



Prepaid Service Roaming Test

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1 Introduction

1.1 Scope

This document contains the specification of IREG End-to-end Functional Capability tests related to the international roaming of a Mobile Station subscribed to CAMEL (Customised Applications for Mobile networks using Enhanced Logic) services, belonging to a home PMN(a), within a visited PMN(b).

Whilst it is expected that CAMEL roaming will be a bilateral activity between two PMNs, this document is written in a unidirectional context. Hence, roaming is taking place by a MS(a) roamed to VPMN(b) only. There is no reference to a Mobile Station MS(b) visiting PMN(a).

This document does not cover:

- SCCP testing [see Stage 2: NG PRD IR25]
- Exchange of PMN numbering, addressing and routing data [see Stage 3: NG PRD IR23]
- Testing of Transferred Account Procedure (TAP), billing applications and any inter-PMN financial statements; [see IDS PRD TD06]. However, the production of a Toll Ticketing file, for use in the IDS Stage 3 testing, is included.
- Definition of operation and maintenance procedures such as contact points for fault reporting and notification of planned works. [See Stage 3: NG PRD IR23]
- IR24 International Roaming testing. [See Stage 4: NG PRD IR24]

The scope of the document extends to CAMEL Phase 1 and Phase 2.

1.2 Definitions

Term	Description
BOICExH	Barring of Outgoing International Calles Except Home
CAMEL	Customised Applications for Mobile networks using Enhanced Logic
CFNRY	Call Forwarding on No Reply
DCH	Default Call Handling
DPC	Destination Point Code
HLR	Home Location Register
HPLMN	Home PLMN
O-CSI	Originating CAMEL Subscription Information
ODB	Operator Determined Barring
RHSP	Roaming Hub Service Provider
SCF	Service Control Function
SCP	Service Control Point
SMS	Short Message Service
TAP	Transferred Accounts Procedure

1.3 References

Ref	Document Number	Title
1	IR.23	Organisation of GSM International Roaming Tests
2	TD.46	TAP Test Cases (TTC) for CAMEL Phase 1, Phase 2 and Phase 3 Services
3	IR.80	Technical Architecture Alternatives for Open Connectivity Roaming Hubbing Model

2 Testing Principles

In order to maximize the efficiency of testing, the test cases have been drawn up so as to minimize the requirements for simultaneous joint activity by both PMN(a) and PMN(b).

There are two testing scopes:

- CAMEL testing: Basic testing can be performed to ensure the CAMEL protocol is working as expected in the VPMN.
- Prepaid testing: Extended testing can be performed to ensure there is no fraud exposure
- The testing program takes into account three distinct components.
- PMN(a) issues pre-programmed (U)SIMs and programmed HLR and SCP
- PMN(b) or RHSP on behalf of PMN(b) performs tests
- PMN(b) and PMN(a) discuss results bilaterally or via the RHSP

2.1 Test objectives

The fundamental objective of this testing is to confirm the capability of CAMEL services so that GSM users subscribed to these services will receive them when roaming from their Home PMN(a) to a visited PMN(b). Consequently, the tests are restricted to top-level capability testing. There is no provocative or inopportune behaviour testing.

As the testing is at a top-level, its scope includes checking the correct behaviour of CAMEL features. The term "CAMEL features" is related to CAMEL Phase 1 and Phase 2 throughout the document.

The overall objective of the tests is to confirm that the CAMEL features, which are known to operate correctly within each separate PMN, will also operate correctly for Inter-PMN roaming.

The specific objectives:

- "Location updating" and the associated "Inserting of Subscriber data" including O-CSI can be successfully completed for MS(a) roaming in PMN(b).
- "Provide Subscriber Info" is successfully executed.
- Outgoing speech calls by MS(a) are handled for calls to VPMN(b)
- Encountered Event Detection Points are reported correctly.
- SCF is able to terminate calls.
- The default call handling described in O-CSI is correctly executed.
- Suppression of announcements in VMSC is successfully executed.
- Interworking with GSM SS and ODB is correctly executed.
- Termination of call establishment via ReleaseCall is optionally tested to reduce expenditure
- In case an emergency call is requested, the SCF(Service Control Function) is not invoked

The following topics are not tested:

- Charging aspects are not specifically verified here. However TAP Records will be produced, which may be used to check charging procedures.
- CAMEL specific parameters will be included in TAP Records according to TD.46
- The ActivityTest information flow is not tested, as the initiation timers are SCP dependent.

2.2 Test Cases

2.2.1 CAMEL testing

2.2.1.1 MS1(a) Calls MS2(a) in international format (+ or 00), both roamed in VPMN(b)

1. Preconditions

MS1(a) and MS2(a) have sufficient credit to initiate/terminate calls.

2. Action

Check the balance of MS1(a) and MS2(a)
MS1(a) establishes call to MS2(a).
Call is answered and held for one minute.
Check the balance of MS1(a) and MS2(a)

3. Expected Result

The call is connected successfully and the balances of MS1(a) and MS2(a) are decreased

4. Comments

2.2.1.2 MS1(a) calls HPMN short code

1. Preconditions

MS1(a) has sufficient credit to initiate/terminate calls.

2. Action

Check the balance of MS1(a)
MS1(a) establishes call to HPMN short code
Check the balance of MS1(a)

3. Expected Result

The call is connected successfully

4. Comments

2.2.1.3 MS2(a) performs Call Forwarding on No Reply to Voicemail

1. Preconditions

MS1(a) and MS2(a) have sufficient credit to initiate/terminate calls.
MS2(a) has to have an active CFNRY (Call Forwarding on No Reply) to voicemail.
The CFNRY is either activated by default by the HPMN or manually by the tester

2. Action

Check the balance of MS2(a)
MS1(a) or PSTN(b) calls MS2(a).
MS2(a) does not respond and the call is forwarded to the voicemail.
Check the balance of MS2(a)

3. Expected Result

The call to MS2(a) is successfully forwarded to the voicemail.
No local announcement is played.
MS2(a) is charged if the HPMN does not use optimal routing for conditional call forwarding.
MS2(a) is not charged if the HPMN does use optimal routing for conditional call forwarding.

4. Comments

2.2.1.4 MS1(a) calls Visited country number in international format, account depleted

1. Preconditions

The credit of MS1(a) should be minimal. If the credit at this stage is too high, please contact the HPMN to set a lower balance for MS1(a)
The call duration could be computed as the credit divided by the price/minute.

2. Action

Check the balance of MS1(a)
MS1(a) establishes call to a Visited country number in international format.
Call is answered.
Check the balance of MS1(a)

3. Expected Result

The call is disconnected when the credit is exhausted.

4. Comments

2.2.1.5 MS1(a) calls Visited country number in international format, without credit

1. Preconditions

MS1(a) has no more credit to initiate a call.

The Dialed number should be the same as for 1.5.1.4

2. Action

Check the balance of MS1(a)

MS1(a) establishes call to a Visited country number in international format (same as previous test).

Check the balance of MS1(a)

3. Expected Result

The call is released by the SCP.

4. Comments

2.2.1.6 MS1(a) calls local Emergency number without credit

1. Preconditions

MS1(a) has no more credit to initiate a call.

2. Action

Check the balance of MS1(a)

MS1(a) establishes call to local emergency number.

Check the balance of MS1(a)

3. Expected Result

The call is connected successfully

The balance is not decreased.

4. Comments

2.2.1.7 Check DCH set to Release/Continue: MS3(a) calls Visited country number in international format

1. Preconditions

MS3(a) has sufficient credit to initiate/terminate calls.

MS3(a) could be implemented using:

- MS1(a) if only 2 (U)SIMs are exchanged for testing, especially for bilateral mode where it is important to minimize the number of (U)SIM cards exchanged. In such case, the "Default Call handling" will be invoked on the MSC by configuring the SCP routing to a dummy DPC.

- MS3(a), a specific (U)SIM provided, could be quite interesting for roaming hub testing. In such case, the “Default Call handling” will be invoked on the MSC by configuring the MS3(a) profile in the HLR with a dummy SCP address.

2. Action

Check the balance of MS3(a)
MS3(a) establishes call to a Visited country number in international format.
Call answered and held for one minute.
Check the balance of MS3(a)

3. Expected Result

Expected results depend on DCH value which will be provided by the Home HLR:

DCH set to Release: the call is released and the balance is not decreased
DCH set to Continue: the call is connected successfully and the balance is not decreased

4. Comments

This test must not be executed for non-regression testing if MS1(a) is used and VPMN is configured to route HPMN SCP to a dummy DPC.

2.2.2 Prepaid testing

2.2.2.1 MS2(a) sends a text message to MS1(a), both roamed in VPMN(b)

1. Preconditions

MS2(a) has sufficient credit to initiate calls.
MS2(a) uses the SMS-Service Centre of the HPMN

2. Action

MS2(a) sends text message to MS1(a)

3. Expected Result

The text message is sent and delivered successfully.
Both MS1(a) and MS2(a) are charged but generally MS1(a) should not be charged.

4. Comments

Monitor that MO Forward SM signalling message is sent from VPMN

2.2.2.2 MS2(a) sends a text message to MS1(a), both roamed in VPMN(b), using the SMSC of the VPMN

1. Preconditions

MS2(a) has sufficient credit to initiate calls.
MS2(a) uses the SMS-Service Centre of the VPMN
MS2(a) has BOICExH for SMS active

2. Action

MS2(a) sends text message to MS1(a)

3. Expected Result

The SMS-MO will fail

4. Comments

Monitor that no MO Forward SM signalling message is sent from VPMN

2.2.2.3 MS2(a) sends a text message to MS1(a), both roamed in VPMN(b), using the SMSC of a 3rd party Operator

1. Preconditions

MS2(a) has sufficient credit to initiate calls.
MS2(a) uses the SMS-Service Centre of a 3rd party Operator
MS2(a) has BOICExH for SMS active

2. Action

MS2(a) sends text message to MS1(a)

3. Expected Result

The SMS-MO will fail

4. Comments

Monitor that no MO Forward SM signalling message is sent from the VPMN

2.2.2.4 MS2(a) calls to a Premium number from the Visited country

1. Preconditions

MS2(a) has sufficient credit to initiate/terminate calls.

MS2(a) has ODB for Premium numbers active

2. Action

MS2(a) calls local Premium number from the visited country

3. Expected Result

MS2(a) is not able to make the call

4. Comments

3 Equipment requirements

The testing responsibility on PMN(b) rests with PMN(b) or the RHSP, dependent on their agreement as per PRD IR.80.

3.1 User equipment

The equipment described in this section is necessary for undertaking the test cases described in Section 2.

- a) Two Mobile Equipments supplied by PMN(b) or equivalent testing probes supplied by the RHSP to which PMN(b) is connected.
- b) Two prepaid (U)SIMs supplied by PMN(a) as MS1(a) and MS2(a)
- c) One prepaid (U)SIM supplied by PMN(a) with DCH set on Continue/Release and a dummy SCP in case of Roaming Hubbing as MS3(a)

3.2 Test Equipment

The availability of a CCITT # 7 tester able to decode SCCP, TCAP, MAP, and CAP is highly advisable, but not strictly necessary for these tests. However, it is essential for any analysis of test case failures.

A clock capable of allowing testing personnel to record the call starting time and chargeable starting time (answering time) to an accuracy not less than five seconds. If possible, the clock shall be adjusted to be aligned with the internal MSC clock which is also used for the Toll Ticketing function.

A stopwatch capable of measuring the chargeable call duration to an accuracy of one second.

4 Pre-Testing Data Exchange

4.1 Testing Contact Information

The following test co-ordination contact information should be exchanged by both PMNs and the Roaming Hub Provider:

- names,
- telephone numbers,
- fax numbers, and
- email address.

4.2 (U)SIM associated data supplied by PMN(a)

The following information is required individually for each of the (U)SIMs supplied

- PIN, PUK/ (SUPER PIN).
- IMSI
- MSISDN
- Default Call Handling
- BOICExH for SMS

PMN addressing, numbering and routing data as referenced in PRD IR.23 [1] is regarded as advisable. Such information includes:

- E212-E214 translation
- MSC/VLR and HLR E.164 addresses
- MSRN number ranges
- SMS Service Centre E.164 address of HPMN
- HPMN short codes
- Voicemail number
- Whether HPMN uses optimal routing for call forwarding
- Balance check code
- Visited country emergency number
- SMS Service Centre E.164 address of VPMN
- SCP address of HPMN

Annex A Test document



IR60 v5.xlsx

Annex B Document Management

B.1 Document History

Version	Date	Brief Description of Change	Approval Authority	Editor/Company
1.0.0	12/09/2001	First draft of Prepaid service Roaming test template	IREG	
2.0.0	19/03/2002	IREG approved document.	IREG	
3.0.0	09/06/2003	Approved by EMC	IREG	
3.1.0	08/12/2004	NCR 001 by D2 Germany (Chapter 8: "3G Test Cases" added)	IREG	
3.1.1	29/03/2005	NCR 002 by KPN Mobile Netherlands (Chapter 1 is updated with improved explanation of template usage)	IREG	
3.1.2	21/04/2006	NCR 003 by Signal WP (Chapter 1 is updated with recommendation for HPLMN to design test specifications)	IREG	
4.0	04/05/2009	Changed IR60 from Word to EXCEL within GSMA Open Connectivity project 2008, Presented Signal43 Ghent, Approved via Signal Mailing List	IREG	
5.0	20/01/2015	Update IR60 and include fraud related cases. Presented in SIGNAL#80 London.	NG	Mihaela Ambrozie/Vodafone Roaming Services

B.2 Other Information

Type	Description
Document Owner	NG SIGNAL
Editor / Company	Javier Sendin, GSMA

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