

IPv6 READY
IMS Interoperability Scenario

Technical Document

Revision 0.3.0

IPv6 Forum
IPv6 Ready Logo Committee
Converged Test Specification
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MODIFICATION RECORD

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Commentators:



INTRODUCTION

Overview

The IPv6 forum plays a major role to bring together industrial actors, to develop and deploy the new generation of IP protocols. Contrary to IPv4, which started with a small closed group of implementers, the universality of IPv6 leads to a huge number of implementations. Interoperability has always been considered as a critical feature in the Internet community.

Due to the large number of IPv6 implementations, it is important to provide the market a strong signal proving the level of interoperability across various products.

To avoid confusion in the mind of customers, a globally unique logo program should be defined. The IPv6 logo will give confidence to users that IPv6 is currently operational. It will also be a clear indication that the technology will still be used in the future. To summarize, this logo program will contribute to the feeling that IPv6 is available and ready to be used.

Abbreviations and Acronyms

UE	- IMS User Equipment
P-CSCF	- IMS Proxy- Call/Session Control Function
I-CSCF	- IMS Interrogating- Call/Session Control Function
S-CSCF	- IMS Serving- Call/Session Control Function
HSS	-Home Subscriber Server
IF	- Interface
UNI	- User-Network Interface
NNI	- Network-Network Interface
NUT	- Node Under Test



REQUIREMENT

To obtain the IPv6 Ready Logo for IMS- Phase 2, the NUT (Node Under Test) must satisfy the following requirements

Equipment Type

UE (User Equipment):

A node that initiates and receives requests to exchange parameters between P-CSCF.

UE must pass the interoperability test on the architecture as following (Figure 1). Also, it is recommended to execute the interoperability test with UE2 (REF UE) which is the same vendor as UE1 (TARGET UE). Moreover, UE2 must support the same functions as UE1, and IMS CSCFs1/HSS1 (REF) must support all BASIC functions.

The architecture for IMS Interoperability test

IMS IPv6 UE must execute the interoperability test with two or more vendor's equipments (IMS P-CSCF1) that obtain IPv6 Ready Logo for IMS- Phase 2.

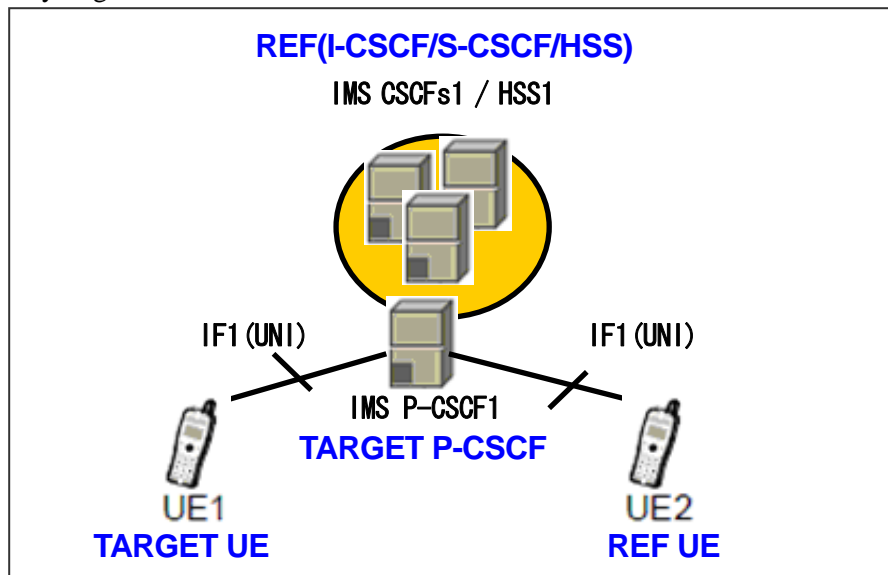


Figure 1 Selection method of target nodes (TARGET: UE)

* Must set up as the following combinations.

- If you use the IMS Core as the IMS CSCFs1/HSS1,

Vendor A (IMS CSCFs1/HSS1) ----- Any Vendor (UE2)

Vendor B (IMS CSCFs1/HSS1) ----- Any Vendor (UE2)

- In other cases,

Vendor A (IMS P-CSCF1) + Any Vendor (IMS CSCFs1/HSS1) ----- Any Vendor (UE2)

Vendor B (IMS P-CSCF1) + Any Vendor (IMS CSCFs1/HSS1) ----- Any Vendor (UE2)



IMS Interoperability Test Criteria

Table 1 is the list of IPv6 Ready Logo for IMS interoperability test criteria.
It is recommended to start the test from the initial item in each category.

Table 1 IPv6 Ready Logo for IMS Interoperability Test Criteria

T A R	Category	Test num	Item num	Test scenario	TARGET/REF			
					UE1	P-CSCF1	CSCFs1 HSS1	UE2
U E	Registration and Authentication	1	IMS.INTEROP.1.1	Initial Registration	TU	TP	R	
		2	IMS.INTEROP.1.2	Reregistration	TU	TP	R	
	Registration-State Event Package	3	IMS.INTEROP.2.1	Subscription and Notification	TU	TP	R	
	Session	4	IMS.INTEROP.3.1	Call Initiation and Termination (UE-originating case)	TU	TP	R	R
		5	IMS.INTEROP.3.2	Call Initiation and Termination (UE-terminating case)	TU	TP	R	R
		6	IMS.INTEROP.3.3	Call Cancellation (call UE-originating case)	TU	TP	R	R
		7	IMS.INTEROP.3.4	Call Cancellation (call UE-terminating case)	TU	TP	R	R

: BASIC

TU : TARGET UE (Applicant device) TP: TARGET P-CSCF (Vender A, B) R : REF (Any Vender)



TEST ORGANIZATION

This document organizes tests by Section based on related test methodology or goals. Each group begins with a brief set of comments pertaining to all tests within that group. This is followed by a series of description blocks; each block describes a single test. The format of the description block is as follows:

- Test Label:** The test label and title comprise the first line of the test block. The test label is composed by concatenating the short test suite name, the section number, the group number, and the test number within the group. These elements are separated by periods. The Test Number is the section, group and test number, also separated by periods.
- Purpose:** The Purpose is a short statement describing what the test attempts to achieve. It is usually phrased as a simple assertion of the feature or capability to be tested.
- References:** The References section lists cross-references to the specifications and documentation that might be helpful in understanding and evaluating the test and results.
- Resource Requirements:** The Resource Requirements section specifies the software, hardware, and test equipment that will be needed to perform the test.
- Test Setup:** The Test Setup section describes the configuration of all devices prior to the start of the test. Different parts of the procedure may involve configuration steps that deviate from what is given in the test setup. If a value is not provided for a protocol parameter, then the protocol's default is used for that parameter.
- Procedure:** This section of the test description contains the step-by-step instructions for carrying out the test. These steps include such things as enabling interfaces, unplugging devices from the network, or sending packets from a test station. The test procedure also cues the tester to make observations, which are interpreted in accordance with the observable results given for that test part.
- Observable Results:** This section lists observable results that can be examined by the tester to verify that the NUT is operating properly. When multiple observable results are possible, this section provides a short discussion on how to interpret them. The determination of a pass or fail for each test is usually based on how the NUT's behavior compares to the results described in this section.
- Possible Problems:** This section contains a description of known issues with the test procedure, which may affect test results in certain situations.



REFERENCES

The following documents are referenced in this text:

- [TS24.229] 3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (Release 7), 3GPP TS 24.229 v7.8.0.
- [TS33.203] 3rd Generation Partnership Project Technical Specification Group Services and System Aspects; 3G security Access security for IP-based services (Release 7), 3GPP TS 33.203 v7.6.0.
- [SIP] J.Rosenberg, H. Schulzrinne, G.Camarillo, A.Johnston, J. Peterson, R. Sparks, M, Handley, E. Schooler, SIP: Session Initiation Protocol, RFC 3261, June 2002.
- [SDP] M. Handley, V. Jacobson, and C. Perkins, SDP: Session Description Protocol, RFC 4566, July 2006.
- [SIPEVENT] A. B. Roach, Session Initiation Protocol (SIP)-Specific Event Notification, RFC 3265, June 2002.
- [RFC3329] J. Arkko, V. Torvinen, G. Camarillo, A. Niemi, and T.Haukka, Security Mechanism Agreement for the Session Initiation Protocol (SIP), RFC 3329, January 2003.



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Group 1: Registration and Authentication

Scope

Test in this group verify that the target devices properly registers and authenticates.

Overview

The following tests verify operations such as initial registration, and reregister.

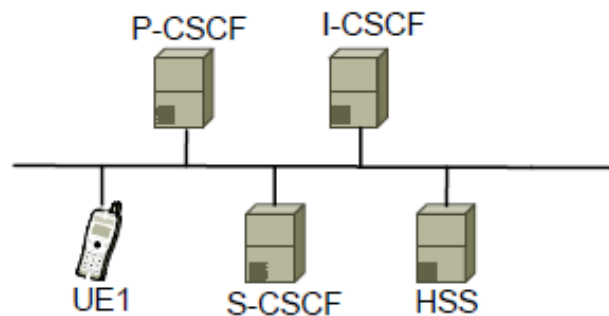
Test IMS.Interop.1.1: Initial Registration

Purpose: To verify that a UE completes initial registration properly.

References:

- [TS24.229] – Section 5.1.1
- [TS24.229] – Section 5.1.1.2

Test Setup: Connect the devices as per the figure below. Configure the P-CSCF, S-CSCF, I-CSCF, and HSS to be in the same domain. UE1 is unregistered.



Procedure:

1. Initialize UE1.
2. Observe the packets on all networks.

Observable Results:

Step 2: UE1 transmits a REGISTER request to P-CSCF. The P-CSCF transmits a 401 Unauthorized response to UE1. UE1 transmits a new REGISTER request including valid credentials to P-CSCF by using temporary security associations. The P-CSCF transmits a 200 response to UE1 using security associations.

Possible Problems:

- None.

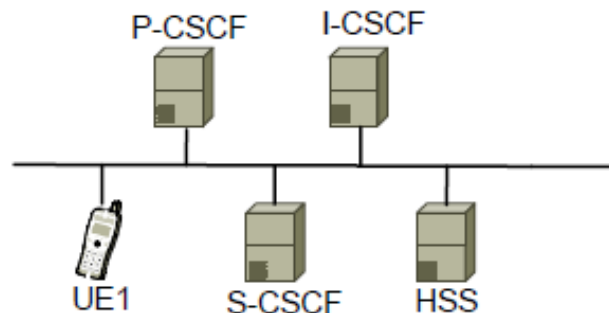
Test IMS.Interop.1.2: Reregistration

Purpose: To verify that a UE can perform the reregistration.

References:

- [TS24.229] – Section 5.1.1.4

Test Setup: Connect the devices as per the figure below. Configure the P-CSCF, S-CSCF, I-CSCF, and HSS to be in the same domain. UE1 is unregistered. Configure the registration expired time to 120 seconds in the S-CSCF.



Procedure:

1. Initialize UE1.
2. UE1 transmits a REGISTER request to P-CSCF.
3. P-CSCF transmits a 401 Unauthorized response to UE1.
4. UE1 transmits a REGISTER request with valid credentials to P-CSCF.
5. P-CSCF transmits a 200 response to UE1.
6. Wait 60 seconds after in the successful initial registration.
7. Observe the packets on all networks.

Observable Results:

Step 7: UE1 transmits a REGISTER request to the P-CSCF using the existing security associations. The P-CSCF transmits a 200 OK response to UE1 using the existing security associations.

Addition 1: All of messages between UE and P-CSCF are protected by SA after Registration.

Addition 2: If UE1 supports SigComp, UE1 use SigComp after Registration.

Possible Problems:

- None.



Group 2: Registration-State Event Package

Scope

Test in this group verify that the target devices properly receives the registration-state event package.

Overview

The following tests verify operations of registration-state event package using the SUBSCRIBE and NOTIFY framework.

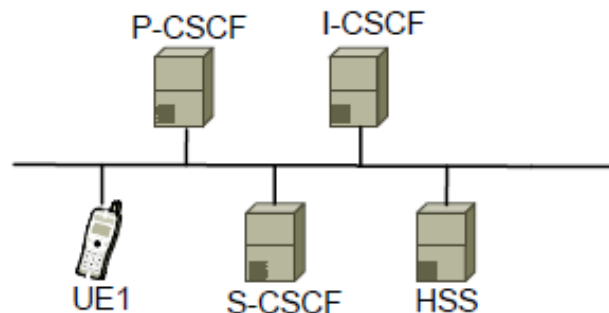
Test IMS.Interop.2.1: Subscription and Notification

Purpose: To verify that a UE properly supports subscription and notification.

References:

- [TS24.229] – Section 5.1.2

Test Setup: Connect the devices as per the figure below. Configure the P-CSCF, S-CSCF, I-CSCF, and HSS to be in the same domain. UE1 is unregistered.



Procedure:

1. Initialize UE1.
2. UE1 transmits a REGISTER request to P-CSCF.
3. P-CSCF transmits a 401 Unauthorized response to UE1.
4. UE1 transmits a REGISTER request with valid credentials to P-CSCF.
5. P-CSCF transmits a 200 response to UE1.
6. Observe the packets on all networks.
7. P-CSCF transmits a 200 response to UE1.
8. P-CSCF transmits a NOTIFY request to UE1.
9. Observe the packets on all networks.

Observable Results:

Step 6: UE1 transmits a SUBSCRIBE request to P-CSCF.

Step 9: UE1 transmits a 200 response to P-CSCF.

Addition 1: All of messages between UE and P-CSCF are protected by SA after Registration.

Addition 2: If UE1 supports SigComp, UE1 use SigComp after Registration.

Possible Problems:

- None.



Group 3: Session

Scope

Test in this group verify that the target devices properly initiates and receives IMS calls.

Overview

The following tests verify that IMS call all can be completed and properly process cancellation.

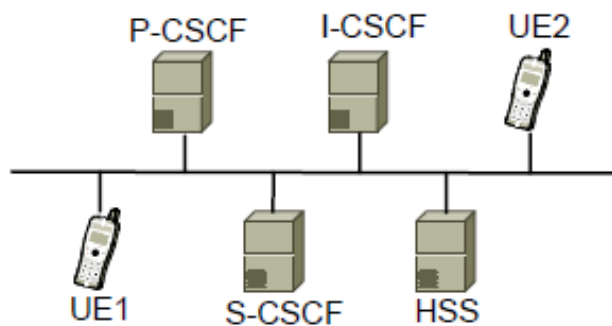
Test IMS.Interop.3.1: Call Initiation and Termination (UE-originating case)

Purpose: To verify that a UE properly initiate a session (by sending an INVITE request).
To verify that UE properly terminate a session (by receiving a BYE request).

References:

- [TS24.229] – Section 5.1.2A.2

Test Setup: Connect the devices as per the figure below. Configure the P-CSCF, S-CSCF, I-CSCF, and HSS to be in the same domain. UE1 is unregistered. UE2 is already registered.



Procedure:

1. Initialize UE1.
2. UE1 transmits a REGISTER request to P-CSCF.
3. P-CSCF transmits a 401 Unauthorized response to UE1.
4. UE1 transmits a REGISTER request with valid credentials to P-CSCF.
5. P-CSCF transmits a 200 response to UE1.
6. UE1 subscribes to the registration-state event package.
7. UE1 calls UE2.
8. Observe the packets on all networks.
9. UE2 answers.
10. Observe the packets on all networks.
11. UE2 hangs up.
12. Observe the packets on all networks.

Observable Results:

Step 8: UE1 transmits an INVITE request to P-CSCF. UE receives 100 response from P-CSCF. UE2 transmits a 180 and UE1 receives the 180 response from P-CSCF.

Step 10: UE2 transmits a 200 response and UE1 receives a 200 response from P-CSCF. UE1 transmits ACK to P-CSCF.

Step 12: UE2 transmits a BYE request and UE1 receives the BYE request from P-CSCF. UE1 transmits a 200 response to P-CSCF.

Addition 1: All of messages between UE and P-CSCF are protected by SA after Registration.



Addition 2: If UE1 supports SigComp, UE1 use SigComp after Registration.

Possible Problems:

- None.

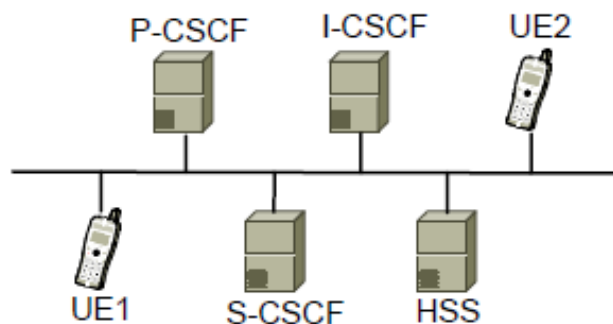
Test IMS.Interop.3.2: Call Initiation and Termination (UE-terminating case)

Purpose: To verify that a UE properly initiate a session (by receiving an INVITE request).
To verify that UE properly terminate a session (by sending a BYE request).

References:

- [TS24.229] – Section 5.1.2A.2

Test Setup: Connect the devices as per the figure below. Configure the P-CSCF, S-CSCF, I-CSCF, and HSS to be in the same domain. UE1 is unregistered. UE2 is already registered.



Procedure:

1. Initialize UE1.
2. UE1 transmits a REGISTER request.
3. P-CSCF transmits a 401 Unauthorized response.
4. UE1 transmits a REGISTER request with valid credentials to P-CSCF.
5. P-CSCF transmits a 200 response to UE1.
6. UE1 subscribes to the registration-state event package.
7. UE2 calls UE1.
8. Observe the packets on all networks.
9. UE1 answers.
10. Observe the packets on all networks.
11. UE1 hangs up.
12. Observe the packets on all networks.

Observable Results:

Step 8: UE2 transmits an INVITE request and UE1 receives the INVITE request from P-CSCF. UE1 transmits a 180 Ringing response to P-CSCF.

Step 10: UE1 transmits a 200 OK to P-CSCF. UE2 transmits an ACK request and UE1 receives the ACK request from P-CSCF.

Step 12: UE1 transmits a BYE request to P-CSCF. UE2 transmits a 200 response and UE1 receives the BYE request from P-CSCF.

Addition 1: All of messages between UE and P-CSCF are protected by SA after Registration.



Addition 2: If UE1 supports SigComp, UE1 use SigComp after Registration.

Possible Problems:

- None.

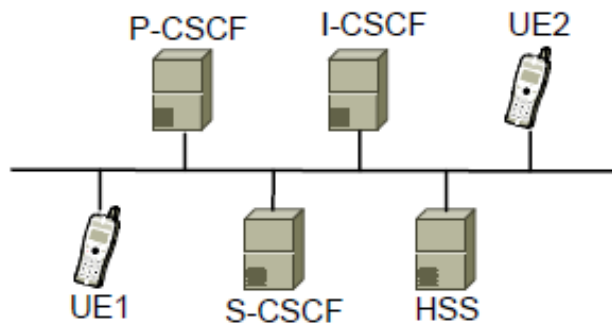
Test IMS.Interop.3.3: Call Cancellation (call UE-originating case)

Purpose: To verify that a UE properly cancels a session (by sending a CANCEL request).
To verify that a UE properly process a 487 response (by receiving a 487 response).

References:

- [RFC3261] – Section 9

Test Setup: Connect the devices as per the figure below. Configure the P-CSCF, S-CSCF, I-CSCF, and HSS to be in the same domain. UE1 is unregistered. UE2 is already registered.



Procedure:

1. Initialize UE1.
2. UE1 transmits a REGISTER request to P-CSCF.
3. P-CSCF transmits a 401 Unauthorized response to UE1.
4. UE1 transmits a REGISTER request with valid credentials to P-CSCF.
5. P-CSCF transmits a 200 response to UE1.
6. UE1 subscribes to the registration-state event package.
7. UE1 calls UE2.
8. UE1 transmits a INVITE request to P-CSCF and then UE2 receives a INVITE request.
9. UE1 receives a 180 Ringing response from P-CSCF.
10. UE1 cancels the call
11. Observe the packets on all networks.
12. UE2 responds for a canceled call.
13. Observe the packets on all networks.

Observable Results:

- Step 11:** UE1 transmits a CANCEL request to P-CSCF. UE1 receives a 200 OK response from P-CSCF.
- Step 13:** UE2 transmits a 487 Request Terminated response and then UE1 receives a 487 response from P-CSCF. UE1 transmits an ACK to P-CSCF.
- Addition 1:** All of messages between UE and P-CSCF are protected by SA after Registration.
- Addition 2:** If UE1 supports SigComp, UE1 use SigComp after Registration.



Possible Problems:

- None.

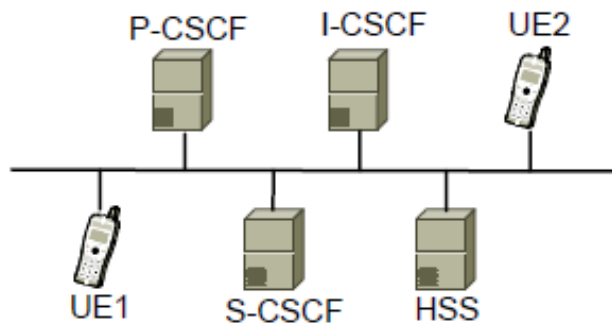
Test IMS.Interop.3.4: Call Cancellation (call UE-terminating case)

Purpose: To verify that a UE properly cancels a session (by receiving a CANCEL request).
To verify that a UE properly respond to the original INVITE request with a 487 response.

References:

- [RFC3261] – Section 9

Test Setup: Connect the devices as per the figure below. Configure the P-CSCF, S-CSCF, I-CSCF, and HSS to be in the same domain. UE1 is unregistered. UE2 is already registered.



Procedure:

1. Initialize UE1.
2. UE1 transmits a REGISTER request to P-CSCF.
3. P-CSCF transmits a 401 Unauthorized response to UE1.
4. UE1 transmits a REGISTER request with valid credentials to P-CSCF.
5. P-CSCF transmits a 200 response to UE1.
6. UE1 subscribes to the registration-state event package.
7. UE2 calls UE1.
8. UE2 transmits a INVITE request and then UE1 receives a INVITE request from P-CSCF.
9. UE1 transmits a 180 Ringing response to P-CSCF.
10. UE2 cancels the call
11. Observe the packets on all networks.
12. UE1 responds for a canceled call.
13. Observe the packets on all networks.

Observable Results:

Step 11: UE2 transmits a CANCEL request and then UE1 receives a CANCEL request from P-CSCF. UE2 transmits a 200 OK response to P-CSCF.

Step 13: UE1 transmits a 487 Request Terminated response to P-CSCF. UE1 receives an ACK from P-CSCF.

Addition 1: All of messages between UE and P-CSCF are protected by SA after Registration.



Addition 2: If UE1 supports SigComp, UE1 use SigComp after Registration.

Possible Problems:

- None.



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