P-CSCF forwards PRACK to UE_B
16					←		200 OK UE_B responds PRACK with 200 OK
17				←			200 OK IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
18			←				200 OK IMS_A P-CSCF forwards the 200 OK response to UE_A
19						←	User B answers call

4.5.2.2.10 Initial INVITE request with DNS/ENUM lookup procedures

Test description		
Identifier:	TD_IMS_0015	
Summary:	Initial INVITE request with DNS/ENUM lookup procedures	
Configuration:	CF_MO2-SS1-MT2c	
References	Test purpose	Specification reference
	TP_IMS_5097_05	TS 124 229 [1], clause 5.4.3.2, ¶ 1
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_5_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only • DNS_B is configured with a DNS/ENUM entry mapping UE_B's E.164 number to "user_5_pub@ims-b.net" 	
Test sequence:	Step	
	1 TB	Initiate an IMS VoIP call on UE_A, addressed to the E.164 number configured in DNS_B (CFW step 1) (CFW step 1)
	2 TB	Verify that UE_B rings (CFW step 8)
	3 PO	Verify that ringback is present at UE_A (CFW step 12)
	4 PO	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
7 PO	Verify that call is released at UE_B (CFW step 32)	
Conformance criteria:	Check	
	1	TP_IMS_5097_05 in CFW step 4 (INVITE): <i>ensure that {</i> <i> when { UE_A sends initial INVITE to UE_B</i> <i> containing a Request_URI</i> <i> indicating a Tel_URI}</i> <i> then { IMS_A sends a DNS_Query to DNS_A</i> <i> containing the Tel_URI_E.164_Number }</i> <i> when { IMS_A receives DNS_Response</i> <i> containing a NAPTR_Resource_Record</i> <i> indicating the SIP_URI of UE_B }</i> <i> then { IMS_A sends the initial INVITE to IMS_B</i> <i> containing a Request_URI</i> <i> indicating a SIP_URI</i> <i> and</i> <i> UE_B receives the INVITE }</i> <i>}</i>

The expected test body call flow sequence is:

Step	Direction							Message	Comment
	U s e r A	U E A	I M S A	D N S A	I M S B	U E B	U s e r B		
1		→							User A calls User B
2			→					INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
3			←					100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
4				→				DNS QUERY	IMS_A sends DNS QUERY to DNS_A containing a E.164 telephone URI
5				←				DNS RESPONSE	DNS_A send a DNS RESPONSE to IMS_A containing a NAPTR resource record
6				→				INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
7				←				100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
10						→		INVITE	IMS_B P-CSCF forwards INVITE to UE_B
11						←		100 Trying	UE_B responds with a 100 Trying provisional response
12						→			User B is informed of incoming call of User A

4.5.2.3 Special case of initial INVITE dialog procedures

4.5.2.3.1 P-CSCF initiated session release, session establishment cancelled

Test description													
Identifier:	TD_IMS_0016												
Summary:	P-CSCF-initiated session release, session establishment cancelled, resources no longer available												
Configuration:	CF_MO2-SS1-MT2												
References	<table border="1"> <thead> <tr> <th>Test purpose</th> <th>Specification reference</th> </tr> </thead> <tbody> <tr> <td>TP_IMS_5072_01</td> <td>TS 124 229 [1] clause 5.2.8.1.1, ¶ 1</td> </tr> </tbody> </table>	Test purpose	Specification reference	TP_IMS_5072_01	TS 124 229 [1] clause 5.2.8.1.1, ¶ 1								
Test purpose	Specification reference												
TP_IMS_5072_01	TS 124 229 [1] clause 5.2.8.1.1, ¶ 1												
Use Case:	UC_10 (CFW for Cancelled)												
Pre-test conditions:	<ul style="list-style-type: none"> Static configuration as per clause 4.3 UE_A, UE_B support 100rel, no SDP preconditions UE_A, UE_B have no filter criteria defined in HSS UE_A, UE_B IP bearers established as per clause 4.2.1 UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 UE_A, UE_B registered public identities are SIP URIs only P-CSCF can receive notifications of UE_A network access failures 												
Test sequence:	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1 PR</td> <td>Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)</td> </tr> <tr> <td>2 PR</td> <td>Verify that UE_B rings (CFW step 8)</td> </tr> <tr> <td>3 PR</td> <td>Verify that ringback is present at UE_A (CFW step 12)</td> </tr> <tr> <td>4 TB</td> <td>Remove cable, antenna or battery from UE_A (CFW step 19)</td> </tr> <tr> <td>5 TB</td> <td>Verify that call is ended at UE_B (CFW step 25)</td> </tr> </tbody> </table>	Step		1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)	2 PR	Verify that UE_B rings (CFW step 8)	3 PR	Verify that ringback is present at UE_A (CFW step 12)	4 TB	Remove cable, antenna or battery from UE_A (CFW step 19)	5 TB	Verify that call is ended at UE_B (CFW step 25)
Step													
1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)												
2 PR	Verify that UE_B rings (CFW step 8)												
3 PR	Verify that ringback is present at UE_A (CFW step 12)												
4 TB	Remove cable, antenna or battery from UE_A (CFW step 19)												
5 TB	Verify that call is ended at UE_B (CFW step 25)												
Conformance criteria:	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>TP_IMS_5072_01 in CFW step 20 (CANCEL): <i>ensure that { when { IMS_A receives "an indication that UE_A is no longer available" } then { IMS_A sends a CANCEL to IMS_B and UE_B receives the CANCEL } } }</i> </td> </tr> </tbody> </table>	Check		1	TP_IMS_5072_01 in CFW step 20 (CANCEL): <i>ensure that { when { IMS_A receives "an indication that UE_A is no longer available" } then { IMS_A sends a CANCEL to IMS_B and UE_B receives the CANCEL } } }</i>								
Check													
1	TP_IMS_5072_01 in CFW step 20 (CANCEL): <i>ensure that { when { IMS_A receives "an indication that UE_A is no longer available" } then { IMS_A sends a CANCEL to IMS_B and UE_B receives the CANCEL } } }</i>												

The expected test body call flow is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
19							LOSS	Internal a message that resources for UE_A are not available
20				→			CANCEL	IMS_A sends CANCEL to IMS_B
22				←			200 OK	IMS_B S-CSCF responds with a 200 OK
23					→		CANCEL	IMS_B sends CANCEL to UE_B
24					←		200 OK	UE_B responds with 200 OK
25						→		User B is informed the call has ended

4.5.2.3.2 P-CSCF initiated session release, session released from originating network

Test description		
Identifier:	TD_IMS_0017	
Summary:	P-CSCF-initiated session release, session released from originating network	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5073_01	TS 124 229 [1], clause 5.2.8.1.2, ¶ 1
Use Case:	UC_11 (CFW for originating network)	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only • P-CSCF can receive notifications of UE_A network access failures 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 PR	Answer the call at UE_B (CFW step 19)
	5 PR	Verify that voice can be exchanged in both directions (CFW step 27)
	6 TB	Remove cable, antenna or battery from UE_A (CFW step 28)
7 TB	Verify that call is released at UE_B (CFW step 31)	
Conformance criteria:	Check	
	1	TP_IMS_5073_01 in CFW step 29 (BYE): <i>ensure that {</i> <i> when { UE_A is no_longer_available }</i> <i> then { IMS_B receives BYE from IMS_A</i> <i> containing Request_URI</i> <i> indicating the Contact_header_value of UE_B and</i> <i> containing To_header</i> <i> indicating the initial 200_OK_To_header_value from UE_B</i> <i> containing From_header</i> <i> indicating the initial INVITE_From_header_value from UE_A</i> <i> and</i> <i> containing Call-ID_header</i> <i> indicating the initial INVITE_Call_Id_header_value from UE_A</i> <i> and</i> <i> containing CSeq_header</i> <i> indicating an incremented Sequence_Number and</i> <i> containing Route_header</i> <i> indicating 'dialog specific routing information for UE_B' and</i> <i> "further headers based on local policy or call release reason"</i> <i> and</i> <i> UE_B receives BYE</i> <i>}</i> }

The expected test body call flow is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
28							LOSS	PDF or SPDF sends a message that resources are missing for UE_A
29				→			BYE	IMS_A P-CSCF sends BYE to IMS_B S-CSCF
30					→		BYE	IMS_B P-CSCF forwards BYE to UE_B
31						→		User B is informed the call has ended

4.5.2.3.3 P-CSCF initiated session release, session released from terminating network

Test description		
Identifier:	TD_IMS_0018	
Summary:	P-CSCF-initiated session release, session released from terminating network	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5074_01	TS 124 229 [1], clause 5.2.8.1.2, ¶ 10
Use Case:	UC_12 (CFW for terminating network)	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only • P-CSCF can receive notifications of UE_B network access failures 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 PR	Answer the call at UE_B (CFW step 19)
	5 PR	Verify that voice can be exchanged in both directions (CFW step 27)
	6 TB	Remove cable, antenna or battery from UE_B (CFW step 28)
	7 TB	Verify that call is released at UE_A (CFW step 31)
Conformance criteria:	Check	
	1	TP_IMS_5074_01 in CFW step 29 (BYE): <i>ensure that {</i> <i> when { UE_B is no_longer_available }</i> <i> then { IMS_A receives BYE from IMS_B</i> <i> containing Request_URI</i> <i> indicating the Contact_header_value of UE_A and</i> <i> containing To_header</i> <i> indicating the initial INVITE_To_header_value from UE_A</i> <i> containing From_header</i> <i> indicating the initial 200_OK_From_header_value from UE_B</i> <i> and</i> <i> containing Call-ID_header</i> <i> indicating the initial INVITE_Call_Id_header_value from UE_A</i> <i> and</i> <i> containing CSeq_header</i> <i> indicating an incremented Sequence_Number and</i> <i> containing Route_header</i> <i> indicating 'dialog specific routing information for UE_A' and</i> <i> "further headers based on local policy or call release reason"</i> <i> and</i> <i> UE_A receives BYE</i> <i>}</i> }

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
28							LOSS	PDF or SPDF(in IMS_B) sends a message that resources are missing for UE_B
29				←			BYE	IMS_B P-CSCF sends BYE to IMS_A S-CSCF
30			←				BYE	IMS_A P-CSCF forwards BYE to UE_A
31	←							User A is informed the call has ended

4.5.2.3.4 Initial request to non-existent user procedures

Test description		
Identifier:	TD_IMS_0019	
Summary:	Initial INVITE request to non-existent user procedures	
Configuration:	CF_MO2-SS1	
References	Test purpose	Specification reference
	TP_IMS_5132_01	TS 124 229 [1], clause 5.3.2.1, ¶ 32
Use Case:	UC_05	
Pre-test conditions:	<ul style="list-style-type: none"> Static configuration as per clause 4.3 UE_A support 100rel, no SDP preconditions UE_A have no filter criteria defined in HSS UE_A IP bearers established as per clause 4.2.1 UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 UE_A registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to sip:non_existent_user@ims-b.net (CFW step 1)
	2 TB	Verify that an error is received and call is aborted at UE_A (after CFW step 6)
Conformance criteria:	Check	
	1	TP_IMS_5132_01 in CFW step 6 (404 or 604 Response): ensure that { when { UE_A sends INVITE containing a Request_URI indicating a non_existent_user in IMS_B} then { IMS_B receives the INVITE and IMS_B sends (a 404_response or a 604_response) and UE_A receives the response } }

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→				INVITE UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←				100 Trying IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→			INVITE IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←			100 Trying IMS_B I-CSCF responds with a 100 Trying provisional response	
6				←			404 Not Found or 604 Does not exist anywhere IMS_B I-CSCF generates error message indicating non-existent user	
7			←				404 Not Found or 604 Does not exist anywhere IMS_A P-CSCF forwards error response to UE_A	
8		←					User A is informed of "no such user"	

4.5.2.3.5 Initial request to non-registered user with no filter criterion

Test description		
Identifier:	TD_IMS_0020	
Summary:	Initial request to non-registered user with no filter criterion	
Configuration:	CF_MO2-SS1-MT2b	
References	Test purpose	Specification reference
	TP_IMS_5133_01	TS 124 229 [1], clause 5.3.2.1, ¶ 33
Use Case:	UC_03	
Pre-test conditions:	<ul style="list-style-type: none"> Static configuration as per clause 4.3 UE_A, UE_B support 100rel, no SDP preconditions UE_A, UE_B have no filter criteria defined in HSS UE_A, UE_B IP bearers established as per clause 4.2.1 UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 UE_B not registered as user_1_priv@ims-b.net UE_A registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 TB	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 TB	Verify that error is received and call is aborted at UE_A (CFW step 8)
Conformance criteria:	Check	
	1	TP_IMS_5133_01 in CFW step 6 (480 Response): ensure that { when { UE_A sends INVITE to UE_B } then { IMS_B receives the INVITE and sends a 480_response to IMS_A and UE_A receives the 480_response } }

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→					User A calls User B	
2			→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports	
3			←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response	
4				→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF	
5				←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response	
6				←		480 Temporarily unavailable	IMS_B I-CSCF generates error message indicating unavailable user	
7			←			480 Temporarily unavailable	IMS_A P-CSCF forwards error response to UE_A	
8		←					User A is informed of User B unreachable	

4.5.2.3.6 Initial request to non-registered user with terminating unregistered filter criterion

Test description		
Identifier:	TD_IMS_0021	
Summary:	Initial request to non-registered user with terminating unregistered filter criterion	
Configuration:	CF_MO2-SS1-MT2-AST4b	
References	Test purpose	Specification reference
	TP_IMS_5109_01	TS 124 229 [1], clause 5.4.3.3, ¶ 35
Use Case:	UC_04	
Pre-test conditions:	<ul style="list-style-type: none"> Static configuration as per clause 4.3 UE_A, UE_B support 100rel, no SDP preconditions UE_A has no filter criteria defined in HSS IMS_B has terminating unregistered criterion set for UE_B on INVITE indicating SESSION_TERMINATED option and forward the INVITE to AS_B AS_B is unreachable from IMS_B UE_A, UE_B IP bearers established as per clause 4.2.1 UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 UE_B not registered as user_4_priv@ims-b.net UE_A registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_4_pub@ims-b.net" (CFW step 1)
	2 TB	Verify that error is received and call is aborted at UE_A (CFW step 6 and 8)
Conformance criteria:	Check	
	1	TP_IMS_5109_01 in CFW step 6 (Error Response): ensure that { when { UE_A sends INVITE to UE_B } then { IMS_B receives the INVITE and sends (a 408_response or a 5xx_response) to IMS_A and UE_A receives the response } }

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
1		→						User A calls User B
2			→				INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
3			←				100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
4				→			INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
5				←			100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
6				←			408 Request Timeout or 5xx Response	IMS_B I-CSCF forwards S-CSCF error message indicating unreachable AS
7			←				408 Request Timeout or 5xx Response	IMS_A P-CSCF forwards error response to UE_A
8		←						User A is informed of "not reachable"

4.5.2.3.7 S-CSCF initiated session release from originating network

Test description		
Identifier:	TD_IMS_0022	
Summary:	S-CSCF-initiated release of established session from originating network	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5139_01	TS 124 229 [1], clause 5.4.5.1.2, ¶ 1
Use Case:	UC_08 (CFW for originating network)	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 PR	Answer the call at UE_B (CFW step 19)
	5 PR	Verify that voice can be exchanged in both directions (CFW step 27)
	6 TB	Set UE_A registration status to de-registered in IMS_A HSS (CFW step 28)
	7 TB	Verify that call is ended at UE_B (CFW step 30)
	8 PO	Verify that call is ended at UE_A (CFW step 34)
	9 PO	Verify that UE_A is deregistered
Conformance criteria:	Check	
	1	<p><i>TP_IMS_5139_01 in CFW step 28 (BYE):</i></p> <pre> ensure that { when { IMS_A receives 'an indication that UE_A is to be de-registered' } then { IMS_A sends a BYE to IMS_B containing Request_URI indicating the initial 200_OK_Contact_value sent by IMS_B and containing To_header indicating the initial 200_OK_To_value sent by IMS_B and containing From_header indicating the initial INVITE_From_value sent by IMS_A and containing Call-ID_header indicating the initial INVITE_Call_Id_value sent by IMS_A and containing CSeq_header indicating the initial INVITE_Cseq_value sent by IMS_A incremented by 1 and containing Route_header indicating "dialog specific routing information for UE_B" and "further headers based on local policy or call release reason" and UE_B receives BYE } } </pre>

The expected TB call flow is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
27						→		User B is informed that call is in progress
28				→			BYE	IMS_A S-CSCF releases the call towards the called user with BYE
29					→		BYE	IMS_B P-CSCF forwards BYE to UE_B
30					→			User B is informed the call has ended
31					←		200 OK	UE_B sends 200 OK for BYE
32				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
33			←				BYE	IMS_A S-CSCF releases the call towards the calling user with BYE
34		←						User A is informed the call has ended
35			→				200 OK	UE_A sends 200 OK for BYE

4.5.2.3.8 S-CSCF initiated session release from terminating network

Test description		
Identifier:	TD_IMS_0023	
Summary:	S-CSCF-initiated release of established session from terminating network	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5139_02	TS 124 229 [1], clause 5.4.5.1.2, ¶ 1
Use Case:	UC_09 (CFW for terminating network)	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 PR	Answer the call at UE_B (CFW step 19)
	5 PR	Verify that voice can be exchanged in both directions (CFW step 27)
	6 TB	Set UE_B registration status to de-registered in IMS_B HSS (CFW step 28)
	7 TB	Verify that call is ended at UE_A (CFW step 30)
	8 PO	Verify that call is ended at UE_B (CFW step 34)
	9 PO	Verify that UE_B is deregistered
Conformance criteria:	Check	
	1	TP_IMS_5139_02 in CFW step 28 (BYE): <i>ensure that {</i> <i> when { IMS_B receives 'an indication that UE_B is no_longer_available' }</i> <i> then { IMS_B sends a BYE to IMS_A</i> <i> containing Request_URI</i> <i> indicating the initial INVITE_Contact_value sent by IMS_A</i> <i> and</i> <i> containing To_header</i> <i> indicating the initial INVITE_From_value sent by IMS_A and</i> <i> containing From_header</i> <i> indicating the initial 200_OK_To_value sent by IMS_B and</i> <i> containing Call-ID_header</i> <i> indicating the initial INVITE_Call_Id_value sent by IMS_A and</i> <i> containing CSeq_header</i> <i> indicating the CSeq_value of the last request sent by IMS_B</i> <i> incremented by 1 and</i> <i> containing Route_header</i> <i> indicating "dialog specific routing information for UE_A" and</i> <i> "further headers based on local policy or call release reason"</i> <i> and</i> <i> UE_A receives BYE</i> <i>}</i> <i>}</i>

The expected TB call flow is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
27						→		User B is informed that call is in progress
28				←			BYE	IMS_B S-CSCF releases the call towards the calling user with BYE
29			←				BYE	IMS_A P-CSCF forwards BYE to UE_B
30		←						User A is informed the call has ended
31			→				200 OK	UE_A sends 200 OK for BYE
32				→			200 OK	IMS_A S-CSCF forwards 200 OK response to IMS_B S-CSCF
33					→		BYE	IMS_B S-CSCF releases the call towards the called user with BYE
34					→			User B is informed the call has ended
35				←			200 OK	UE_B sends 200 OK for BYE

4.5.3 Subsequent requests within dialog procedures

4.5.3.1 Subsequent UPDATE target refresh request procedures

Test description		
Identifier:	TD_IMS_0024	
Summary:	Subsequent UPDATE target refresh requests and 200 OK response procedures	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5048_02	TS 124 229 [1], clause 5.2.6.3, ¶ 26
	TP_IMS_5058_02	TS 124 229 [1], clause 5.2.6.4, ¶ 67
	TP_IMS_5106_02	TS 124 229 [1], clause 5.4.3.2, ¶ 42
Use Case:	UC_06 (CFW for UPDATE)	
Pre-test conditions:	<ul style="list-style-type: none"> Static configuration as per clause 4.3 UE_A, UE_B support 100rel, no SDP preconditions UE_A, UE_B have no filter criteria defined in HSS UE_A, UE_B IP bearers established as per clause 4.2.1 UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 UE_A, UE_B registered public identities are SIP URIs only UE_A, UE_B support UPDATE method for call hold/resume 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 PR	Answer the call at UE_B (CFW step 19)
	5 PR	Verify that voice can be exchanged in both directions (CFW step 27)
	6 TB	Place call on hold at UE_A (CFW step 28)
	7 TB	Verify that voice can no longer be exchanged in both directions (CFW step 32)
	8 TB	Resume call at UE_A (CFW step 36)
	9 TB	Verify that voice can be exchanged in both directions (CFW step 44)
	10 PO	Release call at UE_A (CFW step 45)
11 PO	Verify that call is released at UE_B (CFW step 49)	

Conformance criteria:		Check	Test description
	1		<p>TP_IMS_5048_02 in CFW step 30 and 38 (UPDATE):</p> <p>ensure that {</p> <p> when { UE_A sends UPDATE to UE_B }</p> <p> then { IMS_B receives the UPDATE</p> <p> containing an additional Via_header</p> <p> containing (P-CSCF_port_number 'where it awaits the responses to arrive' and</p> <p> (P-CSCF-FQDN_address or</p> <p> P-CSCF-IP_address)) of IMS_A and</p> <p> containing an additional topmost Record-Route_header</p> <p> containing (P-CSCF_port_number "where it awaits subsequent requests from the called party" and</p> <p> (P-CSCF-FQDN_address or</p> <p> P-CSCF-IP_address)) of IMS_A</p> <p> and</p> <p> UE_B receives UPDATE</p> <p> }</p> <p>}</p>
			<p>TP_IMS_5058_02 in CFW step 34 and 42 (200 Ok):</p> <p>ensure that {</p> <p> when { UE_B sends a 2xx_response to UE_A }</p> <p> then { IMS_A receives 2xx_response</p> <p> containing Record-Route_header</p> <p> containing the same P-CSCF_port_number of IMS_B "as in the response to the previous initial request" and</p> <p> not containing a comp_parameter</p> <p> and</p> <p> UE_A receives 2xx_response</p> <p> }</p> <p>}</p>
			<p>TP_IMS_5106_02 in CFW step 30 and 38 (UPDATE):</p> <p>ensure that {</p> <p> when { UE_A sends subsequent UPDATE to UE_B }</p> <p> then { IMS_B receives the subsequent UPDATE</p> <p> containing a topmost Record-Route_header</p> <p> containing the S-CSCF_SIP_URI of IMS_A and</p> <p> containing a P-Charging-Vector_header</p> <p> not containing a access-network-charging-info_parameter</p> <p> and</p> <p> not containing a P-Access-Network-Info_header</p> <p> and</p> <p> UE_B receives the UPDATE }</p> <p>}</p>

The expected test body (TB) call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
28		→					User A put call on hold	
29			→			UPDATE	UE_A sends UPDATE message indicating media stream inactive (Call Hold)	
30				→		UPDATE	IMS_A S-CSCF forwards UPDATE to IMS_B S-CSCF	
31					→	UPDATE	IMS_B P-CSCF forwards UPDATE to UE_B	
32					→		User B is informed that call on hold	
33					←	200 OK	UE_B responds to UPDATE with 200 OK indicating media stream inactive	
34				←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
35			←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A	

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
36		→					User A resumes call	
37			→				UPDATE UE_A sends UPDATE message indicating media stream active (Call Resume)	
38				→			UPDATE IMS_A S-CSCF forwards UPDATE to IMS_B S-CSCF	
39					→		UPDATE IMS_B P-CSCF forwards UPDATE to UE_B	
40						→	User B is informed the call is resumed	
41					←		200 OK UE_B responds to UPDATE with 200 OK indicating media stream active	
42				←			200 OK IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF	
43			←				200 OK IMS_A P-CSCF forwards the 200 OK response to UE_A	
44		←					User A is informed that call is resumed	

4.5.3.2 Subsequent PRACK request procedures

Test description		
Identifier:	TD_IMS_0025	
Summary:	Subsequent PRACK requests and 200 OK response procedures	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5107_01	TS 124 229 [1], clause 5.4.3.2, ¶ 49
	TP_IMS_5121_02	TS 124 229 [1], clause 5.4.3.3, ¶ 60
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 TB	Answer the call at UE_B (CFW step 19)
	5 PO	Verify that voice can be exchanged in both directions (CFW step 27)
	6 PO	Release call at UE_A (CFW step 28)
7 PO	Verify that call is released at UE_B (CFW step 32)	
Conformance criteria:	Check	
	1	TP_IMS_5107_01 in CFW step 14 (PRACK): ensure that { when { UE_A sends PRACK to UE_B } then { IMS_B receives the PRACK (containing a P-Charging-Vector_header not containing a access-network-charging-info_parameter or not containing a P-Charging-Vector_header) and not containing a P-Access-Network-Info_header and UE_B receives the PRACK } }

Test description	
2	TP_IMS_5121_02 in CFW step 17 (200 OK): <i>ensure that {</i> <i> when { UE_B sends 2xx_response to UE_A }</i> <i> then { IMS_A receives the 2xx_response</i> <i> containing a P-Charging-Vector_header</i> <i> not containing a access-network-charging-info_parameter</i> <i> and</i> <i> not containing a P-Access-Network-Info_header</i> <i> and</i> <i> UE_A receives the 2xx_response }</i> <i>}</i>

The expected test body (TB) call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
13			→				PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
14				→			PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
15					→		PRACK	IMS_B P-CSCF forwards PRACK to UE_B
16					←		200 OK	UE_B responds PRACK with 200 OK
17				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
18			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.5.3.3 Subsequent BYE request procedures

Test description		
Identifier:	TD_IMS_0026	
Summary:	Subsequent BYE requests and 200 OK response procedures	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5107_02	TS 124 229 [1], clause 5.4.3.2, ¶ 49
	TP_IMS_5121_02	TS 124 229 [1], clause 5.4.3.3, ¶ 60
Use Case:	UC_01	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A, UE_B support 100rel, no SDP preconditions • UE_A, UE_B have no filter criteria defined in HSS • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 PR	Answer the call at UE_B (CFW step 19)
	5 PR	Verify that voice can be exchanged in both directions (CFW step 27)
	6 TB	Release call at UE_A (CFW step 28)
7 TB	Verify that call is released at UE_B (CFW step 32)	
Conformance criteria:	Check	
	1	TP_IMS_5107_02 in CFW step 30 (BYE): ensure that { when { UE_A sends BYE to UE_B } then { IMS_B receives the BYE (containing a P-Charging-Vector_header not containing a access-network-charging-info_parameter or not containing a P-Charging-Vector_header) and not containing a P-Access-Network-Info_header and UE_B receives the BYE } }
	2	TP_IMS_5121_02 in CFW step 34 (200 OK): ensure that { when { UE_B sends 2xx_response to UE_A } then { IMS_A receives the 2xx_response containing a P-Charging-Vector_header not containing a access-network-charging-info_parameter and not containing a P-Access-Network-Info_header and UE_A receives the 2xx_response } }

The expected test body (TB) call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
29			→				BYE	UE_A releases the call with BYE
30				→			BYE	IMS_A S-CSCF forwards BYE to IMS_B S-CSCF
31					→		BYE	IMS_B P-CSCF forwards BYE to UE_B
32					→			User B is informed that call has ended
33					←		200 OK	UE_B sends 200 OK for BYE
34				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
35			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.5.3.4 Subsequent INVITE target refresh request procedures

Test description		
Identifier:	TD_IMS_0027	
Summary:	Subsequent INVITE target refresh requests and 200 OK response procedures	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5048_01	TS 124 229 [1], clause 5.2.6.3, ¶ 26
	TP_IMS_5058_02	TS 124 229 [1], clause 5.2.6.4, ¶ 67
	TP_IMS_5106_01	TS 124 229 [1], clause 5.4.3.2, ¶ 42
Use Case:	UC_06 (CFW for relINVITE)	
Pre-test conditions:	<ul style="list-style-type: none"> Static configuration as per clause 4.3 UE_A, UE_B support 100rel, no SDP preconditions UE_A, UE_B have no filter criteria defined in HSS UE_A, UE_B IP bearers established as per clause 4.2.1 UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 UE_A, UE_B registered public identities are SIP URIs only UE_A, UE_B support relINVITE method for call hold/resume 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 PR	Answer the call at UE_B (CFW step 19)
	5 PR	Verify that voice can be exchanged in both directions (CFW step 27)
	6 TB	Place call on hold at UE_A (CFW step 29)
	7 TB	Verify that voice can no longer be exchanged in both directions (CFW step 35)
	8 TB	Resume call at UE_A (CFW step 42)
	9 TB	Verify that voice can be exchanged in both directions (CFW step 53)
	10 PO	Release call at UE_A (CFW step 57)
11 PO	Verify that call is released at UE_B (CFW step 61)	

Conformance criteria:		Check	Test description
	1	TP_IMS_5048_01 in CFW step 31 and 45 (INVITE): ensure that { when { UE_A sends subsequent INVITEs to UE_B } then { IMS_B receives the subsequent INVITEs containing an additional Via_header containing (P-CSCF_port_number 'where it awaits the responses to arrive' and (P-CSCF-FQDN_address or P-CSCF-IP_address)) of IMS_A and containing an additional Record-Route_header containing (P-CSCF_port_number "where it awaits subsequent requests from the called party" and (P-CSCF-FQDN_address or P-CSCF-IP_address)) of IMS_A and UE_B receives INVITEs } }	
	2	TP_IMS_5058_02 in CFW step 37 and 51 (200 Ok): ensure that { when { UE_B sends 2xx_responses for subsequent INVITEs to UE_A } then { IMS_A receives 2xx_responses containing Record-Route_header containing the same P-CSCF_port_number of IMS_B "as in the response to the previous initial request" and not containing a comp_parameter and UE_A receives 2xx_responses } }	
	3	TP_IMS_5106_01 in CFW step 31 and 45 (INVITE): ensure that { when { UE_A sends subsequent INVITEs to UE_B } then { IMS_B receives the subsequent INVITEs containing a topmost Record-Route_header containing the S-CSCF_SIP_URI of IMS_A and containing a P-Charging-Vector_header not containing a access-network-charging-info_parameter and not containing a P-Access-Network-Info_header and UE_B receives the INVITEs } }	

The expected test body (TB) call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
28		→					User A puts call on hold	
29			→			INVITE	UE_A sends reINVITE message indicating media stream inactive (Call Hold)	
30			←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response	
31				→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B S-CSCF	
32				←		100 Trying	IMS_B S-CSCF responds with a 100 Trying provisional response	
33					→	INVITE	IMS_A P-CSCF forwards INVITE to UE_B	
34					←	100 Trying	UE_B responds with a 100 Trying provisional response	
35							User B is informed that call on hold	

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
36					←		200 OK	UE_B responds to INVITE with 200 OK indicating media stream inactive
37					←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
38			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
39			→				ACK	UE_A acknowledges the receipt of 200 OK for INVITE
40				→			ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
41					→		ACK	IMS_B P-CSCF forwards ACK to UE_B
42								User A resumes call
43			→				INVITE	UE_A sends reINVITE message indicating media stream active (Call Resume)
44			←				100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
45				→			INVITE	IMS_A S-CSCF forwards INVITE to IMS_B S-CSCF
46				←			100 Trying	IMS_B S-CSCF responds with a 100 Trying provisional response
47					→		INVITE	IMS_B P-CSCF forwards INVITE to UE_B
48					←		100 Trying	UE_B responds with a 100 Trying provisional response
49								User B is informed the call is resumed
50					←		200 OK	UE_B responds to UPDATE with 200 OK indicating media stream active
51				←			200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
52			←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
53								User A is informed that call is resumed

4.5.3.5 Subsequent CANCEL request procedures

Test description		
Identifier:	TD_IMS_0028	
Summary:	Subsequent CANCEL request procedures	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5107_04	TS 124 229 [1], clause 5.4.3.2, ¶ 49
	TP_IMS_5121_02	TS 124 229 [1], clause 5.4.3.3, ¶ 60
Use Case:	UC_04	
Pre-test conditions:	<ul style="list-style-type: none"> • Static configuration as per clause 4.3 • UE_A support 100rel, no SDP preconditions • UE_A have no filter criteria defined in HSS • UE_A IP bearers established as per clause 4.2.1 • UE_A registered using user_1_priv@ims-a.net as per clause 4.2.3 • UE_B registered using user_1_priv@ims-b.net as per clause 4.2.3 • UE_A registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to "user_1_pub@ims-b.net" (CFW step 1)
	2 PR	Verify that UE_B rings (CFW step 8)
	3 PR	Verify that ringback is present at UE_A (CFW step 12)
	4 TB	End call at UE_A (CFW step 19)
	5 PO	Verify that call is ended at UE_B (CFW step 26)
Conformance criteria:	Check	
	1	TP_IMS_5107_04 in CFW step 22 (CANCEL): ensure that { when { UE_A sends CANCEL to UE_B } then { IMS_B receives the CANCEL (containing a P-Charging-Vector_header not containing a access-network-charging-info_parameter or not containing a P-Charging-Vector_header) and not containing a P-Access-Network-Info_header and UE_B receives the CANCEL } }
	2	TP_IMS_5121_02 in CFW step 23 (200 OK): ensure that { when { UE_B sends 2xx_response to UE_A } then { IMS_A receives the 2xx_response (containing a P-Charging-Vector_header not containing a access-network-charging-info_parameter or not containing a P-Charging-Vector_header) and not containing a P-Access-Network-Info_header and UE_A receives the 2xx_response } }

The expected test body call flow sequence is:

Step	Direction						Message	Comment
	U s e r A	U E A	I M S A	I M S B	U E B	U s e r B		
19		→						User A cancel ringing
20			→				CANCEL	UE_A sends CANCEL to abort call
21			←				200 OK	IMS_A P-CSCF responds with a 200 OK response
22				→			CANCEL	IMS_A S-CSCF sends CANCEL to IMS_B S-CSCF
23				←			200 OK	IMS_B S-CSCF responds with a 200 OK response
24					→		CANCEL	IMS_B P-CSCF sends CANCEL to UE_B
25					←		200 OK	UE_B responds with a 200 OK response
26						→		User B informed that call is aborted
27					←		487 Request Terminated	UE_B confirms cancellation of the INVITE request with a 487 Request Terminated error response
28						→	ACK	IMS_B P-CSCF responds with an ACK to UE_B
29				←			487 Request Terminated	IMS_B S-CSCF sends a 487 Request Terminated error response to IMS_A S-CSCF
30						→	ACK	IMS_A S-CSCF responds with an ACK
31				←			487 Request Terminated	IMS_B P-CSCF sends a 487 Request Terminated error response to UE_A
32						→	ACK	UE_A responds with an ACK

History

Document history		
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