

**Telecommunications and Internet converged Services and
Protocols for Advanced Networking (TISPAN);
IMS NNI Interworking Test Specifications;
Part 2: Test Descriptions for IMS NNI Interworking**



Reference

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Foreword

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

The present document is part 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".

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 [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 (ES 202 553 [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 TS 124 229 [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 [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 124 229 version 6.13.0 Release 6)".

- [2] ETSI TS 186 011-1: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); 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 (V6.0.0): "Universal Mobile Telecommunications System (UMTS); Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Part 2: Implementation Conformance Statement (ICS) specification (3GPP TS 34.229-2 version 6.0.0 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] Void.
- [10] Void.
- [11] 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)".
- [12] 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)".

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.

- [13] 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)".
- [14] 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
AS	(IMS) Application Server
CF	(Test) ConFiguration
CFW	Call FloW
CN	Core Network
CSCF	Call Session Control Function

DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
HSS	Home Subscriber Server
I-CSCF	Interrogating CSCF
IMS	IP Multimedia Subsystem
IOI	Inter Operator Identifier
IP	Internet Protocol
NNI	Network-to-Network Interface
PCO	Point of Control and Observation
P-CSCF	Proxy CSCF
PO	POstamble
PR	PReamble
PSTN	Public Switched Telephone Network
RQ	ReQUIREment
S-CSCF	Serving CSCF
SIP	Session Initiation Protocol
SDP	Session Description Protocol
SUT	System Under Test
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
TB	Test Body
TD	Test Description
TP	Test Purpose
TPLan	Test purpose Notation
TSS	Test Suite Structure
UC	Use Case
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 [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 [14].

4.2.2 IP bearer establishment

4.2.2.1 3GPP

3GPP bearer establishment procedures imply the creation of a PDP context over GPRS [11] and [12].

4.2.3 Authentication and security

4.2.3.1 3GPP

The current test specification supports standard 3GPP security, namely full IMS [8], early IMS [13] and optionally allows SIP Digest authentication without key agreement and null authentication.

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 4.2.2.

Depending on the security and authentication method used, the registration steps are:

1. *All:* The UE establishes an IP bearer as required by its specific access network.
2. *All:* Optional P-CSCF address discovery using the DHCP procedure.
3. *All:* The UE initiates IMS registration. IMS waits for the UE to send an initial REGISTER request.
4. *Full IMS, SIP Digest:* The IMS responds to the initial REGISTER request with a valid 401 unauthorized response.
5. *Full IMS:* The IMS and UE set up a temporary set of security associations.
6. *Full IMS, SIP Digest:* UE sends another REGISTER request (over the security associations for Full IMS).
7. *All:* The IMS responds to the REGISTER request with valid 200 OK responses (sent over the same temporary set of security associations that the UE used for sending the REGISTER request for Full IMS).
8. *All:* The IMS waits for the UE to send a SUBSCRIBE request (over the newly established security association for Full IMS).
9. *All:* The IMS responds to the SUBSCRIBE request with a valid 200 OK response.
10. *All:* The IMS sends a valid NOTIFY request for the subscribed registration event package.
11. *All:* The IMS waits for the UE to respond to the NOTIFY with a 200 OK response.

Expected sequence:

Step	Direction		Message	Comment
	UE	IMS		
2	←→			Optional P-CSCF address discovery using DHCP procedures for IPv4.
3	→		REGISTER	The UE sends initial registration for IMS services.
4	←		401 Unauthorized	<i>Full IMS, SIP Digest:</i> The IMS responds with a valid authentication challenge and security mechanisms supported by the network.
5	→		REGISTER	<i>Full IMS, SIP Digest:</i> The UE completes the security negotiation procedures (sets up a temporary set of security associations for Full IMS) and 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.

4.2.5 Supported options

4.2.5.1 Security

"Early IMS" is the default security configuration in all test descriptions. Optional support for sec-agree when full IMS security is used. Tests may be executed with full IMS security if all required 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) 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. However, no test descriptions are available that validate the operation of the Mw interface between the P-CSCF and S-CSCF as an NNI interface.

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

IMS Domain	Private Identity	Public Identity 1	Public Identity 2	Default Public Identity	Filter criteria
ims_a.net	user_a1_priv@ims_a.net	sip:user_a1_pub@ims_a.net	na	1	na
ims_a.net	user_a2_priv@ims_a.net	sip:user_a2_pub@ims_a.net	tel:+33633348273	1	na
ims_a.net	user_a3_priv@ims_a.net	sip:user_a3_pub@ims_a.net	tel:+33633348274	2	na
ims_a.net	user_a4_priv@ims_a.net	sip:user_a4_pub@ims_a.net	na	1	terminating_unregistered/INVITE/ SESSION_TERMINATED/ as_a1.ims_a.net
ims_a.net	user_a5_priv@ims_a.net	sip:user_a5_pub@ims_a.net	na	1	
ims_b.net	user_b1_priv@ims_a.net	sip:user_b1_pub@ims_a.net	na	1	
ims_b.net	user_b2_priv@ims_a.net	sip:user_b2_pub@ims_a.net	tel:+44744459384	1	
ims_b.net	user_b3_priv@ims_a.net	sip:user_b3_pub@ims_a.net	tel:+44744459385	2	
ims_b.net	user_b4_priv@ims_a.net	sip:user_b4_pub@ims_a.net	na	1	terminating_unregistered/INVITE/ SESSION_TERMINATED/ as_b1.ims_b.net
ims_b.net	user_b5_priv@ims_a.net	sip:user_b5_pub@ims_a.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.

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 this test specification.

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.

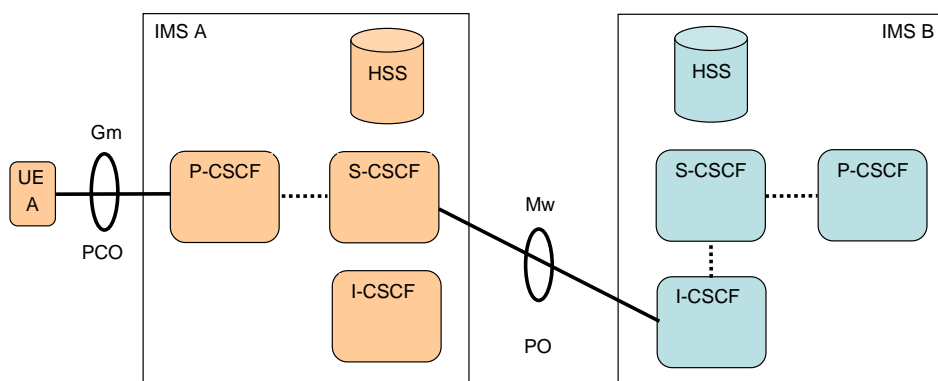
4.3.4 Test configurations

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

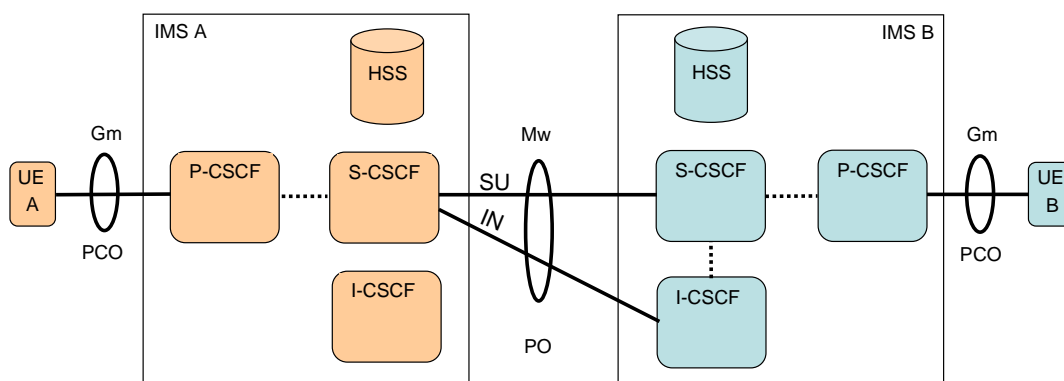
Test configuration for:

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:

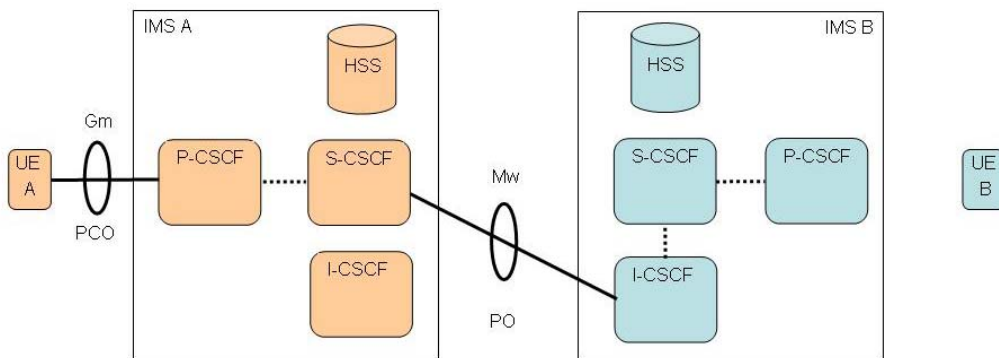
Initial (IN) and Subsequent (SU) requests and responses between UE_A and UE_B

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

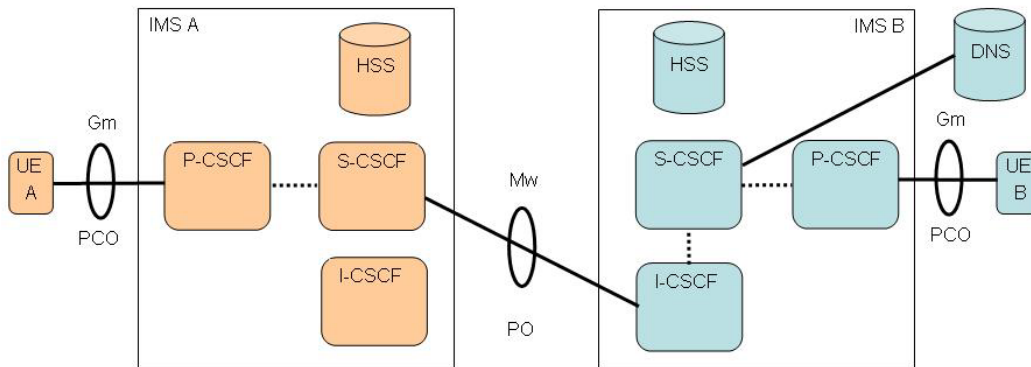


Precondition:
 Different network operators performing origination and termination (SS1), UE_A in Home network A (MO2), UE_B in Home network B (MT2), only UE_A registered, neither AS nor THIG nor IMS-ALG involved, in SU case dialog initiated between UE_A and UE_B

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

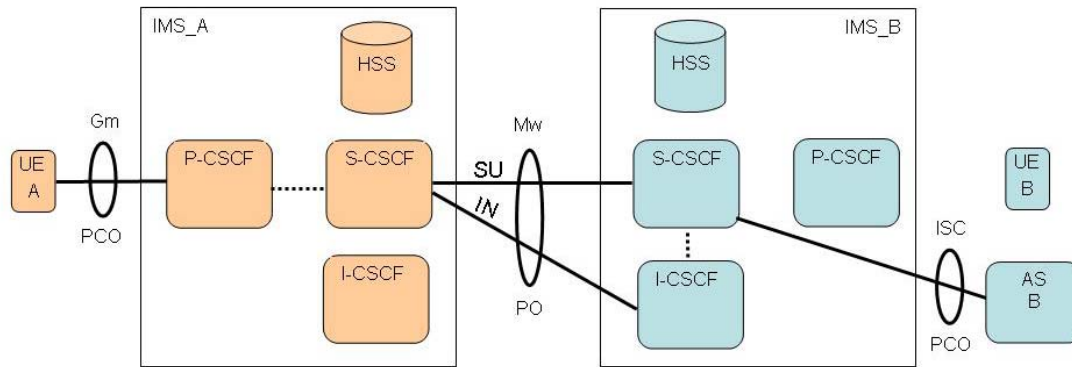


Precondition:
 Different network operators performing origination and termination (SS1), UE_A in Home network A (MO2), UE_B in Home network B (MT2), both UEs registered, DNS server involved in network B, neither AS nor THIG nor IMS-ALG involved, in SU case dialog initiated between UE_A and UE_B

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:

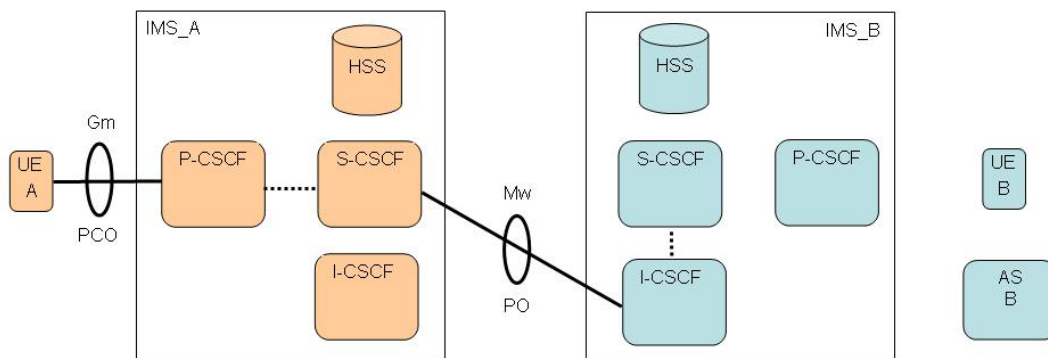
Initial (IN) and Subsequent (SU) requests and responses between UE_A and AS_B

Example:

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

4.4 Test descriptions

Test descriptions (TDs) are provided below. For each TD, one generic use case forms the basis of the test sequence which presented in clause 4.5.2 of the present document. Each test sequence step includes also a reference to a specific step within the SIP call flow steps of the generic use case. Whereas test preamble (PR) and postamble (PO) call flow steps are only referenced in test descriptions, the call flow steps for the test body (TB) are repeated after each TD and include any modifications necessary to the generic use case call flow. In test body call flows steps that are associated with user interactions are shown shaded and steps which have pass criteria are associated with are shown in bold.

4.4.1 General capabilities

4.4.1.1 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	<table border="1"> <thead> <tr> <th>Test purpose</th> <th>Specification reference</th> </tr> </thead> <tbody> <tr> <td>TP_IMS_4002_01</td> <td>TS 124 229 [1] clause 4.2A paragraph 1</td> </tr> </tbody> </table>	Test purpose	Specification reference	TP_IMS_4002_01	TS 124 229 [1] clause 4.2A paragraph 1				
Test purpose	Specification reference								
TP_IMS_4002_01	TS 124 229 [1] clause 4.2A paragraph 1								
Use case:	UC_05								
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, UE_B registered 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 PR</td> <td>UE_A is requested to send a MESSAGE with 2 000 byte file to UE_B (prior to CFW step 1)</td> </tr> <tr> <td>2 TB</td> <td>Verify that message delivery is attempted over TCP (CFW step 2)</td> </tr> <tr> <td>3 TB</td> <td>Verify that UE_B receives MESSAGE with 2 000 byte file (prior to CFW step 4)</td> </tr> </tbody> </table>	Step		1 PR	UE_A is requested to send a MESSAGE with 2 000 byte file to UE_B (prior to CFW step 1)	2 TB	Verify that message delivery is attempted over TCP (CFW step 2)	3 TB	Verify that UE_B receives MESSAGE with 2 000 byte file (prior to CFW step 4)
Step									
1 PR	UE_A is requested to send a MESSAGE with 2 000 byte file to UE_B (prior to CFW step 1)								
2 TB	Verify that message delivery is attempted over TCP (CFW step 2)								
3 TB	Verify that UE_B receives MESSAGE with 2 000 byte file (prior to CFW step 4)								
Pass criteria:	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>TP_IMS_4002_01 in CFW step 2 (MESSAGE): ensure that { when { UE_A sends MESSAGE to UE_B containing a Message_Body bigger than 1 500 bytes } then { IMS_B receives the MESSAGE containing a Message_Body bigger than 1 500 bytes and UE_B receives MESSAGE } }</td> </tr> </tbody> </table>	Check		1	TP_IMS_4002_01 in CFW step 2 (MESSAGE): ensure that { when { UE_A sends MESSAGE to UE_B containing a Message_Body bigger than 1 500 bytes } then { IMS_B receives the MESSAGE containing a Message_Body bigger than 1 500 bytes and UE_B receives MESSAGE } }				
Check									
1	TP_IMS_4002_01 in CFW step 2 (MESSAGE): ensure that { when { UE_A sends MESSAGE to UE_B containing a Message_Body bigger than 1 500 bytes } then { IMS_B receives the MESSAGE containing a Message_Body bigger than 1 500 bytes and UE_B receives MESSAGE } }								

The expected test body call flow sequence is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			MESSAGE	UE_A sends MESSAGE to IMS_A
2			→		MESSAGE	IMS_A sends MESSAGE to IMS_B
3				→	MESSAGE	IMS_A sends MESSAGE to UE_B
4				←	200 OK	UE_B sends 200 OK to IMS_B
5			←		200 OK	IMS_B sends 200 OK to IMS_A
6		←			200 OK	IMS_A sends 200 OK to UE_A

4.4.2 Initial dialog or standalone request procedures

4.4.2.1 Standalone request procedures

4.4.2.1.1 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_5050_03	
	TP_IMS_5061_02	TS 124 229 [1] clause 5.2.6.4 paragraph 89
	TP_IMS_5097_06	TS 124 229 [1] clause 5.4.3.2 paragraph 1
	TP_IMS_5117_02	TS 124 229 [1] clause 5.4.3.3 paragraph 49
	TP_IMS_5118_01	TS 124 229 [1] clause 5.4.3.3 paragraph 54
Use case reference:	UC_05	
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, UE_B registered 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 a MESSAGE from UE_A to UE_B (prior to CFW step 1)
	2 TB	Verify that UE_B gets the MESSAGE (prior to CFW step 4)
Pass criteria:	Check	
	1	TP_IMS_5050_03 in CFW step 2 (MESSAGE): ensure that { when { UE_A sends MESSAGE to UE_B } then { IMS_B receives MESSAGE not containing P-Preferred-Identity_header and containing P-Asserted-Identity_header containing an address of UE_A and containing the P-Charging-Vector_header containing icid_parameter and UE_B receives MESSAGE } }
	2	TP_IMS_5061_02 in CFW step 5 (200 OK): ensure that { when { UE_B sends a 2xx_response from 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 } }
	3	TP_IMS_5097_06 in CFW step 2 (MESSAGE): ensure that { when { UE_A sends a MESSAGE to UE_B } then { IMS_B receives the MESSAGE containing a P-Charging-Vector_header containing a icid_parameter and UE_B receives the MESSAGE } }
	4	TP_IMS_5097_07 in CFW step 2 (MESSAGE):

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

The expected test body call flow sequence is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			MESSAGE	UE_A sends MESSAGE to IMS_A
2			→		MESSAGE	IMS_A sends MESSAGE to IMS_B
3				→	MESSAGE	IMS_A sends MESSAGE to UE_B
4				←	200 OK	UE_B sends 200 OK to IMS_B
5			←		200 OK	IMS_B sends 200 OK to IMS_A
6		←			200 OK	IMS_A sends 200 OK to UE_A

4.4.2.1.2 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] clause 5.4.3.2 paragraph 1
	TP_IMS_5117_04	TS 124 229 [1] clause 5.4.3.3 paragraph 49
Use case ref.:	UC_05	
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, UE_B registered 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 a MESSAGE from UE_A to UE_B (prior to CFW step 1)
	2 TB	Verify that UE_B gets the MESSAGE (prior to CFW step 4)
Pass criteria:	Check	
	1	TP_IMS_5097_08 in CFW step 2 (MESSAGE): <i>ensure that {</i> <i> when { UE_A sends MESSAGE 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 MESSAGE</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating the default_registered_public_identity and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_URI</i> <i> and</i> <i> UE_B receives the MESSAGE }</i> <i>}</i>
		TP_IMS_5117_04 in CFW step 5 (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 and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_URI</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 E A	I M S A	I M S B	U E B		
1		→			MESSAGE	UE_A sends MESSAGE to IMS_A
2			→		MESSAGE	IMS_A sends MESSAGE to IMS_B
3				→	MESSAGE	IMS_A sends MESSAGE to UE_B
4				←	200 OK	UE_B sends 200 OK to IMS_B
5			←		200 OK	IMS_B sends 200 OK to IMS_A
6		←			200 OK	IMS_A sends 200 OK to UE_A

4.4.2.1.3 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] clause 5.4.3.2 paragraph 1
	TP_IMS_5117_06	TS 124 229 [1] clause 5.4.3.3 paragraph 49
Use case reference:	UC_05	
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, UE_B registered 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 a MESSAGE from UE_A to UE_B (prior to CFW step 1)
	2 TB	Verify that UE_B gets the MESSAGE (prior to CFW step 4)
Pass criteria:	Check	
	1	TP_IMS_5097_09 in CFW step 2 (MESSAGE): <i>ensure that {</i> <i> when { UE_A sends MESSAGE to UE_B</i> <i> not containing a P-Preferred-Identity_header</i> <i> containing a P-Preferred-Identity_header</i> <i> indicating a Tel_URI }</i> <i> then { IMS_B receives the MESSAGE</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating the default_registered_public_identity and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_derived_SIP_URI</i> <i> and</i> <i> UE_B receives the MESSAGE }</i> <i>}</i>
		TP_IMS_5117_06 in CFW step 5 (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</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 and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_derived_SIP_URI</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 E A	I M S A	I M S B	U E B		
1		→			MESSAGE	UE_A sends MESSAGE to IMS_A
2			→		MESSAGE	IMS_A sends MESSAGE to IMS_B
3				→	MESSAGE	IMS_A sends MESSAGE to UE_B
4				←	200 OK	UE_B sends 200 OK to IMS_B
5			←		200 OK	IMS_B sends 200 OK to IMS_A
6		←			200 OK	IMS_A sends 200 OK to UE_A

4.4.2.1.4 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 paragraph 1
Use case reference.:	UC_05	
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, UE_B registered 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 its SIP URI public identity 	
Test sequence:	Step	
	1 PR	UE_A is requested to send a MESSAGE from UE_A to UE_B (prior to CFW step 1)
	2 TB	Verify that UE_B gets the MESSAGE (prior to CFW step 4)
Pass 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_B</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 E A	I M S A	I M S B	U E B		
1		→			MESSAGE	UE_A sends MESSAGE to IMS_A
2			→		MESSAGE	IMS_A sends MESSAGE to IMS_B
3				→	MESSAGE	IMS_A sends MESSAGE to UE_B
4				←	200 OK	UE_B sends 200 OK to IMS_B
5				←	200 OK	IMS_B sends 200 OK to IMS_A
6		←			200 OK	IMS_A sends 200 OK to UE_A

4.4.2.2 Initial INVITE dialog procedures

4.4.2.2.1 Initial INVITE request procedure

Test description		
Identifier:	TD_IMS_0006	
Summary:	Initial INVITE request procedures	
Configuration:	CF_MO2-SS1-MT2	
References	Test purpose	Specification reference
	TP_IMS_5046_01	TS 124 229 [1] clause 5.2.6.3 paragraph 4
	TP_IMS_5097_01	TS 124 229 [1] clause 5.4.3.2 paragraph 1
	TP_IMS_5097_02	TS 124 229 [1] clause 5.4.3.2 paragraph 1
Use case reference.:	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, UE_B registered as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 TB	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)
	2 PO	Verify that UE_B rings (prior to CFW step 7)
	3 PO	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PO	Answer the call at UE_B (prior to CFW step 16)
	5 PO	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 PO	Release call at UE_A (prior to CFW step 22)
	7 PO	Verify that call is released at UE_B (prior to CFW step 25)
Pass criteria:	Check	
	1	TP_IMS_5046_01 in CFW step 3 (INVITE): ensure that { when { UE_A sends INVITE to UE_B } then { IMS_B receives the INVITE containing an additional Via_header containing (P-CSCF_via_port_number and (P-CSCF-FQDN_address or P-CSCF-IP_address)) of IMS_A and containing an additional topmost 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 not containing P-Preferred-Identity_header and containing P-Asserted-Identity_header containing an address of UE_A and containing P-Charging-Vector_header containing icid_parameter and UE_B receives INVITE } }
	2	TP_IMS_5097_01 in CFW step 3 (INVITE): ensure that { when { UE_A sends an initial INVITE to UE_B } then { IMS_B receives the initial INVITE containing a P-Charging-Vector_header containing a icid_parameter and UE_B receives the INVITE } }

Test description	
3	<p>TP_IMS_5097_02 in CFW step 3 (INVITE):</p> <p><i>ensure that {</i></p> <p style="padding-left: 20px;"><i>when { UE_A sends initial INVITE to UE_B</i></p> <p style="padding-left: 40px;"><i>containing a P-Access-Network-Info_header }</i></p> <p style="padding-left: 20px;"><i>then { IMS_B receives the initial INVITE</i></p> <p style="padding-left: 40px;"><i>containing a topmost Record-Route_header</i></p> <p style="padding-left: 40px;"><i>indicating the originating S-CSCF_SIP_URI and</i></p> <p style="padding-left: 40px;"><i>containing a P-Charging-Vector_header</i></p> <p style="padding-left: 40px;"><i>(containing a orig-voi_parameter</i></p> <p style="padding-left: 40px;"><i>indicating IMS_A and</i></p> <p style="padding-left: 40px;"><i>not containing a access-network-charging-info_parameter)</i></p> <p><i>and</i></p> <p style="padding-left: 40px;"><i>not containing a P-Access-Network-Info_header</i></p> <p><i>and</i></p> <p style="padding-left: 20px;"><i>UE_B receives the INVITE }</i></p> <p><i>}</i></p>

The expected test body call flow sequence is:

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

The expected test body call flow sequence is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8			←		180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9		←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10		→			PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK

4.4.2.2.3 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	
	TP_IMS_5055_02	TS 124 229 [1] clause 5.2.6.4 paragraph 15
	TP_IMS_5115_02	TS 124 229 [1] clause 5.4.3.3 paragraph 44
	TP_IMS_5131_02	TS 124 229 [1] clause 5.3.2.1 paragraph 44
	TP_IMS_5107_03	TS 124 229 [1] clause 5.4.3.2 paragraph 49
Use case reference.:	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, UE_B registered 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 UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 TB	Answer the call at UE_B (prior to CFW step 16)
	5 PO	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 PO	Release call at UE_A (prior to CFW step 22)
7 PO	Verify that call is released at UE_B (prior to CFW step 25)	
Pass criteria:	Check	
	1	TP_IMS_5055_02 in CFW step 17 (200 Ok): ensure that { when { UE_B sends a 2xx_response to UE_A } then { IMS_A receives 2xx_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_B receives 2xx_response } }

Test description		
	2	TP_IMS_5115_02 in CFW step 17 (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 containing an orig-ioi_parameter indicating IMS_A and containing a term-ioi_parameter indicating IMS_B and UE_A receives the 2xx_response } }
	3	TP_IMS_5131_02 in CFW step 17 (200 Ok): 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 } }
	4	TP_IMS_5107_03 in CFW step 20 (ACK): ensure that { when { (UE_A sends ACK to UE_B) containing a P-Access-Network-Info_header } 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 } }

The expected test body call flow sequence is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
16				←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
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		→			ACK	UE_A acknowledges the receipt of 200 OK for INVITE
20			→		ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
21				→	ACK	IMS_B P-CSCF forwards ACK to UE_B

4.4.2.2.4 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 paragraph 1
Use case reference.:	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, UE_B registered 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 UE_B's SIP URI (prior to CFW step 1)
	2 PO	Verify that UE_B rings (prior to CFW step 7)
	3 PO	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PO	Answer the call at UE_B (prior to CFW step 16)
	5 PO	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 PO	Release call at UE_A (prior to CFW step 22)
7 PO	Verify that call is released at UE_B (prior to CFW step 25)	
Pass criteria:	Check	
	1	TP_IMS_5097_03 in CFW step 3 (INVITE): <i>ensure that {</i> <i> when { UE_A sends initial INVITE to UE_B</i> <i> not containing a P-Preferred-Identity_header</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 and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_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 E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response

4.4.2.2.5 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 paragraph 44
Use case reference.:	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, UE_B registered 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 UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 TB	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PO	Answer the call at UE_B (prior to CFW step 16)
	5 PO	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 PO	Release call at UE_A (prior to CFW step 22)
7 PO	Verify that call is released at UE_B (prior to CFW step 25)	
Pass criteria:	Check	
	1	TP_IMS_5115_03 in CFW step 8 (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 and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_URI</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 E A	I M S A	I M S B	U E B		
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8			←		180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9		←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10		→			PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK

4.4.2.2.6 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	<table border="1"> <thead> <tr> <th>Test purpose</th> <th>Specification reference</th> </tr> </thead> <tbody> <tr> <td>TP_IMS_5115_04</td> <td>TS 124 229 [1] clause 5.4.3.3 paragraph 44</td> </tr> </tbody> </table>	Test purpose	Specification reference	TP_IMS_5115_04	TS 124 229 [1] clause 5.4.3.3 paragraph 44												
Test purpose	Specification reference																
TP_IMS_5115_04	TS 124 229 [1] clause 5.4.3.3 paragraph 44																
Use case reference.:	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, UE_B registered 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:	<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 UE_B's SIP URI (prior to CFW step 1)</td> </tr> <tr> <td>2 PR</td> <td>Verify that UE_B rings (prior to CFW step 7)</td> </tr> <tr> <td>3 PR</td> <td>Verify that ringback is present at UE_A (prior to CFW step 10)</td> </tr> <tr> <td>4 TB</td> <td>Answer the call at UE_B (prior to CFW step 16)</td> </tr> <tr> <td>5 PO</td> <td>Verify that voice can be exchanged in both directions (prior to CFW step 22)</td> </tr> <tr> <td>6 PO</td> <td>Release call at UE_A (prior to CFW step 22)</td> </tr> <tr> <td>7 PO</td> <td>Verify that call is released at UE_B (prior to CFW step 25)</td> </tr> </tbody> </table>	Step		1 PR	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)	2 PR	Verify that UE_B rings (prior to CFW step 7)	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)	4 TB	Answer the call at UE_B (prior to CFW step 16)	5 PO	Verify that voice can be exchanged in both directions (prior to CFW step 22)	6 PO	Release call at UE_A (prior to CFW step 22)	7 PO	Verify that call is released at UE_B (prior to CFW step 25)
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Pass criteria:	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td> TP_IMS_5115_04 in CFW step 17 (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</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 and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_URI</i> <i> and</i> <i> UE_A receives the 2xx_response }</i> <i>}</i> </td> </tr> </tbody> </table>	Check		1	TP_IMS_5115_04 in CFW step 17 (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</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 and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_URI</i> <i> and</i> <i> UE_A receives the 2xx_response }</i> <i>}</i>												
Check																	
1	TP_IMS_5115_04 in CFW step 17 (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</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 and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_URI</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 E A	I M S A	I M S B	U E B		
16				←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
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		→			ACK	UE_A acknowledges the receipt of 200 OK for INVITE
20			→		ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
21				→	ACK	IMS_B P-CSCF forwards ACK to UE_B
22		→			BYE	UE_A releases the call with BYE

4.4.2.2.7 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 paragraph 1
Use case reference.:	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, UE_B registered 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 SIP URI (prior to CFW step 1)
	2 PO	Verify that UE_B rings (prior to CFW step 7)
	3 PO	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PO	Answer the call at UE_B (prior to CFW step 16)
	5 PO	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 PO	Release call at UE_A (prior to CFW step 22)
7 PO	Verify that call is released at UE_B (prior to CFW step 25)	
Pass criteria:	Check	
	1	TP_IMS_5097_04 in CFW step 3 (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 and</i> <i> containing a P-Asserted-Identity_header</i> <i> indicating a Tel_derived_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 E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response

4.4.2.2.8 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 paragraph 44
Use case reference.:	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, UE_B registered 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 SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 TB	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PO	Answer the call at UE_B (prior to CFW step 16)
	5 PO	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 PO	Release call at UE_A (prior to CFW step 22)
7 PO	Verify that call is released at UE_B (prior to CFW step 25)	
Pass criteria:	Check	
	1	TP_IMS_5115_05 in CFW step 8 (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 and</i> <i> containing a P-Asserted-Identity_header</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:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8			←		180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9		←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10		→			PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK

4.4.2.2.9 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	<table border="1"> <thead> <tr> <th>Test purpose</th> <th>Specification reference</th> </tr> </thead> <tbody> <tr> <td>TP_IMS_5115_06</td> <td>TS 124 229 [1] clause 5.4.3.3 paragraph 44</td> </tr> </tbody> </table>	Test purpose	Specification reference	TP_IMS_5115_06	TS 124 229 [1] clause 5.4.3.3 paragraph 44												
Test purpose	Specification reference																
TP_IMS_5115_06	TS 124 229 [1] clause 5.4.3.3 paragraph 44																
Use case reference.:	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, UE_B registered 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 																
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Pass criteria:	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td> TP_IMS_5115_06 in CFW step 17 (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</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 and</i> <i>containing a P-Asserted-Identity_header</i> <i>indicating a Tel_derived_SIP_URI</i> <i>and</i> <i>UE_A receives the 2xx_response }</i> <i>}</i> </td> </tr> </tbody> </table>	Check		1	TP_IMS_5115_06 in CFW step 17 (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</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 and</i> <i>containing a P-Asserted-Identity_header</i> <i>indicating a Tel_derived_SIP_URI</i> <i>and</i> <i>UE_A receives the 2xx_response }</i> <i>}</i>												
Check																	
1	TP_IMS_5115_06 in CFW step 17 (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</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 and</i> <i>containing a P-Asserted-Identity_header</i> <i>indicating a Tel_derived_SIP_URI</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 E A	I M S A	I M S B	U E B		
16				←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
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		→			ACK	UE_A acknowledges the receipt of 200 OK for INVITE
20			→		ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
21				→	ACK	IMS_B P-CSCF forwards ACK to UE_B

4.4.2.2.10 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 paragraph 1
Use case reference.:	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, UE_B registered 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 its SIP URI public identity 	
Test sequence:	Step	
	1 TB	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)
	2 TB	Verify that UE_B rings (prior to CFW step 7)
	3 PO	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PO	Answer the call at UE_B (prior to CFW step 16)
	5 PO	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 PO	Release call at UE_A (prior to CFW step 22)
7 PO	Verify that call is released at UE_B (prior to CFW step 25)	
Pass criteria:	Check	
	1	TP_IMS_5097_05 in CFW step 3 (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_B</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 E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting

4.4.2.3 Special case of initial INVITE dialog procedures

4.4.2.3.1 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 paragraph 1</td> </tr> </tbody> </table>	Test purpose	Specification reference	TP_IMS_5072_01	TS 124 229 [1] clause 5.2.8.1.1 paragraph 1								
Test purpose	Specification reference												
TP_IMS_5072_01	TS 124 229 [1] clause 5.2.8.1.1 paragraph 1												
Use case reference.:	UC_04 (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, UE_B registered 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 UE_B's SIP URI (prior to CFW step 1)</td> </tr> <tr> <td>2 PR</td> <td>Verify that UE_B rings (prior to CFW step 7)</td> </tr> <tr> <td>3 PR</td> <td>Verify that ringback is present at UE_A (prior to CFW step 10)</td> </tr> <tr> <td>4 TB</td> <td>Remove cable, antenna or battery from UE_A (prior to CFW step 16)</td> </tr> <tr> <td>5 TB</td> <td>Verify that call is ended at UE_B (prior to CFW step 20)</td> </tr> </tbody> </table>	Step		1 PR	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)	2 PR	Verify that UE_B rings (prior to CFW step 7)	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)	4 TB	Remove cable, antenna or battery from UE_A (prior to CFW step 16)	5 TB	Verify that call is ended at UE_B (prior to CFW step 20)
Step													
1 PR	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)												
2 PR	Verify that UE_B rings (prior to CFW step 7)												
3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)												
4 TB	Remove cable, antenna or battery from UE_A (prior to CFW step 16)												
5 TB	Verify that call is ended at UE_B (prior to CFW step 20)												
Pass 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 17 (CANCEL): 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 } }</td> </tr> </tbody> </table>	Check		1	TP_IMS_5072_01 in CFW step 17 (CANCEL): 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 } }								
Check													
1	TP_IMS_5072_01 in CFW step 17 (CANCEL): 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 } }												

The expected test body call flow is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
16					LOSS	PDF or SPDF sends a message that resources are missing for UE_A
17			→		CANCEL	IMS_A sends CANCEL to IMS_B
18			←		200 OK	IMS_B S-CSCF responds with a 200 OK
19				→	CANCEL	IMS_B sends CANCEL to UE_B
20				←	200 OK	UE_B responds with 200 OK

4.4.2.3.2 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	<table border="1"> <thead> <tr> <th>Test purpose</th> <th>Specification reference</th> </tr> </thead> <tbody> <tr> <td>TP_IMS_5073_01</td> <td>TS 124 229 [1] clause 5.2.8.1.2 paragraph 1</td> </tr> </tbody> </table>	Test purpose	Specification reference	TP_IMS_5073_01	TS 124 229 [1] clause 5.2.8.1.2 paragraph 1												
Test purpose	Specification reference																
TP_IMS_5073_01	TS 124 229 [1] clause 5.2.8.1.2 paragraph 1																
Use case reference.:	UC_04 (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, UE_B registered 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 UE_B's SIP URI (prior to CFW step 1)</td> </tr> <tr> <td>2 PR</td> <td>Verify that UE_B rings (prior to CFW step 7)</td> </tr> <tr> <td>3 PR</td> <td>Verify that ringback is present at UE_A (prior to CFW step 10)</td> </tr> <tr> <td>4 PR</td> <td>Answer the call at UE_B (prior to CFW step 16)</td> </tr> <tr> <td>5 PR</td> <td>Verify that voice can be exchanged in both directions (prior to CFW step 22)</td> </tr> <tr> <td>6 TB</td> <td>Remove cable, antenna or battery from UE_A (prior to CFW step 22)</td> </tr> <tr> <td>7 TB</td> <td>Verify that call is released at UE_B (prior to CFW step 25)</td> </tr> </tbody> </table>	Step		1 PR	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)	2 PR	Verify that UE_B rings (prior to CFW step 7)	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)	4 PR	Answer the call at UE_B (prior to CFW step 16)	5 PR	Verify that voice can be exchanged in both directions (prior to CFW step 22)	6 TB	Remove cable, antenna or battery from UE_A (prior to CFW step 22)	7 TB	Verify that call is released at UE_B (prior to CFW step 25)
Step																	
1 PR	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)																
2 PR	Verify that UE_B rings (prior to CFW step 7)																
3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)																
4 PR	Answer the call at UE_B (prior to CFW step 16)																
5 PR	Verify that voice can be exchanged in both directions (prior to CFW step 22)																
6 TB	Remove cable, antenna or battery from UE_A (prior to CFW step 22)																
7 TB	Verify that call is released at UE_B (prior to CFW step 25)																
Pass criteria:	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td> TP_IMS_5073_01 in CFW step 23 (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> <i>}</i> </td> </tr> </tbody> </table>	Check		1	TP_IMS_5073_01 in CFW step 23 (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> <i>}</i>												
Check																	
1	TP_IMS_5073_01 in CFW step 23 (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> <i>}</i>																

The expected test body call flow is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
22					LOSS	PDF or SPDF sends a message that resources are missing for UE_A
23			→		BYE	IMS_A P-CSCF sends BYE to IMS_B S-CSCF
24				→	BYE	IMS_B P-CSCF forwards BYE to UE_B
25				←	200 OK	UE_B sends 200 OK for BYE

4.4.2.3.3 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 paragraph 10
Use case reference.:	UC_04 (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, UE_B registered 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 UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PR	Answer the call at UE_B (prior to CFW step 16)
	5 PR	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 TB	Remove cable, antenna or battery from UE_B (prior to CFW step 22)
7 TB	Verify that call is released at UE_A (prior to CFW step 25)	
Pass criteria:	Check	
	1	TP_IMS_5074_01 in CFW step 23 (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> <i>}</i>

The expected test body call flow sequence is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
22					LOSS	PDF or SPDF(in IMS_B) sends a message that resources are missing for UE_B
23			←		BYE	IMS_A P-CSCF sends BYE to IMS_B S-CSCF
24		←			BYE	IMS_B P-CSCF forwards BYE to UE_B
25		→			200 OK	UE_B sends 200 OK for BYE

4.4.2.3.4 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 paragraph 32
Use case reference.:	UC_01
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 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 (prior to CFW step 1)
	2 TB Verify that an error is received and call is aborted at UE_A (after CFW step 6)
Pass criteria:	Check
	1 TP_IMS_5132_01 in CFW step 5 (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 E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5			←		404 Not Found or 604 Does not exist anywhere	IMS_B I-CSCF generates error message indicating non-existent user
6		←			404 Not Found or 604 Does not exist anywhere	IMS_A P-CSCF forwards error response to UE_A

4.4.2.3.5 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 paragraph 33
Use case reference.:	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 as per clause 4.2.3 • UE_B not registered • UE_A registered public identities are SIP URIs only
Test sequence:	Step
	1 TB Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1) 2 TB Verify that error is received and call is aborted at UE_A (after CFW step 6)
Pass criteria:	Check
	1 TP_IMS_5133_01 in CFW step 5 (480 Response): <i>ensure that {</i> <i> when { UE_A sends INVITE to UE_B }</i> <i> then { IMS_B receives the INVITE and</i> <i> sends a 480_response to IMS_A</i> <i> and</i> <i> UE_A receives the 480_response }</i> <i>}</i>

The expected test body call flow sequence is:

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

4.4.2.3.6 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_5133_01	TS 124 229 [1] clause 5.3.2.1 paragraph 33
Use case reference.:	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 has no filter criteria defined in HSS • IMS_B has terminating unregistered criterion for UE_B on INVITE indicating SESSION_TERMINATED option • Target AS in IMS_B is unreachable • UE_A, UE_B IP bearers established as per clause 4.2.1 • UE_A registered as per clause 4.2.3 • UE_B not registered • UE_A registered public identities are SIP URIs only 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)
	2 TB	Verify that error is received and call is aborted at UE_A (prior to CFW step 6)
Pass criteria:	Check	
	1	TP_IMS_5109_01 in CFW step 5 (Error Response): <i>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 } }</i>

The expected test body call flow sequence is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5			←		408 Request Timeout or 5xx Response	IMS_B I-CSCF forwards S-CSCF error message indicating unreachable AS
6		←			408 Request Timeout or 5xx Response	IMS_A P-CSCF forwards error response to UE_A

4.4.2.3.7 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 paragraph 1	
Use case reference.:	UC_03 (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 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 UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PR	Answer the call at UE_B (prior to CFW step 16)
	5 PR	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 TB	Set UE_A registration status to de-registered in IMS_A HSS (prior to CFW step 22)
	7 TB	Verify that call is ended at UE_B (prior to CFW step 24)
	8 PO	Verify that call is ended at UE_A (prior to CFW step 27)
9 PO	Verify that UE_A is deregistered	

Pass criteria:		Check	Test description
		1	<p><i>TP_IMS_5139_01 in CFW step 22 (BYE):</i> <i>ensure that {</i> <i>when { IMS_A receives 'an indication that UE_A is to be de-registered' }</i> <i>then { IMS_A sends a BYE to IMS_B</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_value from UE_B</i> <i> containing From_header</i> <i> indicating the initial INVITE_From_value from UE_A and</i> <i> containing Call-ID_header</i> <i> indicating the initial INVITE_Call_Id_value from UE_A 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> <i>}</i></p>

The expected TB call flow is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
22			→		BYE	IMS_A S-CSCF releases the call towards the called user with BYE
23				→	BYE	IMS_B P-CSCF forwards BYE to UE_B
24				←	200 OK	UE_B sends 200 OK for BYE
25				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
26		←			BYE	IMS_A S-CSCF releases the call towards the calling user with BYE
27		→			200 OK	UE_A sends 200 OK for BYE

4.4.2.3.8 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 paragraph 1	
Use case reference.:	UC_03 (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 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 UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 PR	Verify that ringback is present at UE_A (prior to CFW step 9)
	4 PR	Answer the call at UE_B (prior to CFW step 16)
	5 PR	Verify that voice can be exchanged in both directions (prior to CFW step 21)
	6 TB	Set UE_A registration status to de-registered in IMS_A HSS (prior to CFW step 22)
	7 TB	Verify that call is ended at UE_A (prior to CFW step 24)
	8 PO	Verify that call is ended at UE_B (prior to CFW step 27)
9 PO	Verify that UE_A is deregistered	
Pass criteria:	Check	
	1	TP_IMS_5139_02 in CFW step 22 (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 Contact_header_value of UE_A and</i> <i> containing To_header</i> <i> indicating the initial INVITE_To_value from UE_A</i> <i> containing From_header</i> <i> indicating the initial 200_OK_From_value from UE_B and</i> <i> containing Call-ID_header</i> <i> indicating the initial INVITE_Call_Id_value from UE_A 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> <i>}</i>

The expected TB call flow is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
22			←		BYE	IMS_B S-CSCF releases the call towards the calling user with BYE
23		←			BYE	IMS_A P-CSCF forwards BYE to UE_B
24		→			200 OK	UE_A sends 200 OK for BYE
25			→		200 OK	IMS_A S-CSCF forwards 200 OK response to IMS_B S-CSCF
26				→	BYE	IMS_B S-CSCF releases the call towards the called user with BYE
27				←	200 OK	UE_B sends 200 OK for BYE

4.4.3 Subsequent requests within dialog procedures

4.4.3.1 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 paragraph 26
	TP_IMS_5058_02	TS 124 229 [1] clause 5.2.6.4 paragraph 67
	TP_IMS_5106_02	TS 124 229 [1] clause 5.4.3.2 paragraph 42
Use case reference.:	UC_02 (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, UE_B registered 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 UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PR	Answer the call at UE_B (prior to CFW step 16)
	5 PR	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 TB	Place call on hold at UE_A (prior to CFW step 22)
	7 TB	Verify that voice can no longer be exchanged in both directions (prior to CFW step 25)
	8 TB	Resume call at UE_A (prior to CFW step 28)
	9 TB	Verify that voice can be exchanged in both directions (prior to CFW step 31)
	10 PO	Release call at UE_A (prior to CFW step 34)
11 PO	Verify that call is released at UE_B (prior to CFW step 37)	

Test description		
Pass criteria:	Check	
	1	<p>TP_IMS_5048_02 in CFW step 23 and 29 (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 26 and 32 (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 23 and 29 (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 E A	I M S A	I M S B	U E B		
22		→			UPDATE	UE_A sends UPDATE message indicating media stream inactive (Call Hold)
23			→		UPDATE	IMS_A S-CSCF forwards UPDATE to IMS_B S-CSCF
24				→	UPDATE	IMS_B P-CSCF forwards UPDATE to UE_B
25				←	200 OK	UE_B responds to UPDATE with 200 OK indicating media stream inactive
26			←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
27		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
28		→			UPDATE	UE_A sends UPDATE message indicating media stream active (Call Resume)
29			→		UPDATE	IMS_A S-CSCF forwards UPDATE to IMS_B S-CSCF
30				→	UPDATE	IMS_B P-CSCF forwards UPDATE to UE_B
31				←	200 OK	UE_B responds to UPDATE with 200 OK indicating media stream active
32			←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
33		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.4.3.2 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 paragraph 49	
Use case reference.:	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, UE_B registered 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 UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 PR	Verify that ringback is present at UE_A (prior to CFW step 9)
	4 TB	Answer the call at UE_B (prior to CFW step 16)
	5 PO	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 PO	Release call at UE_A (prior to CFW step 22)
	7 PO	Verify that call is released at UE_B (prior to CFW step 25)
Pass criteria:	Check	
	1	TP_IMS_5107_01 in CFW step 11 (PRACK): ensure that { when { (UE_A sends PRACK to UE_B) containing a P-Access-Network-Info_header } 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 } }
	2	TP_IMS_5121_02 in CFW step 14 (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 E A	I M S A	I M S B	U E B		
10		→			PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
11			→		PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
12				→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B
13				←	200 OK	UE_B responds PRACK with 200 OK
14			←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
15		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.4.3.3 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_01	TS 124 229 [1] clause 5.4.3.2 paragraph 49
	TP_IMS_5121_02	TS 124 229 [1] clause 5.4.3.3 paragraph 60
Use case reference.:	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, UE_B registered 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 UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PR	Answer the call at UE_B (prior to CFW step 16)
	5 PR	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 TB	Release call at UE_A (prior to CFW step 22)
7 TB	Verify that call is released at UE_B (prior to CFW step 25)	
Pass criteria:	Check	
	1	TP_IMS_5107_02 in CFW step 23 (BYE): ensure that { when { (UE_A sends BYE to UE_B) containing a P-Access-Network-Info_header } 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 } }

Test description	
2	<p>TP_IMS_5121_02 in CFW step 26 (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></p>

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

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
22		→			BYE	UE_A releases the call with BYE
23			→		BYE	IMS_A S-CSCF forwards BYE to IMS_B S-CSCF
24				→	BYE	IMS_B P-CSCF forwards BYE to UE_B
25				←	200 OK	UE_B sends 200 OK for BYE
26				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
27				←	200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.4.3.4 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 paragraph 26
	TP_IMS_5058_02	TS 124 229 [1] clause 5.2.6.4 paragraph 67
	TP_IMS_5106_01	TS 124 229 [1] clause 5.4.3.2 paragraph 42
Use case reference.:	UC_02 (CFW for reINVITE)	
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, UE_B registered as per clause 4.2.3 • UE_A, UE_B registered public identities are SIP URIs only • UE_A, UE_B support reINVITE method for call hold/resume 	
Test sequence:	Step	
	1 PR	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 PR	Answer the call at UE_B (prior to CFW step 16)
	5 PR	Verify that voice can be exchanged in both directions (prior to CFW step 22)
	6 TB	Place call on hold at UE_A (prior to CFW step 22)
	7 TB	Verify that voice can no longer be exchanged in both directions (prior to CFW step 28)
	8 TB	Resume call at UE_A (prior to CFW step 34)
	9 TB	Verify that voice can be exchanged in both directions (prior to CFW step 40)
10 PO	Release call at UE_A (prior to CFW step 46)	

Test description		
	11 PO	Verify that call is released at UE_B (prior to CFW step 49)
Pass criteria:	Check	
	1	<p>TP_IMS_5048_01 in CFW step 24 and 36 (INVITE): <i>ensure that {</i> <i> when { UE_A sends a subsequent INVITE to UE_B }</i> <i> then { IMS_B receives the subsequent INVITE</i> <i> containing an additional Via_header</i> <i> containing (P-CSCF_port_number 'where it awaits the responses</i> <i>to arrive' and</i> <i> (P-CSCF-FQDN_address or</i> <i> P-CSCF-IP_address)) of IMS_A and</i> <i> containing an additional topmost Record-Route_header</i> <i> containing (P-CSCF_port_number 'where it awaits subsequent</i> <i>requests from the called party' and</i> <i> (P-CSCF-FQDN_address or</i> <i> P-CSCF-IP_address)) of IMS_A</i> <i> and</i> <i> UE_B receives INVITE</i> <i> }</i> <i>}</i></p>
		<p>TP_IMS_5058_02 in CFW step 29 and 41 (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 same P-CSCF_port_number of IMS_B 'as in the</i> <i>response to the previous initial request' and</i> <i> not containing a comp_parameter</i> <i> and</i> <i> UE_A receives 2xx_response</i> <i> }</i> <i>}</i></p>
		<p>TP_IMS_5106_01 in CFW step 24 and 36 (INVITE): <i>ensure that {</i> <i> when { UE_A sends subsequent INVITE to UE_B }</i> <i> then { IMS_B receives the subsequent INVITE</i> <i> containing a topmost Record-Route_header</i> <i> containing the S-CSCF_SIP_URI of IMS_A and</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_B receives the INVITE }</i> <i>}</i></p>

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

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
22		→			INVITE	UE_A sends reINVITE message indicating media stream inactive (Call Hold)
23		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
24			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B S-CSCF
25			←		100 Trying	IMS_B S-CSCF responds with a 100 Trying provisional response
26				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
27				←	100 Trying	UE_B responds with a 100 Trying provisional response
28				←	200 OK	UE_B responds to UPDATE with 200 OK indicating media stream inactive
29				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
30		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
31		→			ACK	UE_A acknowledges the receipt of 200 OK for INVITE
32			→		ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
33				→	ACK	IMS_B P-CSCF forwards ACK to UE_B
34		→			INVITE	UE_A sends reINVITE message indicating media stream active (Call Resume)
35		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
36			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B S-CSCF
37			←		100 Trying	IMS_B S-CSCF responds with a 100 Trying provisional response
38				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
39				←	100 Trying	UE_B responds with a 100 Trying provisional response
40				←	200 OK	UE_B responds to UPDATE with 200 OK indicating media stream active
41				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
42		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
43		→			ACK	UE_A acknowledges the receipt of 200 OK for INVITE
44			→		ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
45				→	ACK	IMS_B P-CSCF forwards ACK to UE_B

4.4.3.5 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 paragraph 49
	TP_IMS_5121_02	TS 124 229 [1] clause 5.4.3.3 paragraph 60
Use case reference.:	UC_01	
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 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 UE_B's SIP URI (prior to CFW step 1)
	2 PR	Verify that UE_B rings (prior to CFW step 7)
	3 PR	Verify that ringback is present at UE_A (prior to CFW step 10)
	4 TB	End call at UE_A (prior to CFW step 16)
5 PO	Verify that call is ended at UE_B (prior to CFW step 21)	
Pass criteria:	Check	
	1	TP_IMS_5107_04 in CFW step 18 (CANCEL): <i>ensure that {</i> <i> when { UE_A sends CANCEL to UE_B }</i> <i> then { IMS_B receives the CANCEL</i> <i> (containing a P-Charging-Vector_header</i> <i> not containing a access-network-charging-info_parameter or</i> <i> not containing a P-Charging-Vector_header) and</i> <i> not containing a P-Access-Network-Info_header</i> <i> and</i> <i> UE_B receives the CANCEL }</i> <i>}</i>
2	TP_IMS_5121_02 in CFW step 18 (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 or</i> <i> not containing a P-Charging-Vector_header) 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 call flow sequence is:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
16		→			CANCEL	UE_A sends CANCEL to abort call
17		←			200 OK	IMS_A P-CSCF responds with a 200 OK response
18			→		CANCEL	IMS_A S-CSCF sends CANCEL to IMS_B S-CSCF
19			←		200 OK	IMS_B S-CSCF responds with a 200 OK response
20				→	CANCEL	IMS_B P-CSCF sends CANCEL to UE_B
21				←	200 OK	UE_B responds with a 200 OK response
22				←	487 Request Terminated	UE_B confirms cancellation of the INVITE request with a 487 Request Terminated error response
23				→	ACK	IMS_B P-CSCF responds with an ACK to UE_B
24				←	487 Request Terminated	IMS_B S-CSCF sends a 487 Request Terminated error response to IMS_A S-CSCF
25				→	ACK	IMS_A S-CSCF responds with an ACK
26		←			487 Request Terminated	IMS_B P-CSCF sends a 487 Request Terminated error response to UE_A
27		→			ACK	UE_A responds with an ACK

4.5 Use cases

All test descriptions are based on an underlying use case, i.e. user interactions with an external IMS entity, which serves as the basis for stimulating the generation of SIP messages at the IMS NNI. Test procedures include the execution of the use case, validation of the call flow and validation of generic headers. Test requirements validate specific messages and headers observed over NNI. These are related to test purposes and underlying specification requirements. Use case descriptions, associated test sequences and call flows referenced by TDs are presented below. Call flow steps corresponding to specific test sequence steps are displayed with shading.

4.5.1 UC_01: User-initiated VoIP call setup and release

4.5.1.1 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	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)
2	Verify that UE_B rings (prior to CFW step 7)
3	Verify that ringback is present at UE_A (prior to CFW step 10)
4	Answer the call at UE_B (prior to CFW step 16)
5	Verify that voice can be exchanged in both directions (prior to CFW step 22)
6	Release call at UE_A (prior to CFW step 22)
7	Verify that call is released at UE_B (prior to CFW step 25)

4.5.1.2 SIP Call Flow

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

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8				←	180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9		←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10				→	PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
11				→	PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
12				→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B
13				←	200 OK	UE_B responds PRACK with 200 OK
14				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
15		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
16				←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
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				→	ACK	UE_A acknowledges the receipt of 200 OK for INVITE
20				→	ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
21				→	ACK	IMS_B P-CSCF forwards ACK to UE_B
22		→			BYE	UE_A releases the call with BYE
23				→	BYE	IMS_A S-CSCF forwards BYE to IMS_B S-CSCF
24				→	BYE	IMS_B P-CSCF forwards BYE to UE_B
25				←	200 OK	UE_B sends 200 OK for BYE
26				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
27		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.5.2 UC_02: User-initiated call hold and resume

4.5.2.1 Description

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.

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

1	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)
2	Verify that UE_B rings (prior to CFW step 7)
3	Verify that ringback is present at UE_A (prior to CFW step 10)
4	Answer the call at UE_B (prior to CFW step 16)
5	Verify that voice can be exchanged in both directions (prior to CFW step 22)
6	Place call on hold at UE_A (prior to CFW step 22)
7	Verify that voice can no longer be exchanged in both directions (prior to CFW step 25)
8	Resume call at UE_A (prior to CFW step 28)
9	Verify that voice can be exchanged in both directions (prior to CFW step 31)
10	Release call at UE_A (prior to CFW step 34)
11	Verify that call is released at UE_B (prior to CFW step 37)

4.5.2.2 SIP Call Flow with UPDATE

The expected sequence:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCFW responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8				←	180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9		←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10				→	PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
11				→	PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
12				→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B
13				←	200 OK	UE_B responds to PRACK with 200 OK
14				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
15		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
16				←	200 OK	UE_B responds to INVITE with 200 OK to indicate that the call has been answered
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				→	ACK	UE_A acknowledges the receipt of 200 OK for INVITE
20				→	ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
21				→	ACK	IMS_B P-CSCF forwards ACK to UE_B
22		→			UPDATE	UE_A sends UPDATE message indicating media stream inactive (Call Hold)
23				→	UPDATE	IMS_A S-CSCF forwards UPDATE to IMS_B S-CSCF
24				→	UPDATE	IMS_B P-CSCF forwards UPDATE to UE_B
25				←	200 OK	UE_B responds to UPDATE with 200 OK indicating media stream inactive
26				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
27		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
28				→	UPDATE	UE_A sends UPDATE message indicating media stream active (Call Resume)
29				→	UPDATE	IMS_A S-CSCF forwards UPDATE to IMS_B S-CSCF
30				→	UPDATE	IMS_B P-CSCF forwards UPDATE to UE_B
31				←	200 OK	UE_B responds to UPDATE with 200 OK indicating media stream active
32				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF

Step	Direction				Message	Comment
33	←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
34	→				BYE	UE_A releases the call with BYE
35		→			BYE	IMS_A S-CSCF forwards BYE to IMS_B S-CSCF
36			→		BYE	IMS_B P-CSCF forwards BYE to UE_B
37			←		200 OK	UE_B sends 200 OK for BYE
38			←		200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
39	←				200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.5.2.3 SIP Call Flow with reINVITE

The expected sequence:

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8				←	180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9		←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10				→	PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
11				→	PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
12				→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B
13				←	200 OK	UE_B responds to PRACK with 200 OK
14				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
15		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
16				←	200 OK	UE_B responds to INVITE with 200 OK to indicate that the call has been answered
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				→	ACK	UE_A acknowledges the receipt of 200 OK for INVITE
20				→	ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
21				→	ACK	IMS_B P-CSCF forwards ACK to UE_B
22				→	INVITE	UE_A sends reINVITE message indicating media stream inactive (Call Hold)
23				←	100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response

Step	Direction			Message	Comment
24			→	INVITE	IMS_A S-CSCF forwards INVITE to IMS_B S-CSCF
25			←	100 Trying	IMS_B S-CSCF responds with a 100 Trying provisional response
26			→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
27			←	100 Trying	UE_B responds with a 100 Trying provisional response
28			←	200 OK	UE_B responds to UPDATE with 200 OK indicating media stream inactive
29			←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
30		←		200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
31		→		ACK	UE_A acknowledges the receipt of 200 OK for INVITE
32			→	ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
33			→	ACK	IMS_B P-CSCF forwards ACK to UE_B
34		→		INVITE	UE_A sends reINVITE message indicating media stream active (Call Resume)
35		←		100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
36			→	INVITE	IMS_A S-CSCF forwards INVITE to IMS_B S-CSCF
37			←	100 Trying	IMS_B S-CSCF responds with a 100 Trying provisional response
38			→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
39			←	100 Trying	UE_B responds with a 100 Trying provisional response
40			←	200 OK	UE_B responds to UPDATE with 200 OK indicating media stream active
41			←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
42		←		200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
43		→		ACK	UE_A acknowledges the receipt of 200 OK for INVITE
44			→	ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
45			→	ACK	IMS_B P-CSCF forwards ACK to UE_B
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			←	200 OK	UE_B sends 200 OK for BYE
50			←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
51		←		200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A

4.5.3 UC_03: S-CSCF initiated session release

4.5.3.1 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	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)
2	Verify that UE_B rings (prior to CFW step 7)
3	Verify that ringback is present at UE_A (prior to CFW step 10)
4	Answer the call at UE_B (prior to CFW step 16)
5	Verify that voice can be exchanged in both directions (prior to CFW step 22)
6	Forced de-registration by IMS_A (prior to CFW step 22)
7	Verify that call is released at UE_B (prior to CFW step 24)

4.5.3.2 Call Flow

4.5.3.2.1 Session release from originating network

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8			←		180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9		←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10				→	PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
11				→	PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
12				→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B
13				←	200 OK	UE_B responds PRACK with 200 OK
14				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
15		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
16				←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
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				→	ACK	UE_A acknowledges the receipt of 200 OK for INVITE
20				→	ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
21				→	ACK	IMS_B P-CSCF forwards ACK to UE_B
22				→	BYE	IMS_A S-CSCF releases the call towards the called user with BYE
23				→	BYE	IMS_B P-CSCF forwards BYE to UE_B
24				←	200 OK	UE_B sends 200 OK for BYE
25				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
26		←			BYE	IMS_A S-CSCF releases the call towards the calling user with BYE
27		→			200 OK	UE_A sends 200 OK for BYE

4.5.3.2.2 Session release from terminating network

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8				←	180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9				←	180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10				→	PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
11				→	PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
12				→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B
13				←	200 OK	UE_B responds PRACK with 200 OK
14				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
15				←	200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
16				←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
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				→	ACK	UE_A acknowledges the receipt of 200 OK for INVITE
20				→	ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
21				→	ACK	IMS_B P-CSCF forwards ACK to UE_B
22				←	BYE	IMS_B S-CSCF releases the call towards the calling user with BYE
23				←	BYE	IMS_A P-CSCF forwards BYE to UE_B
24				→	200 OK	UE_A sends 200 OK for BYE
25				→	200 OK	IMS_A S-CSCF forwards 200 OK response to IMS_B S-CSCF
26				→	BYE	IMS_B S-CSCF releases the call towards the called user with BYE
27				←	200 OK	UE_B sends 200 OK for BYE

4.5.4 UC_04: P-CSCF initiated session release

4.5.4.1 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	Initiate an IMS VoIP call on UE_A, addressed to UE_B's SIP URI (prior to CFW step 1)
2	Verify that UE_B rings (prior to CFW step 7)
3	Verify that ringback is present at UE_A (prior to CFW step 10)
4	Remove cable, antenna or battery from UE_A (prior to CFW step 16/22)
5	Verify that the call is terminated at UE_B (prior to CFW step 20/25)

4.5.4.2 Call flow

4.5.4.2.1 Session establishment cancelled

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8				←	180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9		←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10		→			PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
11			→		PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
12				→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B
13				←	200 OK	UE_B responds PRACK with 200 OK
14				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
15		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
16					LOSS	Internal a message that resources for UE_A are not available
17			→		CANCEL	IMS_A sends CANCEL to IMS_B
18				←	200 OK	IMS_B S-CSCF responds with a 200 OK
19				→	CANCEL	IMS_B sends CANCEL to UE_B
20				←	200 OK	UE_B responds with 200 OK
21				←	437 Request Terminated	UE_B S-CSCF sends 437 Request Terminated to IMS_B
22				→	ACK	IMS_B responds with ACK
23				←	437 Request Terminated	IMS_B sends 437 Request Terminated to IMS_A
24				→	ACK	IMS_A responds with ACK

4.5.4.2.2 Session release from originating network

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			INVITE	UE_A sends INVITE with the first SDP offer indicating all desired medias and codecs that UE_A supports
2		←			100 Trying	IMS_A P-CSCF responds with a 100 Trying provisional response
3			→		INVITE	IMS_A S-CSCF forwards INVITE to IMS_B I-CSCF
4			←		100 Trying	IMS_B I-CSCF responds with a 100 Trying provisional response
5				→	INVITE	IMS_B P-CSCF forwards INVITE to UE_B
6				←	100 Trying	UE_B responds with a 100 Trying provisional response
7				←	180 Ringing	UE_B responds to initial INVITE with 180 Ringing to indicate that it has started alerting
8				←	180 Ringing	IMS_B S-CSCF forwards 180 Ringing response to IMS_A S-CSCF
9		←			180 Ringing	IMS_A P-CSCF forwards the 180 Ringing response to UE_A
10		→			PRACK	UE_A acknowledges the receipt of 180 response by sending PRACK
11			→		PRACK	IMS_A S-CSCF forwards PRACK to IMS_B S-CSCF
12				→	PRACK	IMS_B P-CSCF forwards PRACK to UE_B
13				←	200 OK	UE_B responds PRACK with 200 OK
14				←	200 OK	IMS_B S-CSCF forwards 200 OK response to IMS_A S-CSCF
15		←			200 OK	IMS_A P-CSCF forwards the 200 OK response to UE_A
16				←	200 OK	UE_B responds INVITE with 200 OK to indicate that the call has been answered
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		→			ACK	UE_A acknowledges the receipt of 200 OK for INVITE
20			→		ACK	IMS_A S-CSCF forwards ACK to IMS_B S-CSCF
21				→	ACK	IMS_B P-CSCF forwards ACK to UE_B
22					LOSS	PDF or SPDF sends a message that resources are missing for UE_A
23			→		BYE	IMS_A P-CSCF sends BYE to IMS_B S-CSCF
24				→	BYE	IMS_B P-CSCF forwards BYE to UE_B
25				←	200 OK	UE_B sends 200 OK for BYE
26				←	200 OK	IMS_B forwards 200 OK response to IMS_A

4.5.4.2.3 Session release from terminating network

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

4.5.5 UC_05: IMS message exchange between UEs in different networks

4.5.5.1 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	UE_A is requested to send a MESSAGE to UE_B (prior to CFW step 1)
2	Verify that UE_B gets the MESSAGE (prior to CFW step 4)

4.5.5.2 Call flow

Step	Direction				Message	Comment
	U E A	I M S A	I M S B	U E B		
1		→			MESSAGE	UE_A sends MESSAGE to IMS_A
2			→		MESSAGE	IMS_A sends MESSAGE to IMS_B
3				→	MESSAGE	IMS_A sends MESSAGE to UE_B
4				←	200 OK	UE_B sends 200 OK to IMS_B
5			←		200 OK	IMS_B sends 200 OK to IMS_A
6		←			200 OK	IMS_A sends 200 OK to UE_A

History

Document history		
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