IPv6 READY

IMS Interoperability Scenario

Technical Document

Revision 0.4.0

MODIFICATION RECORD

Revision0.3.0   Jun. 15, 2009   Pre-release(trial version)
Revision0.3.1   Jun. 19, 2009   Fixed a typo.
Revision0.4.0   Nov. 26, 2010   Major version up (trial version)
                                                  - Updated for 3GPP relase8

ACKNOWLEDGMENTS

TABLE OF CONTENTS

1. 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

REFERENCES

The following documents are referenced in this text:

[IMS]
(1) TS 24.229: IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3(Release 8), 3GPP TS 24.229 v8.10.0. (http://www.3gpp.org/ftp/Specs/html-info/24229.htm)

[SIP/SDP]
(2) RFC3261: SIP: Session Initiation Protocol (http://www.ietf.org/rfc/rfc3261.txt)
(3) RFC3265: Session Initiation Protocol (SIP)-Specific Event Notification

---

(http://www.ietf.org/rfc/rfc3265.txt)

(4) RFC3327: Session Initiation Protocol (SIP) Extension Header Field for Registering   Non-Adjacent Contacts (http://www.ietf.org/rfc/rfc3327.txt)

(5) RFC3455: Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation Partnership Project (3GPP) (http://www.ietf.org/rfc/rfc3455.txt)

(6) RFC3608: Session Initiation Protocol (SIP) Extension Header Field for Service Route   Discovery During Registration (http://www.ietf.org/rfc/rfc3608.txt)

(7) RFC3680: A Session Initiation Protocol (SIP) Event Package for Registrations (http://www.ietf.org/rfc/rfc3680.txt)

(8) RFC4320: Actions addressing identified issues with the Session Initiation Protocol's non-INVITE Transaction (http://www.ietf.org/rfc/rfc4320.txt)

(9) RFC4566: SDP: Session Description Protocol (http://www.ietf.org/rfc/rfc4566.txt)

[IMS AKA and Security Association]

(10) TS.33.203: 3G security; Access security for IP-based services (Release8), 3GPP TS 33.203 v8.8.0. (http://www.3gpp.org/ftp/Specs/html-info/33203.htm)

(11) RFC3310: Hypertext Transfer Protocol (HTTP) Digest Authentication Using Authentication and Key Agreement (AKA) (http://www.ietf.org/rfc/rfc3310.txt)

(12) RFC3329: Security Mechanism Agreement for the Session Initiation Protocol (SIP) (http://www.ietf.org/rfc/rfc3329.txt)

[SIP digest]

(13) RFC2617: HTTP Authentication: Basic and Digest Access Authentication (http://www.ietf.org/rfc/rfc2617.txt)

[Call Flow Examples]

(14) TS24.228: Signalling flows for the IP multimedia call control based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3, 3GPP TS 24.228 v5.15.0. (http://www.3gpp.org/ftp/Specs/html-info/24228.htm)

(15) RFC3665: SIP Basic Call Flow Examples (http://www.ietf.org/rfc/rfc3665.txt)

2. 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 vender as UE1 (TARTGET 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.
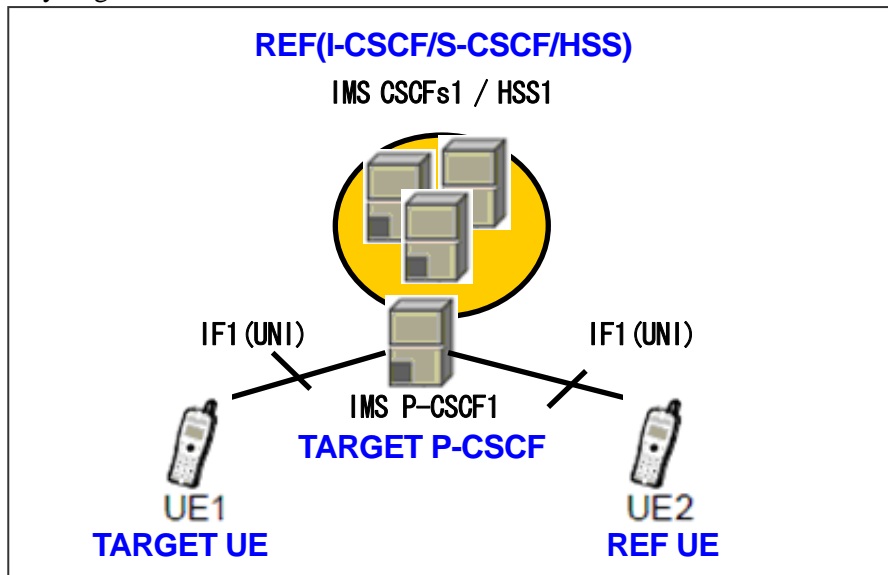
Figure 1   Selection method of target nodes (TARGET: UE)

* Must set up as the following combinations.
 - If you use the IMS Core as the IMS CSCFs1/HSS1,
  Vender A (IMS CSCFs1/HSS1) ----------- Any Vender (UE2)
  Vender B (IMS CSCFs1/HSS1) ----------- Any Vender (UE2)
 - In other cases,
  Vender A (IMS P-CSCF1) + Any Vender (IMS CSCFs1/HSS1) ----------- Any Vender (UE2)
  Vender B (IMS P-CSCF1) + Any Vender (IMS CSCFs1/HSS1) ----------- Any Vender (UE2)

The process of the Interoperability test
The Outline of the "Interoperability test scenario for the IPv6 Ready Logo Phase 2 program" is as follows.

<1> Check the required nodes and scenarios for the interoperability test (See Table 1).
<2> Connect the necessary equipment properly. (See section 2.REQUIREMENT)
<3> Execute the tests according to the interoperability test scenario.
    (And you need to save the interoperability test logs.)
<4> Capture all packets on each link during the test with a device that is not part of the test. For each part of test put the captured packet into individual files within tcpdump format (cap).
<5> Write the result ('OK' or 'NG') on the check sheet every scenario.

As for the above <3>, the actual test scenarios are described in section 3 "Test Procedure for Interoperability test scenario for the IPv6 Ready Logo Phase 2". Each test scenario in the section provides the details of the test scenario to conduct the actual test.

As for the above <5>, refer to *The explanation of the submission for the SIPIMS IPv6 Ready Logo*.

For checking of the interoperability test results, you can use section 5 "Result Table for Interoperability test scenario for the IPv6 Ready Logo Phase 2" in this document.

IMS Interoperability Test Criteria

Table 2 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 2 IPv6 Ready Logo for IMS Interoperability Test Criteria

T A R	Category	Security mechanism	Test num	Item num	Test scenario	TARGET/REF			
						UE1	P-CSCF1	CSCFs1 HSS1	UE2
U E	**Registration and Authentication**	IMS-AKA	1	IMS.INTEROP.1.1.1	Initial Registration	**TU**	**TP**	**R**	
			2	IMS.INTEROP.1.1.2	Reregistration	**TU**	**TP**	**R**	
		SIP digest	3	IMS.INTEROP.1.2.1	Initial Registration	**TU**	**TP**	**R**	
			4	IMS.INTEROP.1.2.2	Reregistration	**TU**	**TP**	**R**	
	Registration-State Event Package	IMS-AKA	5	IMS.INTEROP.2.1.1	Subscription and Notification	**TU**	**TP**	**R**	
		SIP digest	6	IMS.INTEROP.2.2.1	Subscription and Notification	**TU**	**TP**	**R**	
	Session	IMS-AKA	7	IMS.INTEROP.3.1.1	Call Initiation and Termination (UE-originating case)	**TU**	**TP**	**R**	**R**
			8	IMS.INTEROP.3.1.2	Call Initiation and Termination (UE-terminating case)	**TU**	**TP**	**R**	**R**
			9	IMS.INTEROP.3.1.3	Call Cancellation (call UE-originating case)	**TU**	**TP**	**R**	**R**
			10	IMS.INTEROP.3.1.4	Call Cancellation (call UE-terminating case)	**TU**	**TP**	**R**	**R**
		SIP digest	11	IMS.INTEROP.3.2.1	Call Initiation and Termination (UE-originating case)	**TU**	**TP**	**R**	**R**
			12	IMS.INTEROP.3.2.2	Call Initiation and Termination (UE-terminating case)	**TU**	**TP**	**R**	**R**
			13	IMS.INTEROP.3.2.3	Call Cancellation (call UE-originating case)	**TU**	**TP**	**R**	**R**
			14	IMS.INTEROP.3.2.4	Call Cancellation (call UE-terminating case)	**TU**	**TP**	**R**	**R**

☐ : BASIC (IMS-AKA is mandatory for all UEs containing a UICC)
☐ : ADVANCED
TU : TARGET UE (Appricant device)   TP: TARGET P-CSCF (Vender A, B)   R : REF (Any Vender)

3. Test Procedure for Interoperability test scenario for the IPv6 Ready Logo Phase 2

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.

Group1: 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.

1.1 IMS-AKA

Test IMS.Interop.1.1.1: Initial Registration

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

References:

- [TS24.229] – Section 5.1.1.1
- [TS24.229] – Section 5.1.1.2.1
- [TS24.229] – Section 5.1.1.2.2

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.
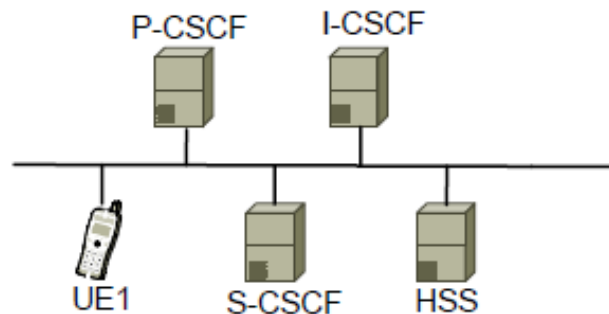
Procedure:

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

Observable Results:

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

Possible Problems:

- None.

Test IMS.Interop.1.1.2: Reregistration

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

References:

- [TS24.229] – Section 5.1.1.4
- [TS24.229] – Section 5.1.1.4.1
- [TS24.229] – Section 5.1.1.4.2

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. 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 OK response to UE1.
6. Wait expiration Interval 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. UE1 receives a 200 OK response from P-CSCF 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 uses SigComp after Registration.

Possible Problems:

- None.

1.2 SIP digest

Test IMS.Interop.1.2.1: Initial Registration

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

References:

- [TS24.229] – Section 5.1.1.1
- [TS24.229] – Section 5.1.1.2.1
- [TS24.229] – Section 5.1.1.2.2

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.
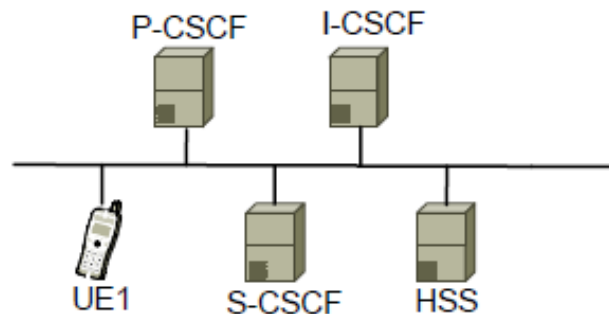
Procedure:

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

Observable Results:

Step 2: UE1 transmits a REGISTER request to P-CSCF. UE1 receives a 401 Unauthorized response from P-CSCF. UE1 transmits a new REGISTER request including valid credentials to P-CSCF. UE1 receives a 200 OK response from P-CSCF.
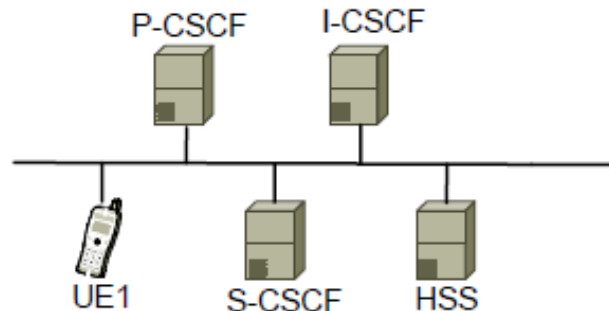
Possible Problems:

- None.

Test IMS.Interop.1.2.2: Reregistration

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

References:

- • [TS24.229] – Section 5.1.1.4
- • [TS24.229] – Section 5.1.1.4.1
- • [TS24.229] – Section 5.1.1.4.2

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. 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 OK response to UE1.
6. Wait expiration Interval 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. UE1 receives a 200 OK response from P-CSCF.
Addition 1: If UE1 supports SigComp, UE1 uses SigComp after Registration.

Possible Problems:

- • None.

Group2:   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.

2.1 IMS-AKA

Test IMS.Interop.2.1.1: 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 OK response to UE1.
 6. Observe the packets on all networks.
 7. P-CSCF transmits a 200 OK 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 OK 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 uses SigComp after Registration.
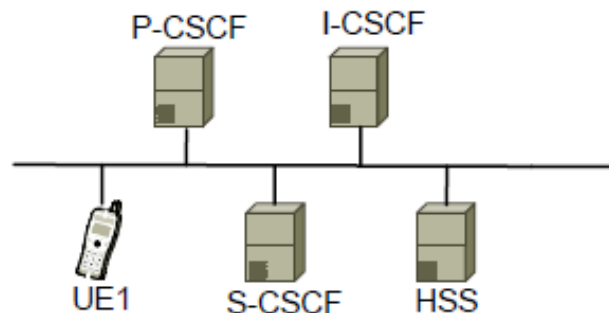
Possible Problems:

• None.

2.2 SIP digest

Test IMS.Interop.2.2.1: 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 OK response to UE1.
  6. Observe the packets on all networks.
  7. P-CSCF transmits a 200 OK 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 OK response to P-CSCF.
  Addition 1: If UE1 supports SigComp, UE1 uses SigComp after Registration.

Possible Problems:

• None.

Group3: 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.

3.1 IMS-AKA

Test IMS.Interop.3.1.1: 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.1
- [TS24.229] – Section 5.1.3

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. UE1 receives 100 Trying response from P-CSCF. UE1 receives the 180 Ringing response from P-CSCF.
Step 10: UE1 receives a 200 response from P-CSCF. UE1 transmits ACK to P-CSCF.

Step 12: UE1 receives the BYE request from P-CSCF. UE1 transmits a 200 OK 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.

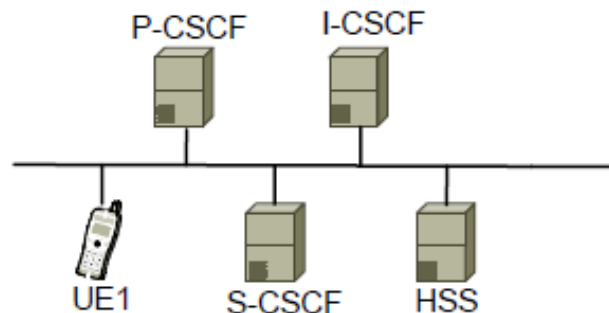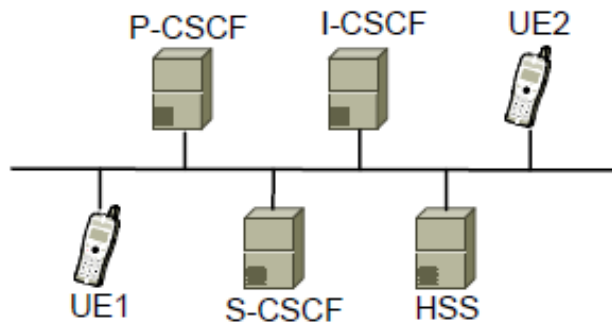**Possible Problems**:

- None.

Test IMS.Interop.3.1.2: 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
- [TS24.229] – Section 5.1.3

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: UE1 receives the INVITE request form P-CSCF. UE1 transmits a 180 Ringing response to P-CSCF.
Step 10: UE1 transmits a 200 OK response to P-CSCF. UE1 receives the ACK request from P-CSCF.
Step 12: UE1 transmits a BYE request to P-CSCF. UE1 receives 200 OK response 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.3.1.3: 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: 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.
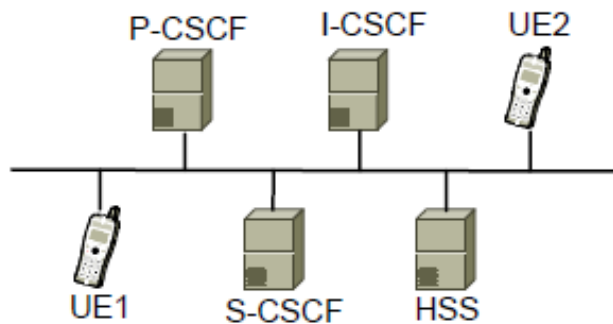
Possible Problems:

  • None.

Test IMS.Interop.3.1.4: 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: UE1 receives a CANCEL request from P-CSCF. UE1 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.

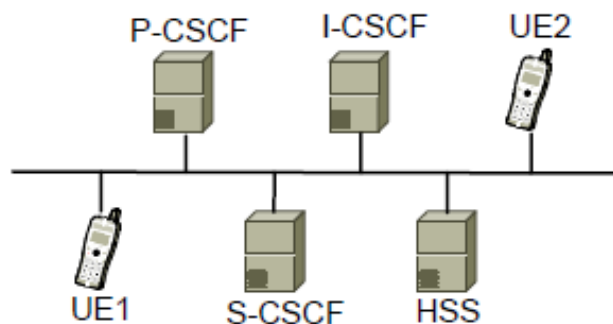**Addition 2:** If UE1 supports SigComp, UE1 use SigComp after Registration.
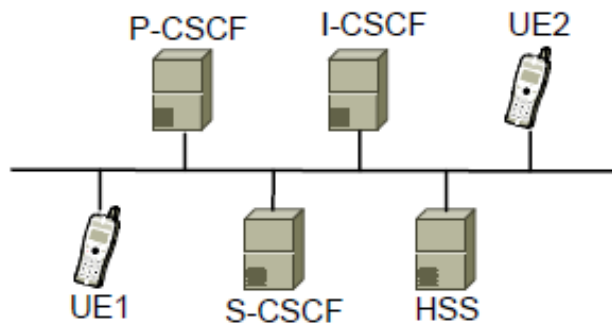
Possible Problems:

• None.

3.2 SIP digest

Test IMS.Interop.3.2.1: 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.1
- [TS24.229] – Section 5.1.3

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. UE1 receives 100 Trying response from P-CSCF. UE1 receives the 180 Ringing response from P-CSCF.
Step 10: UE1 receives a 200 response from P-CSCF. UE1 transmits ACK to P-CSCF.

Step 12: UE1 receives the BYE request from P-CSCF. UE1 transmits a 200 OK response to P-CSCF.
Addition 1: If UE1 supports SigComp, UE1 use SigComp after Registration.
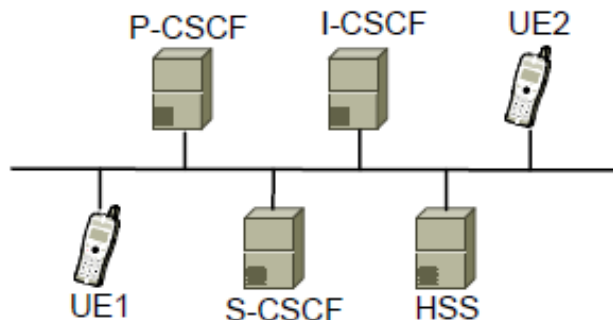
Possible Problems:

  • None.

Test IMS.Interop.3.2.2: 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
- [TS24.229] – Section 5.1.3

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: UE1 receives the INVITE request form P-CSCF. UE1 transmits a 180 Ringing response to P-CSCF.
Step 10: UE1 transmits a 200 OK response to P-CSCF. UE1 receives the ACK request from P-CSCF.
Step 12: UE1 transmits a BYE request to P-CSCF. UE1 receives 200 OK response from P-CSCF.
Addition 1: If UE1 supports SigComp, UE1 use SigComp after Registration.

Possible Problems:

  • None.

Test IMS.Interop.3.2.3: 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: UE1 receives a 487 response from P-CSCF. UE1 transmits an ACK to P-CSCF.
Addition 1: If UE1 supports SigComp, UE1 use SigComp after Registration.
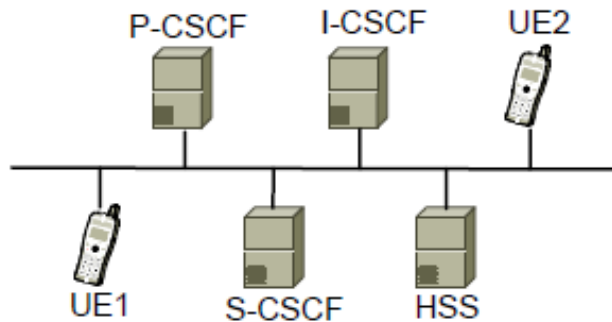
Possible Problems:

• None.

Test IMS.Interop.3.2.4: 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: UE1 receives a CANCEL request from P-CSCF. UE1 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: If UE1 supports SigComp, UE1 use SigComp after Registration.
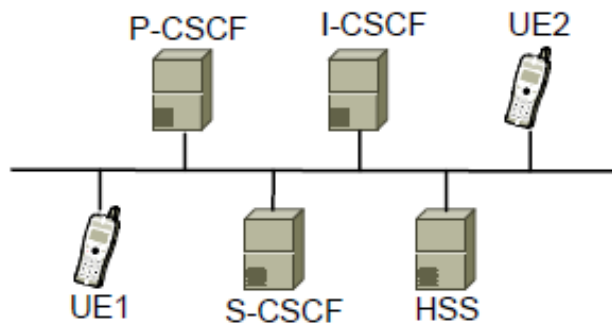
Possible Problems:

• None.

4. Topology Map for Interoperability test scenario for the IPv6 Ready Logo Phase 2

Topology Map
(*This form is required for the each session of Interoperability test.)
Please describe topology map based on the test environment.
Some examples are described below, see Example-1 to Example-2.

Form-1)
==
Please describe the topology map
Interoperability test scenario Item num :_____

UEa1   : Vendor name :_____   Device name :_____
P-CSCFa1   : Vendor name :_____   Device name :_____
S-CSCFa1   : Vendor name :_____   Device name :_____
I-CSCFa1   : Vendor name :_____   Device name :_____
HSS   : Vendor name :_____   Device name :_____

```
--+-----------+-------------+------------+-------------+----- Link 1
  |           |             |            |             |
 UEa1    P-CSCFa1    I-CSCFa1    S-CSCFa1       HSS
```

IP address information

  Link
    Link1
      Network Prefix: _____

  User Equipment Node
    UEa1
      Global Address   : _____
      Link Local Address   : _____
      MAC Address   : _____

  Server Node
    P-CSCFa1
      Global Address   : _____
      Link Local Address   : _____
      MAC Address   : _____

    S-CSCFa1

Global Address   : _____

Link Local Address   : _____

MAC Address   : _____

I-CSCFa1

    Global Address   : _____

    Link Local Address   : _____

    MAC Address   : _____

HSS

    Global Address   : _____

    Link Local Address   : _____

    MAC Address   : _____

AKA information (* Please describe when using IMS-AKA.)

    Subscriber key (Secret key) : _____ (ASCII/HEX)

SIP digest secret key information (* Please describe when using SIP digest.)

    Secret key : _____ (ASCII)

==

Form-2)

==

Please describe the topology map

Interoperability test scenario Item num :_____

UEa1   : Vendor name :_____   Device name :_____

UEa2   : Vendor name :_____   Device name :_____

P-CSCFa1   : Vendor name :_____   Device name :_____

S-CSCFa1   : Vendor name :_____   Device name :_____

I-CSCFa1   : Vendor name :_____   Device name :_____

HSS   : Vendor name :_____   Device name :_____


```
--+-----------+------------+------------+--------------+-------------+----- Link 1
  |           |            |            |              |             |
UEa1      UEa2      P-CSCFa1    S-CSCFa1     I-CSCFa1       HSS
```


IP address information

    Link

Link1
    Network Prefix: _____

  User Equipment Node
    UEa1
       Global Address   : _____
       Link Local Address   : _____
       MAC Address   : _____

    UEa2
       Global Address   : _____
       Link Local Address   : _____
       MAC Address   : _____

  Server Node
    P-CSCFa1
       Global Address   : _____
       Link Local Address   : _____
       MAC Address   : _____

    S-CSCFa1
       Global Address   : _____
       Link Local Address   : _____
       MAC Address   : _____

    I-CSCFa1
       Global Address   : _____
       Link Local Address   : _____
       MAC Address   : _____

    HSS
       Global Address   : _____
       Link Local Address   : _____
       MAC Address   : _____

AKA information (* Please describe when using IMS-AKA.)
    Subscriber key (Secret key) : _____ (ASCII/HEX)

SIP digest secret key information (* Please describe when using SIP digest.)
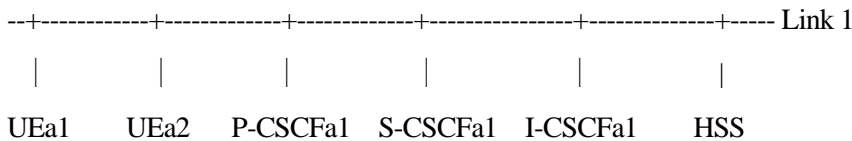   Secret key : _____ (ASCII)

===

Example-1

Topology map
===
Please describe the topology map
Interoperability test scenario Item num : Test IMS.Interop.1.1.1

UEa1   : Vendor name :Foo   Corp   Device name :Foo   UE
P-CSCFa1   : Vendor name :Bar   Corp   Device name :Bar   P-CSCF
S-CSCFa1   : Vendor name :FooBar Corp   Device name :FooBar S-CSCF
I-CSCFa1   : Vendor name :FooBar Corp   Device name :FooBar I-CSCF
HSS   : Vendor name :FooBar Corp   Device name :FooBar HSS


```
  ---+-----------+--------------+-------------+-----------+----- Link 1
     |           |              |             |           |
   UEa1    P-CSCFa1    I-CSCFa1    S-CSCFa1      HSS
```


IP address information

  Link
    Link1
      Network Prefix: 3ffe:0501:ffff:0005::/64

  User Equipment Node
    UEa1
      Global Address   : 3ffe:0501:ffff:0005:0200:00ff:fe00:0100
      Link Local Address   : fe80::0200:00ff:fe00:0100
      MAC Address   : 00:00:00:00:01:00

  Server Node
    P-CSCFa1
      Global Address   : 3ffe:0501:ffff:0005:0200:00ff:fe00:0200
      Link Local Address   : fe80::0200:00ff:fe00:0200
      MAC Address   : 00:00:00:00:02:00

    S-CSCFa1
      Global Address   : 3ffe:0501:ffff:0005:0200:00ff:fe00:0300
      Link Local Address   : fe80::0200:00ff:fe00:0300
      MAC Address   : 00:00:00:00:03:00
    I-CSCFa1
      Global Address   : 3ffe:0501:ffff:0005:0200:00ff:fe00:0400
      Link Local Address   : fe80::0200:00ff:fe00:0400
      MAC Address   : 00:00:00:00:04:00

    HSS

Global Address : 3ffe:0501:ffff:0005:0200:00ff:fe00:0500
Link Local Address : fe80::0200:00ff:fe00:0500
MAC Address : 00:00:00:00:05:00

AKA information (* Please describe when using IMS-AKA.)
   Subscriber key (Secret key) : 0x465b5ce8b199b49faa5f0a2ee238a6bc (HEX)

SIP digest secret key information (* Please describe when using SIP digest.)
   Secret key :   123456789 (ASCII)

==

Example-2
Topology map
==
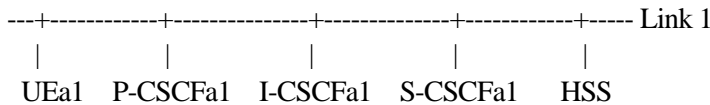Please describe the topology map
Interoperability test scenario Item num : Test IMS.Interop.3.1.1

UEa1   : Vendor name :Foo   Corp   Device name :Hoge   UE
UEa2   : Vendor name :Fuga   Corp   Device name :Fuga   UE
P-CSCFa1   : Vendor name :Bar   Corp   Device name :Bar   P-CSCF
S-CSCFa1   : Vendor name :FooBar Corp   Device name :FooBar S-CSCF
I-CSCFa1   : Vendor name :FooBar Corp   Device name :FooBar I-CSCF
HSS   : Vendor name :FooBar Corp   Device name :FooBar HSS

   --+----------+-------------+-------------+--------------+--------------+----- Link 1
    | | | | | |
   UEa1   UEa2   P-CSCFa1   S-CSCFa1   I-CSCFa1   HSS

IP address information

  Link
    Link1
      Network Prefix: 3ffe:0501:ffff:0005::/64

  User Equipment Node
    UEa1
      Global Address   : 3ffe:0501:ffff:0005:0200:00ff:fe00:0100
      Link Local Address   : fe80::0200:00ff:fe00:0100
      MAC Address   : 00:00:00:00:01:00

    UEa2
      Global Address   : 3ffe:0501:ffff:0005:0200:00ff:fe00:0101

```
    Link Local Address        : fe80::0200:00ff:fe00:0101
    MAC Address               : 00:00:00:00:01:01

Server Node
  P-CSCFa1
    Global Address            : 3ffe:0501:ffff:0005:0200:00ff:fe00:0200
    Link Local Address        : fe80::0200:00ff:fe00:0200
    MAC Address               : 00:00:00:00:02:00

  S-CSCFa1
    Global Address            : 3ffe:0501:ffff:0005:0200:00ff:fe00:0300
    Link Local Address        : fe80::0200:00ff:fe00:0300
    MAC Address               : 00:00:00:00:03:00
  I-CSCFa1
    Global Address            : 3ffe:0501:ffff:0005:0200:00ff:fe00:0400
    Link Local Address        : fe80::0200:00ff:fe00:0400
    MAC Address               : 00:00:00:00:04:00

  HSS
    Global Address            : 3ffe:0501:ffff:0005:0200:00ff:fe00:0500
    Link Local Address        : fe80::0200:00ff:fe00:0500
    MAC Address               : 00:00:00:00:05:00
```
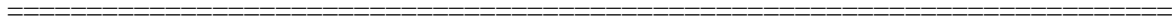
AKA information (* Please describe when using IMS-AKA.)
  Subscriber key (Secret key) : alice (ASCII)

SIP digest secret key information (* Please describe when using SIP digest.)
  Secret key :   123456789 (ASCII)

===

5. Result Table for Interoperability test scenario for the IPv6 Ready Logo Phase 2

Result Table
(* This is need per one application.)

Please fill in the blanks relating to your executed test results as example below.

For UE
===
UE is a candidate for Phase 2 certification.

   IO test result

Target	IMS CSCFs No1.	IMS CSCFs No2.
UEa1		

===

Example)

For UE
===
UE is a candidate for Phase 2 certification.

   IO test result

Target	IMS CSCFs No1.	IMS CSCFs No2.
UEa1	PASS	PASS

===