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## Foreword

This Technical Specification (TS) has been produced by the 3<sup>rd</sup> Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

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## Introduction

The present document is the first part of a multi-part conformance specification valid for 3GPP Release 1999, 3GPP Release 4 and 3GPP Release 5. 3GPP TS 34.123-2 [11] contains a pro-forma for the Implementation Conformance Statement (ICS) and an applicability table, indicating the release from which each test case is applicable. 3GPP TS 34.123-3 [12] contains a detailed and executable description of the test cases written in a standard testing language, TTCN, as defined in ISO/IEC 9646.

For at least a minimum set of services, the prose descriptions of test cases will have a matching detailed test case implemented in TTCN [12].

For Release 1999, the minimum set of services is defined as:

- voice calls;
- emergency calls;
- SMS (both Point-to-point and Cell broadcast);
- Circuit Switched data at up to 64 k bits/second;
- fax;

including the underlying layers to support these services.

Release 1999 will also include the areas:

- auto-calling restrictions.

The present document may contain descriptions of tests for additional services, but these tests may not have matching TTCN test cases.

The present document will not contain any tests on the USIM, or the interface between the UE and the USIM. These tests are documented elsewhere.

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# 1 Scope

The present document specifies the protocol conformance testing for the 3<sup>rd</sup> Generation User Equipment (UE).

This is the first part of a multi-part test specification. The following information can be found in this part:

- the overall test structure;
- the test configurations;
- the conformance requirement and reference to the core specifications;
- the test purposes; and
- a brief description of the test procedure, the specific test requirements and short message exchange table.

The following information relevant to testing can be found in accompanying specifications:

- the default setting of the test parameters [9];
- the applicability of each test case [11].

A detailed description of the expected sequence of messages can be found in the 3<sup>rd</sup> part of this test specification.

The Implementation Conformance Statement (ICS) pro-forma can be found in the 2<sup>nd</sup> part of the present document.

The present document is valid for UE implemented according to 3GPP Release 1999, 3GPP Release 4 or 3GPP Release 5.

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## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.
  - For a Release 1999 UE, references to 3GPP documents are to version 3.x.y, when available.
  - For a Release 4 UE, references to 3GPP documents are to version 4.x.y, when available.
  - For a Release 5 UE, references to 3GPP documents are to version 5.x.y, when available.
  - For a Release 6 UE, references to 3GPP documents are to version 6.x.y, when available.
  - For a Release 7 UE, references to 3GPP documents are to version 7.x.y, when available.
  - For a Release 8 UE, references to 3GPP documents are to version 8.x.y, when available.
  - For a Release 9 UE, references to 3GPP documents are to version 9.x.y, when available.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.003: "Numbering, Addressing and Identification".
- [3] 3GPP TS 23.122: "Non-Access-Stratum functions related to Mobile Station (MS) in idle mode".
- [4] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".
- [5] 3GPP TS 25.214: "Physical layer procedures (FDD)".
- [6] 3GPP TS 25.321: "MAC protocol specification".
- [7] 3GPP TS 25.322: "RLC protocol specification".
- [8] 3GPP TS 25.331: "RRC Protocol Specification".
- [9] 3GPP TS 34.108: "Common Test Environments for User Equipment (UE) Conformance Testing".
- [10] 3GPP TS 34.109: "Terminal logical test interface; Special conformance testing functions".
- [11] 3GPP TS 34.123-2: "User Equipment (UE) conformance specification; Part 2: Implementation Conformance Statement (ICS) proforma specification".
- [12] 3GPP TS 34.123-3: "User Equipment (UE) conformance specification; Part 3: Abstract Test Suites (ATS)".
- [13] 3GPP TS 51.010-1: "Mobile Station (MS) conformance specification; Part 1: Conformance specification".
- [14] ISO/IEC 9646 (all parts): "Information technology - Open Systems Interconnection - Conformance testing methodology and framework".
- [15] 3GPP TS 25.304: "UE Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode".
- [16] 3GPP TS 34.121: "Terminal Conformance Specification; Radio Transmission and Reception (FDD)".

- [17] 3GPP TS 34.122: "Terminal Conformance Specification; Radio Transmission and Reception (TDD)".
- [18] 3GPP TS 31.102: "Characteristics of the USIM Application".
- [19] 3GPP TS 25.224: "Physical Layer Procedures (TDD)".
- [20] 3GPP TS 25.215: "Physical layer - Measurements (FDD)".
- [21] 3GPP TS 25.101: "UE Radio Transmission and Reception (FDD)".
- [22] 3GPP TS 25.123: "Requirements for support of radio resource management (TDD)".
- [23] 3GPP TS 25.133: "Requirements for Support of Radio Resource Management (FDD)".
- [24] 3GPP TS 03.22: "Functions related to Mobile Station (MS) in idle mode and group receive mode".
- [25] 3GPP TS 04.18: "Mobile radio interface layer 3 specification; Radio Resource Control Protocol".
- [26] 3GPP TS 05.08: "Radio Subsystem Link Control".
- [27] 3GPP TS 22.001: "Principles of circuit telecommunication services supported by a Public Land Mobile Network (PLMN)".
- [28] 3GPP TS 24.007: "Mobile radio interface signalling layer 3; General aspects".
- [29] 3GPP TS 25.211: "Physical channels and mapping of transport channels onto physical channels (FDD)".
- [30] 3GPP TS 25.323: "Packet Data Convergence Protocol (PDCP) Specification".
- [31] 3GPP TS 33.102: "3G Security; Security Architecture".
- [32] 3GPP TS 23.060: "General Packet Radio Service (GPRS) Service description; Stage 2".
- [33] Void.
- [34] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS)".
- [35] 3GPP TS 23.038: "Alphabets and language-specific information".
- [36] 3GPP TS 24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".
- [37] 3GPP TS 25.324: "Broadcast/Multicast Control BMC".
- [38] 3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".
- [39] RFC 2507: "IP Header Compression".
- [40] RFC 3095: "RObust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed".
- [41] RFC 4815: "RObust Header Compression (ROHC): Corrections and Clarifications to RFC 3095".
- [42] 3GPP TS 23.228: "IP Multimedia Subsystem (IMS)".
- [43] 3GPP TS 22.246: "Multimedia Broadcast/Multicast Service (MBMS) user services; Stage 1".
- [44] 3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".
- [45] 3GPP TS 51.010-2: "Mobile Station (MS) conformance specification; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".
- [46] 3GPP TS 36.523-2: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRAN); User Equipment (UE) conformance specification; Part 2: Implementation Conformance Statement (ICS) proforma specification".

- [47] 3GPP TS 36.523-3: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRAN); User Equipment (UE) conformance specification; Part 3: Test Suites"
- [48] Void
- [49] 3GPP TS 37.571-2: "User Equipment (UE) conformance specification for UE positioning; Part 2: Protocol conformance".

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 apply, unless specified below:

**example:** text used to clarify abstract rules by applying them literally

**Floor:** Floor( $x$ ) is the largest integer smaller than or equal to  $x$ .

**Ceil:** Ceil ( $x$ ) is the smallest integer larger than or equal to  $x$ .

### 3.2 Abbreviations

For the purposes of the present document, the abbreviations specified in TR 21.905 apply, with any additional abbreviations specified below:

SS	System Simulator
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## 4 Overview

### 4.1 Test Methodology

#### 4.1.1 Testing of optional functions and procedures

Any function or procedure which is optional, as indicated in the present document may be subject to a conformance test if it is implemented in the UE.

A declaration by the apparatus supplier (ICS) is used to determine whether an optional function/procedure has been implemented.

#### 4.1.2 Test interfaces and facilities

Detailed descriptions of the UE test interfaces and special facilities for testing are provided in [10].

### 4.2 Implicit Testing

For some 3GPP signalling and protocol features conformance is not verified explicitly in the present document. This does not imply that correct functioning of these features is not essential, but that these are implicitly tested to a sufficient degree in other tests.

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## 5 Reference Conditions

The reference environments used by all signalling and protocol tests are specified in TS 34.108. Where a test requires an environment that is different, this will be specified in the test itself.

### 5.1 Generic setup procedures

A set of basic generic procedures for radio resource signalling, and generic setup procedures for layer 3 NAS signalling are described in TS 34.108 clause 7. These procedures are used in numerous test cases throughout the present document.

## 6 Idle mode operations

In the following paragraphs some explanatory text is given concerning the nature of the tests in this clause and the general behaviour of the SS is described.

Since the conformance requirements of most of the tests in this clause cannot be tested explicitly, testing is done implicitly by testing the UE behaviour from its responses to the SS.

In some cases, a test is performed in multiple stages in order that the requirements can be tested within the above constraints.

For any UE all the carriers are in its supported band(s) of operation.

Unless otherwise stated in the method of test, in all of the tests of this clause:

- the default values of the system information data fields given in TS 34.108 are used;
- the UE is equipped with a USIM containing default values. The USIM is in the idle updated state in the default location area with a TMSI assigned at the beginning of each test;
- default cell numbering as defined in TS 34.108 clause 6.1 have been used in the cell selection and re-selection test cases;
- the cells shall be configured such that  $Squal > 0$  (FDD only) and  $Srxlev > 0$  while applying  $Qqualmin$  (FDD only) and  $Qrxlevmin$  in table 6.1. In addition, for an FDD cell, the measured primary CPICH RSCP value shall be greater than or equal to -95 dBm (definition of High Quality cell, see TS 25.304, clause 5.1.2.2). In addition, for a TDD cell, the measured P-CCPCH RSCP shall be greater than or equal to -84 dBm (definition of High Quality cell, see TS 25.304, clause 5.1.2.2).

Three different methods A, B and C are applied in the tests:

Method A:

- the SS is continuously paging the UE on all cells at the start of the test and does not respond to RACH requests from the UE (which causes a cell reselection). Where a test specifies that the UE is not paged on a particular cell, only idle paging is transmitted. This method is similar to the one used in TS 51.010-1, clause 20.

Method B:

- the SS is continuously paging the UE on all cells at the start of the test and responds to RACH requests from the UE with an IMMEDIATE ASSIGNMENT REJECT (GERAN cell) or RRC CONNECTION REJECT (UTRAN cell) message which causes the UE to return to Idle mode. Where a test specifies that the UE is not paged in a particular cell, only idle paging is transmitted.

Method C:

- no continuously paging as in method A or B. Normal response to RACH requests so Location Updating and Calls can be done.

In case a test specifies that UE shall read System Information on BCCH while camped on a UTRAN cell, SS shall notify UE on the BCCH modification by sending a PAGING TYPE 1 message to UE. This message shall contain IE BCCH Modification Info with the following settings:

Information Element	Value/remark
BCCH modification info	
MIB Value Tag	Set to the same value as the value tag of the MIB after the BCCH modification
BCCH Modification time	Not present

**Table 6.1: Default values of the system information fields**

Parameter	Setting
IMSI attach/detach	Method A, B: Not allowed Method C: Allowed
Intra-frequency cell re-selection indicator	Set to allowed if IE Cell Barred is set to barred; otherwise this IE Not Present
Cell_selection_and_reselection_quality_measure	CPICH RSCP (FDD)
Qqualmin (FDD only)	-24 dB
Qrxlevmin (FDD)	-115 dBm
Qrxlevmin (TDD)	-103 dBm
DRX cycle length	1,28 s

For a UE camping in a FDD cell, CPICH\_Ec/Io and SCH\_Ec/Io shall fulfil requirements in TS 25.133, clause 8.1.2.2.1: The UE is able to identify a new detectable cell belonging to the monitored set within  $T_{\text{identify intra}}$  when CPICH Ec/Io  $\geq$  -20 dB and SCH\_Ec/Io  $\geq$  -20 dB.

For a UE camping in a TDD cell, the UE shall be able to identify a new detectable cell belonging to the monitored set within  $T_{\text{identify intra}}$  when fulfil requirements in TS 25.123, clause 8.1.2.2 for TDD 3.84 Mcps option and 8.1A.2.2 for TDD 1.28 Mcps option.

It is a UE option whether to indicate access technologies to the user (TS 23.122, clause 4.4.3.1.2). Therefore, for combined UTRAN/GSM tests, it is indicated in parentheses which access technology shall be indicated to the user if the UE has this capability.

If a parameter is indicated with a \*, it means that the parameter is calculated internally in the UE and is only shown for clarification of the test procedure.

The PLMN numbers indicated in table 6.2 are used in test cases to associate a cell with an MCC and MNC for that cell. If no PLMN is explicitly specified, the default value is PLMN 1.

**Table 6.2: Location Area Information (LAI) in System Information type 3 messages broadcast on the BCCH (GSM) or System Information Block Type 1 broadcast on the BCH (UMTS)**

PLMN	MCC1	MCC2	MCC3	MNC1	MNC2	MNC3	LAC
1	0	0	1	0	1	Not present	x
2	0	0	2	1	1	Not present	x
3	0	0	3	2	1	Not present	x
4	0	0	4	3	1	Not present	x
5	0	0	5	4	1	Not present	x
6	0	0	6	5	1	Not present	x
7	0	0	7	6	1	Not present	x
8	0	0	8	7	1	Not present	x
9	0	0	9	0	2	Not present	x
10	0	1	0	1	2	Not present	x
11	0	1	1	2	2	Not present	x
12	0	1	2	3	2	Not present	x

NOTE: 'x' denotes any value.

NOTE: 3rd digit of MNC value is equal to '1' for test case 6.2.1.2a.1 if PLMN's are used for ITU region 2.

References: TS 23.122, annex A and TS 23.003, clause 2.

The FDD frequency bands used in different ITU regions are indicated in table 6.2A. These frequency bands may be selected in dependency of the ITU regions in the initial conditions of each test case.

**Table 6.2A: FDD frequency bands used in different ITU regions**

Operating FDD Band	FDD Frequency used in ITU region (Note)
I	1/3
II	2
III	1
IV	2
V	2/3
VI	3
VII	1
VIII	1
IX	3
X	2
XI	3
XII	2
XIII	2
XIV	2
XIX	3
XX	1
XXI	3
XXII	1

NOTE: The FDD frequency bands used in ITU region 3 for the selection of RAT for PLMNs between frequency bands of different ITU regions are FFS.

The GSM frequency bands used in different ITU regions are indicated in table 6.2B. These frequency bands may be selected according to the requirement mentioned in the initial conditions of each test case.

**Table 6.2B: GSM frequency bands used in different ITU regions**

Operating GSM Band	GSM Frequency used in ITU region (Note)
GSM 850	2
GSM 900	1
DCS 1 800	1
PCS 1 900	2

NOTE: The GSM frequency bands used in ITU region 3 for the selection of RAT for PLMNs between frequency bands of different ITU regions are FFS.

The test channel numbers indicated in tables 6.3, 6.3B, 6.4, 6.4a, 6.5, 6.6 and 6.7 are used in test cases to associate a cell with a frequency for that cell. The frequencies for GSM and DCS cells in table 6.5, 6.6 and 6.7 are identical to those used in TS 51.010-1, clause 26.3.1. The RF signal levels are given in table 6.5, 6.6 and 6.7 for GSM cells, in table 6.3 and 6.3B for UTRAN FDD cells, in table 6.4 for UTRAN TDD cells 3.84 Mcps option and in table 6.4a for UTRAN TDD cells 1.28 Mcps option. If no channel is explicitly specified, the default value is Test Channel 1.

NOTE: The following list contains the test case(s) which simultaneously configure(s) 4 or more than 4 channels and make(s) use of these tables: test 9.4.5.4.1.

**Table 6.3: UTRA (FDD) test frequencies**

Test Channel:	1	2	3	4	Unit
RF signal level	-60	-65	-70	-75	CPICH_Ec dBm / 3.84 MHz
<b>Band I</b>	9613	9663	9713	9763	Uplink UARFCN
<b>Band II</b>	9263	9313	9363	9413	Uplink UARFCN
<b>Band III</b>	938	988	1038	1088	Uplink UARFCN
<b>Band IV</b>	1313	1363	1413	1463	Uplink UARFCN
<b>Band V (*)</b>	4133	4158	4183	4208	Uplink UARFCN
<b>Band VI (*)</b>	812	837	Void	Void	Uplink UARFCN
<b>Band VII</b>	2013	2063	2113	2163	Uplink UARFCN
<b>Band VIII (**)</b>	2713	2763	2813	2862	Uplink UARFCN
<b>Band IX</b>	8762	8812	8862	8912	Uplink UARFCN
<b>Band X</b>	2888	2938	2988	3038	Uplink UARFCN
<b>Band XI (*)</b>	3487	3512	3537	3562	Uplink UARFCN
<b>Band XII (*)</b>	3613	3638	3663	Void	Uplink UARFCN
<b>Band XIII (*)</b>	3842	3867	Void	Void	Uplink UARFCN
<b>Band XIV (*)</b>	3942	3967	Void	Void	Uplink UARFCN
<b>Band XIX (*)</b>	387	412	437	Void	Uplink UARFCN
<b>Band XX (*)</b>	4288	4338	4388	Void	Uplink UARFCN
<b>Band XXI (*)</b>	462	487	512	Void	Uplink UARFCN
<b>Band XXII</b>	4438	4488	4538	4588	Uplink UARFCN
<b>Band XXV</b>	4488	4538	4588	4638	Uplink UARFCN
<b>Band XXVI (*)</b>	4083	4108	4133	4158	Uplink UARFCN

NOTE: Bands marked with (\*) use a 5 MHz spacing between test channels because the total available bandwidth is limited. Other bands use a 10 MHz spacing between test channels. For Band VIII (\*\*) test channel 4 is only 9.8 MHz separated from test channel 3. Test cases which use more than the currently defined test channels in Table 6.3 can not be executed and are not applicable for Band VI, XII, XIII, XIV, XIX and XXI.

**Table 6.3A: Void**

NOTE: The following list in table 6.3B is used for test cases in section 6.2.1.8a which verify the selection of RAT for OPLMN between frequency bands of different ITU regions. Test Channel combinations defined for single FDD frequency band (e.g. Band I) are used if the UE supports only one FDD frequency band within one ITU region (e.g. UE supports only FDD I for ITU region 1 and FDD II for ITU region 2).

**Table 6.3B: UTRA (FDD) test frequencies and levels for test cases which verify the selection of RAT for PLMN between frequency bands of different ITU regions**

Test Channel:	1	2	3	4	Unit
RF signal level	-60	-65	-70	-75	CPICH_Ec dBm / 3.84 MHz
Band I	9613	9663	9613	9663	Uplink UARFCN
Band II	9263	9313	9263	9313	Uplink UARFCN
Band III	FFS	FFS	FFS	FFS	Uplink UARFCN
Band IV	1313	1363	1313	1363	Uplink UARFCN
Band V (*)	4133	4158	4133	4158	Uplink UARFCN
Band VI	FFS	FFS	FFS	FFS	Uplink UARFCN
Band VII	FFS	FFS	FFS	FFS	Uplink UARFCN
Band VIII (**)	2713	2763	2713	2763	Uplink UARFCN
Band IX	FFS	FFS	FFS	FFS	Uplink UARFCN
Band X	FFS	FFS	FFS	FFS	Uplink UARFCN
Band XI	FFS	FFS	FFS	FFS	Uplink UARFCN
Band XII	FFS	FFS	FFS	FFS	Uplink UARFCN
Band XIII	FFS	FFS	FFS	FFS	Uplink UARFCN
Band XIV	FFS	FFS	FFS	FFS	Uplink UARFCN
Band XIX	FFS	FFS	FFS	FFS	Uplink UARFCN
Band XX	FFS	FFS	FFS	FFS	Uplink UARFCN
Band XXI	FFS	FFS	FFS	FFS	Uplink UARFCN
Band XXII	FFS	FFS	FFS	FFS	Uplink UARFCN
Band I / VIII	9613	2713	2713	9613	Uplink UARFCN
Band II / IV	9263	1313	1313	9263	Uplink UARFCN
Band II / V	9263	4133	4133	9263	Uplink UARFCN
Band V / IV	4133	1313	1313	4133	Uplink UARFCN

NOTE: Bands marked with (\*) use a 5 MHz spacing between test channels because the total available bandwidth is limited. Other bands use a 10 MHz spacing between test channels. For Band VIII (\*\*) test channel 4 is only 9.8 MHz separated from test channel 3.

References: TS 34.108, clause 5.1.1 and TS 34.121, clause 4.

**Table 6.4: UTRA TDD test frequencies (3.84 Mcps option)**

Test Channel	Band a		Band b		Band c	
	P-CCPCH_RSCP [dBm]	UARFCN	P-CCPCH_RSCP [dBm]	UARFCN	P-CCPCH_RSCP [dBm]	UARFCN
1	-54	9 513	-54	9 263	-54	9563
2	-59	9 550	-59	9 400	-59	9577
3	-64	9 587	-64	9 537	-64	9591
4	-69	10 063	-69	9 663	-69	9605
5	-74	10 087	-74	9 800	-74	9619
6	-79	10 112	-79	9 937	-79	9637

**Table 6.4a: UTRA TDD test frequencies (1.28 Mcps option)**

Test Channel	Band a		Band b		Band c	
	P-CCPCH_RSCP [dBm]	UARFCN	P-CCPCH_RSCP [dBm]	UARFCN	P-CCPCH_RSCP [dBm]	UARFCN
1	-54	9 505	-54	9 255	-54	9555
2	-59	9 550	-59	9 400	-59	9573
3	-64	9 595	-64	9 545	-64	9591
4	-69	10 055	-69	9 655	-69	9608
5	-74	10 088	-74	9 800	-74	9626
6	-79	10 120	-79	9 945	-79	9645

References: TS 34.108, clause 5.1.2 and TS 34.122, clause 4.

**Table 6.5: GSM/DCS test frequencies and levels**

Test Channel:	1	2	3	Unit
RF signal level	+65 / -48	+63 / -50	+61 / -52	dB $\mu$ Vemf() / dBm
<b>GSM 450</b>	259	261	267	BCCH ARFCN
<b>DCS 480</b>	306	308	314	BCCH ARFCN
<b>GSM 710/ GSM 750/ T-GSM 810</b>	441	452	461	BCCH ARFCN
<b>GSM 850</b>	251	224	212	BCCH ARFCN
<b>GSM 900</b>	1	7	39	BCCH ARFCN
<b>DCS 1800</b>	885	830	703	BCCH ARFCN
<b>PCS 1900</b>	800	703	610	BCCH ARFCN
<b>Multiband 450/900</b>	1	261	267	BCCH ARFCN
<b>Multiband 480/900</b>	1	308	314	BCCH ARFCN
<b>Multiband 450/1800</b>	885	261	267	BCCH ARFCN
<b>Multiband 480/1800</b>	885	308	314	BCCH ARFCN
<b>Multiband 900/1800</b>	885	7	39	BCCH ARFCN

NOTE: The test channels using GSM/DCS test frequencies defined in Table 6.5 are also used in interRAT measurement test cases of section 8.4.

For GSM 710 and T-GSM 810 Bands, ARFCNs are defined using Dynamic Mapping. The information about dynamic mapping is provided by System Information type 15 and the required parameters are defined in 3GPP 51.010-1[13], Table 20.1d.

The following list in table 6.6 is used for test cases which verify the selection of RAT for PLMN between frequency bands of different ITU regions when FDD frequency band of ITU region 2 is configured. Test Channel combinations of one, two or three GSM frequency bands are used if the UE supports only one, two or three GSM frequency bands.

**Table 6.6: GSM/DCS test frequencies and levels for test cases which verify the selection of RAT for PLMN between frequency bands of different ITU regions when FDD frequency band of ITU region 2 is configured**

Test Channel:	1	2	3	Unit
RF signal level	+65 / -48	+63 / -50	+61 / -52	dB $\mu$ Vemf() / dBm
<b>GSM 900</b>	65	66	65	BCCH ARFCN
<b>GSM 1800</b>	520	522	520	BCCH ARFCN
<b>GSM 900 / 1800</b>	520	66	520	BCCH ARFCN
<b>GSM 900 / 850</b>	215	65	66	BCCH ARFCN
<b>GSM 900 / 1900</b>	702	65	66	BCCH ARFCN
<b>GSM 1800 / 850</b>	215	520	522	BCCH ARFCN
<b>GSM 1800 / 1900</b>	522 (GSM 1800)	520 (GSM 1800)	522 (GSM 1800)	BCCH ARFCN
<b>GSM 900 / 1800 / 850</b>	215	65	520	BCCH ARFCN
<b>GSM 900 / 850 / 1900</b>	702	65	66	BCCH ARFCN
<b>GSM 900 / 1800 / 1900</b>	702 (GSM 1900)	65	520 (GSM 1800)	BCCH ARFCN
<b>GSM 1800 / 850 / 1900</b>	215	520 (GSM 1800)	522 (GSM 1800)	BCCH ARFCN
<b>GSM 900 / 1800 / 850 / 1900</b>	702 (GSM 1900)	65	520 (GSM 1800)	BCCH ARFCN

The following list in table 6.7 is used for test cases which verify the selection of RAT for PLMN between frequency bands of different ITU regions when FDD frequency band of ITU region 1 is configured. Test Channel combinations of one, two or three GSM frequency bands are used if the UE supports only one, two or three GSM frequency bands.

**Table 6.7: GSM/DCS test frequencies and levels for test cases which verify the selection of RAT for PLMN between frequency bands of different ITU regions when FDD frequency band of ITU region 1 is configured**

Test Channel:	1	2	3	Unit
RF signal level	+65 / -48	+63 / -50	+61 / -52	dB $\mu$ Vemf() / dBm
<b>GSM 850</b>	215	217	215	BCCH ARFCN
<b>GSM 1900</b>	702	704	702	BCCH ARFCN
<b>GSM 850 / 1900</b>	215	704	215	BCCH ARFCN
<b>GSM 850 / 900</b>	65	215	217	BCCH ARFCN
<b>GSM 850 / 1800</b>	520	215	217	BCCH ARFCN
<b>GSM 1900 / 900</b>	65	702	704	BCCH ARFCN
<b>GSM 1900 / 1800</b>	704 (GSM 1900)	702 (GSM 1900)	704 (GSM 1900)	BCCH ARFCN
<b>GSM 850 / 1900 / 900</b>	65	702	215	BCCH ARFCN
<b>GSM 850 / 900 / 1800</b>	65	215	217	BCCH ARFCN
<b>GSM 850 / 1900 / 1800</b>	215	702 (GSM 1900)	215	BCCH ARFCN
<b>GSM 1900 / 900 / 1800</b>	65	702	704	BCCH ARFCN
<b>GSM 850 / 1900 / 900 / 1800</b>	65	702	215	BCCH ARFCN

## 6.1 In a pure 3G environment

### 6.1.1 PLMN selection

#### 6.1.1.1 PLMN selection of RPLMN, HPLMN, UPLMN and OPLMN; Manual mode

##### 6.1.1.1.1 Definition

Test to verify that the UE can present the available PLMNs in priority order to the user when asked to do so in manual mode and that the displayed PLMNs can be selected / reselected by the user. If available, the RPLMN shall be selected at switch-on, otherwise the displayed list shall include in priority order HPLMN, User-PLMN and Operator-PLMN. The last priority in the list is "Other PLMN/access technology combinations" which is not included in this test.

Only UTRAN cells and a UE equipped with a USIM with Radio Access Technology fields set to UTRAN are considered.

##### 6.1.1.1.2 Conformance requirement

- At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see TS 23.122, clause 4.5.2) attempts to perform a Location Registration.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows either Automatic or Manual Network Selection Mode Procedure depending on its operating mode.

- Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS.

If displayed, PLMNs meeting the criteria above are presented in the following order:

- HPLMN;
- PLMNs contained in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- PLMNs contained in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);

2.4 Other PLMN/access technology combinations with received high quality signal in random order;

2.5 Other PLMN/access technology combinations in order of decreasing signal quality.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

3. If a "PLMN not allowed" message is received by an MS in response to an LR request from a VPLMN, that VPLMN is added to a list of "forbidden PLMNs" in the SIM and thereafter that VPLMN will not be accessed by the MS when in automatic mode. A PLMN is removed from the "forbidden PLMNs" list if, after a subsequent manual selection of that PLMN, there is a successful LR. This list is retained when the MS is switched off or the SIM is removed. The HPLMN shall not be stored on the list of "forbidden PLMNs".

## References

1. TS 23.122, clause 4.4.3.1;
2. TS 23.122, clause 4.4.3.1.2;
3. TS 23.122, clause 3.1.

NOTE: TS 31.102 defines the USIM fields.

### 6.1.1.1.3 Test purpose

1. To verify that if available, the RPLMN is selected at switch-on.
2. To verify that in Manual Network Selection Mode Procedure, the UE presents the HPLMN, UPLMN and OPLMN in a prioritized order.

### 6.1.1.1.4 Method of test

#### Initial conditions

The UE is in manual PLMN selection mode.

Cell levels are from table 6.3. (FDD).

All Radio Access Technology USIM fields and cells are UTRAN.

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	-60	-54	1	PLMN 1
Cell 2	-65	-59	2	PLMN 2
Cell 4	-75	-69	3	PLMN 4
Cell 5	-80	-74	4	PLMN 5

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN
EF <sub>LOC1</sub>		PLMN 1
EF <sub>PLMNwAcT</sub>	1 <sup>st</sup>	PLMN 4
EF <sub>OPLMNwAcT</sub>	1 <sup>st</sup>	PLMN 5

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN2.

## Test procedure

Method C is applied.

- a) The SS activates 4 cells and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) Cell 1 is switched off.
- e) PLMN 4 shall be selected when the PLMN list is presented.
- f) The SS waits for random access requests from the UE.
- g) Cell 4 is switched off.
- h) Void
- i) PLMN 5 shall be selected (the list is already available).
- j) The SS waits for random access requests from the UE.
- k) Cell 5 is switched off.
- l) PLMN 2 shall be selected when the PLMN list is presented.
- m) The SS waits for random access requests from the UE.
- n) Cell 2 is switched off.

### 6.1.1.1.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 1.
- 2) In step e), the list shall be presented. The priority shall be as follows: PLMN 2, PLMN 4 and PLMN 5.
- 3) In step f), the response from the UE shall be on Cell 4. The displayed PLMN shall be PLMN 4.
- 4) In step j), the response from the UE shall be on Cell 5. The displayed PLMN shall be PLMN 5.
- 5) In step l), the list shall be presented. The priority shall be as follows: PLMN 2.
- 6) In step m), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN 2.

### 6.1.1.2 PLMN selection of "Other PLMN / access technology combinations"; Manual mode

#### 6.1.1.2.1 Definition

Test to verify that the UE can present the available high quality signal PLMNs in random order to the user when asked to do so in manual mode and that the displayed PLMNs can be selected / reselected by the user. Forbidden PLMNs shall also be displayed in the list.

Only UTRAN cells and a UE equipped with a USIM with Radio Access Technology fields set to UTRAN are considered.

#### 6.1.1.2.2 Conformance requirement

1. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see TS 23.122, clause 4.5.2) attempts to perform a Location Registration.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows either Automatic or Manual Network Selection Mode Procedure depending on its operating mode.

## 2. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS.

If displayed, PLMNs meeting the criteria above are presented in the following order:

- 2.1 HPLMN;
- 2.2 PLMNs contained in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.3 PLMNs contained in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.4 Other PLMN/access technology combinations with received high quality signal in random order;
- 2.5 Other PLMN/access technology combinations in order of decreasing signal quality.

In 2.5, the MS shall order the PLMN/access technology combinations in order of decreasing signal quality within each access technology. The order between PLMN/access technology combinations with different access technologies is an MS implementation issue.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

3. If a "PLMN not allowed" message is received by an MS in response to an LR request from a VPLMN, that VPLMN is added to a list of "forbidden PLMNs" in the SIM and thereafter that VPLMN will not be accessed by the MS when in automatic mode. A PLMN is removed from the "forbidden PLMNs" list if, after a subsequent manual selection of that PLMN, there is a successful LR. This list is retained when the MS is switched off or the SIM is removed. The HPLMN shall not be stored on the list of "forbidden PLMNs".
4. The UE shall scan all RF channels in the UTRA band according to its capabilities to find available PLMNs. On each carrier, the UE shall search for the strongest cell according to the cell search procedures (for FDD, see TS 25.214, and TDD, see TS 25.224) and read its system information, in order to find out which PLMN the cell belongs to. If the UE can read the PLMN identity, the found PLMN shall be reported to the NAS as a high quality PLMN (but without the RSCP value), provided that the following high quality criterion is fulfilled:
  - For an FDD cell, the measured primary CPICH RSCP value shall be greater than or equal to -95 dBm.
  - For a TDD cell, the measured P-CCPCH RSCP shall be greater than or equal to -84 dBm.

Found PLMNs that do not satisfy the high quality criterion, but for which the UE has been able to read the PLMN identities are reported to the NAS together with the CPICH RSCP value for UTRA FDD cells and P-CCPCH RSCP for UTRA TDD cells.

## References

1. TS 23.122, clause 4.4.3.1.
2. TS 23.122, clause 4.4.3.1.2.
3. TS 23.122, clause 3.1.

4. TS 25.304, clause 5.1.2.2.

NOTE: TS 31.102 defines the USIM fields.

#### 6.1.1.2.3 Test purpose

1. To verify that in Manual Network Selection Mode Procedure, the UE presents "Other PLMN/access technology combinations" in a random order according to conformance requirement 2.4. UE requirement on measurement accuracy for PLMN selection is not specified in core specifications. Therefore, the ordering of PLMNs according to conformance requirement 2.5 is not tested.
2. To verify that forbidden PLMNs are also displayed in the list.

#### 6.1.1.2.4 Method of test

Initial conditions

The UE is in manual PLMN selection mode.

All Radio Access Technology USIM fields and cells are UTRAN.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	High Quality signal	Test Channel	PLMN
Cell 1	-85	-74	Yes	1	PLMN 6
Cell 2	-80	-69	Yes	2	PLMN 7
Cell 3	-80	-69	Yes	3	PLMN 8
Cell 4	-80	-69	Yes	4	PLMN 10

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN
EF <sub>LOC1</sub>		PLMN 6
EF <sub>FPLMN</sub>		PLMN 10

#### Test procedure

Method C is applied.

- a) The SS activates cells 1-4 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) PLMN 6 shall be selected when the PLMN list is presented.
- d) The SS waits for random access requests from the UE.
- e) Cell 1 is switched off.
- f) PLMN 7 shall be selected when the PLMN list is presented.
- g) The SS waits for random access requests from the UE.
- h) Cell 2 is switched off.
- i) PLMN 8 shall be selected when the PLMN list is presented.
- j) The SS waits for random access requests from the UE.
- k) Cell 3 is switched off.
- l) PLMN 10 shall be selected when the PLMN list is presented. The SS shall accept the Registration Request from the UE.
- m) Cell 4 is switched off.

#### 6.1.1.2.5 Test Requirements

- 1) In step c), the list shall be presented. The priority shall be as follows: PLMN 6 followed by PLMN 7, PLMN 8 and PLMN 10 in random order.
- 2) In step d), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 6.
- 3) In step f), the list shall be presented. The priority shall be as follows: PLMN 7, PLMN 8 and PLMN 10 in random order.
- 4) In step g), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN 7.
- 5) In step i), the list shall be presented. The priority shall be as follows: PLMN 8 and PLMN 10 in random order.
- 6) In step j), the response from the UE shall be on Cell 3. The displayed PLMN shall be PLMN 8.
- 7) In step l), the list shall be presented containing only PLMN 10. The UE shall perform successful registration on Cell 4.
- 8) After step m), the UE shall inform that no network is available.

#### 6.1.1.3 PLMN selection; independence of RF level and preferred PLMN; Manual mode

##### 6.1.1.3.1 Definition

Test to verify that in Manual Network Selection Mode, the UE is able to obtain normal service on a PLMN which is neither the better nor a preferred PLMN and that it tries to obtain service on a VPLMN if and only if the user selects it manually.

##### 6.1.1.3.2 Conformance requirement

1. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see TS 23.122, clause 4.5.2) attempts to perform a Location Registration.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows either Automatic or Manual Network Selection Mode Procedure depending on its operating mode.

2. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS.

If displayed, PLMNs meeting the criteria above are presented in the following order:

- 2.1 HPLMN;
- 2.2 PLMNs contained in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.3 PLMNs contained in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.4 Other PLMN/access technology combinations with received high quality signal in random order;
- 2.5 Other PLMN/access technology combinations in order of decreasing signal quality.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for

roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

References

1. TS 23.122, clause 4.4.3.1.
2. TS 23.122, clause 4.4.3.1.2

NOTE: TS 31.102 defines the USIM fields.

6.1.1.3.3 Test purpose

1. To verify that the selected PLMN at switch-on is the HPLMN.
2. To verify that in Manual Network Selection Mode Procedure the UE tries to obtain service on a VPLMN if and only if the user selects it manually.
3. To verify that the UE is able to obtain normal service on a PLMN which is neither the better nor a preferred PLMN.

6.1.1.3.4 Method of test

Initial conditions

The UE is in manual PLMN selection mode.

"IMSI attach" flag in the BCCH is set to allowed.

For FDD only:

Step a-d:

Parameter	Unit	Cell 1	Cell 2	Cell 3
Test Channel		1	2	3
CPICH_Ec	dBm/3.84 MHz	-60	-70	OFF
PLMN		1	2	3

Step e-f:

CPICH_Ec	dBm/3.84 MHz	-60 -> OFF	-70	OFF
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Step g-h:

CPICH_Ec	dBm/3.84 MHz	OFF	-70	OFF -> -60
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Step i-l:

CPICH_Ec	dBm/3.84 MHz	OFF	-70 -> OFF	-60
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For TDD only:

Step a-d:

Parameter	Unit	Cell 1	Cell 2	Cell 3
Test Channel		1	2	3
P-CCPCH RSCP	dBm	-69	-74	OFF
PLMN		1	2	3

Step e-f:

P-CCPCH RSCP		-69 -> OFF	-74	OFF
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Step g-h:

P-CCPCH RSCP		OFF	-74	OFF -> -69
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Step k-l:

P-CCPCH RSCP		OFF	-74 -> OFF	-69
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The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN
EF <sub>LOCI</sub>		
EF <sub>PLMNwACT</sub>	1 <sup>st</sup>	PLMN 3

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

#### Test procedure

Method C is applied.

- a) The SS activates cells 1 and 2.
- b) The UE is switched on.
- c) PLMN 1 is selected manually.
- d) The SS waits for random access requests from the UE. A complete Location Update is done.
- e) Cell 1 is switched off.
- f) The SS waits to see if there is any random access request from the UE.
- g) Cell 3 is switched on.
- h) The SS waits to see if there is any random access request from the UE.
- i) PLMN 2 is selected manually.
- j) The SS waits for random access requests from the UE. A complete Location Update is done.
- k) Cell 2 is switched off.
- l) The SS waits to see if there is any random access request from the UE.

#### 6.1.1.3.5 Test Requirements

- 1) In step d), there shall be a response on Cell 1. The selected PLMN shall be PLMN 1.
- 2) In step f), there shall be no response from the UE within 2 min.

- 3) In step h), there shall be no response from the UE within 2 min.
- 4) In step j), there shall be a response on Cell 2. The selected PLMN shall be PLMN 2.
- 5) In step l), there shall be no response from the UE within 2 min.

#### 6.1.1.4 PLMN selection of RPLMN, HPLMN, UPLMN and OPLMN; Automatic mode

##### 6.1.1.4.1 Definition

Test to verify that in Automatic Network Selection Mode, the UE selects PLMNs in a prioritized order. If available, the RPLMN shall be selected at switch-on, otherwise the list shall include in priority order HPLMN, User-PLMN and Operator-PLMN. The last priority in the list is "Other PLMN/access technology combinations" which is not included in this test.

Only UTRAN cells and a UE equipped with a USIM with Radio Access Technology fields set to UTRAN are considered.

##### 6.1.1.4.2 Conformance requirement

1. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see TS 23.122, clause 4.5.2) attempts to perform a Location Registration.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows either Automatic or Manual Network Selection Mode Procedure depending on its operating mode.

2. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMNs, if available and allowable in the following order:

- 2.1 HPLMN (if not previously selected);
- 2.2 Each PLMN in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.3 Each PLMN in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.4 Other PLMN/access technology combinations with received high quality signal in random order;
- 2.5 Other PLMN/access technology combinations in order of decreasing signal quality.

If successful registration is achieved, the MS indicates the selected PLMN.

If registration cannot be achieved because no PLMNs are available and allowable, the MS indicates "no service" to the user, waits until a new PLMN is available and allowable and then repeats the procedure.

If there were one or more PLMNs which were available and allowable, but an LR failure made registration on those PLMNs unsuccessful or an entry in the "forbidden LAs for regional provision of service" list prevented a registration attempt, the MS selects the first such PLMN again and enters a limited service state.

3. If a "PLMN not allowed" message is received by an MS in response to an LR request from a VPLMN, that VPLMN is added to a list of "forbidden PLMNs" in the SIM and thereafter that VPLMN will not be accessed by the MS when in automatic mode. A PLMN is removed from the "forbidden PLMNs" list if, after a subsequent manual selection of that PLMN, there is a successful LR. This list is retained when the MS is switched off or the SIM is removed. The HPLMN shall not be stored on the list of "forbidden PLMNs".

#### References

1. TS 23.122, clause 4.4.3.1.
2. TS 23.122, clause 4.4.3.1.1.

3. TS 23.122, clause 3.1.

NOTE: TS 31.102 defines the USIM fields.

#### 6.1.1.4.3 Test purpose

1. To verify that if available, the RPLMN is selected at switch-on.
2. To verify that in Automatic Network Selection Mode Procedure, the UE selects the RPLMN, HPLMN, UPLMN and OPLMN in a prioritized order.

#### 6.1.1.4.4 Method of test

##### Initial conditions

The UE is in automatic PLMN selection mode.

"IMSI attach" flag in the BCCH is set to allowed.

Cell levels are from table 6.3 (FDD).

All Radio Access Technology USIM fields and cells are UTRAN.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	-60	-54	1	PLMN 2
Cell 2	-65	-59	2	PLMN 1
Cell 4	-75	-69	3	PLMN 4
Cell 5	-80	-74	4	PLMN 5

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN
EF <sub>PLMNwAct</sub>	1 <sup>st</sup>	PLMN 4
EF <sub>OPLMNwAct</sub>	1 <sup>st</sup>	PLMN 5

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

UE is previously registered on PLMN2, before switched off.

##### Test procedure

Method C is applied.

- a) The SS activates 4 cells and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) Cell 1 is switched off.
- e) The SS waits for random access requests from the UE.
- f) Cell 2 is switched off.
- g) The SS waits for random access requests from the UE.
- i) Cell 4 is switched off.
- j) The SS waits for random access requests from the UE.

k) Cell 5 is switched off.

#### 6.1.1.4.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 2.
- 2) In step e), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN 1.
- 3) In step g), the response from the UE shall be on Cell 4. The displayed PLMN shall be PLMN 4.
- 4) In step j), the response from the UE shall be on Cell 5. The displayed PLMN shall be PLMN 5.

#### 6.1.1.5 PLMN selection of "Other PLMN / access technology combinations"; Automatic mode

##### 6.1.1.5.1 Definition

Test to verify that in Automatic Network Selection Mode, the UE selects high quality signal PLMNs in a random order.

Only UTRAN cells and a UE equipped with a USIM with Radio Access Technology fields set to UTRAN are considered.

##### 6.1.1.5.2 Conformance requirement

1. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see TS 23.122, clause 4.5.2) attempts to perform a Location Registration.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows either Automatic or Manual Network Selection Mode Procedure depending on its operating mode.

2. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMNs, if available and allowable in the following order:

- 2.1 HPLMN (if not previously selected);
- 2.2 Each PLMN in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.3 Each PLMN in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.4 Other PLMN/access technology combinations with received high quality signal in random order;
- 2.5 Other PLMN/access technology combinations in order of decreasing signal quality.

In 2.5, the MS shall order the PLMN/access technology combinations in order of decreasing signal quality within each access technology. The order between PLMN/access technology combinations with different access technologies is an MS implementation issue.

If successful registration is achieved, the MS indicates the selected PLMN.

If registration cannot be achieved because no PLMNs are available and allowable, the MS indicates "no service" to the user, waits until a new PLMN is available and allowable and then repeats the procedure.

If there were one or more PLMNs which were available and allowable, but an LR failure made registration on those PLMNs unsuccessful or an entry in the "forbidden LAs for regional provision of service" list prevented a registration attempt, the MS selects the first such PLMN again and enters a limited service state.

3. If a "PLMN not allowed" message is received by an MS in response to an LR request from a VPLMN, that VPLMN is added to a list of "forbidden PLMNs" in the SIM and thereafter that VPLMN will not be accessed by the MS when in automatic mode. A PLMN is removed from the "forbidden PLMNs" list if, after a subsequent

manual selection of that PLMN, there is a successful LR. This list is retained when the MS is switched off or the SIM is removed. The HPLMN shall not be stored on the list of "forbidden PLMNs".

4. The UE shall scan all RF channels in the UTRA band according to its capabilities to find available PLMNs. On each carrier, the UE shall search for the strongest cell according to the cell search procedures (for FDD, see TS 25.214, and TDD, see TS 25.224) and read its system information, in order to find out which PLMN the cell belongs to. If the UE can read the PLMN identity, the found PLMN shall be reported to the NAS as a high quality PLMN (but without the RSCP value), provided that the following high quality criterion is fulfilled:
  - For an FDD cell, the measured primary CPICH RSCP value shall be greater than or equal to -95 dBm.
  - For a TDD cell, the measured P-CCPCH RSCP shall be greater than or equal to -84 dBm.

Found PLMNs that do not satisfy the high quality criterion, but for which the UE has been able to read the PLMN identities are reported to the NAS together with the CPICH RSCP value for UTRA FDD cells and P-CCPCH RSCP for UTRA TDD cells.

#### References

1. TS 23.122, clause 4.4.3.1.
2. TS 23.122, clause 4.4.3.1.1.
3. TS 23.122, clause 3.1.
4. TS 25.304, clause 5.1.2.2.

NOTE: TS 31.102 defines the USIM fields.

#### 6.1.1.5.3 Test purpose

1. To verify that in Automatic Network Selection Mode Procedure, the UE selects "Other PLMN/access technology combinations" in a random order according to conformance requirement 2.4. UE requirement on measurement accuracy for PLMN selection is not specified in core specifications. Therefore, the ordering of PLMNs according to conformance requirement 2.5 is not tested.

#### 6.1.1.5.4 Method of test

##### Initial conditions

The UE is in automatic PLMN selection mode.

All Radio Access Technology USIM fields and cells are UTRAN.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	High Quality signal	Test Channel	PLMN
Cell 1	-85	-74	Yes	1	PLMN 6
Cell 2	-80	-69	Yes	2	PLMN 7
Cell 3	-80	-69	Yes	3	PLMN 8

UE is previously registered on PLMN6, before switched off.

##### Test procedure

Method C is applied.

- a) The SS activates cells 1-3 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) Cell 1 is switched off.
- e) The SS waits for random access requests from the UE.

- f) The cell associated to the currently shown PLMN shall be switched off.
- g) The SS waits for random access requests from the UE.

#### 6.1.1.5.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 6.
- 2) In step e), the response from the UE shall be on either Cell 2 or 3. The displayed PLMN shall be the one associated with the cell on which the response was received.
- 3) In step g), the response from the UE shall be on either Cell 2 or 3 (excluding the cell in step 2). The displayed PLMN shall be the one associated with the cell on which the response was received.

#### 6.1.1.6 Void

#### 6.1.1.7 Cell reselection of ePLMN in manual mode

##### 6.1.1.7.1 Definition

Test to verify that the UE shall be able to reselect to a cell of another PLMN declared as equivalent PLMN to the registered PLMN in the manual mode.

##### 6.1.1.7.2 Conformance requirement

###### B) Manual network selection mode

Once the UE has registered on a PLMN selected by the user, the UE shall not automatically register on a different PLMN unless:

- i) The new PLMN is declared as an equivalent PLMN by the registered PLMN;

or,

- ii) The user selects automatic mode.

##### References:

TS 22.011 clause 3.2.2.2B

##### 6.1.1.7.3 Test purpose

To verify that in Manual Network Selection Mode Procedure, the UE can perform cell reselection to an equivalent PLMN.

##### 6.1.1.7.4 Method of test

###### Initial conditions

The UE is in manual PLMN selection mode and has successfully selected a PLMN in manual PLMN selection mode.

Cell\_selection\_and\_reselection\_quality\_measure is CPICH\_RSCP (FDD).

All Radio Access Technology USIM fields and cells are UTRAN.

Each cell shall include the other cells as neighbouring cells in System Information Block Type 11.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	-78	-69	1	PLMN 1
Cell 4	-62	-54	2	PLMN 2
Cell7	-68	-64	3	PLMN 3

Values of the system information fields applicable for this test case to fulfil the criteria of Cell Reselection

Parameter	Setting
IMSI attach/detach	Method A, B: Not allowed Method C: Allowed
Cell_selection_and_reselection_quality_measure	CPICH RSCP (FDD)
Qqualmin (FDD only)	-16 dB
Qrxlevmin (FDD)	-115 dBm
Qrxlevmin (TDD)	-103 dBm
DRX cycle length	1,28 s

PLMN1 is the HPLMN.

UE is previously registered on PLMN1, before switched off.

#### Test procedure

- a) The SS activates cells 1.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) A Location Update Accept message shall be sent on reception of a Location Update message from the UE. The Location Update Accept message shall include PLMN3 in the equivalent PLMN list. For a UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure. In these cases, the GMM Attach Accept message shall include PLMN3 in the equivalent PLMN list.
- e) Cell 4 and 7 are activated.

#### 6.1.1.7.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 1.
- 2) In step e), the UE shall perform a cell reselection and Location Update or Routing Area Update to PLMN 3, which is equivalent to PLMN1.

### 6.1.1.8 PLMN selection in shared network environment, Automatic mode

#### 6.1.1.8.1 Definition

Test to verify that when operating in automatic PLMN selection mode in shared network environment, the UE selects PLMNs in a prioritized order according to TS 23.122. Forbidden PLMNs shall not be selected. RPLMN shall be selected at switch-on, otherwise the list shall include in priority order HPLMN, User-PLMN and Operator-PLMN. The last priority in the list is "Other PLMN/access technology combinations" which is not included in this test.

Only UTRAN cells and a UE equipped with a USIM with Radio Access Technology fields set to UTRAN are considered.

#### 6.1.1.8.2 Conformance requirement

1. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see TS 23.122, clause 4.5.2) attempts to perform a Location Registration.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows either Automatic or Manual Network Selection Mode Procedure depending on its operating mode.

2. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMNs, if available and allowable in the following order:

- 2.1 HPLMN (if not previously selected);
- 2.2 Each PLMN in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.3 Each PLMN in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 2.4 Other PLMN/access technology combinations with received high quality signal in random order;
- 2.5 Other PLMN/access technology combinations in order of decreasing signal quality.

If successful registration is achieved, the MS indicates the selected PLMN.

If registration cannot be achieved because no PLMNs are available and allowable, the MS indicates "no service" to the user, waits until a new PLMN is available and allowable and then repeats the procedure.

If there were one or more PLMNs which were available and allowable, but an LR failure made registration on those PLMNs unsuccessful or an entry in the "forbidden LAs for regional provision of service" list prevented a registration attempt, the MS selects the first such PLMN again and enters a limited service state.

3. If a "PLMN not allowed" message is received by an MS in response to an LR request from a VPLMN, that VPLMN is added to a list of "forbidden PLMNs" in the SIM and thereafter that VPLMN will not be accessed by the MS when in automatic mode. A PLMN is removed from the "forbidden PLMNs" list if, after a subsequent manual selection of that PLMN, there is a successful LR. This list is retained when the MS is switched off or the SIM is removed. The HPLMN shall not be stored on the list of "forbidden PLMNs".

## References

1. TS 23.122, clause 4.4.3.1.
2. TS 23.122, clause 4.4.3.1.1.
3. TS 23.122, clause 3.1.

NOTE: TS 31.102 defines the USIM fields.

### 6.1.1.8.3 Test purpose

1. To verify that if available, the RPLMN is selected at switch-on.
2. To verify that in Automatic Network Selection Mode, the UE selects the RPLMN, HPLMN, UPLMN and OPLMN in a prioritized order.
3. To verify that forbidden PLMNs are not selected.

For all paragraphs above, it is verified that the UE behaves in accordance with the core specification TS 23.122 when operating in shared network environment. Independence of RF level is also implicitly tested.

### 6.1.1.8.4 Method of test

Initial conditions

System Simulator:

Cell levels are from table 6.3 (Band I).

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	Test Channel
Cell 1	-65	1
Cell 3	-70	2
Cell 5	-80	3
Cell 6	-85	4

The reference system configuration from TS 34.108 clause 6.1 is used in all cells, with modifications in the Master Information Block according to the table below.

- MIB value tag	Set to (Current MIB value tag + 1)
- Supported PLMN types	
- PLMN type	GSM-MAP
- PLMN identity	
- MCC digit	See table below
- MNC digit	See table below
- Multiple PLMN List	
- MIB PLMN Identity	See table below
- Multiple PLMNs (1)	
- MCC	See table below
- MNC	See table below
- Multiple PLMNs (2)	
- MCC	See table below
- MNC	See table below

The MIB PLMN Identity, PLMN codes and LAC broadcasted on the BCCH in each cell shall be configured as defined in the table below.

Cell	MIB PLMN Identity	PLMN Identity		Multiple PLMNs (1)		Multiple PLMNs (2)		LAC
		MCC digits	MNC digits	MCC digits	MNC digits	MCC digits	MNC digits	
1	FALSE	PLMN 5	PLMN 5	PLMN 10	PLMN 10	PLMN 6	PLMN 6	X
3	TRUE	PLMN 5	PLMN 5	-	PLMN 9	-	PLMN 7	X
5	FALSE	PLMN 5	PLMN 5	-	PLMN 1	-	PLMN 7	X
6	FALSE	PLMN 5	PLMN 5	-	PLMN 1	-	PLMN 2	X

NOTE: the “-“ (dash) denotes “not present”, and “X” denotes “any value”

The definition of each PLMN code is found in table below.

PLMN	MCC digit			MNC digit		
	1	2	3	1	2	3
1	0	0	1	0	1	-
2	0	0	1	0	2	-
3	0	0	1	0	3	-
4	0	0	1	0	4	-
5	0	0	1	0	5	-
6	0	0	1	0	6	-
7	0	0	1	0	7	-
8	0	0	1	0	8	-
9	0	0	1	0	9	-
10	0	0	2	1	0	-

NOTE: “-“ (dash) denotes “not present”

#### UE:

The UE is in automatic PLMN selection mode, and equipped with a USIM containing default values except for those listed below. All Radio Access Technology USIM fields are UTRAN.

USIM field	Priority	PLMN
EF <sub>PLMNwAcT</sub>	1 <sup>st</sup>	PLMN 7
EF <sub>OPLMNwAcT</sub>	1 <sup>st</sup>	PLMN 5
	2 <sup>nd</sup>	PLMN 6
EF <sub>FPLMN</sub>	PLMN 7	

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

UE is previously registered on PLMN2, before switched off.

Test procedure:

Method C is applied.

- a) The SS activates all cells and monitors the cells for random access requests from the UE
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) Cell 6 is switched off.
- e) The SS waits for random access requests from the UE.
- f) Cell 5 is switched off.
- g) The SS waits for random access requests from the UE.
- h) Cell 3 is switched off.
- i) The SS waits for random access requests from the UE.
- j) Cell 1 is switched off.

#### 6.1.1.8.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 6. The displayed PLMN shall be PLMN 2.
- 2) In step e), the response from the UE shall be on Cell 5. The displayed PLMN shall be PLMN 1.
- 3) In step g), the response from the UE shall be on Cell 3. The displayed PLMN shall be PLMN 5.
- 4) In step i), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 6.
- 5) After step j), the UE shall inform that no service or no network is available.

### 6.1.1.9 PLMN selection in shared network environment, Manual Mode

#### 6.1.1.9.1 Definition

Test to verify that the UE can present the available PLMNs in priority order to the user when asked to do so in manual mode and that the displayed PLMNs can be selected / reselected by the user. The test is performed in shared network environment. All PLMNs shall be displayed in the list, including forbidden PLMNs and PLMNs in the "Multiple PLMN list". If available, the RPLMN shall be selected at switch-on, otherwise the displayed list shall include in priority order HPLMN, User-PLMN, Operator-PLMN and "Other PLMN/access technology combinations. Only UTRAN cells and a UE equipped with a USIM with Radio Access Technology fields set to UTRAN are considered.

#### 6.1.1.9.2 Conformance requirement

1. At switch on or recovery from lack of coverage

At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see clause 4.5.2) attempts to perform a Location Registration.

EXCEPTION: In A/Gb mode an MS with voice capability, shall not search for CPBCCCH carriers. In A/Gb mode an MS not supporting packet services shall not search for CPBCCCH carriers.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its operating mode.

EXCEPTION: If registration is not possible on recovery from lack of coverage due to the registered PLMN being unavailable, a MS attached to GPRS services may, optionally, continue looking for the registered PLMN for an implementation dependent time.

NOTE: A MS attached to GPRS services should use the above exception only if one or more PDP contexts are currently active.

## 2. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS. An MS which supports GSM COMPACT shall also indicate GSM COMPACT PLMNs (which use PBCCH).

If displayed, PLMNs meeting the criteria above are presented in the following order:

- i)- HPLMN;
- ii)- PLMN/access technology combinations contained in the " User Controlled PLMN Selector with Access Technology " data file in the SIM (in priority order);
- iii)- PLMN/access technology combinations contained in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
- iv)- other PLMN/access technology combinations with received high quality signal in random order;
- v)- other PLMN/access technology combinations in order of decreasing signal quality.

In ii and iii, an MS using a SIM without access technology information storage (i.e. the "User Controlled PLMN Selector with Access Technology" and the "Operator Controlled PLMN Selector with Access Technology" data files are not present) shall instead present the PLMNs contained in the "PLMN Selector" data file in the SIM (in priority order).

In v, requirement h) in clause 4.4.3.1.1 applies.

In GSM COMPACT, the non support of voice services shall be indicated to the user.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

Once the UE has registered on a PLMN selected by the user, the UE shall not automatically register on a different PLMN unless:

- i) the new PLMN is declared as an equivalent PLMN by the registered PLMN; or
- ii) the user selects automatic mode.

NOTE 1: It is an MS implementation option whether to indicate access technologies to the user. If the MS does display access technologies, then the access technology used should be the access technology chosen by the user for that PLMN. If the MS does not display access technologies, then the access technology chosen for a particular PLMN should be the highest priority available access technology for that PLMN, if the associated access technologies have a priority order.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

NOTE 2: High quality signal is defined in the appropriate AS specification.

3. If a "PLMN not allowed" message is received by an MS in response to an LR request from a VPLMN, that VPLMN is added to a list of "forbidden PLMNs" in the SIM and thereafter that VPLMN will not be accessed by the MS when in automatic mode. A PLMN is removed from the "forbidden PLMNs" list if, after a subsequent manual selection of that PLMN, there is a successful LR. This list is retained when the MS is switched off or the SIM is removed. The HPLMN shall not be stored on the list of "forbidden PLMNs".

## References

1. TS 23.122, clause 4.4.3.1
2. TS 23.122, clause 4.4.3.1.2
3. TS 23.122, clause 3.1.

NOTE: TS 31.102 defines the USIM fields.

## 6.1.1.9.3 Test purpose

1. To verify that all PLMNs broadcasted in the IEs “Multiple PLMN list” are displayed to the user in Manual Selection Mode, even if present in the “forbidden PLMNs” list on the USIM.
2. To verify that the PLMN in the IE “PLMN Identity” is displayed/not displayed according to the value of the IE “MIB PLMN Identity”.
3. To verify that it is possible to select any PLMN on the displayed list, and that the UE subsequently attempts to register on the selected PLMN.
4. To verify that the UE in general behaves according to TS 23.122 in Shared Network environment (Manual Mode).

## 6.1.1.9.4 Method of test

## Initial conditions

Cell levels are from table 6.3. (FDD).

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	Test Channel
Cell 1	-85	1
Cell 2	-80	2
Cell 3	-75	3
Cell 4	-70	4

The reference system configuration from TS 34.108 clause 6.1 is used in all cells, with the following modifications:

## Master Information Block

- MIB value tag	Set to (Current MIB value tag + 1)
- Supported PLMN types	
- PLMN type	GSM-MAP
- PLMN identity	
- MCC digit	See table below
- MNC digit	See table below
- Multiple PLMN List	
- MIB PLMN Identity	See table below
- Multiple PLMNs (1)	
- MCC	See table below
- MNC	See table below
- Multiple PLMNs (2)	
- MCC	See table below
- MNC	See table below

The MIB PLMN Identity and PLMN codes broadcasted on the BCCH in each cell shall be configured as defined in the table below.

Cell	MIB PLMN Identity	PLMN Identity		Multiple PLMNs (1)		Multiple PLMNs (2)	
		MCC digits	MNC digits	MCC digits	MNC digits	MCC digits	MNC digits
1	FALSE	PLMN 3	PLMN 3	-	PLMN 2	-	PLMN 4
2	FALSE	PLMN 4	PLMN 4	-	PLMN 3	-	PLMN 1
3	FALSE	PLMN 5	PLMN 5	-	PLMN 3	-	PLMN 4
4	TRUE	PLMN 4	PLMN 4	PLMN 5	PLMN 5	PLMN 6	PLMN 6

The definition of each PLMN code is found in table below.

PLMN	MCC digit			MNC digit		
	1	2	3	1	2	3
1	0	0	1	0	1	-
2	0	0	1	0	2	-
3	0	0	1	0	3	-
4	0	0	1	0	4	-
5	0	0	1	0	5	-
6	0	0	2	0	6	-

NOTE: “-“ (dash) denotes “not present”

The UE is in manual PLMN selection mode and equipped with a USIM containing default values except for those listed below. The UE has successfully selected a PLMN in manual PLMN selection mode. All Radio Access Technology USIM fields are set to UTRAN. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

USIM field	Priority	PLMN
EF <sub>PLMNwACT</sub>	1 <sup>st</sup>	PLMN 3
EF <sub>OPLMNwACT</sub>	1 <sup>st</sup>	PLMN 4
	2 <sup>nd</sup>	PLMN 5
EF <sub>FPLMN</sub>	PLMN 5	

UE is previously registered on PLMN2, before switched off.

#### Test procedure

Method C is applied.

- a) The SS activates cells 1-4 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) Cell 1 is switched off.
- e) PLMN 1 (HPLMN) shall be selected when the PLMN list is presented.
- f) The SS waits for random access requests from the UE.
- g) Cell 2 is switched off.
- h) PLMN 3 shall be selected when the PLMN list is presented.
- i) The SS waits for random access requests from the UE.
- j) Cell 3 is switched off.
- k) PLMN 5 shall be selected when the PLMN list is presented.
- l) The SS waits for random access requests from the UE.
- m) Cell 4 is switched off.

#### 6.1.1.9.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 2.
- 2) In step e), the list shall be presented. The priority shall be as follows: PLMN 1, PLMN 3, PLMN 4, PLMN 5, PLMN 6.
- 3) In step f), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN 1.
- 4) In step h), the list shall be presented. The priority shall be as follows: PLMN 3, PLMN 4, PLMN 5, PLMN 6.
- 6) In step i), the response from the UE shall be on Cell 3. The displayed PLMN shall be PLMN 3.
- 7) In step k), the list shall be presented. The priority shall be as follows: PLMN 4, PLMN 5, PLMN 6.
- 8) In step l), the response from the UE shall be on Cell 4. The displayed PLMN shall be PLMN 5.
- 9) After step m), the UE shall inform that no network belonging to PLMN 1 to 6 is available.

#### 6.1.1.10 Presentation of additional information during PLMN selection; Manual mode

##### 6.1.1.10.1 Definition

Test to verify that in Manual Network Selection Mode, the UE displays additional information about the available PLMNs.

##### 6.1.1.10.2 Conformance requirement

The HPLMN may provide on the SIM additional information on the available PLMNs. If this information is provided then the MS shall indicate it to the user. This information, provided as free text may include:

- preferred partner,
- roaming agreement status,
- supported services

Furthermore, the MS may indicate whether the available PLMNs are present on the EHPLMN list, the Forbidden list, the User Controlled PLMN List or the Operator Controlled PLMN List. The MS may also indicate that the PLMN is not present on any of these lists.

##### References

1. TS 23.122, clause 4.4.3.1.2.

NOTE: TS 31.102 defines the USIM fields.

##### 6.1.1.10.3 Test purpose

To verify that in manual network selection mode if additional information is available on the SIM/USIM about the available PLMNs that information is displayed to the user.

##### 6.1.1.10.4 Method of test

###### Initial conditions

The UE is in automatic PLMN selection mode.

"IMSI attach" flag in the BCCH is set to allowed.

Cell levels are from table 6.3 for FDD and from table 6.4 for TDD.

All Radio Access Technology USIM fields and cells are UTRAN.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	-60	-54	1	PLMN 1
Cell 2	-65	-59	2	PLMN 2
Cell 4	-75	-69	3	PLMN 4
Cell 5	-80	-74	4	PLMN 5

UE is previously registered on PLMN1 before switched off.

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN
EF <sub>PLMNwACT</sub>	1 <sup>st</sup>	PLMN 2
EF <sub>OPLMNwACT</sub>	1 <sup>st</sup>	PLMN 5
EF <sub>FPLMN</sub>	1 <sup>st</sup>	PLMN 4

Contents of EF<sub>OPL</sub>:

Location Area Identity	PLMN Network Name Record Identifier
MCC and MNC of PLMN1+all LAC*	1
MCC and MNC of PLMN2+all LAC*	2
MCC and MNC of PLMN4+all LAC*	3
MCC and MNC of PLMN5+all LAC*	4
*A value of '0000' stored in bytes 4 to 5 and a value of 'FFFE' stored in bytes 6 to 7 shall be used to indicate the entire range of LACs for the given PLMN.	

Contents of EF<sub>PNN</sub>:

Record order	Full name for network	Short name for network	PLMN Additional Information
1 <sup>st</sup>	Test network PLMN1	PLMN1	PLMN1 offers voice call, SMS and PS data services.
2 <sup>nd</sup>	Test network PLMN2	PLMN2	PLMN2 offers voice call services.
3 <sup>rd</sup>	Test network PLMN4	PLMN4	[field is empty]
4 <sup>th</sup>	Test network PLMN5	PLMN5	PLMN5 offers PS data services.

The EF<sub>EHPLMN</sub> list is empty.

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

Related ICS/IXIT statements

Indicating whether a PLMN is present on a PLMN list stored on the USIM Yes/No

Test procedure

Method C is applied.

- a) The SS activates all 4 cells and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The UE is switched to manual network selection mode and it is made to display the available PLMNs

- e) The user selects PLMN2
- f) The SS waits for random access requests from the UE.

#### 6.1.1.10.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 1.
- 2) In step d) the UE shall indicate:
  - For PLMN1 the UE shall indicate that "PLMN1 offers voice call, SMS and PS data services."
  - For PLMN2 the UE shall indicate that "PLMN2 offers voice call services."
 If the UE supports "Indicating whether a PLMN is present on a PLMN list stored on the USIM" the UE shall indicate that PLMN2 is present on the User Controlled PLMN List.
  - If the UE supports "Indicating whether a PLMN is present on a PLMN list stored on the USIM" the UE shall indicate that PLMN4 is present on the Forbidden list.
  - For PLMN5 the UE shall indicate that "PLMN5 offers PS data services."
 If the UE supports "Indicating whether a PLMN is present on a PLMN list stored on the USIM" the UE shall indicate that PLMN5 is present on the Operator Controlled PLMN List.
- 3) In step f), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN 2.

#### 6.1.1.11 Void

#### 6.1.1.12 Displaying EHPLMNs in manual mode

##### 6.1.1.12.1 Definition

Test to verify that in Manual Network Selection Mode, the UE is able to display HPLMN and EHPLMNs in the correct order according to the parameters provided by the USIM.

##### 6.1.1.12.2 Conformance requirement

1. The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS. An MS which supports GSM COMPACT shall also indicate GSM COMPACT PLMNs (which use PBCCH).

If displayed, PLMNs meeting the criteria above are presented in the following order:

- i)- either the HPLMN (if the EHPLMN list is not present or is empty) or, if one or more of the EHPLMNs are available then based on an optional data field on the SIM either only the highest priority available EHPLMN is to be presented to the user or all available EHPLMNs are presented to the user in priority order. If the data field is not present on the SIM, then only the highest priority available EHPLMN is presented;

...

2. If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its PLMN selection operating mode. At switch on, if the MS provides the optional feature of user preferred PLMN selection operating mode at switch on then this operating mode shall be used.

**EXCEPTION:** At switch on, if the MS is in manual mode and neither registered PLMN nor PLMN that is equivalent to it is available but EHPLMN is available, then instead of performing the manual network selection mode procedure of clause 4.4.3.1.2 the MS may select and attempt registration on the highest priority EHPLMN. If the EHPLMN list is not available or is empty and the HPLMN is available, then the MS may select and attempt registration on the HPLMN. The MS shall remain in manual mode.

**NOTE 1:** If successful registration is achieved, then the current serving PLMN becomes the registered PLMN and the MS does not store the previous registered PLMN for later use.

#### References

1. TS 23.122, clause 4.4.3.1.2

2. TS 23.122, clause 4.4.3.1

NOTE: TS 31.102 defines the USIM fields.

#### 6.1.1.12.3 Test purpose

1. To confirm that if the  $EF_{EHPLMN}$  (Equivalent HPLMN) data field on the USIM is present but there are no EHPLMNs available, only the HPLMN is displayed.
2. To confirm that if EHPLMNs are available and the  $EF_{EHPLMN}$  (Equivalent HPLMN) data field on the USIM is present then depending on the USIM settings of  $EF_{EHPLMNPI}$  (Equivalent HPLMN Presentation Indication) either all available EHPLMNs are displayed in priority order or only the highest priority EHPLMN is displayed.
3. To confirm that if EHPLMNs are available but the  $EF_{EHPLMNPI}$  (Equivalent HPLMN Presentation Indication) data field on the USIM is not present, only the highest priority EHPLMN is displayed.

#### 6.1.1.12.4 Method of test

##### Initial conditions

The UE is in manual PLMN selection mode.

Cell levels are from table 6.3 for FDD and from table 6.4 for TDD.

All Radio Access Technology USIM fields and cells are UTRAN.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

Steps a) – d)

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	off	off	1	PLMN 3
Cell 2	off	off	2	PLMN 2
Cell 3	-70	-64	3	PLMN 1
Cell 4	off	off	4	PLMN 4

Steps e) – t)

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	-60	-54	1	PLMN 3
Cell 2	-65	-59	2	PLMN 2
Cell 3	-70	-64	3	PLMN 1
Cell 4	-75	-69	4	PLMN 4

The UE is equipped with a USIM A containing default values except for those listed below (steps a – h).

USIM field	Priority	PLMN
$EF_{EHPLMN}$	1 <sup>st</sup>	PLMN 4
	2 <sup>nd</sup>	PLMN 2
	3 <sup>rd</sup>	PLMN 1
$EF_{UST}$	Service n°71 Equivalent HPLMN and Service n°73 Equivalent HPLMN Presentation Indication available	
$EF_{EHPLMNPI}$	'02' - Display all the available EHPLMNs	

The UE is equipped with a USIM B containing default values except for those listed below (steps i – l).

USIM field	Priority	PLMN
EF <sub>EHPLMN</sub>	1 <sup>st</sup>	PLMN 2
	2 <sup>nd</sup>	PLMN 3
	3 <sup>rd</sup>	PLMN 1
EF <sub>UST</sub>	Service n°71 Equivalent HPLMN and Service n°73 Equivalent HPLMN Presentation Indication available	
EF <sub>EHPLMNPI</sub>	'01' - Display the highest-priority available EHPLMN only	

The UE is equipped with a USIM C containing default values except for those listed below (steps m – o).

USIM field	Priority	PLMN
EF <sub>EHPLMN</sub>	1 <sup>st</sup>	PLMN 3
	2 <sup>nd</sup>	PLMN 4
	3 <sup>rd</sup>	PLMN 1
EF <sub>UST</sub>	Service n°71 Equivalent HPLMN available	
EF <sub>EHPLMNPI</sub>	Not present	

The HPLMN (MCC+MNC) of the IMSI for USIM is set to PLMN 1 (steps a – p).

UE is previously registered on PLMN5, before switched off.

Related ICS/IXIT statement(s)

UE supporting Exception to manual network selection mode at switch-on yes/no

Test procedure

Method C is applied.

- a) The SS activates Cell 3 and monitors the cell for random access requests from the UE.
- b) The UE is switched on, equipped with USIM A.
- c) The SS waits to see if there are any random access requests from the UE. The UE is made to display the available PLMNs. If not yet selected, the UE is made to select the available PLMN.
- d) The SS waits for random access requests from the UE, if not done in step c).
- e) The SS activates all 4 cells and monitors the cells for random access requests from the UE.
- f) The UE is made to display the available PLMNs. The UE is made to select the highest priority EHPLMN.
- g) The SS waits for random access requests from the UE.
- h) The UE is switched off.
- i) The UE is equipped with USIM B, switched on and made to register to PLMN5, switched off, then switched on again.
- j) The SS waits to see if there are any random access requests from the UE. The UE is made to display the available PLMNs. If not yet selected, the UE is made to select the displayed EHPLMN.
- k) The SS waits for random access requests from the UE, if not done in step j).
- l) The UE is switched off.
- m) The UE is equipped with USIM C, switched on and made to register to PLMN5, switched off, and switched on again.

- n) The SS waits to see if there are any random access requests from the UE. The UE is made to display the available PLMNs. If not yet selected, the UE is made to select the displayed EHPLMN.
- o) The SS waits for random access requests from the UE, if not done in step n).
- p) The UE is switched off.

#### 6.1.1.12.5 Test Requirements

- 1) In step c), the UE shall indicate that only PLMN 1 is available.
- 2) If UE supports “Exception to manual network selection mode at switch-on” the response from UE shall come in step c) otherwise the response from UE shall come in step d). In both cases, the response from the UE shall be on Cell 3. The displayed PLMN shall be PLMN 1.
- 3) In step f), the UE shall indicate that PLMN 4, PLMN 2, PLMN 1 and PLMN 3 (non-EHPLMN) are available in this priority order.
- 4) In step g), the response from the UE shall be on Cell 4. The displayed PLMN shall be PLMN 4.
- 5) In step j), the UE shall indicate that PLMN 2 and PLMN 4 (non-EHPLMN) are available in this priority order.
- 6) If UE supports “Exception to manual network selection mode at switch-on” the response from UE shall come in step j) otherwise the response from UE shall come in step k). In both cases, the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN 2.
- 7) In step n), the UE shall indicate that PLMN 3 and PLMN 2 (non-EHPLMN) are available in this priority order.
- 8) If UE supports “Exception to manual network selection mode at switch-on” the response from UE shall come in step n) otherwise the response from UE shall come in step o). In both cases, the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 3.

#### 6.1.1.13 PLMN selection of RPLMN or (E)HPLMN; Automatic mode

##### 6.1.1.13.1 Definition

Test to verify that in Automatic Network Selection Mode, the UE selects PLMNs in the correct order according to the setting of  $EF_{LRPLMNSI}$ . If  $EF_{LRPLMNSI}$  is available and the field is set to “01”, and a non-empty EHPLMN list is present, at switch-on, the UE shall select the EHPLMN or the last RPLMN. If  $EF_{LRPLMNSI}$  is set to “00” the last RPLMN shall be selected at switch-on if available.

##### 6.1.1.13.2 Conformance requirement

- 1. Equivalent HPLMN list: To allow provision for multiple HPLMN codes, PLMN codes that are present within this list shall replace the HPLMN code derived from the IMSI for PLMN selection purposes. This list is stored on the USIM and is known as the EHPLMN list. The EHPLMN list may also contain the HPLMN code derived from the IMSI. If the HPLMN code derived from the IMSI is not present in the EHPLMN list then it shall be treated as a Visited PLMN for PLMN selection purposes.
- 2. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see subclause 4.5.2) attempts to perform a Location Registration.

EXCEPTION: As an alternative option to this, if the MS is in automatic network selection mode and it finds coverage of an EHPLMN, the MS may register to the highest priority EHPLMN available and not return to the registered PLMN or equivalent PLMN. If the EHPLMN list is not present or is empty, and the HPLMN is available, the MS may register on the HPLMN and not return to the registered PLMN or equivalent PLMN. The operator shall be able to control by SIM configuration whether an MS that supports this option is permitted to perform this alternative behaviour.

EXCEPTION: In A/Gb mode an MS with voice capability, shall not search for CPBCCCH carriers. In A/Gb mode an MS not supporting packet services shall not search for CPBCCCH carriers.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its PLMN selection operating mode. At switch on, if the MS provides the optional feature of user preferred PLMN selection operating mode at switch on then this operating mode shall be used.

### 3. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMN/access technology combinations, if available and allowable in the following order:

- i) either the HPLMN (if the EHPLMN list is not present or is empty) or the highest priority EHPLMN that is available (if the EHPLMN list is present);
- ii) Each PLMN/access technology combination in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- iii) Each PLMN/access technology combination in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- iv) Other PLMN/access technology combinations with received high quality signal in random order;
- v) Other PLMN/access technology combinations in order of decreasing signal quality.

...

If successful registration is achieved, the MS indicates the selected PLMN.

## References

1. TS 23.122, clause 1.2
2. TS 23.122, clause 4.4.3.1.
3. TS 23.122, clause 4.4.3.1.1.

NOTE: TS 31.102 defines the USIM fields.

### 6.1.1.13.3 Test purpose

1. To verify that the RPLMN or the EHPLMN is selected at switch-on if  $EF_{LRPLMNSI} = "01"$ .
2. To verify that the RPLMN is selected at switch-on if  $EF_{LRPLMNSI} = "00"$ .
3. The UE indicates the correct PLMN to the User when an EHPLMN is selected.

### 6.1.1.13.4 Method of test

#### Initial conditions

The UE is in automatic PLMN selection mode.

"IMSI attach" flag in the BCCH is set to allowed.

All Radio Access Technology USIM fields and cells are UTRAN.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

The definition of each PLMN code is found in table below.

PLMN	MCC digit			MNC digit		
	1	2	3	1	2	3
1	0	0	1	0	1	-
2	0	0	2	0	2	-
3	0	0	2	0	3	-
4	0	0	1	0	4	-
5	0	0	1	0	5	-

NOTE: “-“ (dash) denotes “not present”.

Cells 1, 2, 3 use respectively test channels 1, 2, 3 on primary band. If the UE supports multiple frequency bands, Cell 4 uses test channel 1 on secondary band (in the same region if supported) otherwise Cell 4 uses test channel 4 on primary band. Primary and secondary bands are selected according to PIXIT parameters.

Steps a) – d) and i)–k)

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	-65	-59	1	PLMN 4
Cell 2	off	off	2	PLMN 2
Cell 3	-75	-74	3	PLMN 3
Cell 4	-80	-69	4 (primary band) or 1 (secondary band)	PLMN 2

Steps e) – h)

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	off	off	1	PLMN 4
Cell 2	-60	-54	2	PLMN 2
Cell 3	off	off	3	PLMN 3
Cell 4	off	off	4 (primary band) or 1 (secondary band)	PLMN 2

The UE is equipped with a USIM containing default values except for those listed below.

USIM A

USIM field	LRPLMNSI
EF <sub>LRPLMNSI</sub>	01

USIM B

USIM field	LRPLMNSI
EF <sub>LRPLMNSI</sub>	00

USIM A & USIM B

EF<sub>SPN</sub> is not present.

Contents of EF<sub>EHPLMN</sub>

Priority	PLMN
1 <sup>st</sup>	PLMN 5
2 <sup>nd</sup>	PLMN 4

Contents of record 1 of EF<sub>OPL</sub>

Location Area Identity/Tracking Area Identity	PLMN Network Name Record Identifier
PLMN 4 (see Note 1)	record 1
PLMN 5 (see Note 1)	record 1

Note 1: The entire range of LACs/TACs for each PLMN shall be coded as per 31.102.

Contents of record 1 of EF<sub>PNN</sub>

Full name for network contents	Short name for network contents	PLMN Additional Information
Test Home PLMN	THPLMN	Not present

The HPLMN (MCC+MNC) of the IMSI for USIM A and USIM B is set to PLMN1.

UE with USIM A is previously registered on PLMN 2 on Cell 2, before switched off.

Related ICS/IXIT statement(s)

UEs supporting Last RPLMN feature yes/no

Test procedure

Method C is applied.

- a) The SS activates cells 1, 3 and 4 and monitors the cells for random access requests from the UE.
- b) The UE is switched on with a USIM setting according to USIM-A inserted.
- c) The SS waits for random access requests from the UE.
- d) The UE is switched off and a USIM with settings according to USIM B is inserted.
- e) The SS deactivates cells 1, 3 and 4 and activates cell 2. The SS monitors cell 2 for random access requests from the UE.
- f) The UE is switched on.
- g) The SS waits for random access requests from the UE.
- h) The UE is switched off.
- i) The SS deactivates cell 2 and activates cells 1, 3 and 4 and monitors the cells for random access requests from the UE.
- j) The UE is switched on.
- k) The SS waits for random access requests from the UE.

#### 6.1.1.13.5 Test Requirements

- 1) In step c), the response from the UE shall be either:
  - on Cell 1 and the displayed PLMN shall be Test Home PLMN or THPLMN or
  - on Cell 4 and the UE shall indicate PLMN 2.

- 2) In step g), the response from the UE shall be on Cell 2 and the UE shall indicate PLMN 2.
- 3) In step k), the response from the UE shall be on Cell 4 and the UE shall indicate PLMN 2.

#### 6.1.1.14 Network selection mode at switch-on

##### 6.1.1.14.1 Definition

Test to verify that the UE uses the optional feature of user preferred PLMN selection operating mode at switch on.

##### 6.1.1.14.2 Conformance requirement

1. If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its PLMN selection operating mode. At switch on, if the MS provides the optional feature of user preferred PLMN selection operating mode at switch on then this operating mode shall be used.
2. The UE shall support both manual and automatic network selection mechanisms (modes). The UE shall select the last mode used, as the default mode, at every switch-on.

As an optional feature of the ME, the user shall be able to set a preference in the ME for the mode that shall be used at switch on. If set then the ME shall select this preference rather than the default mode.

NOTE: By defaulting to the last mode used, e.g. manual network selection, the undesired automatic selection of an adjacent PLMN instead of the desired HPLMN in border areas, can be avoided at switch-on.

The user shall be given the opportunity to change mode at any time.

Except as defined below, the MMI shall be at the discretion of the UE manufacturer.

The UE shall contain display functions by which Available PLMNs and the Selected PLMN can be indicated.

In order not to confuse the user, the same definitions of PLMN names shall be applied consistently both in registered mode and in the list presented to the user when in manual mode.

In shared networks a radio access network can be part of more than one PLMN. This shall be transparent to the user, i.e. the UE shall be able to indicate those PLMNs to the user, and the UE shall support network selection among those PLMNs, as in non-shared networks.

3. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS. An MS which supports GSM COMPACT shall also indicate GSM COMPACT PLMNs (which use PBCCH).

If displayed, PLMNs meeting the criteria above are presented in the following order:

- i)- either the HPLMN (if the EHPLMN list is not present or is empty) or, if one or more of the EHPLMNs are available then based on an optional data field on the SIM either only the highest priority available EHPLMN is to be presented to the user\_or all available EHPLMNs are presented to the user in priority order. If the data field is not present on the SIM, then only the highest priority available EHPLMN is presented;
- ii)- PLMN/access technology combinations contained in the " User Controlled PLMN Selector with Access Technology " data file in the SIM (in priority order);
- iii)- PLMN/access technology combinations contained in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
- iv)- other PLMN/access technology combinations with received high quality signal in random order;
- v)- other PLMN/access technology combinations in order of decreasing signal quality.

...

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that

PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden TAs for roaming", "forbidden LAs for regional provision of service", "forbidden TAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

...

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

#### 4. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMNs, if available and allowable in the following order:

- i) either the HPLMN (if the EHPLMN list is not present or is empty) or the highest priority EHPLMN that is available (if the EHPLMN list is present);
- ii) each PLMN/access technology combination in the "User Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
- iii) each PLMN/access technology combination in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
- iv) other PLMN/access technology combinations with received high quality signal in random order;
- v) other PLMN/access technology combinations in order of decreasing signal quality.

....

If successful registration is achieved, the MS indicates the selected PLMN.

If registration cannot be achieved because no PLMNs are available and allowable, the MS indicates "no service" to the user, waits until a new PLMN is available and allowable and then repeats the procedure.

If there were one or more PLMNs which were available and allowable, but an LR failure made registration on those PLMNs unsuccessful or an entry in the "forbidden LAs for regional provision of service" list prevented a registration attempt, the MS selects the first such PLMN again and enters a limited service state.

#### References

1. TS 23.122, clause 4.4.3.1
2. TS 22.011, clause 3.2.1
3. TS 23.122, clause 4.4.3.1.2
4. TS 23.122, clause 4.4.3.1.1

NOTE: TS 31.102 defines the USIM fields.

#### 6.1.1.14.3 Test purpose

1. To verify that the user is allowed to configure what network selection mode should be used at switch-on.
2. To verify that this information is not stored on the USIM.

#### 6.1.1.14.4 Method of test

##### Initial conditions

"IMSI attach" flag in the BCCH is set to allowed.

Cell levels are from table 6.3 for FDD and from table 6.4 for TDD.

All Radio Access Technology USIM fields and cells are UTRAN.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

The UE is in manual PLMN selection mode.

UE is previously registered on PLMN2, before switched off.

The user sets the optional feature "PLMN selection operation mode at switch on" to automatic network selection.

All Radio Access Technology USIM fields and cells are UTRAN.

Steps a) – e)

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 4	-75	-69	1	PLMN 4
Cell 5	-80	-74	2	PLMN 5

Steps f) – h)

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 4	OFF	OFF	1	PLMN 4
Cell 5	-80	-74	2	PLMN 5

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN
EF <sub>PLMNwAcT</sub>	1 <sup>st</sup>	PLMN 4
EF <sub>OPLMNwAcT</sub>	1 <sup>st</sup>	PLMN 5

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

Related ICS/IXIT statement(s)

- UEs supporting NW selection mode at switch-on yes/no

Test procedure

Method C is applied.

- The SS activates both the cells Cell 4 and Cell 5, and monitors the cells for random access requests from the UE.
- The UE is switched on.
- The SS waits for random access requests from the UE.
- The UE is set to automatic NW selection mode, the optional feature "PLMN selection operation mode at switch on" is set to manual NW selection.
- The UE is switched off
- The SS deactivates cell 4 and monitors the cells for random access request from the UE.
- The UE is switched on
- The SS waits for random access requests from the UE.

#### 6.1.1.14.5 Test Requirements

- In step c), the response from the UE shall be on Cell 4. The displayed PLMN shall be PLMN4.
- In step h), The UE does not send a response on any cell.

### 6.1.1.15 Exception in manual network selection mode when HPLMN is available at power-on

#### 6.1.1.15.1 Definition

Test to verify that UE in Manual Network Selection Mode at switch on, when neither the RPLMN nor any equivalent PLMN to the RPLMN is available then the UE may optional select the highest priority PLMN in the EHPLMN list or select the HPLMN if EHPLMN list is not available or empty.

#### 6.1.1.15.2 Conformance requirement

1. Equivalent HPLMN list: To allow provision for multiple HPLMN codes, PLMN codes that are present within this list shall replace the HPLMN code derived from the IMSI for PLMN selection purposes. This list is stored on the USIM and is known as the EHPLMN list. The EHPLMN list may also contain the HPLMN code derived from the IMSI. If the HPLMN code derived from the IMSI is not present in the EHPLMN list then it shall be treated as a Visited PLMN for PLMN selection purposes.
2. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see clause 4.5.2) attempts to perform a Location Registration.

...

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its PLMN selection operating mode. At switch on, if the MS provides the optional feature of user preferred PLMN selection operating mode at switch on then this operating mode shall be used.

**EXCEPTION:** At switch on, if the MS is in manual mode and neither registered PLMN nor PLMN that is equivalent to it is available but EHPLMN is available, then instead of performing the manual network selection mode procedure of clause 4.4.3.1.2 the MS may select and attempt registration on the highest priority EHPLMN. If the EHPLMN list is not available or is empty and the HPLMN is available, then the MS may select and attempt registration on the HPLMN. The MS shall remain in manual mode.

**NOTE 1:** If successful registration is achieved, then the current serving PLMN becomes the registered PLMN and the MS does not store the previous registered PLMN for later use.

#### 3. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS. An MS which supports GSM COMPACT shall also indicate GSM COMPACT PLMNs (which use PBCCH).

If displayed, PLMNs meeting the criteria above are presented in the following order:

- i)- either the HPLMN (if the EHPLMN list is not present or is empty) or, if one or more of the EHPLMNs are available then based on an optional data field on the SIM either only the highest priority available EHPLMN is to be presented to the user or all available EHPLMNs are presented to the user in priority order. If the data field is not present on the SIM, then only the highest priority available EHPLMN is presented;
- ii)- PLMN/access technology combinations contained in the " User Controlled PLMN Selector with Access Technology " data file in the SIM (in priority order);
- iii)- PLMN/access technology combinations contained in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
- iv)- other PLMN/access technology combinations with received high quality signal in random order;
- v)- other PLMN/access technology combinations in order of decreasing signal quality.

In ii and iii, an MS using a SIM without access technology information storage (i.e. the "User Controlled PLMN Selector with Access Technology" and the "Operator Controlled PLMN Selector with Access Technology" data files are not present) shall instead present the PLMNs contained in the "PLMN Selector" data file in the SIM (in priority order).

In v, requirement h) in clause 4.4.3.1.1 applies.

In GSM COMPACT, the non support of voice services shall be indicated to the user.

The HPLMN may provide on the SIM additional information on the available PLMNs. If this information is provided then the MS shall indicate it to the user. This information, provided as free text may include:

- preferred partner,
- roaming agreement status,
- supported services

Furthermore, the MS may indicate whether the available PLMNs are present on the EHPLMN list, the Forbidden list, the User Controlled PLMN List or the Operator Controlled PLMN List. The MS may also indicate that the PLMN is not present on any of these lists.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

Once the UE has registered on a PLMN selected by the user, the UE shall not automatically register on a different PLMN unless:

- i) the new PLMN is declared as an equivalent PLMN by the registered PLMN; or
- ii) the user selects automatic mode.

NOTE 1: It is an MS implementation option whether to indicate access technologies to the user. If the MS does display access technologies, then the access technology used should be the access technology chosen by the user for that PLMN. If the MS does not display access technologies, then the access technology chosen for a particular PLMN should be the highest priority available access technology for that PLMN, if the associated access technologies have a priority order.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

NOTE 2: High quality signal is defined in the appropriate AS specification.

## References

1. TS 23.122, clause 1.2
2. TS 23.122, clause 4.4.3.1.
3. TS 23.122, clause 4.4.3.1.2.

NOTE: TS 31.102 defines the USIM fields.

### 6.1.1.15.3 Test purpose

1. To verify that a UE supporting the exception to manual network selection mode when HPLMN is available at power-on selects the highest priority available EHPLMN at switch on when the RPLMN or a PLMN equivalent to it is not available at switch-on.

2. To verify that a UE supporting the exception to manual network selection procedure mode when HPLMN is available at power-on selects the HPLMN when neither the RPLMN (or a PLMN equivalent to it) nor EHPLMNs are available (or EHPLMN list is empty).

#### 6.1.1.15.4 Method of test

##### Initial conditions

The UE is in manual PLMN selection mode.

UE is previously registered on PLMN2, before switched off.

"IMSI attach" flag in the BCCH is set to allowed.

Cell levels are from table 6.3 for FDD and from table 6.4 for TDD.

All Radio Access Technology USIM fields and cells are UTRAN.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

Steps a) – d) and steps i) – l)

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	-60	-54	1	PLMN 2
Cell 2	OFF	OFF	2	PLMN 1
Cell 4	OFF	OFF	3	PLMN 4
Cell 5	OFF	OFF	4	PLMN 5

Steps e) – h) and steps m) – o)

Cell	CPICH_ Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_ RSCP [dBm] (TDD)	Test Channel	PLMN
Cell 1	OFF	OFF	1	PLMN 2
Cell 2	-65	-59	2	PLMN 1
Cell 4	-75	-69	3	PLMN 4
Cell 5	-80	-74	4	PLMN 5

The UE is equipped with a USIM containing default values except for those listed below.

##### USIM A

USIM field	Priority	PLMN
EF <sub>EHPLMN</sub>	1 <sup>st</sup>	PLMN 5
EF <sub>EHPLMN</sub>	2 <sup>nd</sup>	PLMN 4

##### USIM B

- EF<sub>EHPLMN</sub> not present

##### USIM A and USIM B

- The HPLMN (MCC+MNC) of the IMSI set to PLMN1.

UE is switched off.

##### Related ICS/IXIT statement(s)

- UEs supporting NW selection mode at switch-on yes/no

## Test procedure

Method C is applied.

- a) The SS activates Cell 1 and monitors the cell for random access requests from the UE.
- b) The UE is switched on with a USIM setting according to USIM-A inserted.
- c) The SS waits for random access requests from the UE. See note 1.
- d) The UE is switched off.
- e) The SS deactivate Cell 1 and activates Cell 2, Cell 4 and Cell 5 and monitors the cells for random access requests from the UE.
- f) The UE is switched on.
- g) The SS waits for random access requests from the UE. See Note 2.
- h) The UE is switched off and a USIM with settings according to USIM B is inserted.
- i) The SS activates Cell 1 and deactivates Cell 2, Cell 4 and Cell 5 and monitors the cells for random access requests from the UE.
- j) The UE is switched on.
- k) The UE is made to register to PLMN 2. See note 1.
- l) The UE is switched off.
- m) The SS deactivate Cell 1 and activates Cell 2, Cell 4 and Cell 5 and monitors the cells for random access requests from the UE.
- n) The UE is switched on.
- o) The SS waits for random access requests from the UE. See note 3.

NOTE 1. UE is expected to register on Cell 1 and set the previously registered PLMN on the USIM to PLMN2.

NOTE 2. As previously registered PLMN2 is not available and list of EHPLMN exists then UE is expected to send random access requests on the cell belonging to the highest priority PLMN (PLMN5) on the EHPLMN list.

NOTE 3. As previously registered PLMN2 is not available and EHPLMN list does not exist then UE is expected to send random access requests on the cell belonging to the HPLMN (PLMN1).

### 6.1.1.15.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN2.
- 2) In step g), the response from the UE shall be on Cell 5. The displayed PLMN shall be PLMN5 (highest priority PLMN in EHPLMN list).
- 3) In step k), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN2.
- 4) In step o), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN1 (HPLMN).

## 6.1.2 Cell selection and reselection

### 6.1.2.1 Cell reselection

#### 6.1.2.1.1 Definition

Test to verify that the UE performs the cell reselection correctly for intra/inter-frequency cells if the serving cell becomes barred or  $S < 0$ .

## 6.1.2.1.2 Conformance requirement

1. When camped on a cell, the UE shall regularly search for a better cell according to the cell reselection criteria. If a better cell is found, that cell is selected. The change of cell may imply a change of RAT.
2. A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.
  - 2.1 The cell is part of the selected PLMN or of a PLMN considered as equivalent by the UE according to the information provided by the NAS.
  - 2.2 The cell is not barred.
  - 2.3 The cell is not part of the list of "forbidden LAs for roaming".
  - 2.4 The cell selection criteria are fulfilled.
3. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 3.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode and in TS 25.123 for TDD mode.
  - 3.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
4. Cell Reselection Criteria:
  - 4.1 The UE shall perform ranking of all cells that fulfil the S criterion.
  - 4.2 The cells shall be ranked according to the R criteria, deriving  $Q_{meas,n}$  and  $Q_{meas,s}$  and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in TS 25.133 and TS 25.123 for FDD, TDD and GSM cells, respectively.
 

The offset  $Q_{offset1,s,n}$  is used for  $Q_{offset,s,n}$  to calculate  $R_n$ , the hysteresis  $Q_{hyst1,s}$  is used for  $Q_{hyst,s}$  to calculate  $R_s$ .

If the usage of HCS is indicated in system information,  $TEMP\_OFFSET1_n$  is used for  $TEMP\_OFFSET_n$  to calculate  $TO_n$ . If it is indicated in system information that HCS is not used,  $TEMP\_OFFSET_n$  is not applied when calculating  $R_n$ . The best ranked cell is the cell with the highest R value.

If a TDD cell is ranked as the best cell, the UE shall perform cell re-selection to that TDD cell.

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH RSCP, the UE shall perform cell re-selection to that FDD cell.
  - 4.3 In all cases, the UE shall reselect the new cell, only if the following conditions are met:
    - the new cell is better ranked than the serving cell during a time interval  $T_{reselection}$ .
    - more than 1 second has elapsed since the UE camped on the current serving cell.
5. When cell status "barred" is indicated, the UE shall select another cell according to the following rule:
  - 5.1 If the "Intra-frequency cell re-selection indicator" IE in Cell Access Restriction IE is set to value "allowed", the UE may select another cell on the same frequency if selection/re-selection criteria are fulfilled.
    - If the UE is camping on another cell, the UE shall exclude the barred cell from the neighbouring cell list until the expiry of a time interval  $T_{barred}$ . The time interval  $T_{barred}$  is sent via system information in a barred cell together with Cell status information in the Cell Access Restriction IE.
    - If the UE does not select another cell, and the barred cell remains to be the "best" one, the UE shall after expiry of the time interval  $T_{barred}$  again check whether the status of the barred cell has changed.
  - 5.2 If the "Intra-frequency cell re-selection indicator" IE is set to "not allowed" the UE shall not re-select a cell on the same frequency as the barred cell. For emergency call, the Intra-frequency cell re-selection indicator IE shall be ignored, i.e. even if it is set to "not allowed" the UE may select another intra-frequency cell.

## References

1. TS 25.304, clause 5.2.1.
2. TS 25.304, clause 4.3.
3. TS 25.304, clause 5.2.5.1.
4. TS 25.304, clause 5.2.6.1.4.
5. TS 25.304, clause 5.3.1.1.

## 6.1.2.1.3 Test purpose

1. To verify that the UE performs cell reselection on the following occasions:
  - 1.1 Serving cell becomes barred;
  - 1.2  $S < 0$  for serving cell.
2. To verify conformance requirement 5.

NOTE: Reselection triggered by the cell becoming a part of a forbidden registration area is tested in clause 9.4.2.3 and clause 9.4.2.4.

## 6.1.2.1.4 Method of test

## Initial conditions

Reselection,  $Q_{hyst}$ ,  $Q_{offset}$ ,  $TEMP\_OFFSET$  and  $PENALTY\_TIME$  are not used, so the cell-ranking criterion  $R$  equals  $CPICH\_RSCP$  for FDD cells, and  $P-CCPCH\_RSCP$  for TDD cells.

Step a-c (FDD):

Parameter	Unit	Cell 1	Cell 2	Cell 4
Test Channel		1	1	2
LAC		0001	0002	0003
CPICH_Ec	dBm/3.84 MHz	-60	-67	-80
Qrxlevmin	dBm	-115	-115	-115
Qqualmin	dB	-16	-16	-16
Srxlev*	dBm	55	48	35
CellBarred		Not barred	Not barred	Not barred

Step a-c (TDD):

Parameter	Unit	Cell 1	Cell 2	Cell 4
P-CCPCH RSCP	dBm	-69	-74	-79
Qrxlevmin	dBm	-103	-103	-103
Srxlev*	dB	34	29	24

Step d-f:

CellBarred		Not barred -> Barred	Not barred	Not barred
Intra-frequency cell re-selection indicator		Not allowed		
Tbarred		10s		

Step g-h:

Intra-frequency cell re-selection indicator		Not Allowed -> Allowed		
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Step i-k:

Parameter	Unit	Cell 1	Cell 2	Cell 4
CellBarred		Barred -> Not barred	Not barred	Not barred

Step l-m (FDD):

Qrxlevmin	dBm	-115 -> -51	-115	-115
Qqualmin	dB	-16	-16	-16
Srxlev*	dBm	55 -> -9	48	35

Step l-m (TDD):

Qrxlevmin		-103 -> -59	-103	-103
Srxlev*		34 -> -10	29	24

## Test procedure

Method C is applied.

- a) The SS activates Cell 1, 2 and 4 and monitors them for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits to see if there are any random access requests from the UE.
- d) The SS sets Cell 1 to be barred. The SS notifies UE of the BCCH modification.
- e) The SS waits to see if there are any random access requests from the UE.
- f) The SS sets "Intra-frequency cell re-selection indicator" to "Allowed". The SS notifies UE of the BCCH modification.
- g) The SS waits to see if there are any random access requests from the UE.
- h) The UE is switched off.
- i) The SS sets Cell 1 to be not barred.
- j) The UE is switched on.
- k) The SS waits to see if there are any random access requests from the UE.
- l) For FDD cell, Qrxlev min is increased to -51 dBm, so S will become negative.  
For TDD cell, Qrxlev min is increased to -59 dBm, so S will become negative.  
The SS notifies UE of the BCCH modification
- m) The SS waits for random access requests from the UE.

### 6.1.2.1.5 Test requirements

- 1) In step c), after the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- 2) In step e), the UE shall respond on Cell 4.
- 3) In step g), the UE shall respond on Cell 2.

- 4) In step k), after the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- 5) In step m), the UE shall respond on Cell 2.

### 6.1.2.1a Cell reselection for inter-band operation

#### 6.1.2.1a.1 Definition

This test case is identical to test case 6.1.2.1 except that the cell to be reselected is on a different frequency band.

#### 6.1.2.1a.2 Conformance requirement

Same conformance requirement as in clause 6.1.2.1.2.

#### 6.1.2.1a.3 Test purpose

Same test purpose as in clause 6.1.2.1.3 except that the cell to be reselected is on a different frequency band.

#### 6.1.2.1a.4 Method of test

##### Initial conditions

Same initial conditions as in clause 6.1.2.1.4 except that cells 1 and 2 use test channel 1 as specified in Table 6.3 for the primary band and that cell 4 uses test channel 2 as specified in Table 6.3 for the secondary band. Primary and secondary bands are selected according to PIXIT parameters.

##### Related ICS/IXIT statement(s)

- UE supports multiple bands simultaneously yes/no

##### Test procedure

Same test procedure as in clause 6.1.2.1.4.

NOTE: If the UE supports more than 2 frequency bands, the test may be executed for various band combinations.

#### 6.1.2.1a.5 Test requirements

Same test requirement as in clause 6.1.2.1.5.

### 6.1.2.1b Cell reselection for inter-band operation(LCR TDD band a-f)

#### 6.1.2.1b.1 Definition

This test case is identical to test case 6.1.2.1 except that the cell to be reselected is on a different frequency band.

#### 6.1.2.1b.2 Conformance requirement

Same conformance requirement as in clause 6.1.2.1.2.

#### 6.1.2.1b.3 Test purpose

Same test purpose as in clause 6.1.2.1.3 except that the cell to be reselected is on a different frequency band.

#### 6.1.2.1b.4 Method of test

##### Initial conditions

Same initial conditions as in clause 6.1.2.1.4 except that cells 1 and 2 use test channel 1 as specified in Table 6.1.2.1b.4-1 below for the band a and that cell 4 uses test channel 2 as specified in Table 6.1.2.1b.4-1 for the secondary band. Primary and secondary bands are selected according to PIXIT parameters

6.1.2.1b.4-1 UTRA TDD test frequencies (1.28 Mcps option)

Test Channel	Band a		Band f	
	P-CCPCH_RSCP [dBm]	UARFCN	P-CCPCH_RSCP [dBm]	UARFCN
1	-54	9 505	-54	9404
2	-59	9 550	-59	9500
3	-64	9 595	-64	9596
4	-69	10 055	-69	
5	-74	10 088	-74	
6	-79	10 120	-79	

#### Related ICS/IXIT statement(s)

- UE supports multiple bands simultaneously yes/no

#### Test procedure

Same test procedure as in clause 6.1.2.1.4.

NOTE: If the UE supports more than 2 frequency bands, the test may be executed for various band combinations.

#### 6.1.2.1b.5 Test requirements

Same test requirement as in clause 6.1.2.1.5.

### 6.1.2.2 Cell reselection using Qhyst, Qoffset and Treselection

#### 6.1.2.2.1 Definition

Test to verify that the UE performs the cell reselection correctly if system information parameters Qoffset, Qhyst and Treselection are applied for non-hierarchical cell structures. TEMP\_OFFSET and PENALTY\_TIME are only applicable when HCS is applied and are tested in clauses 6.1.2.4 and 6.1.2.5.

#### 6.1.2.2.2 Conformance requirement

- When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 1.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode and in TS 25.123 for TDD mode.
  - 1.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
- Cell Reselection Criteria:
  - 2.1 The UE shall perform ranking of all cells that fulfil the S criterion.
  - 2.2 The cells shall be ranked according to the R criteria, deriving  $Q_{meas,n}$  and  $Q_{meas,s}$  and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in TS 25.133 and TS 25.123 for FDD, TDD and GSM cells, respectively.

The offset  $Q_{offset1_{s,n}}$  is used for  $Q_{offset_{s,n}}$  to calculate  $R_n$ , the hysteresis  $Q_{hyst1_s}$  is used for  $Q_{hyst_s}$  to calculate  $R_s$ .

If the usage of HCS is indicated in system information,  $TEMP\_OFFSET1_n$  is used for  $TEMP\_OFFSET_n$  to calculate  $TO_n$ . If it is indicated in system information that HCS is not used,  $TEMP\_OFFSET_n$  is not applied when calculating  $R_n$ . The best ranked cell is the cell with the highest R value.

If a TDD cell is ranked as the best cell, the UE shall perform cell re-selection to that TDD cell.

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH RSCP, the UE shall perform cell re-selection to that FDD cell.

- 2.3 In all cases, the UE shall reselect the new cell, only if the following conditions are met:

- the new cell is better ranked than the serving cell during a time interval  $T_{reselection}$ .
- more than 1 second has elapsed since the UE camped on the current serving cell.

## References

1. TS 25.304, clause 5.2.5.1.
2. TS 25.304, clause 5.2.6.1.4.

## 6.1.2.2.3 Test purpose

1. To verify that the UE calculates  $R$  from  $Q_{hyst}$  and  $Q_{offset}$  and that the modification of these parameters on the BCCH triggers the cell reselection evaluation process.  $TEMP\_OFFSET$  and  $PENALTY\_TIME$  are not applied.
2. To verify that the UE reselects the new cell, if the cell reselection criteria are fulfilled during a time interval  $T_{reselection}$ .

## 6.1.2.2.4 Method of test

## Initial conditions

For FDD only:

Step a-c:

Parameter	Unit	Cell 1	Cell 2
Test channel		1	1
LAC		0001	0002
CPICH_Ec	dBm/3.84 MHz	-60	-66
$Q_{hyst1_s}$	dB	20	0
$R_s^*$	dB	-40	-66
$R_n^*$	dB	-66	-60

Step d-e:

CPICH_Ec	dBm/3.84 MHz	-60 -> -66	-66 -> -60
$R_s^*$	dB	-40 -> -46	-66 -> -60
$R_n^*$	dB	-66 -> -60	-60 -> -66

Step f-g:

$Q_{hyst1_s}$	dB	20 -> 0	0
$R_s^*$	dB	-46 -> -66	-60
$R_n^*$	dB	-60	-66

Step h-j:

CPICH_Ec	dBm/3.84 MHz	-66 -> -60	-60 -> -66
$Q_{offset1_{s,n}}$	dBm	0 -> 20	0
$R_s^*$	dBm	-66 -> -60	-60 -> -66
$R_n^*$	dBm	-60 -> -86	-66 -> -60

Step k-l:

CPICH_Ec	dBm/3.84 MHz	-60 -> -66	-66 -> -60
$R_s^*$	dB	-60 -> -66	-66 -> -60
$R_n^*$	dB	-86 -> -80	-60 -> -66

Step m-n:

Qoffset1 <sub>s,n</sub>	dB	20 -> 0	0
R <sub>s</sub> *	dB	-66	-60
R <sub>n</sub> *	dB	-80 -> -60	-66

Step o-p:

Treselection <sub>s</sub>	s	30	0
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For TDD only:

Step a-c:

Parameter	Unit	Cell 1	Cell 2
P-CCPCH RSCP	dBm	-69	-79
Qhyst1 <sub>s</sub>	dB	10	0
R <sub>s</sub> *	dB	-59	-79
R <sub>n</sub> *	dB	-79	-69

Step d-e:

P-CCPCH RSCP	dBm	-69 -> -79	-79 -> -69
Qhyst1 <sub>s</sub>	dB	10 -> 15	0
R <sub>s</sub> *	dB	-59 -> -64	-79 -> -69
R <sub>n</sub> *	dB	-79 -> -69	-69 -> -79

Step f-g:

Qhyst1 <sub>s</sub>	dB	15 -> 0	0
R <sub>s</sub> *	dB	-64 -> -79	-69
R <sub>n</sub> *	dB	-69	-79

Step h-j:

P-CCPCH RSCP	dBm	-79 -> -69	-69 -> -79
Qoffset1 <sub>s,n</sub>	dB	0 -> 10	0
R <sub>s</sub> *	dB	-79 -> -69	-69 -> -79
R <sub>n</sub> *	dB	-69 -> -79	-79 -> -69

Step k-l:

P-CCPCH RSCP	dBm	-69 -> -79	-79 -> -69
R <sub>s</sub> *	dB	-69 -> -79	-79 -> -69
R <sub>n</sub> *	dB	-79 -> -89	-69 -> -79

Step m-n:

Qoffset1 <sub>s,n</sub>	dB	10 -> 0	0
R <sub>s</sub> *	dB	-79	-69
R <sub>n</sub> *	dB	-89 -> -79	-79

Step o-p:

Treselection <sub>s</sub>	s	0 -> 30	0
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## Test procedure

Method C is applied.

- a) The SS activates Cell 1 and 2 and monitors them for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits to see if there are any random access requests from the UE.
- d) The SS changes the level of Cell 1 and 2 and waits for 10 s (TS 25.133, A.4.2.1.2 for FDD mode and TS 25.123, A.4.2.1.2 for TDD mode).
- e) The SS waits to see if there are any random access requests from the UE.
- f) The SS resets  $Q_{\text{hyst}}$  for Cell 1 and notifies UE of the BCCH modification.
- g) The SS waits for random access requests from the UE.
- h) The UE is switched off. The SS changes the level of Cell 1 and Cell 2. The SS changes  $Q_{\text{offset}}$  in Cell 1.
- i) The UE is switched on.
- j) The SS waits to see if there are any random access requests from the UE.
- k) The SS changes the level of Cell 1 and 2 and waits for 10 s (TS 25.133, clause A.4.2.1.2 for FDD mode and TS 25.123, clause A.4.2.1.2 for TDD mode).
- l) The SS waits to see if there are any random access requests from the UE.
- m) The SS resets  $Q_{\text{offset}}$  for Cell 1, and notifies UE of the BCCH modification.
- n) The SS waits for random access requests from the UE.
- o) Step h-n) is repeated except that Treselection is 30 s

### 6.1.2.2.5 Test Requirements

- 1) In step c), after the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- 2) In step e), there shall not be any random access requests on any cell.
- 3) In step g), the UE shall respond on Cell 2.
- 4) In step j), the UE shall select a cell to camp on. In case the UE has selected Cell 2, it shall make a reselection to Cell 1 within 10s (TS 25.133, clause A.4.2.1.2 for FDD mode and TS 25.123, clause A.4.2.1.2 for TDD mode).
- 5) In step l), there shall not be any random access requests on any cell.
- 6) In step n), the UE shall respond on Cell 2.
- 7) In step o), the UE shall respond as in previous steps except that when reselecting to Cell 2, there shall be no response from the UE on Cell 2 within 28 s of notifying UE on the BCCH modification, but the UE shall respond on Cell 2 within 35 s.

NOTE: Minimum time set by Treselection – 2 s tolerance. Maximum time set by Treselection + 1 280 msec. for DRX cycle + 1280 ms for system information block type scheduling + 2 s tolerance.

### 6.1.2.3 HCS Cell reselection

#### 6.1.2.3.1 Definition

Test to verify that the UE performs the cell reselection correctly for hierarchical cell structures. This shall be done according to the HCS priority, the received signal quality value  $Q$  and the quality level threshold criterion  $H$ .

#### 6.1.2.3.2 Conformance requirement

1. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 1.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode and in TS 25.123 for TDD mode.
  - 1.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
2. Cell Reselection Criteria for hierarchical cells:
  - 2.1 The quality level threshold criterion H for hierarchical cell structures is used to determine whether prioritised ranking according to hierarchical cell re-selection rules shall apply, and is calculated from the Q, Q<sub>hcs</sub>, TEMP\_OFFSET and PENALTY\_TIME parameters.
  - 2.2 The UE shall perform ranking of all cells that fulfil the S criterion among all cells that have the highest HCS\_PRIO among those cells that fulfil the criterion  $H \geq 0$ .
  - 2.3 The cells shall be ranked according to the R criteria. The best ranked cell is the cell with the highest R value. If an FDD cell is ranked as the best cell, the UE shall perform cell re-selection to that FDD cell. If a TDD cell is ranked as the best cell, the UE shall perform cell re-selection to that TDD cell.
  - 2.4 In all cases, the UE shall reselect the new cell, only if the cell reselection criteria are fulfilled during a time interval T<sub>reselction</sub>.
  - 2.5 The cell-ranking criterion R is derived from Q, Q<sub>hyst</sub>, Q<sub>offset</sub>, TEMP\_OFFSET, PENALTY\_TIME.

#### References

1. TS 25.304, clause 5.2.2.
2. TS 25.304, clause 5.2.6.1.4.

#### 6.1.2.3.3 Test purpose

1. Verify that the UE ignores cells with  $H < 0$  for reselection and that H is calculated from Q<sub>hcs</sub>. The modification of this parameter on the BCCH shall trigger the cell reselection evaluation process.
2. Verify that the UE ranks cells based on both HCS priority and R. Q<sub>hyst</sub>, Q<sub>offset</sub>, TEMP\_OFFSET, PENALTY\_TIME and T<sub>reselction</sub> are not applied so R equals CPICH\_RSCP for FDD cells, and P-CCPCH RSCP for TDD cells.

#### 6.1.2.3.4 Method of test

##### Initial conditions

SS shall indicate in System Information that HCS is in use.

Each cell shall include the other cells as neighbouring cells in System Information Block Type 11.

For FDD only:

Step a-c:

Parameter	Unit	Cell 1	Cell 2	Cell 3
Test channel		1	2	2
LAC		0001	0002	0003
CPICH_Ec	dBm/3.84 MHz	-70	-65	-70
HCS priority		6	7	7
Qhcs <sub>s</sub>	dBm	-80	-50	-50
Qhcs <sub>n=1</sub>	dBm	n/a	-80	-80
Qhcs <sub>n=2</sub>	dBm	-50	n/a	-50
Qhcs <sub>n=3</sub>	dBm	-50	-50	n/a
H <sub>s</sub> *	dB	10	-15	-20
H <sub>n=1</sub> *	dB	n/a	10	10
H <sub>n=2</sub> *	dB	-15	n/a	-15
H <sub>n=3</sub> *	dB	-20	-20	n/a

Step d-e:

Qhcs <sub>s</sub>	dBm	-80	-50	-50 -> -80
Qhcs <sub>n=3</sub>	dBm	-50 -> -80	-50 -> -80	n/a
H <sub>s</sub> *	dB	10	-15	-20 -> 10
H <sub>n=3</sub> *	dB	-20 -> 10	-20 -> 10	n/a

Step f-g:

Qhcs <sub>s</sub>	dBm	-80	-50 -> -80	-80
Qhcs <sub>n=2</sub>	dBm	-50 -> -80	n/a	-50 -> -80
H <sub>s</sub> *	dB	10	-15 -> 15	10
H <sub>n=2</sub> *	dB	-15 -> 15	n/a	-15 -> 15

For TDD only:

Step a-c:

Parameter	Unit	Cell 1	Cell 2	Cell 3
P-CCPCH RSCP	dBm	-69	-74	-79
HCS priority		6	7	7
Qhcs <sub>s</sub>	dBm	-89	-59	-59
Qhcs <sub>n=1</sub>	dBm	n/a	-89	-89
Qhcs <sub>n=2</sub>	dBm	-59	n/a	-59
Qhcs <sub>n=3</sub>	dBm	-59	-59	n/a
H <sub>s</sub> *	dB	20	-15	-20
H <sub>n=1</sub> *	dB	n/a	20	20
H <sub>n=2</sub> *	dB	-15	n/a	-15
H <sub>n=3</sub> *	dB	-20	-20	n/a

Step d-e:

Qhcs <sub>s</sub>	dBm	-89	-59	-59 -> -89
Qhcs <sub>n=3</sub>	dBm	-59 -> -89	-59 -> -89	n/a
H <sub>s</sub> *	dB	20	-15	-20 -> 10
H <sub>n=3</sub> *	dB	-20 -> 10	-20 -> 10	n/a

Step f-g:

Qhcss	dBm	-89	-59 -> -89	-89
Qhcsn=2	dBm	-59 -> -89	n/a	-59 -> -89
Hs*	dB	20	-15 -> 15	10
Hn=2*	dB	-15 -> 15	n/a	-15 -> 15

Test procedure

Method C is applied.

- a) The SS activates the cells 1-3 and monitors them for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The SS changes Qhcs for Cell 3, and notifies UE of the BCCH modification.
- e) The SS waits for random access requests from the UE.
- f) The SS changes Qhcs for Cell 2, and notifies UE of the BCCH modification.
- g) The SS waits for random access requests from the UE.

#### 6.1.2.3.5 Test requirements

- 1) In step c), after the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- 2) In step e), the UE shall respond on Cell 3.
- 3) In step g), the UE shall respond on Cell 2.

### 6.1.2.4 HCS Cell reselection using reselection timing parameters for the H criterion

#### 6.1.2.4.1 Definition

Test to verify that the UE performs the cell reselection correctly for hierarchical cell structures using TEMP\_OFFSET and PENALTY\_TIME applied to the H criterion.

#### 6.1.2.4.2 Conformance requirement

1. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 1.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode and in TS 25.123 for TDD mode.
  - 1.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
2. Cell Reselection Criteria for hierarchical cells:
  - 2.1 The quality level threshold criterion H for hierarchical cell structures is used to determine whether prioritised ranking according to hierarchical cell re-selection rules shall apply, and is calculated from the Q, Qhcs, TEMP\_OFFSET and PENALTY\_TIME parameters.
  - 2.2 The UE shall perform ranking of all cells that fulfil the S criterion among all cells that have the highest HCS\_PRIO among those cells that fulfil the criterion  $H \geq 0$ .
  - 2.3 The cells shall be ranked according to the R criteria. The best ranked cell is the cell with the highest R value. If an FDD cell is ranked as the best cell, the UE shall perform cell re-selection to that FDD cell. If a TDD cell is ranked as the best cell, the UE shall perform cell re-selection to that TDD cell.
  - 2.4 In all cases, the UE shall reselect the new cell, only if the cell reselection criteria are fulfilled during a time interval T<sub>reselection</sub>.

2.5 The cell-ranking criterion R is derived from Q, Q<sub>hyst</sub>, Q<sub>offset</sub>, TEMP\_OFFSET and PENALTY\_TIME.

- TEMP\_OFFSET<sub>n</sub> applies an offset to the H criteria for the duration of PENALTY\_TIME<sub>n</sub> after the timer T<sub>n</sub> has started for that cell. T<sub>n</sub> shall be started from zero when Q<sub>meas,n</sub> > Q<sub>hcs,n</sub>. TEMP\_OFFSET is only applied to the H criteria if the cells have different HCS priorities.

#### References

- TS 25.304, clause 5.2.2.
- TS 25.304, clause 5.2.6.1.4.

#### 6.1.2.4.3 Test purpose

- Verify that TEMP\_OFFSET is applied to the H criterion for a period of PENALTY\_TIME and that the timer is started when Q<sub>meas,n</sub> > Q<sub>hcs,n</sub> if serving and neighbour cell have different HCS priorities.

#### 6.1.2.4.4 Method of test

#### Initial conditions

Cell\_selection\_and\_reselection\_quality\_measure is CPICH\_RSCP (FDD).

Each cell includes the other cells in the inter-frequency neighbour cell list in System Information Block Type 11.

For FDD only:

Step a-c:

Parameter	Unit	Cell 1	Cell 2	Cell 3
Test channel		1	2	3
LAC		0001	0002	0003
CPICH_Ec	dBm/3.84 MHz	-60	-70	-70
HCS priority		2	4	7
Q <sub>hcs<sub>s</sub></sub>	dBm	-80	-50	-50
Q <sub>hcs<sub>n=1</sub></sub>	dBm	n/a	-80	-80
Q <sub>hcs<sub>n=2</sub></sub>	dBm	-50	n/a	-50
Q <sub>hcs<sub>n=3</sub></sub>	dBm	-50	-50	n/a
TEMP_OFFSET <sub>1<sub>n=1</sub></sub>	dB	n/a	0	0
TEMP_OFFSET <sub>1<sub>n=2</sub></sub>	dB	inf	n/a	0
TEMP_OFFSET <sub>1<sub>n=3</sub></sub>	dB	inf	inf	n/a
H <sub>s</sub> *	dB	20	-20	-20
H <sub>n=1</sub> *	dB	n/a	20	20
H <sub>n=2</sub> *	dBm	-20	n/a	-20
H <sub>n=3</sub> *	dBm	-20	-20	n/a
PENALTY_TIME <sub>n=1</sub>	sec	n/a	0	0
PENALTY_TIME <sub>n=2</sub>	sec	40	n/a	0
PENALTY_TIME <sub>n=3</sub>	sec	60	60	n/a

Step d-e:

Q <sub>hcs<sub>s</sub></sub>	dBm	-80	-50 -> -85	-50
Q <sub>hcs<sub>n=2</sub></sub>	dBm	-50 -> -85	n/a	-50 -> -85
Q <sub>hcs<sub>n=3</sub></sub>	dBm	-50	-50	n/a
H <sub>s</sub> *	dB	20	-20 -> 15	-20
H <sub>n=2</sub> *	dB	-inf -> 15 (after 40 sec)	n/a	-20 -> 15
H <sub>n=3</sub> *	dB	-20	-20	n/a

Step f-g:

Qhcs <sub>s</sub>	dBm	-80	-85	-50 -> -80
Qhcs <sub>n=1</sub>	dBm	n/a	-80	-80
Qhcs <sub>n=2</sub>	dBm	-85	n/a	-85
Qhcs <sub>n=3</sub>	dBm	-50->80	50->-80	n/a
H <sub>s</sub> *	dB	20	15	-20 -> 10
H <sub>n=1</sub> *	dB	n/a	20	20
H <sub>n=2</sub> *	dB	15	n/a	15
H <sub>n=3</sub> *	dB	-inf -> 10 (after 60 sec)	-inf -> 10 (after 60 sec)	n/a

For TDD only:

Step a-c:

Parameter	Unit	Cell 1	Cell 2	Cell 3
P-CCPCH RSCP	dBm	-69	-74	-74
HCS priority		2	4	7
Qhcs <sub>s</sub>	dBm	-89	-54	-54
Qhcs <sub>n=1</sub>	dBm	n/a	-89	-89
Qhcs <sub>n=2</sub>	dBm	-54	n/a	-54
Qhcs <sub>n=3</sub>	dBm	-54	-54	n/a
TEMP_OFFSET1 <sub>n=1</sub>	dB	n/a	0	0
TEMP_OFFSET1 <sub>n=2</sub>	dB	inf	n/a	0
TEMP_OFFSET1 <sub>n=3</sub>	dB	inf	inf	n/a
H <sub>s</sub> *	dB	20	-20	-20
H <sub>n=1</sub> *	dB	n/a	20	20
H <sub>n=2</sub> *	dB	-20	n/a	-20
H <sub>n=3</sub> *	dB	-20	-20	n/a
PENALTY_TIME <sub>n=1</sub>	sec	n/a	0	0
PENALTY_TIME <sub>n=2</sub>	sec	40	n/a	0
PENALTY_TIME <sub>n=3</sub>	sec	60	60	n/a

Step d-e:

Qhcs <sub>s</sub>	dBm	-89	-54 -> -94	-54
Qhcs <sub>n=2</sub>	dBm	-54 -> -94	n/a	-54 -> -94
Qhcs <sub>n=3</sub>	dBm	-54	-54	n/a
H <sub>s</sub> *	dB	20	-20 -> 20	-20
H <sub>n=2</sub> *	dB	-inf -> 20 (after 40 sec)	n/a	-20 -> 20
H <sub>n=3</sub> *	dB	-inf	-inf	n/a

Step g-f:

Qhcs <sub>s</sub>	dBm	-89	-94	-54 -> -84
Qhcs <sub>n=1</sub>	dBm	na	-89	-89
Qhcs <sub>n=2</sub>	dBm	-94	n/a	-94
Qhcs <sub>n=3</sub>	dBm	-54->84	-54->-84	n/a
H <sub>s</sub> *	dB	20	20	-20 -> 10
H <sub>n=1</sub> *	dB	n/a	20	20
H <sub>n=2</sub> *	dB	20	n/a	20
H <sub>n=3</sub> *	dB	-inf -> 10 (after 60 sec)	-inf -> 10 (after 60 sec)	n/a

Test procedure

Method C is applied.

- a) The SS activates the cells 1-3 and monitors them for random access requests from the UE.
- b) The UE is switched on.

- c) The SS waits for random access requests from the UE.
- d) The SS changes  $Q_{hcs}$  for Cell 2, and notifies UE of the BCCH modification.
- e) The SS waits for random access requests from the UE.
- f) The SS changes  $Q_{hcs}$  for Cell 3, and notifies UE of the BCCH modification.
- g) The SS waits for random access requests from the UE.

#### 6.1.2.4.5 Test requirements

- 1) In step c), after the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- 2) In step e), there shall be no response from the UE on Cell 2 within 38 s after changing the parameters in step d), but the UE shall respond on Cell 2 within 49 s (see NOTE1).
- 3) In step g), There shall be no response from the UE on Cell 3 within 58 s after changing the parameters in step f), but the UE shall respond on Cell 3 within 69 s (see NOTE2).

NOTE1: Minimum time set by PENALTY\_TIME (cell 2) - 2 s tolerance. Maximum time set by PENALTY\_TIME (cell 2) + 1 280 msec. for DRX cycle + 2 s tolerance + 5 s tolerance (for UE to read System Information).

NOTE2: Minimum time set by PENALTY\_TIME (cell 3) - 2 s tolerance. Maximum time set by PENALTY\_TIME (cell 3) + 1 280 msec. for DRX cycle + 2 s tolerance + 5 s tolerance (for UE to read System Information).

### 6.1.2.5 HCS Cell reselection using reselection timing parameters for the R criterion

#### 6.1.2.5.1 Definition

Test to verify that the UE performs the cell reselection correctly for hierarchical cell structures using TEMP\_OFFSET and PENALTY\_TIME applied to the R criterion.

#### 6.1.2.5.2 Conformance requirement

- 1. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 1.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode and in TS 25.123 for TDD mode.
  - 1.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
- 2. Cell Reselection Criteria for hierarchical cells:
  - 2.1 The quality level threshold criterion H for hierarchical cell structures is used to determine whether prioritised ranking according to hierarchical cell re-selection rules shall apply, and is calculated from the Q,  $Q_{hcs}$ , TEMP\_OFFSET and PENALTY\_TIME parameters.
  - 2.2 The UE shall perform ranking of all cells that fulfil the S criterion among all cells, not considering HCS priority levels, if no cell fulfil the criterion  $H \geq 0$ .
  - 2.3 The cells shall be ranked according to the R criteria. The best ranked cell is the cell with the highest R value. If a FDD cell is ranked as the best cell, the UE shall perform cell re-selection to that FDD cell. If a TDD cell is ranked as the best cell, the UE shall perform cell re-selection to that TDD cell.
  - 2.4 In all cases, the UE shall reselect the new cell, only if the cell reselection criteria are fulfilled during a time interval  $T_{reselection}$ .
  - 2.5 The cell-ranking criterion R is derived from Q,  $Q_{hyst}$ ,  $Q_{offset}$ , TEMP\_OFFSET, PENALTY\_TIME.
- 3. TEMP\_OFFSET<sub>n</sub> applies an offset to the R criteria for the duration of PENALTY\_TIME<sub>n</sub> after the timer  $T_n$  has started for that cell.  $T_n$  shall be started from zero when  $Q_{meas,n} > Q_{meas,s} + Q_{offset2,s,n}$ . TEMP\_OFFSET is only applied to the R criteria if the cells have identical priorities.

## References

1. TS 25.304, clause 5.2.2.
- 2,3. TS 25.304, clause 5.2.6.1.4.

## 6.1.2.5.3 Test purpose

1. Verify that TEMP\_OFFSET is applied to the R criterion for a period of PENALTY\_TIME if serving and neighbour cell have identical HCS priorities and that the timer is started when  $Q_{\text{meas},n} > Q_{\text{meas},s} + Q_{\text{offset1}}_{s,n}$ .

## 6.1.2.5.4 Method of test

## Initial conditions

Cell\_selection\_and\_reselection\_quality\_measure is CPICH\_RSCP (FDD).

For FDD only:

Step a-c:

Parameter	Unit	Cell 1	Cell 2	Cell 3
LAC		0001	0002	0003
CPICH_Ec	dBm/3.84 MHz	-60	-70	-75
HCS priority		1	1	1
$Q_{\text{hcs}_s}$	dBm	-80	-80	-80
TEMP_OFFSET1 <sub>n=1</sub>	dB	n/a	0	0
TEMP_OFFSET1 <sub>n=2</sub>	dBm	inf	n/a	0
TEMP_OFFSET1 <sub>n=3</sub>	dBm	inf	inf	n/a
PENALTY_TIME <sub>n=1</sub>	sec	n/a	0	0
PENALTY_TIME <sub>n=2</sub>	sec	40	n/a	0
PENALTY_TIME <sub>n=3</sub>	sec	60	60	n/a
$H_s^*$	dBm	20	10	5
$H_{n=1}^*$	dB	n/a	20	20
$H_{n=2}^*$	dBm	10	n/a	10
$H_{n=3}^*$	dBm	5	5	n/a
$R_s^*$	dBm	-60	-70	-75
$R_{n=1}^*$	dBm	n/a	-60	-60
$R_{n=2}^*$	dBm	-70	n/a	-70
$R_{n=3}^*$	dBm	-75	-75	n/a

Step d-e:

CPICH_Ec	dBm/3.84 MHz	-60 -> -70	-70 -> -65	-75
$R_s^*$	dBm	-60 -> -70	-70 -> -65	-75
$R_{n=1}^*$	dBm	n/a	-60 -> -70	-60 -> -70
$R_{n=2}^*$	dBm	-inf -> -65 (after 40 sec)	n/a	-70 -> -65
$R_{n=3}^*$	dBm	-75	--75	n/a

Step f-g:

CPICH_Ec	dBm/3.84 MHz	-70	-65	-75 -> -60
R <sub>s</sub> *	dBm	-70	-65	-75->-60
R <sub>n=1</sub> *	dBm	n/a	-70	-70
R <sub>n=2</sub> *	dBm	-65	n/a	-65
R <sub>n=3</sub> *	dBm	-inf -> -60 (after 60 sec)	-inf -> -60 (after 60 sec)	n/a

For TDD only:

Step a-c:

Parameter	Unit	Cell 1	Cell 2	Cell 3
P-CCPCH RSCP	dBm	-69	-79	-84
HCS priority		1	1	1
Q <sub>hcs<sub>s</sub></sub>	dBm	-89	-89	-89
TEMP_OFFSET1 <sub>n=1</sub>	dB	n/a	0	0
TEMP_OFFSET1 <sub>n=2</sub>	dB	inf	n/a	0
TEMP_OFFSET1 <sub>n=3</sub>	dB	inf	inf	n/a
PENALTY_TIME <sub>n=2</sub>	sec	n/a	0	0
PENALTY_TIME <sub>n=2</sub>	sec	40	n/a	0
PENALTY_TIME <sub>n=3</sub>	sec	60	60	n/a
H <sub>s</sub> *	dB	20	10	5
H <sub>n=1</sub> *	dB	n/a	20	20
H <sub>n=2</sub> *	dB	10	n/a	10
H <sub>n=3</sub> *	dB	5	5	n/a
R <sub>s</sub> *	dBm	-69	-79	-84
R <sub>n=1</sub> *	dBm	n/a	-69	-69
R <sub>n=2</sub> *	dBm	-79	n/a	-79
R <sub>n=3</sub> *	dBm	-84	-84	n/a

Step d-e:

P-CCPCH RSCP	dBm	-69 -> -79	-79 -> -74	-84
R <sub>s</sub> *	dBm	-69 -> -79	-79 -> -74	-84
R <sub>n=1</sub> *	dBm	n/a	-69 -> -79	-69 -> -79
R <sub>n=2</sub> *	dBm	-inf -> -74 (after 40 sec)	n/a	-79 -> -74
R <sub>n=3</sub> *	dBm	-84	-84	n/a

Step f-g:

P-CCPCH RSCP	dBm	-79	-74	-84 -> -69
R <sub>s</sub> *	dBm	-79	-74	-84 -> -69
R <sub>n=1</sub> *	dBm	n/a	-79	-79
R <sub>n=2</sub> *	dBm	-74	n/a	-74
R <sub>n=3</sub> *	dBm	-inf -> -69 (after 60 sec)	-inf -> -69 (after 60 sec)	n/a

Test procedure

Method C is applied.

- The SS activates the cells 1-3 and monitors them for random access requests from the UE.
- The UE is switched on.
- The SS waits for random access requests from the UE.
- The SS changes the power level of Cell 1-2.
- The SS waits for random access requests from the UE.

- f) The SS changes the power level of Cell 3.
- g) The SS waits for random access requests from the UE.

#### 6.1.2.5.5 Test requirements

- 1) In step c), after the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- 2) In step e), there shall be no response from the UE on Cell 2 within 38 s after changing the parameters in step d), but the UE shall respond on Cell 2 within 50 s (see NOTE1).
- 3) In step g), there shall be no response from the UE on Cell 3 within 58 s after changing the parameters in step f), but the UE shall respond on Cell 2 within 70 s (see NOTE2).

NOTE1: Minimum time set by PENALTY\_TIME (cell 2) – 2 s tolerance. Maximum time set by PENALTY\_TIME (cell 2) + 6.4 s ( $T_{\text{evaluateFDD}}$  from TS 25.133, table 4.1 for FDD mode and  $T_{\text{evaluateTDD}}$  from TS 25.123, table 4.1 for TDD mode) + 1 280 msec + 2 s tolerance.

NOTE2: Minimum time set by PENALTY\_TIME (cell 3) – 2 s tolerance. Maximum time set by PENALTY\_TIME (cell 3) + 6.4 s ( $T_{\text{evaluateFDD}}$  from TS 25.133, table 4.1 for FDD mode and  $T_{\text{evaluateTDD}}$  from TS 25.123, table 4.1 for TDD mode) + 1 280 msec + 2 s tolerance.

### 6.1.2.6 Emergency calls

#### 6.1.2.6.1 Definition

Test to verify that the UE shall be able to initiate emergency calls when no suitable cells of the selected PLMN are available, but at least one acceptable cell is available.

#### 6.1.2.6.2 Conformance requirement

##### 1. Acceptable cell:

An "acceptable cell" is a cell on which the UE may camp to obtain limited service (originate emergency calls). Such a cell shall fulfil the following requirements, which is the minimum set of requirements to initiate an emergency call in a UTRAN network:

- 1.1 The cell is not barred;
- 1.2 The cell selection criteria are fulfilled.
2. A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.
  - 2.1 The cell is part of the selected PLMN or, of a PLMN considered as equivalent by the UE according to the information provided by the NAS.
  - 2.2 The cell is not barred.
  - 2.3 The cell is not part of the list of "forbidden LAs for roaming".
  - 2.4 The cell selection criteria are fulfilled.
3. If the UE is unable to find any suitable cell of selected PLMN the UE shall enter the *Any cell selection* state.
4. Any Cell Selection State: In this state, the UE shall attempt to find an acceptable cell of any PLMN to camp on, trying all RATs that are supported by the UE and searching first for a high quality cell. The UE, which is not camped on any cell, shall stay in this state until an acceptable cell is found.
5. Camped on Any Cell State: In this state the UE obtains limited service. The UE shall regularly attempt to find a suitable cell of the selected PLMN, trying RATs that are supported by the UE. If a suitable cell is found, this causes an exit to the Camped normally State.
6. In the Camped on Any Cell State, the UE shall perform the cell reselection evaluation process on the following occasions/triggers:

6.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode and TS 25.123 for TDD mode.

6.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.

#### References

1. TS 25.304, clause 4.3.
2. TS 25.304, clause 4.3.
3. TS 25.304, clause 5.2.2.1.
4. TS 25.304, clause 5.2.8.
5. TS 25.304, clause 5.2.2.5.
6. TS 25.304, clause 5.2.9.1.

#### 6.1.2.6.3 Test purpose

1. To verify that the UE shall be able to initiate emergency calls when no suitable cells of the selected PLMN are available, but at least one acceptable cell is available.
2. To verify that the UE selects a cell with  $S > 0$  and CellBarred = Not Barred (i.e. an "acceptable cell") when no suitable cells of the selected PLMN are available.
3. To verify that the UE ranks the acceptable cells according to the cell-ranking criterion R which in this test case equals Q as Qhyst, Qoffset, TEMP\_OFFSET and PENALTY\_TIME parameters are not used. Treselection is not used either.

#### 6.1.2.6.4 Method of test

##### Initial conditions

In step a-d, Cell 1 and 4 are neither suitable nor acceptable cells. Cell 7 is an acceptable cell but not suitable.

In step e-f, both Cell 1 and 7 are acceptable cells.

Prior to performing the actual test procedure PLMN3 is set as forbidden PLMN, so that the USIM will contain the following information:

USIM field	PLMN
EF <sub>FPLMN</sub>	PLMN 3

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

All cells in this test case belong to PLMN 3.

Each cell shall include the other cells in the neighbour cell list in System Information Block Type 11.

Step a-d:

For FDD only:

Parameter	Unit	Cell 1	Cell 4	Cell 7
Test Channel		1	2	3
CPICH_Ec	dBm/3.84 MHz	-65	-60	-70
Qrxlevmin	dBm	-81	-51	-81
Qqualmin	dB	-16	-16	-16
Srxlev*	dB	16	-9	11
CellBarred		Barred	Not barred	Not barred
Tbarred		10s		

For TDD only:

Parameter	Unit	Cell 1	Cell 3	Cell 7
Test Channel		1	2	3
P-CCPCH RSCP	dBm	-69	-64	-74
CellBarred		Barred	Not barred	Not barred
Tbarred		10s		

Step e-f:

CellBarred		Barred -> Not barred	0	0
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### Test procedure

Method C is applied.

- a) The SS activates the cells and monitors them for random access requests from the UE.
- b) The UE is switched on.
- c) 50 s after switch on, an emergency call is initiated on the UE.
- d) The SS waits for random access request from the UE.
- e) The SS changes the CellBarred of Cell 1 to 'Not barred'.
- f) After 30 s an emergency call is initiated on the UE.
- g) The SS waits for random access request from the UE.

#### 6.1.2.6.5 Test requirements

- 1) In step d), the first access from the UE shall be on Cell 7.
- 2) In step g), the first access from the UE shall be on Cell 1.

#### 6.1.2.7 Void

#### 6.1.2.8 Cell reselection: Equivalent PLMN

##### 6.1.2.8.1 Definition

Test to verify that the UE performs the cell reselection correctly to a cell belonging to a PLMN Equivalent to the registered PLMN, if the serving cell of registered PLMN becomes barred or  $S < 0$ .

##### 6.1.2.8.2 Conformance requirement

1. When camped on a cell, the UE shall regularly search for a better cell according to the cell reselection criteria. If a better cell is found, that cell is selected. The change of cell may imply a change of RAT.
2. A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.
  - 2.1 The cell is part of the selected PLMN or of a PLMN considered as equivalent by the UE according to the information provided by the NAS
  - 2.2 The cell is not barred
  - 2.3 The cell is not part of the list of "forbidden LAs for roaming"
  - 2.4 The cell selection criteria are fulfilled
3. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:

3.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode and in TS 25.123 for TDD mode.

3.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified

#### 4. Cell Reselection Criteria:

4.1 The UE shall perform ranking of all cells that fulfil the S criterion

4.2 The cells shall be ranked according to the R criteria, deriving  $Q_{meas,n}$  and  $Q_{meas,s}$  and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in TS 25.133 and TS 25.123 for FDD, TDD and GSM cells, respectively.

The offset  $Q_{offset1,s,n}$  is used for  $Q_{offset,s,n}$  to calculate  $R_n$ , the hysteresis  $Q_{hyst1,s}$  is used for  $Q_{hyst,s}$  to calculate  $R_s$ .

If the usage of HCS is indicated in system information,  $TEMP\_OFFSET1_n$  is used for  $TEMP\_OFFSET_n$  to calculate  $TO_n$ . If it is indicated in system information that HCS is not used,  $TEMP\_OFFSET_n$  is not applied when calculating  $R_n$ . The best ranked cell is the cell with the highest R value.

If a TDD cell is ranked as the best cell, the UE shall perform cell re-selection to that TDD cell.

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH RSCP, the UE shall perform cell re-selection to that FDD cell.

4.3 In all cases, the UE shall reselect the new cell, only if the following conditions are met:

- the new cell is better ranked than the serving cell during a time interval  $T_{reselection}$ .
- more than 1 second has elapsed since the UE camped on the current serving cell.

#### 5. When cell status "barred" is indicated, the UE shall select another cell according to the following rule:

5.1 If the "Intra-frequency cell re-selection indicator" IE in Cell Access Restriction IE is set to value "allowed", the UE may select another cell on the same frequency if selection/re-selection criteria are fulfilled.

- If the UE is camping on another cell, the UE shall exclude the barred cell from the neighbouring cell list until the expiry of a time interval  $T_{barred}$ . The time interval  $T_{barred}$  is sent via system information in a barred cell together with Cell status information in the Cell Access Restriction IE.
- If the UE does not select another cell, and the barred cell remains to be the "best" one, the UE shall after expiry of the time interval  $T_{barred}$  again check whether the status of the barred cell has changed.

5.2 If the "Intra-frequency cell re-selection indicator" IE is set to "not allowed" the UE shall not re-select a cell on the same frequency as the barred cell. For emergency call, the Intra-frequency cell re-selection indicator IE shall be ignored, i.e. even if it is set to "not allowed" the UE may select another intra-frequency cell.

#### References

1. TS 25.304, 5.2.1
2. TS 25.304, 4.3
3. TS 25.304, 5.2.5.1
4. TS 25.304, 5.2.6.1.4
5. TS 25.304, 5.3.1.1

#### 6.1.2.8.3 Test purpose

1. To confirm that the UE treats the cell of the equivalent PLMN as a cell of the current PLMN.
2. To verify that the UE performs cell reselection on the following occasions:
  - 2.1 Serving cell becomes barred.

2.2  $S < 0$  for serving cell.

3. To verify conformance requirement 5.

NOTE: Reselection triggered by the cell becoming a part of a forbidden registration area is tested in clause 9.4.2.3 "Location updating / rejected / location area not allowed" and 9.4.2.4 "Location updating / rejected / roaming not allowed in this LA".

#### 6.1.2.8.4 Method of test

##### Initial conditions

Reselection,  $Q_{hyst}$ ,  $Q_{offset}$ ,  $TEMP\_OFFSET$  and  $PENALTY\_TIME$  are not used, so the cell-ranking criterion  $R$  equals  $CPICH\_RSCP$  for FDD cells, and  $P-CCPCH\_RSCP$  for TDD cells.

The UE is Idle Updated on PLMN1 in cell 1.

Cell 1 indicates in System Information Block Type 11 that Cell 2 and Cell 4 are neighbouring cells.

Cell 2 indicates in System Information Block Type 11 that Cell 1 and Cell 4 are neighbouring cells.

Cell 4 indicates in System Information Block Type 11 that Cell 1 and Cell 2 are neighbouring cells.

Step a-c (FDD):

Parameter	Unit	Cell 1	Cell 2	Cell 4
Test Channel		1	1	2
PLMN		PLMN 1	PLMN 2	PLMN 3
CPICH_Ec	dBm/ 3.84 MHz	-60	-67	-80
$Q_{rxlevmin}$	dBm	-115	-115	-115
$Q_{qualmin}$	dB	-16	-16	-16
$S_{rxlev}^*$	dB	55	48	35
CellBarred		Not barred	Not barred	Not barred

Step a-c (TDD):

Parameter	Unit	Cell 1	Cell 2	Cell 4
Test Channel		1	1	2
PLMN		PLMN 1	PLMN 2	PLMN 3
P-CCPCH RSCP	dBm	-69	-74	-79
$Q_{rxlevmin}$	dBm	-103	-103	-103
$S_{rxlev}^*$	dB	34	29	24

Step d-f:

CellBarred		Not barred->Barred		
Intra-frequency cell re-selection indicator		Not Allowed		
$T_{barred}$	s	10		

Step g-h:

Intra-frequency cell re-selection indicator		Not Allowed -> Allowed		
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Step i-k:

Parameter	Unit	Cell 1	Cell 2	Cell 4
CellBarred		Barred -> Not barred	Not barred	Not barred

Step l-m (FDD):

Qrxlevmin	dBm	-115 -> -51	-115	-115
Qqualmin	dB	-16	-16	-16
Srxlev*	dBm	55 -> -9	48	35

Step l-m (TDD):

Qrxlevmin	dBm	-103 -> -59	-103	-103
Srxlev*	dBm	34 -> -10	29	24

### Test procedure

Method C is applied.

- a) The UE is switched off. The SS activates Cell 2 and 4.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE. A complete Location Update is done. SS specifies PLMN 2 and 3 are Equivalent to PLMN 1 in Location Update Accept Message. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure. In these cases, the GMM Attach Accept message shall include PLMN 2 and PLMN 3 in the equivalent PLMN list.
- d) The SS sets Cell 1 to be barred. The SS notifies UE of the BCCH modification.
- e) The SS waits for random access requests from the UE. A complete Location Update is done. SS specifies PLMN 1 and 2 are Equivalent to PLMN 3 in Location Update Accept Message. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM Routing Area Updating procedure. In these cases, the Routing Area Update Accept message shall include PLMN 1 and PLMN 2 in the equivalent PLMN list.
- f) The SS sets "Intra-frequency cell re-selection indicator" to "Allowed".
- g) The SS waits for random access requests from the UE. A complete Location Update is done. SS specifies PLMN 1 and 3 are Equivalent to PLMN 2 in Location Update Accept Message. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by a Routing Area Updating procedure. In these cases, the Routing Area Update Accept message shall include PLMN 1 and PLMN 3 in the equivalent PLMN list.
- h) Void
- i) The SS sets Cell 1 to be not barred.
- j) Void
- k) The SS waits for random access requests from the UE. A complete Location Update is done. SS specifies PLMN 2 and 3 are Equivalent to PLMN 1 in Location Update Accept Message. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by a Routing Area Updating procedure. In these cases, the Routing Area Update Accept message shall include PLMN 2 and PLMN 3 in the equivalent PLMN list.
- l) For FDD cell, Qrxlev min is increased to -51 dBm, so S will become negative.  
For TDD cell, Qrxlev min is increased to -59 dBm, so S will become negative.  
The SS notifies UE of the BCCH modification
- m) The SS waits for random access requests from the UE.

#### 6.1.2.8.5 Test requirements

- 1) In step c), after the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- 2) In step e), the UE shall respond on Cell 4.
- 3) In step g), the UE shall respond on Cell 2.
- 4) In step k), the UE shall respond on Cell 1. After the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- 5) In step m), the UE shall respond on Cell 2.

#### 6.1.2.9 Void

#### 6.1.2.9a Cell reselection using cell status and cell reservations – Type “A” USIM

##### 6.1.2.9a.1 Definition

Test to verify that the UE correctly interprets cell status and cell reservations when performing cell reselection.

##### 6.1.2.9a.2 Conformance requirement

1. When cell status is indicated as "not barred", "not reserved" for operator use and "not reserved" for future extension (Cell Reservation Extension),
  - the UE may select/re-select this cell during the cell selection and cell re-selection procedures in Idle mode and in Connected mode.
2. When cell status is indicated as "not barred", "not reserved" for operator use and "reserved" for future extension (Cell Reservation Extension),
  - UEs shall behave as if cell status "barred" is indicated using the value "not allowed" in the IE "Intra-frequency cell re-selection indicator" and the maximum value for  $T_{\text{barred}}$ , see [8] (see also below).
3. When cell status is indicated as "not barred" and "reserved" for operator use,
  - UEs assigned to Access Class 11 or 15 may select/re-select this cell if in the home PLMN.
  - UEs assigned to an Access Class in the range 0 to 9 and 12 to 14 shall behave as if cell status "barred" is indicated using the value "not allowed" in the IE "Intra-frequency cell re-selection indicator" and the maximum value for  $T_{\text{barred}}$ , see [8] (see also below).
4. When cell status "barred" is indicated,
  - The UE is not permitted to select/re-select this cell, not even for emergency calls.
  - The UE shall ignore the "Cell Reserved for future extension (Cell Reservation Extension) use" IE.
  - The UE shall select another cell according to the following rule:
    - If the "Intra-frequency cell re-selection indicator" IE in Cell Access Restriction IE is set to value "allowed", the UE may select another cell on the same frequency if selection/re-selection criteria are fulfilled.
    - If the UE is camping on another cell, the UE shall exclude the barred cell from the neighbouring cell list until the expiry of a time interval  $T_{\text{barred}}$ . The time interval  $T_{\text{barred}}$  is sent via system information in a barred cell together with Cell status information in the Cell Access Restriction IE.
    - If the UE does not select another cell, and the barred cell remains to be the "best" one, the UE shall after expiry of the time interval  $T_{\text{barred}}$  again check whether the status of the barred cell has changed.
    - If the "Intra-frequency cell re-selection indicator" IE is set to "not allowed" the UE shall not re-select a cell on the same frequency as the barred cell. For emergency call, the Intra-frequency cell re-selection indicator IE shall be ignored, i.e. even if it is set to "not allowed" the UE may select another intra-frequency cell.

- If the barred cell remains to be the "best" one, the UE shall after expiry of the time interval  $T_{\text{barred}}$  again check whether the status of the barred cell has changed.

The reselection to another cell may also include a change of RAT.

#### Reference(s)

3GPP TS 25.304, clause 5.3.1.1

#### 6.1.2.9a.3 Test purpose

- To verify that when cell status is indicated as "not barred" and "reserved" for operator use,
  - UEs assigned to an Access Class in the range 0 to 9 shall behave as if cell status "barred" is indicated using the value "not allowed" in the IE "Intra-frequency cell re-selection indicator" and the maximum value for  $T_{\text{barred}}$ .

#### 6.1.2.9a.4 Method of test

##### Initial conditions

Use of USIM with "Type A"  $EF_{\text{ACC}}$  as defined in TS 34.108.

Step a-c (FDD):

Parameter	Unit	Cell 1	Cell 2	Cell 4
Test Channel		1	1	2
LAC		0001	0002	0003
CPICH_Ec	dBm/3.84 MHz	-58	-68	-78
Qqualmin	dB	-16	-24	-16
Qrxlevmin	dBm	-83	-83	-83
Srxlev*	dB	25	15	5
Cell Reserved for operator use		not reserved	not reserved	not reserved
Cell Reservation Extension		not reserved	not reserved	not reserved

Step a-c (TDD):

Parameter	Unit	Cell 1	Cell 2	Cell 4
Test Channel		1	1	2
LAC		0001	0002	0003
P-CCPCH RSCP	dBm	-68	-73	-78
Qrxlevmin	dBm	-83	-83	-83
Srxlev*	dB	15	10	5

Step d-e:

Cell Reserved for operator use		not reserved -> reserved	not reserved	not reserved
Cell Reservation Extension		not reserved	not reserved	not reserved

Step f-g:

Cell Reserved for operator use		reserved -> not reserved	not reserved	not reserved
Cell Reservation Extension		not reserved	not reserved	not reserved

#### Related ICS/IXIT Statement(s)

None

## Test procedure

Method C applied.

- a) The SS activates Cell 1, 2 and 4, and monitors them for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits to see if there are any random access requests from the UE.
- d) The SS sets Cell 1 to "reserved" for operator use. The SS notifies UE of the BCCH modification.
- e) The SS waits to see if there are any random access requests from the UE.
- f) The SS sets Cell 1 to "not reserved" for operator use.
- g) The SS waits to see if there are any random access requests from the UE.

### 6.1.2.9a.5 Test requirements

- 1) In step c), the UE shall respond on Cell 1.
- 2) In step e), the UE shall respond on Cell 4.
- 3) In step g), the UE shall respond on Cell 1 after 1280 seconds (maximum value for  $T_{\text{barred}}$ ) from SS notified UE of the BCCH modification in Cell 1 in step d).

### 6.1.2.9b Cell reselection using cell status and cell reservations – Type “B” USIM

#### 6.1.2.9b.1 Definition

This test case is identical to test case 6.1.2.9a except that the USIM used for this test case is of type “B”.

#### 6.1.2.9b.2 Conformance requirement

Same conformance requirement as in clause 6.1.2.9a.2

#### 6.1.2.9b.3 Test purpose

1. To verify that when cell status is indicated as "not barred", "not reserved" for operator use and "reserved" for future extension (Cell Reservation Extension),
  - UEs behave as if cell status "barred" is indicated using the value "not allowed" in the IE "Intra-frequency cell re-selection indicator" and the maximum value for  $T_{\text{barred}}$ .
2. To verify that when cell status is indicated as "not barred" and "reserved" for operator use,
  - UEs assigned to Access Class 11-15 may select/re-select this cell if in the home PLMN.

#### 6.1.2.9b.4 Method of test

Initial conditions

Test procedure: Use of USIM with "Type B"  $EF_{\text{ACC}}$  as defined in TS 34.108.

Step a-c (FDD):

Parameter	Unit	Cell 1	Cell 2	Cell 4
LAC		0001	0002	0003
Test Channel		1	1	2
CPICH_Ec	dBm/3.84 MHz	-58	-68	-78
Qqualmin	dB	-16	-24	-16
Qrxlevmin	dBm	-83	-83	-83
Srxlev*	dB	25	15	5
Cell Reserved for operator use		not reserved	not reserved	not reserved
Cell Reservation Extension		not reserved	not reserved	not reserved

Step a-c (TDD):

Parameter	Unit	Cell 1	Cell 2	Cell 4
LAC		0001	0002	0003
Test Channel		1	1	2
P-CCPCH RSCP	dBm	-68	-73	-78
Qrxlevmin	dBm	-83	-83	-83
Srxlev*	dB	15	10	5

Step d-e:

Cell Reserved for operator use		not reserved	not reserved	not reserved
Cell Reservation Extension		not reserved -> reserved	not reserved	not reserved

Step f-g:

Cell Reserved for operator use		not reserved -> reserved	not reserved	not reserved
Cell Reservation Extension		reserved	not reserved	not reserved

Related ICS/IXIT Statement(s)

None

Test procedure

Method C applied.

- a) The SS activates Cell 1, 2 and 4, and monitors them for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits to see if there are any random access requests from the UE.
- d) The SS sets Cell 1 to "reserved" for future extension. The SS notifies UE of the BCCH modification.
- e) The SS waits to see if there are any random access requests from the UE.
- f) The SS sets Cell 1 to "reserved" for operator use.
- g) The SS waits to see if there are any random access requests from the UE.

#### 6.1.2.9b.5 Test requirements

- 1) In step c), the UE shall respond on Cell 1.
- 2) In step e), the UE shall respond on Cell 4.

- 3) In step g), the UE shall respond on Cell 1 after 1280 seconds (maximum value for Tbarred) from SS notified UE of the BCCH modification in Cell 1 in step d).

### 6.1.2.10 HCS inter-frequency cell reselection

#### 6.1.2.10.1 Definition

Test to verify that the UE performs inter-frequency cell reselection correctly for hierarchical cell structures in FDD. This shall be done according to the received signal quality value Q and the quality level thresholds Sintrasearch, Sintersearch and SsearchHCS.

#### 6.1.2.10.2 Conformance requirement

1. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 1.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode.
  - 1.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
2. Cell Reselection Criteria for hierarchical cells:
  - 2.1 The quality level thresholds for measurement rules for cell reselection can be used to control inter-frequency cell reselections. Intra-frequency cell reselections shall still be performed if Sintrasearch is not sent.
  - 2.2 The quality level threshold criterion H for hierarchical cell structures is used to determine whether prioritised ranking according to hierarchical cell re-selection rules shall apply, and is calculated from the Q, Qhcs, TEMP\_OFFSET and PENALTY\_TIME parameters.
  - 2.3 The UE shall perform ranking of all cells that fulfil the S criterion among all cells that have the highest HCS\_PRIO among those cells that fulfil the criterion  $H \geq 0$ .
  - 2.4 The cells shall be ranked according to the R criteria. The best ranked cell is the cell with the highest R value. If an FDD cell is ranked as the best cell, the UE shall perform cell re-selection to that FDD cell. If a TDD cell is ranked as the best cell, the UE shall perform cell re-selection to that TDD cell.
  - 2.5 In all cases, the UE shall reselect the new cell, only if the cell reselection criteria are fulfilled during a time interval T<sub>reselection</sub>.
  - 2.6 The cell-ranking criterion R is derived from Q, Q<sub>hyst</sub>, Q<sub>offset</sub>, TEMP\_OFFSET, PENALTY\_TIME.

#### References

1. TS 25.304, clause 5.2.2.
2. TS 25.304, clause 5.2.6.1.2.
3. TS 25.304, clause 5.2.6.1.4.

#### 6.1.2.10.3 Test purpose

1. Verify that in FDD the UE ignores inter-frequency cells for reselection when the inter-frequency cells have equal or lower HCS priority than the serving cell, and Sintrasearch is not sent, and Sintersearch < Squal and SsearchHCS < Srxlev.
2. Verify that in FDD the UE reselect to an inter-frequency cells when Sintrasearch is not sent, and Sintersearch < Squal but SsearchHCS > Srxlev. The modification of this parameter on the BCCH shall trigger the cell reselection evaluation process. Q<sub>hyst</sub>, Q<sub>offset</sub>, TEMP\_OFFSET, PENALTY\_TIME and T<sub>reselection</sub> are not applied so R equals CPICH\_RSCP for FDD cells.

#### 6.1.2.10.4 Method of test

##### Initial conditions

SS shall indicate in System Information that HCS is in use.

Each cell shall include the other cells as neighbouring cells in System Information Block Type 11.

For FDD only:

Step a- d:

Parameter	Unit	Cell 1	Cell 2	Cell 3
Test Channel		1	1	2
LAC		0001	0002	0003
HCS priority		6	6	6
CPICH_Ec	dBm/3.84 MHz	-70	-65	-60
CPICH_Ec/No	dB	-11	-6	-5
Qrxlevmin	dBm	-109	-105	-99
Qqualmin	dB	-24	-24	-24
Srxlev*	dB	39	40	39
Squal*	dB	13	18	19
Sintrasearch	dB	8	8	8
Sintersearch	dB	8	8	8
SsearchHCS	dB	31	31	31
Qhcs <sub>s</sub>	dBm	-80	-80	-80
Qhcs <sub>n=1</sub>	dBm	n/a	-80	-80
Qhcs <sub>n=2</sub>	dBm	-80	n/a	-80
Qhcs <sub>n=4</sub>	dBm	-80	-80	n/a
H <sub>s</sub> *	dB	10	15	20
H <sub>n=1</sub> *	dB	n/a	10	10
H <sub>n=2</sub> *	dB	15	n/a	15
H <sub>n=4</sub> *	dB	20	20	n/a

Step e-f:

Sintrasearch	dB	8 -> n/a	8 -> n/a	8 -> n/a
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Step g-h:

Srxlev*	dB	39	40->20	39
Qrxlevmin	dBm	-109	-105 -> -85	-99

Test procedure

Method C is applied.

- The SS activates cell 1.
- The UE is switched on.
- The SS waits for random access requests from the UE.
- The SS activates cells 2 and 3 and monitors them for random access requests from the UE.
- The SS stops the transmission of Sintrasearch in all cells, and notifies UE of the BCCH modification.
- The SS waits for random access requests from the UE.
- The SS changes Qrxlevmin for Cell 2, and notifies UE of the BCCH modification.
- The SS waits for random access requests from the UE.

#### 6.1.2.10.5 Test requirements

- In step c, the UE shall respond on cell 1.
- In step d, the UE shall not respond on cell 2 or 3.
- In step f), the UE shall respond on Cell 2.
- In step h), the UE shall respond on Cell 3.

### 6.1.2.10a HCS inter-frequency cell reselection for inter-band operation

#### 6.1.2.10a.1 Definition

This test case is identical to test case 6.1.2.10 except that the inter-frequency cell to be reselected is on a different frequency band.

#### 6.1.2.10a.2 Conformance requirement

Same conformance requirement as in clause 6.1.2.10.2.

#### 6.1.2.10a.3 Test purpose

Same test purpose as in clause 6.1.2.10.3 except that the inter-frequency cell to be reselected is on a different frequency band.

#### 6.1.2.10a.4 Method of test

Initial conditions

Same initial conditions as in clause 6.1.2.10.4 except that cells 1 and 2 use test channel 1 as specified in Table 6.3 for the primary band and that cell 3 uses test channel 2 as specified in Table 6.3 for the secondary band. Primary and secondary bands are selected according to PIXIT parameters.

Related ICS/IXIT statement(s)

- UE supports multiple bands simultaneously yes/no

Test procedure

Same test procedure as in clause 6.1.2.10.4.

NOTE: If the UE supports more than 2 frequency bands, the test may be executed for various band combinations.

#### 6.1.2.10a.5 Test requirements

Same test requirement as in clause 6.1.2.10.5.

### 6.1.2.11 Cell reselection in shared network environment

#### 6.1.2.11.1 Definition

Test to verify that the UE performs cell reselection according to core specification 25.304 in a shared network environment (FDD). Correct handling of equivalent PLMNs is also verified.

#### 6.1.2.11.2 Conformance requirement

1. suitable cell:

A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.

- The cell shall be part of either:
  - the selected PLMN, or;
  - the registered PLMN, or;
  - a PLMN of the Equivalent PLMN list
 according to the latest information provided by the NAS.
- The cell is not barred, see subclause 5.3.1.1;
- The cell is part of at least one LA that is not part of the list of "forbidden LAs for roaming" [9], which belongs to a PLMN that fulfils the first bullet above;
- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2.

If the IE "Multiple PLMN List" [4] is broadcast in the cell, the cell is considered to be part of all LAs with LAIs constructed from the PLMN identities in the "Multiple PLMN List" and the LAC broadcast in the cell.

2. When camped on a cell, the UE shall regularly search for a better cell according to the cell reselection criteria. If a better cell is found, that cell is selected. The change of cell may imply a change of RAT.
3. When camped normally, the UE shall perform the following tasks:
  - select and monitor the indicated PICH and PCH of the cell as specified in clause 8 according to information sent in system information;
  - monitor relevant System Information. This is specified in [4];
  - perform necessary measurements for the cell reselection evaluation procedure;
  - execute the cell reselection evaluation process on the following occasions/triggers:
    - 1) UE internal triggers, so as to meet performance as specified in [10] and [11];
    - 2) When information on the BCCH used for the cell reselection evaluation procedure has been modified

#### 4. Cell Reselection Criteria:

- 4.1 If HCS is not used in the serving cell the UE shall perform ranking of all cells that fulfil the criterion  $S$ , among:
  - all measured cells (see subclause 5.2.6.1.1).

- 4.2 The cells shall be ranked according to the R criteria, deriving  $Q_{meas,n}$  and  $Q_{meas,s}$  and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in TS 25.133 and TS 25.123 for FDD, TDD and GSM cells, respectively.

The offset  $Q_{offset1_{s,n}}$  is used for  $Q_{offset_{s,n}}$  to calculate  $R_n$ , the hysteresis  $Q_{hyst1_s}$  is used for  $Q_{hyst_s}$  to calculate  $R_s$ .

...

If the usage of HCS is indicated in system information,  $TEMP\_OFFSET1_n$  is used for  $TEMP\_OFFSET_n$  to calculate  $TO_n$ . If it is indicated in system information that HCS is not used,  $TEMP\_OFFSET_n$  is not applied when calculating  $R_n$ . The best ranked cell is the cell with the highest R value.

...

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH RSCP, the UE shall perform cell re-selection to that FDD cell.

- 4.3 In all cases, the UE shall reselect the new cell, only if the following conditions are met:

- the new cell is better ranked than the serving cell during a time interval  $T_{reselection}$ .

...

- more than 1 second has elapsed since the UE camped on the current serving cell.

#### 5. Location Registration

In the UE, the AS shall report registration area information to the NAS.

If the UE reads more than one PLMN identity in the current cell, the UE shall report the found PLMN identities that make the cell suitable in the registration area information to NAS.

#### 6. Location updating accepted by the network

The network may also send a list of "equivalent PLMNs" in the LOCATION UPDATING ACCEPT message. Each entry of the list contains a PLMN code (MCC+MNC). The mobile station shall store the list, as provided by the network, except that any PLMN code that is already in the "forbidden PLMN list" shall be removed from the "equivalent PLMNs" list before it is stored by the mobile station. In addition the mobile station shall add to

the stored list the PLMN code of the registered PLMN that sent the list. All PLMNs in the stored list shall be regarded as equivalent to each other for PLMN selection, cell selection/re-selection and handover. The stored list in the mobile station shall be replaced on each occurrence of the LOCATION UPDATING ACCEPT message. If no list is contained in the message, then the stored list in the mobile station shall be deleted. The list shall be stored in the mobile station while switched off so that it can be used for PLMN selection after switch on.

#### References

1. TS 25.304, 4.3
2. TS 25.304, 5.2.1
3. TS 25.304, 5.2.5.1
4. TS 25.304, 5.2.6.1.4
5. TS 25.304, 5.5
6. TS 24.008, 4.4.4.6

#### 6.1.2.11.3 Test purpose

1. To verify that the UE is able to reselect to a higher ranked cell in shared network environment.
2. To verify that the UE treats a cell of an Equivalent PLMN as a cell of the Registered PLMN for cell reselection in shared network environment.
3. To verify that the UE respects the IE “MIB PLMN Identity” in Camped Normally state.
4. To verify correct behaviour if the stored Equivalent PLMN list is deleted on reception of Location Area Update Accept or Routing Area Update Accept message not containing an Equivalent PLMN list.

#### 6.1.2.11.4 Method of test

##### Initial conditions

The UE is equipped with a USIM containing default values. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

Cell reselection parameters are set to default values, so the cell-ranking criterion R equals CPICH\_RSCP.

Each cell indicates in System Information Block Type 11 that all other cells are neighbouring cells.

Cell 2, Cell 4 and Cell 7 are switched off.

The reference system configuration from TS 34.108 clause 6.1 is used in all cells, with the following modifications:

##### Master Information Block

- MIB value tag	Set to (Current MIB value tag + 1)
- Supported PLMN types	
- PLMN type	GSM-MAP
- PLMN identity	
- MCC digit	See table below
- MNC digit	See table below
- Multiple PLMN List	
- MIB PLMN Identity	See table below
- Multiple PLMNs (1)	
- MCC	See table below
- MNC	See table below
- Multiple PLMNs (2)	
- MCC	See table below
- MNC	See table below

The MIB PLMN Identity and PLMN codes broadcasted on the BCCH in each cell shall be configured as defined in the table below.

Cell	MIB PLMN Identity	PLMN Identity		Multiple PLMNs (1)		Multiple PLMNs (2)	
		MCC digits	MNC digits	MCC digits	MNC digits	MCC digits	MNC digits
1	TRUE	PLMN 1	PLMN 1	-	PLMN 2	-	PLMN 3
2	FALSE	PLMN 3	PLMN 3	-	PLMN 2	-	PLMN 1
4	FALSE	PLMN 4	PLMN 4	-	PLMN 5	-	PLMN 6
7	FALSE	PLMN 6	PLMN 6	-	PLMN 5	-	PLMN 4

The definition of each PLMN code is found in table below.

PLMN	MCC digit			MNC digit		
	1	2	3	1	2	3
1	0	0	1	0	1	-
2	0	0	1	0	2	-
3	0	0	1	0	3	-
4	0	0	1	0	4	-
5	0	0	1	0	5	-
6	0	0	1	0	6	-

NOTE: “-“ (dash) denotes “not present”

System Information Block type 1

The GSM-MAP NAS system information (LAC) broadcasted on the BCCH in each cell shall be configured as defined below.

- CN common GSM-MAP NAS system information	
- GSM-MAP NAS system information	See table below

System Information Block type 3 and 4

Parameter	Cell 1	Cell 2	Cell 4	Cell 7
q_QualMin	-24	-16	-16	-24

Cell	LAC
1	1
2	2
4	4
7	7

Step a-e

Parameter	Unit	Cell 1	Cell 2	Cell 4	Cell 7
Test Channel		1	1	2	3
CPICH_Ec	dBm/ 3.84 MHz	-84	-78	-72	-66

Step f-g

Parameter	Unit	Cell 1	Cell 2	Cell 4	Cell 7
CPICH_Ec	dBm/ 3.84 MHz	-84 -> -60	-78 -> -60	-72	-66

## Test procedure

Method C is applied.

- a) The UE is switched on.
- b) The SS waits for random access requests from the UE. A complete Location Update is done. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- c) Cell 2, Cell 4 and Cell 7 are switched on.
- d) The SS waits for random access requests from the UE. A complete Location Update is done. SS specifies PLMN 6 as Equivalent to PLMN1 in Location Update Accept Message. For UE that supports both CS and PS domains or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM Routing Area Updating procedure. In these cases, the Routing Area Update Accept message shall include PLMN6 in the equivalent PLMN list.
- e) The SS waits for random access requests from the UE. A complete Location Update is done. For UE that supports both CS and PS domains or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- f) The SS changes the levels of Cell 1 and Cell 2.
- g) The SS waits for random access requests from the UE.

### 6.1.2.11.5 Test requirements

- 1) In step b), the UE shall respond on Cell 1.
- 2) In step d), the UE shall respond on Cell 2.
- 3) In step e), the UE shall respond on Cell 4.
- 4) In step g), the UE shall not respond on Cell 1, Cell 2 or Cell 5 within 1 min.

### 6.1.2.12 Cell reselection based on absolute priority in SIB19

#### 6.1.2.12.1 Definition

Test to verify that the UE performs cell reselection based on absolute RAT priority defined in SIB 19.

#### 6.1.2.12.2 Conformance requirement

5.2.6.1.2a Measurement rules for inter-frequency and inter-RAT cell reselection when absolute priorities are used

...

If the UE has received absolute priority information for inter-frequency layers, the UE shall follow these rules:

- The UE shall perform measurements of inter-frequency layers with a priority higher than the priority of the current serving layer.

NOTE: The rate of these measurements may vary depending on whether  $S_{rxlev}$  and  $S_{qual}$  of the serving cell are above or below  $S_{prioritysearch1}$  and  $S_{prioritysearch2}$ . This is specified in [10].

...

- For inter-frequency layers with a priority equal or lower than the priority of the current serving layer:
- If  $S_{rxlev}^{ServingCell} > S_{prioritysearch1}$  and  $S_{qual}^{ServingCell} > S_{prioritysearch2}$  the UE may choose not to perform measurements of inter-frequency layers of equal or lower priority.

- If  $Srxlev_{ServingCell} \leq S_{prioritysearch1}$  or  $Squal_{ServingCell} \leq S_{prioritysearch2}$  the UE shall perform measurements of

inter-frequency layers of equal or lower priority.

- The UE shall not perform measurements of inter-frequency layers for which the UE has no absolute priority.

...

#### 5.2.6.1.4a Absolute priority based criteria for inter-frequency and inter-RAT cell reselection

Absolute priorities of different absolute priority layers may be provided to the UE. The following cell reselection criteria are used for inter-frequency cells if absolute priority information for inter-frequency is available to the UE, and inter-RAT cells if absolute priority information for inter-RAT is available to the UE.

If System Information Block 18 with UTRAN information is provided then the UE shall apply the inter-frequency priority rules below only to UTRAN cells of the selected PLMN or equivalent PLMNs. If System Information Block 18 is not provided, or is provided but contains no information for UTRAN, then the rules below apply for the entire UTRAN RAT.

...

If priority information is provided for any inter-frequency layers, cells belonging to inter-frequency layers for which no priority or no threshold is assigned shall not be considered for reselection.

...

If none of the inter-frequency layers in UTRAN are provided with both priority and threshold parameters, the cell reselection criteria in subclause 5.2.6.1.4 shall apply for inter-frequency layers in UTRAN.

...

If both criteria in subclause 5.2.6.1.4 and criteria in subclause 5.2.6.1.4a are simultaneously fulfilled, the order in which the reselection criteria are evaluated is left to UE implementation.

...

The UE may apply either priorities broadcast in system information or priorities received through dedicated signalling. The rules regarding which set of priorities shall apply are defined in [4]. UE specific priorities are only valid in the RPLMN, and shall be cleared when the validity time of the UE specific priorities expires, or when leaving the RPLMN. UE specific priorities are not applied in camped on any cell state.

...

The following definitions apply for the layers for which  $Thresh_{x,high2}$  or  $Thresh_{x,low2}$  are not provided:

- Criterion 1: the  $Srxlev_{nonServingCell,x}$  of a cell on an evaluated higher absolute priority layer is greater than  $Thresh_{x,high}$  during a time interval  $T_{reselection}$ ;
- Criterion 2:  $Srxlev_{ServingCell} < Thresh_{serving,low}$  or  $Squal_{ServingCell} < 0$  and the  $Srxlev_{nonServingCell,x}$  of a inter-frequency cell on an evaluated equal absolute priority layer is greater than  $Thresh_{x,low}$  during a time interval  $T_{reselection}$ ;
- Criterion 3:  $Srxlev_{ServingCell} < Thresh_{serving,low}$  or  $Squal_{ServingCell} < 0$  and the  $Srxlev_{nonServingCell,x}$  of a cell on an evaluated lower absolute priority layer is greater than  $Thresh_{x,low}$  during a time interval  $T_{reselection}$ ;

The following definitions apply for the layers for which both  $Thresh_{x,high2}$  and  $Thresh_{x,low2}$  are provided:

- Criterion 4: the  $S_{\text{qualnonServingCell},x}$  of a cell on an evaluated higher absolute priority layer is greater than  $\text{Thresh}_{x,\text{high}2}$  during a time interval  $T_{\text{reselection}}$ ;

- Criterion 5:  $S_{\text{qualServingCell}} < \text{Thresh}_{\text{serv},\text{low}2}$  and the  $S_{\text{qualnonServingCell},x}$  of a cell on an evaluated lower absolute priority layer is greater than  $\text{Thresh}_{x,\text{low}2}$  during a time interval  $T_{\text{reselection}}$ ;

Cell reselection to a cell on a higher absolute priority layer than the camped frequency shall be performed if criterion 1 or 4 is fulfilled.

Cell reselection to an inter-frequency cell on an equal absolute priority layer to the camped frequency shall be performed if criterion 2 is fulfilled.

Cell reselection to a cell on a lower absolute priority layer than the camped frequency shall be performed if criterion 3 or 5 is fulfilled.

If more than one cell meets the above criteria, the UE shall reselect the cell with the highest  $S_{\text{rxlevnonServingCell},x}$  among

the cells meeting the criteria on the highest absolute priority layer.

The UE shall not perform cell reselection to cells for which the cell selection criterion  $S$  is not fulfilled.

The UE shall not perform cell reselection until more than 1 second has elapsed since the UE camped on the current serving cell.

The UE should not perform cell reselection while the UE has an allocated common E-DCH resource.

For UE in RRC connected mode states CELL\_PCH or URA\_PCH the interval  $T_{\text{reselection,PCH}}$  applies, if provided in SIB4 (see [4]), while for UE in RRC connected mode state CELL\_FACH the interval  $T_{\text{reselection,FACH}}$  applies, if provided in SIB4 (see [4]).

In all the above criteria the values of  $T_{\text{reselection}}$ ,  $T_{\text{reselection,PCH}}$  or  $T_{\text{reselection,FACH}}$  apply for  $T_{\text{reselection}}$  and are scaled according to the UE mobility state and target RAT, as specified in 5.2.6.1.1a.

#### 8.6.7.3a UTRA priority info list

If the IE "UTRA priority info list" is received in System Information Block Type 19, the UE shall:

- 1> if the value of the IE "Priority status" in the variable PRIORITY\_INFO\_LIST equals "dedicated\_priority":
  - 2> store the value of the IEs " $S_{\text{prioritysearch}1}$ ", " $S_{\text{prioritysearch}2}$ ", " $\text{Thresh}_{\text{serv},\text{low}}$ " and " $\text{Thresh}_{\text{serv},\text{low}2}$ " in the IE "UTRA Serving Cell" in the variable PRIORITY\_INFO\_LIST;
  - 2> if any of the values in any of the occurrences of the IE "Frequency List" in any occurrence of the IE "Priority Info List" within the variable PRIORITY\_INFO\_LIST is the frequency of the serving cell:
    - 3> store the value of the IE "priority" in the IE "UTRA Serving Cell" in the variable PRIORITY\_INFO\_LIST.
  - 2> otherwise:
    - 3> clear the value of the IE "priority" in the IE "UTRA Serving Cell" in the variable PRIORITY\_INFO\_LIST.
  - 2> for each occurrence of the IE "UTRAN FDD Frequencies":
    - 3> if the value of the IE "UARFCN" exists in the list of UTRA FDD priorities in the PRIORITY\_INFO\_LIST then, in the occurrence of IE "Frequency List" within the variable PRIORITY\_INFO\_LIST with that value of the IE "UARFCN":
      - 4> store the value of the IEs " $\text{Thresh}_{x,\text{high}}$ ", " $\text{Thresh}_{x,\text{low}}$ ", " $Q_{\text{qualminFDD}}$ " and " $Q_{\text{rxlevminFDD}}$ ".
  - 2> for each occurrence of the IE "UTRAN TDD Frequencies":

- 3> if the value of the IE "UARFCN" exists in the list of UTRA TDD priorities in the PRIORITY\_INFO\_LIST then, in the occurrence of IE "Frequency List" within the variable PRIORITY\_INFO\_LIST with that value of the IE "UARFCN":
  - 4> store the value of the IEs "Thresh<sub>x,high</sub>", "Thresh<sub>x,low</sub>" and "Qrxlev minTDD".
- 1> otherwise:
  - 2> update the PRIORITY\_INFO\_LIST IE "Priority status" to cause "sys\_info\_priority".
  - 2> store information in the IE "UTRA Serving Cell" in the IE "UTRA Serving Cell" within the variable PRIORITY\_INFO\_LIST;
  - 2> for each occurrence of the IE "UTRAN FDD Frequencies":
    - 3> if an entry already exists in the IE "Priority Info List" in the variable PRIORITY\_INFO\_LIST with the same priority value as indicated in the IE "priority" and has the CHOICE "Radio Access Technology" set to "UTRA FDD":
      - 4> create a new entry in the IE "Frequency List" in that occurrence of IE "Priority Info List", and store the value of "UARFCN" in the IE "UARFCN" in this occurrence of the IE "Frequency List" within the variable PRIORITY\_INFO\_LIST, and in that new entry:
        - 5> store the IEs "Thresh<sub>x,high</sub>", "Thresh<sub>x,low</sub>", "QqualminFDD" and "Qrxlev minFDD".
    - 3> otherwise:
      - 4> create a new entry in the IE "Priority Info List" and store the value of "priority" in the IE "priority" in this occurrence of the IE "Priority Info List" with in the variable PRIORITY\_INFO\_LIST, and in that new entry:
        - 5> set the CHOICE "Radio Access Technology" to "UTRA FDD" and store the value of "UARFCN" in the IE "UARFCN" in the first occurrence of the IE "Frequency List";
        - 5> store the IEs "Thresh<sub>x,high</sub>", "Thresh<sub>x,low</sub>", "QqualminFDD" and "Qrxlev minFDD" in that occurrence of the IE "Frequency List".
  - 2> for each occurrence of the IE "UTRAN TDD Frequencies":
    - 3> if an entry already exists in the IE "Priority Info List" in the variable PRIORITY\_INFO\_LIST with the same priority value as indicated in the IE "priority" and has the CHOICE "Radio Access Technology" set to "UTRA TDD":
      - 4> create a new entry in the IE "Frequency List" in that occurrence of IE "Priority Info List", and store the value of "UARFCN" in the IE "UARFCN" in this occurrence of the IE "Frequency List" within the variable PRIORITY\_INFO\_LIST, and in that new entry:
        - 5> store the IEs "Thresh<sub>x,high</sub>", "Thresh<sub>x,low</sub>" and "Qrxlev minTDD".
    - 3> otherwise:
      - 4> create a new entry in the IE "Priority Info List" and store the value of "priority" in the IE "priority" in this occurrence of the IE "Priority Info List" with in the variable PRIORITY\_INFO\_LIST, and in that new entry:
        - 5> set the CHOICE "Radio Access Technology" to "UTRA TDD" and store the value of "UARFCN" in the IE "UARFCN" in the first occurrence of the IE "Frequency List";
        - 5> store the IEs "Thresh<sub>x,high</sub>", "Thresh<sub>x,low</sub>" and "Qrxlev minTDD" in that occurrence of the IE "Frequency List".

## References

1. TS 25.304, 5.2.6.1.2a
2. TS 25.304, 5.2.6.1.4a

3. TS 25.331, 8.6.7.3a

6.1.2.12.3 Test purpose

1. To verify that UE performs Higher Priority Cell Reselection based on absolute priority.
2. To verify that UE performs LowerPriority Cell Reselection based on absolute priority.
3. To verify that UE performs Equal Priority Cell Reselection based on absolute priority.

6.1.2.12.4 Method of test

Initial conditions

System Simulator:

- 2 cells Cell 1 and Cell 4
- Cell 1 as the active cell with SS downlink transmission power settings according to “T0” in table 6.1.2.x below.
- SIB19 to be transmitted by both cells.

User Equipment:

- UE is in idle mode, registered on Cell 1 with power settings “T0”.
- Idle state (state 3 or state 7) as specified in clause 7.4 of TS 34.108 with a CN UE identity, depending on the CN domain(s) supported by the UE.

Related ICS/IXIT statement(s)

- UE supports FDD.

**Table 6.1.2.12**

Parameter	Unit	Cell 1			Cell 4		
		T0	T1	T2	T0	T1	T2
UTRA RF Channel Number		Mid Range Test Frequency			High Range Test Frequency		
CPICH Ec (FDD)	dBm/3.84MHz	-60	-60	-76	-90	-65	-74
Srxlev*	dB	21	21	5	-9	16	7
qRxLevMinFDD	dB	-81			-81		
Note-Srxlev is calculated in UE. During T1, UE should meet higher priority cell reselection criteria. During T2, UE should meet lower priority cell reselection criteria, followed by equal priority cell reselection criteria.							

Test procedure

Method C is applied.

- a) SS transmits the MIB with the “MIB Value Tag” IE different from the original setting and SIB TYPE 19 with cell 4 as higher priority cell and cell 1 as lower priority cell (See specific message contents).
- b) SS notifies the UE by sending a PAGING TYPE1 with BCCH modification and waits for 5s to ensure UE has read the SIB information.
- c) SS configures downlink transmission power settings according to columns "T1" in the table 6.1.2.x.
- d) UE meets the higher priority cell reselection and reselects to higher priority cell 4.
- e) SS waits for random access request from UE. A Location Area Update procedure is done for UE. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- f) SS transmits the MIB with the “MIB Value Tag” IE different from the original setting and SIB TYPE 19 for cell 4 as indicated in specific message contents.

- g) SS notifies the UE by sending a PAGING TYPE1 with BCCH modification and waits for 5s to ensure UE has read the SIB information.
- h) SS should transmit SIB TYPE 19 default content for cell 1 and then SS configures downlink transmission power settings according to columns "T2" in table 6.1.2.x.
- i) UE meets the lower priority cell reselection criteria and reselects to lower priority cell 1.
- j) SS waits for random access request from UE. A Location Area Update procedure is done for UE. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- k) SS transmits the MIB with the "MIB Value Tag" IE different from the original setting and the SIB TYPE 19 where both Cell 1 and Cell 4 are defined as equal priority cells.
- l) SS notifies the UE by sending PAGING TYPE1 with BCCH modification and waits for 5s to ensure UE has read all the SIB information.
- m) UE meets the equal priority cell reselection criteria with same power level as "T2" and reselects to equal priority cell 4.
- n) SS waits for random access request from UE. A Location Area Update procedure is done for UE. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.

#### Specific Message Contents

The contents of the SYSTEM INFORMATION BLOCK TYPE 19 message in this test case is identical to TS 34.108 clause 6.1.0b, with the following exceptions:

#### System Information Block type 19 (Step a)

Information Element	Value/remark	Version
SysInfoType19		REL-8 or later
utra-PriorityInfoList		
utra-ServingCell		
Priority	[4]	
s-PrioritySearch1	[8 (16 dB)]	
s-PrioritySearch2	Not present	
threshServingLow	[4 (8 dB)]	
utran-FDD-FrequencyList		
uarfcn	Same downlink uarfcn as used for cell 4	
priority	[5]	
threshXhigh	[5 (10 dB)]	
threshXlow	[1 (2 dB)]	
qQualMinFDD	-24 dB	
qRxLevMinFDD	-81 dBm	
utran-TDD-FrequencyList	Not present	
gsm-PriorityInfoList	Not present	
utra-FrequencyAndPriorityInfoList (SIZE (1..maxNumEUTRAFreqs))	Not present	

## System Information Block type 19 (Step f)

Information Element	Value/remark	Version
SysInfoType19		REL-8 or later
utra-PriorityInfoList		
utra-ServingCell		
Priority	[4]	
s-PrioritySearch1	[8 (16 dB)]	
s-PrioritySearch2	Not present	
threshServingLow	[10 (20 dB)]	
utran-FDD-FrequencyList		
uarfcn	Same downlink uarfcn as used for cell 4	
priority	[4]	
threshXhigh	[11 (22 dB)]	
threshXlow	[1 (2 dB)]	
qQualMinFDD	-24 dB	
qRxLevMinFDD	-81 dBm	
utran-TDD-FrequencyList	Not present	
gsm-PriorityInfoList	Not present	
eutra-FrequencyAndPriorityInfoList (SIZE (1..maxNumEUTRAFreqs))	Not present	

## System Information Block type 19 (Step k)

Information Element	Value/remark	Version
SysInfoType19		REL-8 or later
utra-PriorityInfoList		
utra-ServingCell		
Priority	[4]	
s-PrioritySearch1	[8 (16 dB)]	
s-PrioritySearch2	Not present	
threshServingLow	[10 (20 dB)]	
utran-FDD-FrequencyList		
uarfcn	Same downlink uarfcn as used for cell 4	
priority	[4]	
threshXhigh	[11 (22 dB)]	
threshXlow	[1 (2 dB)]	
qQualMinFDD	-24 dB	
qRxLevMinFDD	-81 dBm	
utran-TDD-FrequencyList	Not present	
gsm-PriorityInfoList	Not present	
eutra-FrequencyAndPriorityInfoList ::= SEQUENCE (SIZE (1..maxNumEUTRAFreqs)) OF SEQUENCE {	Not present	

PAGING TYPE 1 (Step b, Step g and Step l)

Information Element	Value/Remark
PagingType1	
pagingRecordList	Not present
bcch-ModificationInfo	
mib-ValueTag	Set to (Current MIB value tag + 1)
bcch-ModificationTime	Not present
laterNonCriticalExtensions SEQUENCE {}	Not present

#### 6.1.2.12.5 Test requirements

- 1) At step d), UE reselects to a higher priority Cell 4.
- 2) At step i), UE reselects to lower priority Cell 4.
- 3) At step m), UE reselects to equal priority Cell 4.

### 6.1.3 MBSFN Cluster selection and reselection

#### 6.1.3.1 MBSFN only service recognition

##### 6.1.3.1.1 Definition

Test to verify that a UE supporting both transmit and receive functions correctly distinguishes an MBSFN only mode cluster from a unicast carrier cell and performs the procedures for either MBSFN cluster selection or UTRAN unicast carrier cell selection as appropriate. The unicast carrier cell may have some (but not all) timeslots assigned to MBSFN.

##### 6.1.3.1.2 Conformance requirement

The MS shall perform registration on the PLMN if the MS is capable of services which require registration. In both automatic and manual modes, the concept of registration on a PLMN is used. An MS successfully registers on a PLMN if:

- a) The MS has found a suitable cell of the PLMN to camp on; and
- b) An LR request from the MS has been accepted in the registration area of the cell on which the MS is camped (see table 1).

...

The registration on the selected PLMN and the location registration are only necessary if the MS is capable of services which require registration. Otherwise, the PLMN selection procedures are performed without registration.

...

At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see clause 4.5.2) attempts to perform a Location Registration.

...

#### suitable cell:

A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.

- The cell shall be part of either:
  - the selected PLMN, or
  - the registered PLMN, or
  - a PLMN of the Equivalent PLMN list

according to the latest information provided by the NAS.

- The cell is not barred, see subclause 5.3.1.1;
- The cell is part of at least one LA that is not part of the list of "forbidden LAs for roaming" [9], which belongs to a PLMN that fulfils the first bullet above;
- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2.

If the IE "Multiple PLMN List" [4] is broadcast in the cell, the cell is considered to be part of all LAs with LAIs constructed from the PLMN identities in the "Multiple PLMN List" and the LAC broadcast in the cell.

...

#### suitable MBSFN cluster:

A cell is part of an MBSFN cluster if it is indicated in system information [4]. An MBSFN cluster provides exclusively MBMS services. A suitable MBSFN cluster shall fulfil all the following requirements:

- For FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD the MBSFN cluster shall be part of either:
  - the registered PLMN, or;
  - a PLMN of the Equivalent PLMN list

The MBSFN cluster shall be indicated as:

- providing MBSFN only service

...

The UE shall search for MBSFN clusters if the frequencies on which MBSFN clusters are available are not indicated in the cell that the UE is camping on for normal service if the mobile is configured to receive services via MBSFN mode. Details of the process are not specified.

For 1.28 Mcps TDD, the UE that needs receive MBMS services delivered in an MBSFN cluster may at the first step select a non MBSFN cell (i.e. a unicast cell), that the MBSFN cluster is associated with. The UE can get synchronized to the MBSFN cluster with the help of the information indicated in system information broadcast by the associated unicast cell, and receive the system information and MCCH messages in the MBSFN Special Timeslot. The details of the association between MBSFN clusters and non MBSFN cells operating in a unicast carrier are not specified. In case there are more than one MBSFN clusters indicated in system information broadcast by a unicast cell, the process of which MBSFN cluster should be selected for searching is not specified.

...

When camped on a MBSFN cluster, the UE shall perform the following tasks:

- receive the MCCH as specified in clause 8.4 and in [4];

...

If the IE "MBSFN only service" is set to TRUE the UE shall:

- 1> consider this cell to operate in MBSFN mode;
- 1> for TDD consider that all slots operate in MBSFN mode;
- 1> for FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD if the UE capabilities allow the reception of MBSFN in addition to the normal UE operation the UE may receive MBMS services from this cell in accordance with requirements for selection of a cell providing only MBSFN as specified in [4]. For 1.28 Mcps TDD, if the UE capabilities allow the reception of MBSFN in addition to the normal UE operation the UE may get synchronized to the MBSFN cluster as specified in [4].

...

A cell provides MBMS service in MBSFN mode if it is indicated so in system information, see subclause 8.1.1.6.3. A UE that supports MBSFN operation may receive MBMS services via a cell operating in MBSFN mode. For FDD, 3.84

Mcps TDD IMB and 3.84/7.68 Mcps TDD in order to receive an MBMS service via a MBSFN cluster the UE shall select the MBSFN cluster as specified in [4] in addition to selecting a cell for normal camping as specified in [4]. For 1.28 Mcps TDD in order to receive an MBMS service via an MBSFN cluster the UE shall at the first step camp on a unicast cell and get the frequency and "cell parameter ID" from the system information, and then get synchronized to the MBSFN cluster operating with that frequency and "cell parameter ID". For 3.84/7.68 Mcps TDD a cell shall be considered to be operating in MBSFN mode when individual scrambling codes are assigned to all timeslots (via the IE "TDD MBSFN Information").

...

For FDD and 3.84/7.68 Mcps TDD if the IE "MBSFN frequency list" is not included in system information block 11 and if services are listed in the variable MBMS\_ACTIVATED\_SERVICES a UE supporting reception of MBMS service in MBSFN mode shall search for cells providing MBMS service in MBSFN mode.

For 1.28 Mcps TDD the IE "Cell parameter ID" in the IE "MBSFN frequency list" included in system information block 11 indicates the cell which is providing MBMS service in MBSFN only mode on the corresponding frequency; if the IE "Cell parameter ID" is not included in the IE "MBSFN frequency list", a UE may consider that the corresponding frequency is the secondary frequency providing MBMS service in non-MBSFN only mode of current multi-frequency cell.

...

If the variable MBMS\_ACTIVATED\_services is not empty, the UE shall apply the MCCH acquisition procedure upon selecting (e.g. upon power on) or re-selecting a cell supporting MBMS or an MBSFN cluster, upon change of MBMS controlling cell (e.g. due to an active set update or hard handover), upon entering UTRA from another RAT, upon release of a MBMS PTP RB for the purpose of changing transfer mode, upon return from loss of coverage and upon receiving an indication from upper layers that the set of activated services has changed.

## References

TS 23.122, 4.4.2, 4.4.3, 4.4.3.1

TS 25.304, 4.3, 6.3.1.1, 6.3.1.2

TS 25.331, 8.1.1.6.3, 8.5.43, 8.6.9.9ac, 8.7.2.2

### 6.1.3.1.3 Test purpose

1. To verify that the UE initiates PLMN registration following selection of a cell that does not indicate MBSFN only mode.
2. To verify that the UE performs PLMN selection procedures without registration in an MBSFN only mode cluster.

### 6.1.3.1.4 Method of test

#### Initial condition

#### System Simulator:

MBSFN carrier: 1 cell, Cell 31 (PLMN1). In addition to broadcasting System Information, MCCH messages are transmitted by the SS using MBMS configuration C2 and Default 1 MCCH scheduling (One ongoing session) according to subclause 11.1 or 11.2 of TS 34.108.

Unicast carrier: 1 cell, Cell 1 (PLMN1) with default configuration. The unicast carrier cell shall support FDD or TDD as appropriate to UE.

#### User Equipment:

The UE is switched off.

The UE is equipped with a Test-USIM containing default values. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

## Related ICS/IXIT statements

- MBMS Broadcast services in MBSFN mode available on UE Yes/No.
- Support of transmit and receive functions available on UE Yes/No.
- Support of MBSFN receive only function available on UE Yes/No.

## Test procedure

- a) The UE is switched on.
- b) The UE registers as specified in clause 7.2.2 of TS 34.108 on the unicast carrier Cell 1. For 3.84 Mcps TDD IMB, the UE registers on the FDD unicast carrier cell 1. On the unicast carrier Cell 1, a Location Update Accept message shall be sent on reception of a Location Updating Request message from the UE. The Location Updating Accept message shall include PLMN2 in the equivalent PLMN list. For a UE that supports both CS and PS domains or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure. In these cases, the GMM Attach Accept message shall include PLMN2 in the equivalent PLMN list.
- c) The SS sends ACTIVATE RB TEST MODE on the unicast carrier and the UE responds with ACTIVATE RB TEST MODE COMPLETE. The SS then sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MCCH of Cell 31.
- d) The SS activates Cell 31.
- e) One MBMS service from the list of services available on the Dedicated National Carrier (see TS 34.108 clause 11.2) is activated on the UE.
- f) The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE "Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS on Cell 31 using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.1 or 11.2 of TS 34.108. The service is carried on a 129.6kbps RB for MTCH with 80 ms TTI as specified in clause 6.10.3.4.4.6(FDD) or a 124.4 kbps RB for MTCH with 80 ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- g) The UE camps on Cell 31 on the MBSFN carrier. The UE shall perform the MCCH acquisition procedure. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.

## Expected sequence

Step	Direction		Carrier	Message	Comments
	UE	SS			
1	UE		U		The UE is switched on and camps on unicast carrier Cell 1.
2	→		U	LOCATION UPDATING REQUEST	For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure
3	←		U	LOCATION UPDATING ACCEPT	
4	→		U	TMSI REALLOCATION COMPLETE	
5	←		U	ACTIVATE RB TEST MODE	
6	→		U	ACTIVATE RB TEST MODE COMPLETE	
7	←		U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for the selected national service on Cell 31.
8	SS		M		Cell 31 is activated

Step	Direction		Carrier	Message	Comments
	UE	SS			
9	UE		M		MBMS National Service 1 is activated.
10	←		M	SYSTEM INFORMATION BLOCK TYPE 5	
11	←		M	MBMS MCCH Message Configuration C2	No modified services. One ongoing session. (Service activated at the UE). 129.6(FDD), 124.4 kbps (IMB) or 124(TDD) kbps PS RAB
12	UE		M		The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period.
13	→		U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
14	←		U	OPEN UE TEST LOOP	
15	→		U	OPEN UE TEST LOOP COMPLETE	
16	←		U	DEACTIVATE RB TEST MODE	
17	→		U	DEACTIVATE RB TEST MODE COMPLETE	

### Specific message contents

With the following exceptions, all messages have the same content as defined in TS 34.108 clause 9.1.1 or 9.1.3 for the MBSFN carrier and in TS 34.108 clause 9.1.1 or clause 9.1.2 for the unicast carrier:

There are no exceptions for this test case.

#### 6.1.3.1.5 Test requirements

- 1) The UE sends a LOCATION UPDATING REQUEST message on the unicast carrier at step 2.
- 2) The UE sends a CLOSE UE TEST LOOP COMPLETE message on the unicast carrier at step 13.

#### 6.1.3.2 Suitable PLMN selection; MBSFN Frequency List present (unicast carrier)

##### 6.1.3.2.1 Definition

Test to verify that the UE performs selection of a suitable MBSFN cluster which is part of the registered PLMN or which is in the stored list of Equivalent PLMN, when the MBSFN Frequency List is present in the SIB1 of the unicast carrier on which the UE has registered.

##### 6.1.3.2.2 Conformance requirement

###### suitable MBSFN cluster:

A cell is part of an MBSFN cluster if it is indicated in system information [4]. An MBSFN cluster provides exclusively MBMS services. A suitable MBSFN cluster shall fulfil all the following requirements:

- For FDD 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD the MBSFN cluster shall be part of either:
  - the registered PLMN, or;
  - a PLMN of the Equivalent PLMN list

The MBSFN cluster shall be indicated as:

- providing MBSFN only service

For FDD and 3.84/7.68 Mcps TDD MBSFN cluster selection/reselection process for MBSFN clusters operating on the same frequency shall be based on reception quality. Details of the process are not specified.

...

When camped on a MBSFN cluster, the UE shall perform the following tasks:

- receive the MCCH as specified in clause 8.4 and in [4];

...

A cell provides MBMS service in MBSFN mode if it is indicated so in system information, see subclause 8.1.1.6.3. A UE that supports MBSFN operation may receive MBMS services via a cell operating in MBSFN mode. For FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD in order to receive an MBMS service via a MBSFN cluster the UE shall select the MBSFN cluster as specified in [4] in addition to selecting a cell for normal camping as specified in [4]. For 1.28 Mcps TDD in order to receive an MBMS service via an MBSFN cluster the UE shall at the first step camp on a unicast cell and get the frequency and "cell parameter ID" from the system information, and then get synchronized to the MBSFN cluster operating with that frequency and "cell parameter ID". For 3.84/7.68 Mcps TDD a cell shall be considered to be operating in MBSFN mode when individual scrambling codes are assigned to all timeslots (via the IE "TDD MBSFN Information").

...

#### MBSFN frequency list

For FDD and 3.84/7.68 Mcps TDD this IE may be included in system information block 11 in a cell which is not providing MBMS service in MBSFN mode in order to provide information about frequencies providing MBMS service in MBSFN mode. For 1.28 Mcps TDD this IE shall be included in system information block 11 in a cell which is not providing MBMS service in MBSFN only mode but is associated with one or more cells in MBSFN only mode, in order to provide information about frequencies providing MBMS service in MBSFN only mode, and this IE also provides information about the secondary frequencies providing MBMS service in non-MBSFN only mode of current multi-frequency cell.

...

If the variable MBMS\_ACTIVATED\_services is not empty, the UE shall apply the MCCH acquisition procedure upon selecting (e.g. upon power on) or re-selecting a cell supporting MBMS or an MBSFN cluster, upon change of MBMS controlling cell (e.g. due to an active set update or hard handover), upon entering UTRA from another RAT, upon release of a MBMS PTP RB for the purpose of changing transfer mode, upon return from loss of coverage and upon receiving an indication from upper layers that the set of activated services has changed.

#### References

TS 25.304, 4.3, 6.3.1.2

TS 25.331, 8.5.43, 8.6.9.9ac, 8.7.2.2

#### 6.1.3.2.3 Test purpose

1. To verify that when SIB11 of the unicast carrier that a UE is camped on contains IE MBSFN Frequency List, a UE supporting reception of MBMS service in MBSFN mode will select a suitable MBSFN cluster if services are listed in the variable MBMS\_ACTIVATED\_SERVICE.
2. To verify that the UE when selecting a suitable MBSFN cluster will select an available MBSFN cluster of the registered PLMN (unicast carrier).
3. To verify that the UE when selecting a suitable MBSFN cluster will select an available MBSFN cluster of a PLMN in the stored list of Equivalent PLMN.
4. To verify that the UE having selected a suitable MBSFN cluster will start to acquire the MCCH.

#### 6.1.3.2.4 Method of test

##### Initial condition

##### System Simulator:

MBSFN carrier(s): 6 cells. Cell 31 (PLMN1), Cell 32 (PLMN2), Cell 33 (PLMN1), Cell 34 (PLMN2), Cell 35 (PLMN3) and Cell 37 (PLMN3) are all switched off.

Unicast carrier: 1 cell, Cell 1 (PLMN1) default configuration.

NOTE: The IE MBSFN frequency list is included in SIB11 of Cell 1.

##### User Equipment:

The UE is switched off.

The UE is equipped with a Test-USIM containing default values. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

#### Related ICS/IXIT statements

- MBMS Broadcast services in MBSFN mode available on UE Yes/No.
- Support of transmit and receive functions available on UE Yes/No.
- Support of MBSFN receive only function available on UE Yes/No.

#### Test procedure

The SS shall apply the downlink power settings as shown below:

##### Step 1-7:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 33	Cell 34	Cell 35	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	OFF	OFF	OFF	OFF	OFF	OFF
CPICH Ec (FDD)	dBm/3.84MHz	-60	OFF	OFF	OFF	OFF	OFF	OFF
P-CPICH Ec (IMB)	dBm/3.84MHz		OFF	OFF	OFF	OFF	OFF	OFF
T-CPICH (IMB)	dBm/3.84MHz		OFF	OFF	OFF	OFF	OFF	OFF

##### Step 8-19:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 33	Cell 34	Cell 35	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	OFF	-69	OFF	-69	-59	-59
CPICH Ec (FDD)	dBm/3.84MHz	-60	OFF	-69	OFF	-69	-59	-59
P-CPICH Ec (IMB)	dBm/3.84MHz		OFF	-69	OFF	-69	-59	-59
T-CPICH (IMB)	dBm/3.84MHz		OFF	-59.5	OFF	-59.5	-49.5	-49.5

##### Step 20-34:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 33	Cell 34	Cell 35	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	-69	OFF	-69	OFF	-59	-59
CPICH Ec (FDD)	dBm/3.84MHz	-60	-69	OFF	-69	OFF	-59	-59
P-CPICH Ec (IMB)	dBm/3.84MHz		-69	OFF	-69	OFF	-59	-59
T-CPICH (IMB)	dBm/3.84MHz		-59.5	OFF	-59.5	OFF	-49.5	-49.5

- a) The UE is switched on.
- b) The UE registers as specified in clause 7.2.2 of TS 34.108 on the unicast carrier Cell 1. For 3.84 Mcps TDD IMB, the UE registers on the FDD unicast carrier cell 1. On the unicast carrier Cell 1, a Location Update Accept message shall be sent on reception of a Location Updating Request message from the UE. The Location Updating Accept message shall include PLMN2 in the equivalent PLMN list. For a UE that supports both CS and PS domains or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure. In these cases, the GMM Attach Accept message shall include PLMN2 in the equivalent PLMN list.
- c) The SS sends ACTIVATE RB TEST MODE on the unicast carrier and the UE responds with ACTIVATE RB TEST MODE COMPLETE. The SS then sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to the activated National Service 1).
- d) The SS activates Cell 32, Cell 34, Cell 35 and Cell 37. The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE "Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS on all these cells using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.1 or 11.2 of TS 34.108. The service is carried on a

- 129.6kbps RB for MTCH with 80 ms TTI as specified in clause 6.10.3.4.4.6(FDD) or a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- e) After the UE is switched on in step 1 the UE starts searching for an MBSFN cell. Cell search on the MBSFN carrier is independent and not time synchronised with the message sequence on the unicast carrier. One MBMS service (National Service 1) from the list of services available is activated at this stage to ensure MBSFN cell search continues.
  - f) The UE camps on Cell 32 or Cell 34, recognising PLMN2 as an Equivalent PLMN to the registered PLMN on the unicast carrier. The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE "Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.1 or 11.2 of TS 34.108. The service is carried on a 129.6kbps RB for MTCH with 80 ms TTI as specified in clause 6.10.3.4.4.6(FDD) or a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
  - g) The UE shall perform the MCCH acquisition procedure. The UE shall detect the available MBMS services by acquiring the MBMS MODIFIED SERVICES INFORMATION, the MBMS UNMODIFIED SERVICES INFORMATION, the MBMS GENERAL INFORMATION, the MBMS COMMON P-T-M RB INFORMATION and the MBMS CURRENT CELL P-T-M INFORMATION.
  - h) The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.
  - i) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for the activated service on Cell 32. The SS then broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for the activated service on Cell 34.
  - j) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is > 0.
  - k) The SS sends OPEN UE TEST LOOP. The UE responds with OPEN UE TEST LOOP COMPLETE.
  - l) The SS switches off Cell 32 and Cell 34. The SS activates Cell 31 and Cell 33.
  - m) The SS sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to the activated National Service 1).
  - n) The UE camps on Cell 31 or Cell 33. The UE shall perform the MCCH acquisition procedure. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.
  - o) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for the activated service on Cell 31. The SS then broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for the activated service on Cell 33.
  - p) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is > 0.

## Expected sequence

Step	Direction		Carrier	Message	Comments
	UE	SS			
1		←	U	SYSTEM INFORMATION BLOCK TYPE 11	The UE is switched on and it camps on unicast carrier Cell 1. The IE MBSFN frequency list is present in SIB 11 on the BCCH.
2		→	U	LOCATION UPDATING REQUEST	For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure
3		←	U	LOCATION UPDATING ACCEPT	IE Equivalent PLMNs contains PLMN2. PLMN2 is maintained in Equivalent PLMN list of UE.
4		→	U	TMSI REALLOCATION COMPLETE	
5		←	U	ACTIVATE RB TEST MODE	
6		→	U	ACTIVATE RB TEST MODE COMPLETE	
7		←	U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for the selected national service
8		SS	M		Cells 32, 34, 35 and 37 are switched ON
9	UE		M		MBMS National Service 1 is activated. UE performs cell search and selects Cell 32 or Cell 34.
10		←	M	SYSTEM INFORMATION BLOCK TYPE 5	
11		←	M	MBMS MCCH Message Configuration C2	No modified services. One ongoing service corresponding to that activated at the UE. 129.6(FDD) or 124(TDD) kbps PS RAB or 124.4 kbps (IMB)
12	UE		M		The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period.
13		→	U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
14		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 32.
15		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 34.
16		←	U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
17		→	U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
18		←	U	OPEN UE TEST LOOP	
19		→	U	OPEN UE TEST LOOP COMPLETE	
20		SS	M		Cell 32 and Cell 34 are switched OFF. Cell 31 and Cell 33 are switched ON.
21		←	U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for the selected national service
22	UE		M		UE performs cell search and selects Cell 31 or Cell 33.
23		←	M	SYSTEM INFORMATION BLOCK TYPE 5	
24		←	M	MBMS MCCH Message Configuration C2	No modified services. One ongoing service corresponding to that activated at the UE. 129.6(FDD) or 124(TDD) kbps PS RAB or 124.4 kbps (IMB)
25	UE		M		The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period.
26		→	U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.

Step	Direction		Carrier	Message	Comments
	UE	SS			
27		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 31.
28		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 33.
29		←	U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
30		→	U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
31		←	U	OPEN UE TEST LOOP	
32		→	U	OPEN UE TEST LOOP COMPLETE	
33		←	U	DEACTIVATE RB TEST MODE	
34		→	U	DEACTIVATE RB TEST MODE COMPLETE	

### Specific message contents

With the following exceptions, all messages have the same content as defined in TS 34.108 clause 9.1.1 or 9.1.3 for the MBSFN carriers and in TS 34.108 clause 9.1.1 or 9.1.2 for the unicast carrier:

#### Contents of System Information Block type 11 (Step 1)

...	
- MBSFN frequency list	
- MBSFN frequency	
- CHOICE <i>mode</i>	FDD or TDD
- UARFCN (Nt)	Refer to clause 6.1 "Simulated network environments" for frequency "f1"
- MBSFN frequency	
- CHOICE <i>mode</i>	FDD or TDD
- UARFCN (Nt)	Refer to clause 6.1 "Simulated network environments" for frequency "f2"

#### Contents of System Information Block type 11 (IMB)

...	
- MBSFN frequency list	
- MBSFN frequency	
- CHOICE <i>mode</i>	TDD
- UARFCN (Nt)	Refer to clause 6.1 "Simulated network environments" for frequency "f1"
- IMB indication	TRUE
- MBSFN frequency	
- CHOICE <i>mode</i>	TDD
- UARFCN (Nt)	Refer to clause 6.1 "Simulated network environments" for frequency "f2"
- IMB indication	TRUE

#### MBMS UNMODIFIED SERVICES INFORMATION (Step 11 and Step 24)

Information Element	Value/remark	Version
Message type		Rel-6
Unmodified service list	4 services	Rel-6
- MBMS Transmission identity		
- MBMS Service ID	(National Service 1)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	'01'	
- MBMS required UE action	Acquire PTM RB info	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 2)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	Not Present	
- MBMS required UE action	None	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 3)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	Not present	
- MBMS required UE action	None	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 4)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	Not Present	
- MBMS required UE action	None	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7

#### 6.1.3.2.5 Test requirements

- 1) After step 17, the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.
- 2) After step 30, the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.

#### 6.1.3.3 Suitable PLMN search; MBSFN Frequency List not present (unicast carrier)

##### 6.1.3.3.1 Definition

Test to verify that the UE performs a search and then selection of a suitable MBSFN cluster which is part of the registered PLMN or which is in the stored list of Equivalent PLMN, when the MBSFN Frequency List is not present in the SIB1 of the unicast carrier on which the UE has registered.

##### 6.1.3.3.2 Conformance requirement

suitable MBSFN cluster:

A cell is part of an MBSFN cluster if it is indicated in system information [4]. An MBSFN cluster provides exclusively MBMS services. A suitable MBSFN cluster shall fulfil all the following requirements:

- For FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD the MBSFN cluster shall be part of either:

- the registered PLMN, or:
- a PLMN of the Equivalent PLMN list

The MBSFN cluster shall be indicated as:

- providing MBSFN only service

For FDD and 3.84/7.68 Mcps TDD MBSFN cluster selection/reselection process for MBSFN clusters operating on the same frequency shall be based on reception quality. Details of the process are not specified.

...

The UE shall search for MBSFN clusters if the frequencies on which MBSFN clusters are available are not indicated in the cell that the UE is camping on for normal service if the mobile is configured to receive services via MBSFN mode. Details of the process are not specified.

...

When camped on a MBSFN cluster, the UE shall perform the following tasks:

- receive the MCCH as specified in clause 8.4 and in [4];

...

A cell provides MBMS service in MBSFN mode if it is indicated so in system information, see subclause 8.1.1.6.3. A UE that supports MBSFN operation may receive MBMS services via a cell operating in MBSFN mode. For FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD in order to receive an MBMS service via a MBSFN cluster the UE shall select the MBSFN cluster as specified in [4] in addition to selecting a cell for normal camping as specified in [4]. For 1.28 Mcps TDD in order to receive an MBMS service via an MBSFN cluster the UE shall at the first step camp on a unicast cell and get the frequency and "cell parameter ID" from the system information, and then get synchronized to the MBSFN cluster operating with that frequency and "cell parameter ID". For 3.84/7.68 Mcps TDD a cell shall be considered to be operating in MBSFN mode when individual scrambling codes are assigned to all timeslots (via the IE "TDD MBSFN Information").

...

For FDD and 3.84/7.68 Mcps TDD if the IE "MBSFN frequency list" is not included in system information block 11 and if services are listed in the variable MBMS\_ACTIVATED\_SERVICES a UE supporting reception of MBMS service in MBSFN mode shall search for cells providing MBMS service in MBSFN mode.

For 1.28 Mcps TDD the IE "Cell parameter ID" in the IE "MBSFN frequency list" included in system information block 11 indicates the cell which is providing MBMS service in MBSFN only mode on the corresponding frequency; if the IE "Cell parameter ID" is not included in the IE "MBSFN frequency list", a UE may consider that the corresponding frequency is the secondary frequency providing MBMS service in non-MBSFN only mode of current multi-frequency cell.

...

If the variable MBMS\_ACTIVATED\_services is not empty, the UE shall apply the MCCH acquisition procedure upon selecting (e.g. upon power on) or re-selecting a cell supporting MBMS or an MBSFN cluster, upon change of MBMS controlling cell (e.g. due to an active set update or hard handover), upon entering UTRA from another RAT, upon release of a MBMS PTP RB for the purpose of changing transfer mode, upon return from loss of coverage and upon receiving an indication from upper layers that the set of activated services has changed.

...

The Mobile Equipment shall store a list of "equivalent PLMNs". This list is replaced or deleted at the end of each location update procedure, routing area update procedure and GPRS attach procedure. The stored list consists of a list of equivalent PLMNs as downloaded by the network plus the PLMN code of the registered PLMN that downloaded the list. The stored list shall not be deleted when the MS is switched off. The stored list shall be deleted if the SIM/USIM is removed. The maximum number of possible entries in the stored list is 16.

## References

TS 25.304, 4.3, 6.3.1.1, 6.3.1.2

TS 25.331, 8.5.43, 8.6.9.9ac, 8.7.2.2

TS 24.008, 4.4.1

#### 6.1.3.3.3 Test purpose

1. To verify that when SIB11 of the unicast carrier that a UE is camped on does not contain IE MBSFN Frequency List, a UE supporting reception of MBMS service in MBSFN mode will search for a suitable MBSFN cluster if services are listed in the variable MBMS\_ACTIVATED\_SERVICES.
2. To verify that the UE when selecting a MBSFN cluster will select a suitable MBSFN cluster of the registered PLMN (unicast carrier).
3. To verify that the UE when selecting a MBSFN cluster will select a suitable MBSFN cluster of a PLMN in the stored list of Equivalent PLMN.
4. To verify that the UE having selected a suitable MBSFN cluster will start to acquire the MCCH.

#### 6.1.3.3.4 Method of test

Initial condition

System Simulator:

MBSFN carrier(s): 3 cells. Cell 31 (PLMN1), Cell 32 (PLMN2) and Cell 37 (PLMN3) are all switched off.

Unicast carrier: 1 cell, Cell 1 (PLMN1) default configuration.

NOTE: The IE MBSFN frequency list is not included in SIB11 of Cell 1.

User Equipment:

The UE is switched off.

The UE is equipped with a Test-USIM containing default values. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

Related ICS/IXIT statements

- MBMS Broadcast services in MBSFN mode available on UE Yes/No.
- Support of transmit and receive functions available on UE Yes/No.
- Support of MBSFN receive only function available on UE Yes/No.

Test procedure

The SS shall apply the downlink power settings as shown below:

Step 1-7:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	OFF	OFF	OFF
CPICH Ec (FDD)	dBm/3.84MHz	-60	OFF	OFF	OFF
P-CPICH (IMB)	dBm/3.84MHz		OFF	OFF	OFF
T-CPICH (IMB)	dBm/3.84MHz		OFF	OFF	OFF

Step 8-19:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	OFF	-69	-59
CPICH Ec (FDD)	dBm/3.84MHz	-60	OFF	-69	-59
P-CPICH (IMB)	dBm/3.84MHz		OFF	-69	-59
T-CPICH (IMB)	dBm/3.84MHz		OFF	-59.5	-49.5

Step 20-34:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	-69	OFF	-59
CPICH Ec (FDD)	dBm/3.84MHz	-60	-69	OFF	-59
P-CPICH (IMB)	dBm/3.84MHz		-69	OFF	-59
T-CPICH (IMB)	dBm/3.84MHz		-59.5	OFF	-49.5

- a) The UE is switched on.
- b) The UE registers as specified in clause 7.2.2 of TS 34.108 on the unicast carrier Cell 1. For 3.84 Mcps TDD IMB, the UE registers on the FDD unicast carrier cell 1. On the unicast carrier Cell 1, a Location Update Accept message shall be sent on reception of a Location Updating Request message from the UE. The Location Updating Accept message shall include PLMN2 in the equivalent PLMN list. For a UE that supports both CS and PS domains or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure. In these cases, the GMM Attach Accept message shall include PLMN2 in the equivalent PLMN list.
- c) The SS sends ACTIVATE RB TEST MODE on the unicast carrier and the UE responds with ACTIVATE RB TEST MODE COMPLETE. The SS then sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to the activated National Service 1).
- d) The SS activates Cell 32 and Cell 37. The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE " Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS on all these cells using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.1 or 11.2 of TS 34.108. The service is carried on a 129.6kbps RB for MTCH with 80 ms TTI as specified in clause 6.10.3.4.4.6(FDD) or a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- e) After the UE is switched on in step 1 the UE starts searching for an MBSFN cell. Cell search on the MBSFN carrier is independent and not time synchronised with the message sequence on the unicast carrier. One MBMS service (National Service 1) from the list of services available is activated at this stage to ensure MBSFN cell search continues.
- f) The UE camps on Cell 32, recognising PLMN2 as an Equivalent PLMN to the registered PLMN on the unicast carrier. The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE " Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.1 or 11.2 of TS 34.108. The service is carried on a 129.6kbps RB for MTCH with 80 ms TTI as specified in clause 6.10.3.4.4.6(FDD) or a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- g) The UE shall perform the MCCH acquisition procedure. The UE shall detect the available MBMS services by acquiring the MBMS MODIFIED SERVICES INFORMATION, the MBMS UNMODIFIED SERVICES INFORMATION, the MBMS GENERAL INFORMATION, the MBMS COMMON P-T-M RB INFORMATION and the MBMS CURRENT CELL P-T-M INFORMATION.
- h) The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.
- i) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for the activated service on Cell 32.

- j) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is  $> 0$ .
- k) The SS sends OPEN UE TEST LOOP. The UE responds with OPEN UE TEST LOOP COMPLETE.
- l) The SS switches off Cell 32. The SS activates Cell 31.
- m) The SS sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to the activated National Service 1).
- n) The UE camps on Cell 31. The UE shall perform the MCCH acquisition procedure. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.
- o) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for the activated service on Cell 31.
- p) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is  $> 0$ .

## Expected sequence

Step	Direction		Carrier	Message	Comments
	UE	SS			
1		←	U	SYSTEM INFORMATION BLOCK TYPE 11	The UE is switched on and it camps on unicast carrier Cell 1. The IE MBSFN frequency list is not present in SIB 11 on the BCCH.
2		→	U	LOCATION UPDATING REQUEST	For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure
3		←	U	LOCATION UPDATING ACCEPT	IE Equivalent PLMNs contains PLMN2. PLMN2 is maintained in Equivalent PLMN list of UE.
4		→	U	TMSI REALLOCATION COMPLETE	
5		←	U	ACTIVATE RB TEST MODE	
6		→	U	ACTIVATE RB TEST MODE COMPLETE	
7		←	U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for the selected national service
8		SS	M		Cells 32 and 37 are switched ON
9		UE	M		MBMS National Service 1 is activated. UE performs cell search and selects Cell 32.
10		←	M	SYSTEM INFORMATION BLOCK TYPE 5	
11		←	M	MBMS MCCH Message Configuration C2	No modified services. One ongoing service corresponding to that activated at the UE. 129.6(FDD) or 124(TDD) kbps PS RAB, 124.4 kbps (IMB)
12		UE	M		The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period.
13		→	U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
14		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 32.

Step	Direction		Carrier	Message	Comments
	UE	SS			
15	←		U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
16	→		U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
17	←		U	OPEN UE TEST LOOP	
18	→		U	OPEN UE TEST LOOP COMPLETE	
19	SS		M		Cell 32 is switched OFF. Cell 31 is switched ON.
20	←		U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for the selected national service
21	UE		M		UE performs cell search and selects Cell 31.
22	←		M	SYSTEM INFORMATION BLOCK TYPE 5	
23	←		M	MBMS MCCH Message Configuration C2	No modified services. One ongoing service corresponding to that activated at the UE. 129.6(FDD) or 124(TDD) kbps PS RAB, 124.4 kbps (IMB)
24	UE		M		The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period.
25	→		U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
26	SS		M		The SS transmits 10 RLC SDUs on the MTCH of Cell 31.
27	←		U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
28	→		U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
29	←		U	OPEN UE TEST LOOP	
30	→		U	OPEN UE TEST LOOP COMPLETE	
31	←		U	DEACTIVATE RB TEST MODE	
32	→		U	DEACTIVATE RB TEST MODE COMPLETE	

#### Specific message contents

With the following exceptions, all messages have the same content as defined in TS 34.108 clause 9.1.1 or 9.1.3 for the MBSFN carrier and in TS 34.108 clause 9.1.1 or 9.1.2 for the unicast carrier:

## MBMS UNMODIFIED SERVICES INFORMATION (Step 11 and Step 23)

Information Element	Value/remark	Version
Message type		Rel-6
Unmodified service list	4 services	Rel-6
- MBMS Transmission identity		
- MBMS Service ID	(National Service 1)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	'01'	
- MBMS required UE action	Acquire PTM RB info	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 2)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	Not Present	
- MBMS required UE action	None	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 3)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	Not present	
- MBMS required UE action	None	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 4)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	Not Present	
- MBMS required UE action	None	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7

## 6.1.3.3.5 Test requirements

- 1) After step 16, the UETEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.
- 2) After step 28, the UETEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.

## 6.1.3.4 Cell reservations and access restrictions; Normal access class only

## 6.1.3.4.1 Definition

Test to verify that a UE, not assigned to any of the special access classes (Access Classes 11 to 15), performs selection of a suitable MBSFN cluster in accordance with the cell reservations and access restrictions signalled over the air interface.

## 6.1.3.4.2 Conformance requirement

For an MBSFN cluster (see [4]) when cell status is indicated "not reserved" for operator use and "not reserved" for future extension (Cell Reservation Extension),

- All UEs shall treat this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures.

For an MBSFN cluster (see [4]) when cell status is indicated as "not reserved" for operator use and "reserved" for future extension (Cell Reservation Extension),

- UEs shall not consider this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures. The UE may choose to not recheck the status of this MBSFN cluster during the time indicated by  $T_{\text{barred}}$ .

For an MBSFN cluster (see [4]) when cell status is indicated as "reserved" for operator use,

- UEs assigned to Access Class 11 or 15 shall treat this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures.
- UEs assigned to an Access Class in the range 0 to 9 and 12 to 14 shall not consider this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures. The UE may choose to not recheck the status of this MBSFN cluster during the time indicated by  $T_{\text{barred}}$ .

...

The UE shall search for MBSFN clusters if the frequencies on which MBSFN clusters are available are not indicated in the cell that the UE is camping on for normal service if the mobile is configured to receive services via MBSFN mode. Details of the process are not specified.

...

When camped on a MBSFN cluster, the UE shall perform the following tasks:

- receive the MCCH as specified in clause 8.4 and in [4];

...

A cell provides MBMS service in MBSFN mode if it is indicated so in system information, see subclause 8.1.1.6.3. A UE that supports MBSFN operation may receive MBMS services via a cell operating in MBSFN mode. For FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD in order to receive an MBMS service via a MBSFN cluster the UE shall select the MBSFN cluster as specified in [4] in addition to selecting a cell for normal camping as specified in [4]. For 1.28 Mcps TDD in order to receive an MBMS service via an MBSFN cluster the UE shall at the first step camp on a unicast cell and get the frequency and "cell parameter ID" from the system information, and then get synchronized to the MBSFN cluster operating with that frequency and "cell parameter ID". For 3.84/7.68 Mcps TDD a cell shall be considered to be operating in MBSFN mode when individual scrambling codes are assigned to all timeslots (via the IE "TDD MBSFN Information").

...

If the variable MBMS\_ACTIVATED\_services is not empty, the UE shall apply the MCCH acquisition procedure upon selecting (e.g. upon power on) or re-selecting a cell supporting MBMS or an MBSFN cluster, upon change of MBMS controlling cell (e.g. due to an active set update or hard handover), upon entering UTRA from another RAT, upon release of a MBMS PTP RB for the purpose of changing transfer mode, upon return from loss of coverage and upon receiving an indication from upper layers that the set of activated services has changed.

## References

TS 25.304, 5.3a, 6.3.1.1, 6.3.1.2

TS 25.331, 8.5.43, 8.7.2.2

### 6.1.3.4.3 Test purpose

1. To verify that a UE not assigned to any of the special access classes (Access Classes 11 to 15), supporting reception of MBMS service in MBSFN mode, will search for a suitable MBSFN cluster if services are listed in the variable MBMS\_ACTIVATED\_SERVICES.
2. To verify that a UE not assigned to any of the special access classes (Access Classes 11 to 15), when selecting a suitable MBSFN cluster will not select an MBSFN cluster when the cell status is indicated as "not reserved" for operator use and is indicated as "reserved" for future extension.

3. To verify that a UE not assigned to any of the special access classes (Access Classes 11 to 15), when selecting a suitable MBSFN cluster will not select an MBSFN cluster when the cell status is indicated as "reserved" for operator use.
4. To verify that a UE not assigned to any of the special access classes (Access Classes 11 to 15), when selecting a suitable MBSFN cluster will select an MBSFN cluster when the cell status is indicated as "not reserved" for operator use and "not reserved" for future extension.
5. To verify that the UE having selected a suitable MBSFN cluster will start to acquire the MCCH.

#### 6.1.3.4.4 Method of test

##### Initial condition

##### System Simulator:

MBSFN carrier: 3 cells, Cell 31 (PLMN1), Cell 32 (PLMN1) and Cell 37 (PLMN1) which are all switched off.

Unicast carrier: 1 cell, Cell 1 (PLMN1) default configuration.

##### User Equipment:

The UE is switched off.

The UE is equipped with a Test-USIM containing default values. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

##### Related ICS/IXIT statements

- MBMS Broadcast services in MBSFN mode available on UE Yes/No.
- Support of transmit and receive functions available on UE Yes/No.
- Support of MBSFN receive only function available on UE Yes/No.

##### Test procedure

The SS shall apply the downlink power settings as shown below:

##### Step 1-7:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	OFF	OFF	OFF
CPICH Ec (FDD)	dBm/3.84MHz	-60	OFF	OFF	OFF
P-CPICH (IMB)	dBm/3.84MHz		OFF	OFF	OFF
T-CPICH (IMB)	dBm/3.84MHz		OFF	OFF	OFF

##### Step 8-16:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	OFF	-59	-59
CPICH Ec (FDD)	dBm/3.84MHz	-60	OFF	-59	-59
P-CPICH (IMB)	dBm/3.84MHz		OFF	-59	-59
T-CPICH (IMB)	dBm/3.84MHz		OFF	-49.5	-49.5

##### Step 17-29:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	-69	-59	-59
CPICH Ec (FDD)	dBm/3.84MHz	-60	-69	-59	-59
P-CPICH (IMB)	dBm/3.84MHz		-69	-59	-59
T-CPICH (IMB)	dBm/3.84MHz		-59.5	-49.5	-49.5

- a) The UE is switched on.
- b) The UE registers as specified in clause 7.2.2 of TS 34.108 on the unicast carrier Cell 1. For 3.84 Mcps TDD IMB, the UE registers on the FDD unicast carrier cell 1. On the unicast carrier Cell 1, a Location Update Accept message shall be sent on reception of a Location Updating Request message from the UE. For a UE that supports both CS and PS domains or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- c) The SS sends ACTIVATE RB TEST MODE on the unicast carrier and the UE responds with ACTIVATE RB TEST MODE COMPLETE. The SS then sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to the activated National Service 1).
- d) The SS activates Cell 32 and Cell 37. Cell 32 indicates 'reserved' for future extension in the Cell Access Restriction IE of SIB3. Cell 37 indicates 'reserved' for operator use in the Cell Access Restriction IE of SIB3. The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE "Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS on these cells using MBMS configuration C2 (one PTM session ongoing) and Default 1 MCCH scheduling according to clause 11.1 or 11.2 of TS 34.108. The service is carried on a 129.6 kbps RB for MTCH with 80 ms TTI as specified in clause 6.10.3.4.4.6 (FDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- e) After the UE is switched on in step 1 the UE starts searching for an MBSFN cell. Cell search on the MBSFN carrier is independent and not time synchronised with the message sequence on the unicast carrier. One MBMS service (National Service 1) from the list of services available is activated at this stage to ensure MBSFN cell search continues. The UE performs cluster selection but is unable to find a suitable MBSFN cluster.
- f) SS delays for a period of time greater than or equal to 10 times the  $T_{\text{barred}}$  setting used in the Cell Access Restriction IE on Cells 32 and 37 (say 120 seconds). Note: If the UE sends CLOSE UE TEST LOOP COMPLETE at this stage then a test failure is recorded.
- g) The SS sends OPEN UE TEST LOOP. The UE responds with OPEN UE TEST LOOP COMPLETE.
- h) MBMS National Service 1 is de-activated at the UE.
- i) The SS sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to National Service 2).
- j) The SS activates Cell 31.
- k) MBMS service (National Service 2) from the list of services available is activated to ensure MBSFN cell search continues.
- l) The UE camps on Cell 31. The UE shall perform the MCCH acquisition procedure. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.
- m) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for National Service 2 on Cell 31.
- n) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter

returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is  $> 0$ .

## Expected sequence

Step	Direction		Carrier	Message	Comments
	UE	SS			
1		←	U	SYSTEM INFORMATION BLOCK TYPE 11	The UE is switched on and it camps on unicast carrier Cell 1.
2		→	U	LOCATION UPDATING REQUEST	For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure
3		←	U	LOCATION UPDATING ACCEPT	
4		→	U	TMSI REALLOCATION COMPLETE	
5		←	U	ACTIVATE RB TEST MODE	
6		→	U	ACTIVATE RB TEST MODE COMPLETE	
7		←	U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for National Service 1
8		SS	M		Cells 32 and 37 are switched ON
9		←	M	SYSTEM INFORMATION BLOCK TYPE 3	On Cell 32 the SIB3 contains the IE Cell Reservation Extension set to 'reserved'.
10		←	M	SYSTEM INFORMATION BLOCK TYPE 3	On Cell 37 the SIB3 contains the IE Cell Reserved for operator use set to 'reserved'.
11		←	M	MBMS MCCH Message Configuration C2	Cell 32 and Cell 37: No modified services. Two ongoing services (National Services 1 and 2). 129.6(FDD) or 124(TDD) kbps PS RAB, 124.4 kbps (IMB)
12		UE	M		MBMS National Service 1 is activated. UE performs cell search but is unable to find a suitable MBSFN cluster.
13		SS	M		SS delays for $\geq 10 \cdot T_{\text{barred}}$ (e.g. 120s). Note: If CLOSE UE TEST LOOP COMPLETE is received a test failure is recorded.
14		←	U	OPEN UE TEST LOOP	
11		→	U	OPEN UE TEST LOOP COMPLETE	
15		UE	M		MBMS National Service 1 is de-activated.
16		←	U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for National Service 2 is included.
17		SS	M		Cell 31 is switched ON.
18		SS	M		MBMS National Service 2 is activated.
19		UE	M		UE performs cell search and selects Cell 31.
20		←	M	MBMS MCCH Message Configuration C2	Cell 31, 32 and Cell 37: No modified services. Two ongoing services (National Services 1 and 2). 129.6(FDD) or 124(TDD) kbps PS RAB, 124.4 kbps (IMB)
21		UE	M		The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period.
22		→	U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
23		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 31 for National Service 2.
24		←	U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
25		→	U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
26		←	U	OPEN UE TEST LOOP	
27		→	U	OPEN UE TEST LOOP COMPLETE	

Step	Direction		Carrier	Message	Comments
	UE	SS			
28	←		U	DEACTIVATE RB TEST MODE	
29	→		U	DEACTIVATE RB TEST MODE COMPLETE	

#### Specific message contents

With the following exceptions, all messages have the same content as defined in TS 34.108 clause 9.1.1 or 9.1.3 for the MBSFN carrier and in TS 34.108 clause 9.1.1 or 9.1.2 for the unicast carrier:

#### SYSTEM INFORMATION BLOCK TYPE 3 for Cell 32 (Step 9)

Information Element	Value/remark
...	
- $T_{\text{barred}}$	10
- Cell Reserved for operator use	not reserved
- Cell Reservation Extension	reserved

#### SYSTEM INFORMATION BLOCK TYPE 3 for Cell 37 (Step 10)

Information Element	Value/remark
...	
- $T_{\text{barred}}$	10
- Cell Reserved for operator use	reserved
- Cell Reservation Extension	not reserved

## MBMS UNMODIFIED SERVICES INFORMATION (Step 11 and Step 20)

Information Element	Value/remark	Version
Message type		Rel-6
Unmodified service list	4 services	Rel-6
- MBMS Transmission identity		
- MBMS Service ID	(National Service 1)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	'01'	
- MBMS required UE action	Acquire PTM RB info	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 2)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	'01'	
- MBMS required UE action	Acquire PTM RB info	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 3)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	Not present	
- MBMS required UE action	None	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 4)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	Not Present	
- MBMS required UE action	None	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7

## 6.1.3.4.5 Test requirements

- 1) At step 13, CLOSE UE TEST LOOP COMPLETE shall not be received from the UE.
- 2) After step 25, the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.

## 6.1.3.5 Cell reservations and access restrictions; Operator access class

## 6.1.3.5.1 Definition

Test to verify that a UE, assigned to one of the Access Classes 11 or 15, performs selection of a suitable MBSFN cluster in accordance with the cell reservations and access restrictions signalled over the air interface.

## 6.1.3.5.2 Conformance requirement

For an MBSFN cluster (see [4]) when cell status is indicated "not reserved" for operator use and "not reserved" for future extension (Cell Reservation Extension),

- All UEs shall treat this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures.

For an MBSFN cluster (see [4]) when cell status is indicated as "not reserved" for operator use and "reserved" for future extension (Cell Reservation Extension),

- UEs shall not consider this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures. The UE may choose to not recheck the status of this MBSFN cluster during the time indicated by  $T_{\text{barred}}$ .

For an MBSFN cluster (see [4]) when cell status is indicated as "reserved" for operator use,

- UEs assigned to Access Class 11 or 15 shall treat this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures.
- UEs assigned to an Access Class in the range 0 to 9 and 12 to 14 shall not consider this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures. The UE may choose to not recheck the status of this MBSFN cluster during the time indicated by  $T_{\text{barred}}$ .

...

The UE shall search for MBSFN clusters if the frequencies on which MBSFN clusters are available are not indicated in the cell that the UE is camping on for normal service if the mobile is configured to receive services via MBSFN mode. Details of the process are not specified.

...

When camped on a MBSFN cluster, the UE shall perform the following tasks:

- receive the MCCH as specified in clause 8.4 and in [4];

...

A cell provides MBMS service in MBSFN mode if it is indicated so in system information, see subclause 8.1.1.6.3. A UE that supports MBSFN operation may receive MBMS services via a cell operating in MBSFN mode. For FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD in order to receive an MBMS service via a MBSFN cluster the UE shall select the MBSFN cluster as specified in [4] in addition to selecting a cell for normal camping as specified in [4]. For 1.28 Mcps TDD in order to receive an MBMS service via an MBSFN cluster the UE shall at the first step camp on a unicast cell and get the frequency and "cell parameter ID" from the system information, and then get synchronized to the MBSFN cluster operating with that frequency and "cell parameter ID". For 3.84/7.68 Mcps TDD a cell shall be considered to be operating in MBSFN mode when individual scrambling codes are assigned to all timeslots (via the IE "TDD MBSFN Information").

...

If the variable MBMS\_ACTIVATED\_services is not empty, the UE shall apply the MCCH acquisition procedure upon selecting (e.g. upon power on) or re-selecting a cell supporting MBMS or an MBSFN cluster, upon change of MBMS controlling cell (e.g. due to an active set update or hard handover), upon entering UTRA from another RAT, upon release of a MBMS PTP RB for the purpose of changing transfer mode, upon return from loss of coverage and upon receiving an indication from upper layers that the set of activated services has changed.

## References

TS 25.304, 5.3a, 6.3.1.1, 6.3.1.2

TS 25.331, 8.5.43, 8.7.2.2

### 6.1.3.5.3 Test purpose

1. To verify that a UE assigned to one of the Access Classes 11 or 15 (in addition to one of the Access Classes 0 to 9), supporting reception of MBMS service in MBSFN mode, will search for a suitable MBSFN cluster if services are listed in the variable MBMS\_ACTIVATED\_SERVICES.
2. To verify that a UE assigned to one of the Access Classes 11 or 15 (in addition to one of the Access Classes 0 to 9), when selecting a suitable MBSFN cluster will not select an MBSFN cluster when the cell status is indicated as "not reserved" for operator use and is indicated as "reserved" for future extension.

3. To verify that a UE assigned to one of the Access Classes 11 or 15 (in addition to one of the Access Classes 0 to 9), when selecting a suitable MBSFN cluster will select an MBSFN cluster when the cell status is indicated as "reserved" for operator use and is indicated as "not reserved" for future extension.
4. To verify that a UE assigned to one of the Access Classes 11 or 15 (in addition to one of the Access Classes 0 to 9), when selecting a suitable MBSFN cluster will select an MBSFN cluster when the cell status is indicated as "not reserved" for operator use and "not reserved" for future extension.
5. To verify that the UE having selected a suitable MBSFN cluster will start to acquire the MCCH.

#### 6.1.3.5.4 Method of test

##### Initial condition

##### System Simulator:

MBSFN carrier: 3 cells, Cell 31 (PLMN1), Cell 32 (PLMN1) and Cell 37 (PLMN1) all are switched off.

Unicast carrier: 1 cell, Cell 1 (PLMN1) default configuration.

##### User Equipment:

The UE is switched off.

The UE is equipped with a Test-USIM containing default values with the exception that the field  $EF_{ACC}$  (Access Control Class) of the Test-USIM shall be set as per "Type C" in clause 8.3.2.15.

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

##### Related ICS/IXIT statements

- MBMS Broadcast services in MBSFN mode available on UE Yes/No.
- Support of transmit and receive functions available on UE Yes/No.
- Support of MBSFN receive only function available on UE Yes/No.

##### Test procedure

The SS shall apply the downlink power settings as shown below:

##### Step 1-7:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	OFF	OFF	OFF
CPICH Ec (FDD)	dBm/3.84MHz	-60	OFF	OFF	OFF
P-CPICH (IMB)	dBm/3.84MHz		OFF	OFF	OFF
T-CPICH (IMB)	dBm/3.84MHz		OFF	OFF	OFF

##### Step 8-16:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	OFF	-59	OFF
CPICH Ec (FDD)	dBm/3.84MHz	-60	OFF	-59	OFF
P-CPICH (IMB)	dBm/3.84MHz		OFF	-59	OFF
T-CPICH (IMB)	dBm/3.84MHz		OFF	-49.5	OFF

##### Step 17-30:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	OFF	-59	-69
CPICH Ec (FDD)	dBm/3.84MHz	-60	OFF	-59	-69
P-CPICH (IMB)	dBm/3.84MHz		OFF	-59	-69
T-CPICH (IMB)	dBm/3.84MHz		OFF	-49.5	-59.5

Step 31-43:

Parameter	Unit	Cell 1	Cell 31	Cell 32	Cell 37
P-CCPCH RSCP (TDD)	dBm	-60	-69	-59	OFF
CPICH Ec (FDD)	dBm/3.84MHz	-60	-69	-59	OFF
P-CPICH (IMB)	dBm/3.84MHz		-69	-59	OFF
T-CPICH (IMB)	dBm/3.84MHz		-59.5	-49.5	OFF

- a) The UE is switched on.
- b) The UE registers as specified in clause 7.2.2 of TS 34.108 on the unicast carrier Cell 1. For 3.84 Mcps TDD IMB, the UE registers on the FDD unicast carrier cell 1. On the unicast carrier Cell 1, a Location Update Accept message shall be sent on reception of a Location Updating Request message from the UE. For a UE that supports both CS and PS domains or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- c) The SS sends ACTIVATE RB TEST MODE on the unicast carrier and the UE responds with ACTIVATE RB TEST MODE COMPLETE. The SS then sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to the activated National Service 1).
- d) The SS activates Cell 32. Cell 32 indicates 'reserved' for future extension in the Cell Access Restriction IE of SIB3. The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE "Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS on these cells using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.1 or 11.2 of TS 34.108. The service is carried on a 129.6kbps RB for MTCH with 80 ms TTI as specified in clause 6.10.3.4.4.6(FDD) or a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- e) After the UE is switched on in step 1 the UE starts searching for an MBSFN cell. Cell search on the MBSFN carrier is independent and not time synchronised with the message sequence on the unicast carrier. One MBMS service (National Service 1) from the list of services available is activated at this stage to ensure MBSFN cell search continues. The UE performs cluster selection but is unable to find a suitable MBSFN cluster.
- f) SS delays for a period of time greater than or equal to 10 times the  $T_{\text{barred}}$  setting used in the Cell Access Restriction IE on Cells 32 (say 120 seconds). Note: If the UE sends CLOSE UE TEST LOOP COMPLETE at this stage then a test failure is recorded.
- g) The SS sends OPEN UE TEST LOOP. The UE responds with OPEN UE TEST LOOP COMPLETE.
- h) MBMS National Service 1 is de-activated at the UE.
- i) The SS sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to National Service 2).
- j) The SS activates Cell 37 as well as Cell 32. Cell 37 indicates 'reserved' for operator use in the Cell Access Restriction IE of SIB3. The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE "Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS on these cells using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.1 or 11.2 of TS 34.108. The service is carried on a 129.6kbps RB for MTCH with 80 ms TTI as specified in clause 6.10.3.4.4.6(FDD) or a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in

clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).

- k) MBMS service (National Service 2) from the list of services available is activated to ensure MBSFN cell search continues.
- l) The UE camps on Cell 37. The UE shall perform the MCCH acquisition procedure. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.
- m) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for National Service 2 on Cell 37.
- n) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is > 0.
- o) The SS sends OPEN UE TEST LOOP. The UE responds with OPEN UE TEST LOOP COMPLETE.
- p) MBMS National Service 2 is de-activated at the UE.
- q) The SS sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to National Service 3).
- r) The SS switches off Cell 37. The SS activates Cell 31 as well as Cell 32. The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE "Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS on these cells using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.1 or 11.2 of TS 34.108. The service is carried on a 129.6kbps RB for MTCH with 80 ms TTI as specified in clause 6.10.3.4.4.6(FDD) or a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- s) MBMS service (National Service 3) from the list of services available is activated to ensure MBSFN cell search continues.
- t) The UE camps on Cell 31. The UE shall perform the MCCH acquisition procedure. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.
- u) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for National Service 2 on Cell 31.
- v) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is > 0.

#### Expected sequence

Step	Direction		Carrier	Message	Comments
	UE	SS			
1		←	U	SYSTEM INFORMATION BLOCK TYPE 11	The UE is switched on and it camps on unicast carrier Cell 1.

Step	Direction		Carrier	Message	Comments
	UE	SS			
2		→	U	LOCATION UPDATING REQUEST	For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure
3		←	U	LOCATION UPDATING ACCEPT	
4		→	U	TMSI REALLOCATION COMPLETE	
5		←	U	ACTIVATE RB TEST MODE	
6		→	U	ACTIVATE RB TEST MODE COMPLETE	
7		←	U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for National Service 1
8		SS	M		Cells 32 is switched ON
9		←	M	SYSTEM INFORMATION BLOCK TYPE 3	On Cell 32 the SIB3 contains the IE Cell Reservation Extension set to 'reserved'.
10		←	M	MBMS MCCH Message Configuration C2	Cell 32: No modified services. Three ongoing services (National Services 1, 2 and 3). 129.6(FDD) or 124(TDD) kbps PS RAB, 124.4 kbps (IMB)
11		UE	M		MBMS National Service 1 is activated. UE performs cell search but is unable to find a suitable MBSFN cluster.
12		SS	M		SS delays for $\geq 10 \cdot T_{\text{barred}}$ (e.g. 120s). Note: If CLOSE UE TEST LOOP COMPLETE is received a test failure is recorded.
13		←	U	OPEN UE TEST LOOP	
14		→	U	OPEN UE TEST LOOP COMPLETE	
15		UE	M		MBMS National Service 1 is de-activated.
16		←	U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for National Service 2 is included.
17		SS	M		Cell 37 is switched ON.
18		SS	M		MBMS National Service 2 is activated.
19		UE	M		UE performs cell search and selects Cell 37.
20		←	M	SYSTEM INFORMATION BLOCK TYPE 3	On Cell 37 the SIB3 contains the IE Cell Reserved for operator use set to 'reserved'.
21		←	M	MBMS MCCH Message Configuration C2	Cell 32 and Cell 37: No modified services. Three ongoing services (National Services 1, 2 and 3). 129.6(FDD) or 124(TDD) kbps PS RAB, 124.4 kbps (IMB)
22		UE	M		The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period.
23		→	U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
24		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 37 for National Service 2.
25		←	U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
26		→	U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
27		←	U	OPEN UE TEST LOOP	
28		→	U	OPEN UE TEST LOOP COMPLETE	
29		UE	M		MBMS National Service 2 is de-activated.
30		←	U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for National Service 3 is included.
31		SS	M		Cell 37 is switched OFF. Cell 31 is switched ON.

Step	Direction		Carrier	Message	Comments
	UE	SS			
32		SS	M		MBMS National Service 3 is activated.
33		UE	M		UE performs cell search and selects Cell 31.
34		←	M	MBMS MCCH Message Configuration C2	Cell 31 and Cell 32: No modified services. Three ongoing services (National Services 1, 2 and 3). 129.6(FDD) or 124(TDD) kbps PS RAB, 124.4 kbps (IMB)
35		UE	M		The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period.
36		→	U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
37		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 31 for National Service 3.
38		←	U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
39		→	U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
40		←	U	OPEN UE TEST LOOP	
41		→	U	OPEN UE TEST LOOP COMPLETE	
42		←	U	DEACTIVATE RB TEST MODE	
43		→	U	DEACTIVATE RB TEST MODE COMPLETE	

#### Specific message contents

With the following exceptions, all messages have the same content as defined in TS 34.108 clause 9.1.1 or 9.1.3 for the MBSFN carrier and in TS 34.108 clause 9.1.1 or 9.1.2 for the unicast carrier:

#### SYSTEM INFORMATION BLOCK TYPE 3 for Cell 32 (Step 9)

Information Element	Value/remark
...	
- $T_{\text{barred}}$	10
- Cell Reserved for operator use	not reserved
- Cell Reservation Extension	reserved

#### SYSTEM INFORMATION BLOCK TYPE 3 for Cell 37 (Step 20)

Information Element	Value/remark
...	
- $T_{\text{barred}}$	10
- Cell Reserved for operator use	reserved
- Cell Reservation Extension	not reserved

## MBMS UNMODIFIED SERVICES INFORMATION (Step 10, Step 21 and Step 34)

Information Element	Value/remark	Version
Message type		Rel-6
Unmodified service list	4 services	Rel-6
- MBMS Transmission identity		
- MBMS Service ID	(National Service 1)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	'01'	
- MBMS required UE action	Acquire PTM RB info	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 2)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	'01'	
- MBMS required UE action	Acquire PTM RB info	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 3)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	'01'	
- MBMS required UE action	Acquire PTM RB info	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7
- MBMS Transmission identity		
- MBMS Service ID	(National Service 4)	
- MBMS Service ID	Refer to clause 11.2.4 "MBSFN service availability"	
- CHOICE PLMN identity	SameAs-MIB	
- no data		
- MBMS Session ID	Not Present	
- MBMS required UE action	None	
- MBMS preferred frequency	Not Present	
- MBSFN cluster frequency	Not Present (MD)	Rel-7

## 6.1.3.5.5 Test requirements

- 1) At step 12, CLOSE UE TEST LOOP COMPLETE shall not be received from the UE.
- 2) After step 26, the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.
- 3) After step 39, the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.

## 6.1.3.6 Cell reservations and access restrictions; Home country services access class

## 6.1.3.6.1 Definition

Test to verify that a UE, assigned to one of the Access Classes 12, 13 or 14, performs selection of a suitable MBSFN cluster in accordance with the cell reservations and access restrictions signalled over the air interface.

## 6.1.3.6.2 Conformance requirement

For an MBSFN cluster (see [4]) when cell status is indicated "not reserved" for operator use and "not reserved" for future extension (Cell Reservation Extension),

- All UEs shall treat this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures.

For an MBSFN cluster (see [4]) when cell status is indicated as "not reserved" for operator use and "reserved" for future extension (Cell Reservation Extension),

- UEs shall not consider this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures. The UE may choose to not recheck the status of this MBSFN cluster during the time indicated by  $T_{\text{barred}}$ .

For an MBSFN cluster (see [4]) when cell status is indicated as "reserved" for operator use,

- UEs assigned to Access Class 11 or 15 shall treat this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures.
- UEs assigned to an Access Class in the range 0 to 9 and 12 to 14 shall not consider this MBSFN cluster as candidate during the MBSFN cluster selection and MBSFN cluster re-selection procedures. The UE may choose to not recheck the status of this MBSFN cluster during the time indicated by  $T_{\text{barred}}$ .

...

The UE shall search for MBSFN clusters if the frequencies on which MBSFN clusters are available are not indicated in the cell that the UE is camping on for normal service if the mobile is configured to receive services via MBSFN mode. Details of the process are not specified.

...

When camped on a MBSFN cluster, the UE shall perform the following tasks:

- receive the MCCH as specified in clause 8.4 and in [4];

...

A cell provides MBMS service in MBSFN mode if it is indicated so in system information, see subclause 8.1.1.6.3. A UE that supports MBSFN operation may receive MBMS services via a cell operating in MBSFN mode. For FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD in order to receive an MBMS service via a MBSFN cluster the UE shall select the MBSFN cluster as specified in [4] in addition to selecting a cell for normal camping as specified in [4]. For 1.28 Mcps TDD in order to receive an MBMS service via an MBSFN cluster the UE shall at the first step camp on a unicast cell and get the frequency and "cell parameter ID" from the system information, and then get synchronized to the MBSFN cluster operating with that frequency and "cell parameter ID". For 3.84/7.68 Mcps TDD a cell shall be considered to be operating in MBSFN mode when individual scrambling codes are assigned to all timeslots (via the IE "TDD MBSFN Information").

...

If the variable MBMS\_ACTIVATED\_services is not empty, the UE shall apply the MCCH acquisition procedure upon selecting (e.g. upon power on) or re-selecting a cell supporting MBMS or an MBSFN cluster, upon change of MBMS controlling cell (e.g. due to an active set update or hard handover), upon entering UTRA from another RAT, upon release of a MBMS PTP RB for the purpose of changing transfer mode, upon return from loss of coverage and upon receiving an indication from upper layers that the set of activated services has changed.

## References

TS 25.304, 5.3a, 6.3.1.1, 6.3.1.2

TS 25.331, 8.5.43, 8.7.2.2

### 6.1.3.6.3 Test purpose

1. To verify that a UE, assigned to just one of the Access Classes 12, 13 or 14 (in addition to one of the Access Classes 0 to 9), supporting reception of MBMS service in MBSFN mode, will search for a suitable MBSFN cluster if services are listed in the variable MBMS\_ACTIVATED\_SERVICES.
2. To verify that a UE, assigned to just one of the Access Classes 12, 13 or 14 (in addition to one of the Access Classes 0 to 9), when selecting a suitable MBSFN cluster will not select an MBSFN cluster when the cell status is indicated as "not reserved" for operator use and is indicated as "reserved" for future extension.

3. To verify that a UE, assigned to just one of the Access Classes 12, 13 or 14 (in addition to one of the Access Classes 0 to 9), when selecting a suitable MBSFN cluster will not select an MBSFN cluster when the cell status is indicated as "reserved" for operator use.
4. To verify that a UE, assigned to just one of the Access Classes 12, 13 or 14 (in addition to one of the Access Classes 0 to 9), when selecting a suitable MBSFN cluster will select an MBSFN cluster when the cell status is indicated as "not reserved" for operator use and "not reserved" for future extension.
5. To verify that the UE having selected a suitable MBSFN cluster will start to acquire the MCCH.

#### 6.1.3.6.4 Method of test

Refer to the "Method of test" in clause 6.1.3.4.4 with the following exception:

The UE is equipped with a Test-USIM containing default values with the exception that the field  $EF_{ACC}$  (Access Control Class) of the Test-USIM shall be set as per "Type D" in clause 8.3.2.15.

#### 6.1.3.6.5 Test requirements

Refer to the "Test requirements" in clause 6.1.3.4.5.

### 6.1.3.7 Inter frequency neighbour reselection / Service activation

#### 6.1.3.7.1 Definition

This test is applicable for UEs that support MBMS broadcast services in MBSFN mode and which support either both TDD transmit and receive functions or TDD MBSFN receive only function or 3.84 Mcps TDD IMB function.

#### 6.1.3.7.2 Conformance requirement

Upon detection of one MBSFN cluster all other frequencies on which MBMS service is provided in MBSFN mode for one of the PLMN assigned to the MBSFN cluster are indicate as specified in [4].

The UE chooses the frequency for the MBSFN cluster to be received based on the information on the services that are provided on the MBSFN clusters of those frequencies.

...

If the variable  $MBMS\_ACTIVATED\_SERVICES$  is not empty, the UE shall apply the MCCH acquisition procedure upon selecting (e.g. upon power on) or re-selecting a cell supporting MBMS or an MBSFN cluster, upon change of MBMS controlling cell (e.g. due to an active set update or hard handover), upon entering UTRA from another RAT, upon release of a MBMS PTP RB for the purpose of changing transfer mode, upon return from loss of coverage and upon receiving an indication from upper layers that the set of activated services has changed.

...

The UE shall detect the available MBMS services by acquiring the MBMS MODIFIED SERVICES INFORMATION and the MBMS UNMODIFIED SERVICES INFORMATION messages without delaying reading of MCCH until the next modification period and without stopping at the end of the modification period, in accordance with subclause 8.7.1.3.

...

For cells operating in MBSFN mode as indicated in subclause 8.1.1.6.3 the UE shall immediately acquire the MBMS GENERAL INFORMATION messages i.e. it shall not delay reception of these messages until it has completed the acquisition of the MBMS MODIFIED SERVICES INFORMATION and the MBMS UNMODIFIED SERVICES INFORMATION messages. Likewise for cells operating in MBSFN mode as indicated in subclause 8.1.1.6.3, the UE should immediately acquire the MBMS CURRENT CELL P-T-M RB INFORMATION.

The UE shall continue acquiring the above messages until it has received a consistent set of MCCH information e.g. both the MBMS MODIFIED SERVICES INFORMATION and the MBMS UNMODIFIED SERVICES INFORMATION message should be acquired in the same modification period.

...

If the UE selects to another cell, the UE shall re-establish the RLC entity used for MCCH reception.

...

If the IE "MBMS required UE action" is included and concerns an MBMS activated service the UE shall:

...

- 1> if the IE "MBMS required UE action" is set to 'Acquire PTM RB info'; or
- 1> if the IE "MBMS required UE action" is set to 'Acquire counting info– PTM RBs unmodified' and the UE is not receiving a p-t-m RB for the concerned service:
  - 2> continue acquiring the MBMS COMMON P-T-M RB INFORMATION, MBMS CURRENT CELL P-T-M RB INFORMATION and the MBMS NEIGHBOURING CELL P-T-M RB INFORMATION messages without delaying reading of MCCH until the next modification period and without stopping at the end of the modification period, in accordance with subclause 8.7.1.3
  - 2> act upon the MBMS COMMON P-T-M RB INFORMATION, MBMS CURRENT CELL P-T-M RB INFORMATION and the MBMS NEIGHBOURING CELL P-T-M RB INFORMATION message, if received, in accordance with subclause 8.7.5;

...

Upon completing the reception of the MBMS COMMON P-T-M RB INFORMATION and the MBMS CURRENT CELL P-T-M RB INFORMATION messages for an activated MBMS service, the UE shall:

- 1> if the UE is already receiving an MTCH and does not have the capability to receive the new service in addition:
  - 2> the UE behaviour is undefined.

NOTE: In this case, the UE may request upper layers to prioritise the services and only receive the service(s) prioritised by upper layers.

- 1> act upon all received information elements as specified in subclause 8.6, unless specified otherwise in the following;
  - 1> if the UE previously received the service by means of a p-t-m radio bearer from a cell belonging to another MBMS cell group:
    - 2> re-establish RLC;
    - 2> re-initialise PDCP.
  - 1> start immediately to use the indicated configuration unless specified otherwise;
  - 1> start or continue receiving the indicated p-t-m radio bearers depending on its UE capabilities.

The UE shall continue acquiring the above messages until it has received a consistent set of MCCH information i.e. the MBMS MODIFIED SERVICES INFORMATION message, MBMS UNMODIFIED SERVICES INFORMATION message, MBMS COMMON P-T-M RB INFORMATION and the MBMS CURRENT CELL P-T-M RB INFORMATION message should be acquired in the same modification period.

## Reference

3GPP TS 25.304 clauses 6.3.1.3.

3GPP TS 25.331 clauses 8.7.2.2, 8.7.2.3, 8.7.1.3, 8.6.9.6, 8.7.5.3.

### 6.1.3.7.3 Test purpose

1. To verify that on indication from upper layers that there has been a change to the activated service(s) the UE will perform a cluster reselection to an inter frequency neighbour cluster providing the required MBMS service .
2. To verify that the UE starts the reception of the activated MBMS service after reselection to the inter frequency neighbour MBSFN cluster.

## 6.1.3.7.4 Method of test

## Initial condition

## System Simulator:

- MBSFN carrier: 2 cells, Cell 31 (PLMN1) and Cell 33 (PLMN1). Cell 31 is powered off. In addition to broadcasting System Information, MCCH messages are transmitted by the SS on Cell 33 using MBMS configuration C1 and Default1 MCCH scheduling (No ongoing session) according to subclause 11.2 of TS 34.108.
- Unicast carrier : 1 cell, Cell 1 with default parameters.

## User Equipment:

- On the unicast carrier cell the UE is in registered Idle Mode on PS (state 3) if the UE only supports PS domain or registered Idle Mode on CS/PS (state 7) if the UE supports both CS and PS domains, as specified in clause 7.2.2 of TS 34.108.
- The UE is in MBSFN Idle mode with no activated service as specified in clause 7.6.3 of TS 34.108.

## Related ICS/IXIT statements

- MBMS Broadcast services in MBSFN mode application available on UE Yes/No.
- Support of TDD transmit and receive functions available on UE Yes/No.
- Support of TDD MBSFN receive only function available on UE Yes/No.

## Test procedure

Table 8.5.1.14

Parameter	Unit	Cell 1		Cell 31		Cell 33	
		T0	T1	T0	T1	T0	T1
UTRARF Channel Number		Ch. 1		Ch. 2		Ch. 3	
CPICH Ec (FDD)	dBm / 3.84MHz	-60	-60	-	-	-	-
P-CCPCH RSCP (TDD)	dBm	-60	-60	OFF	-60	-60	-60
P-CPICH (IMB)	dBm / 3.84MHz			OFF	-60	-60	-60
T-CPICH (IMB)	dBm / 3.84MHz			OFF	-50.5	-50.5	-50.5

Table 8.5.1.1 illustrates the downlink power to be applied for the 3 cells at various time instants of the test execution.

- The UE is camping on Cell 1 and Cell 33. The SS sends ACTIVATE RB TEST MODE on the unicast carrier and the UE responds with ACTIVATE RB TEST MODE COMPLETE. The SS then sends CLOSE UE TEST LOOP to activate RLC SDU counting on MTCH (Transmission identity indicating the MBMS National Service 1 (see TS 34.108 clause 11.2.4). The UE responds with CLOSE UE TEST LOOP COMPLETE.
- The SS powers on Cell 31 at T1.
- National Service 1 ongoing on MBSFN Cell 31 (see TS 34.108 clause 11.2.4) is selected at the UE. The UE determines from the MBMS UNMODIFIED SERVICES INFORMATION and MBMS GENERAL INFORMATION messages on the MCCH of Cell 33 that the selected National Service is available on inter frequency neighbour cell 31.
- The UE reselects to MBSFN carrier on URFCN Ch. 3 and camps on Cell 31. The SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE "Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS on Cell 31 using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.2 of TS 34.108. The service is carried on a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps

RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD).or clause 6.11.6.4.4.9 (7.68 Mcps TDD).

- e) The UE shall perform the MCCH acquisition procedure. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.
- f) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for National Service 1 on Cell 31.
- g) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is > 0.

#### Expected sequence

Step	Direction		Carrier	Message	Comment
	UE	SS			
		←	M	MBMS MCCH Message Configuration C1	Cell 33: No ongoing sessions
1		←	U	ACTIVATE RB TEST MODE	
2		→	U	ACTIVATE RB TEST MODE COMPLETE	
3		←	U	CLOSE UE TEST LOOP	Loop back mode 3 is activated with Short Transmission Identity for National Service 1 on Cell 31.
5		SS			The SS powers on Cell 31 (T1).
6		UE	M		National Service 1, available on Cell 31, is selected at the UE.
6		UE	M		The UE reselects to Cell 31 and starts to acquire the MCCH.
7		←	M	SYSTEM INFORMATION BLOCK TYPE 5	
		←	M	MBMS MCCH Message Configuration C2	Cell 31: No modified services. One ongoing session. (National Service 1). 124 kbps PS RAB, 124.4 kbps (IMB)
15		UE	M		The UE shall continue acquiring the above MBMS messages until it has received a consistent set of MCCH information in the same modification period.
4		→	U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
16		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 31 for National Service 1.
17		←	U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
18		→	U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
19		←	U	OPEN UE TEST LOOP	
20		→	U	OPEN UE TEST LOOP COMPLETE	
21		←	U	DEACTIVATE RB TEST MODE	
22		→	U	DEACTIVATE RB TEST MODE COMPLETE	

#### Specific message contents

All messages have the same content as defined in 34.108 clause 9.1 with the following exceptions:

There are no exceptions for this test case.

#### 6.1.3.7.5 Test requirements

- 1) After step 18, the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.

### 6.1.3.8 Inter frequency neighbour reselection / Activation of higher priority service

#### 6.1.3.8.1 Definition

This test is applicable for UEs that support MBMS broadcast services in MBSFN mode and which support either both TDD transmit and receive functions or TDD MBSFN receive only function or 3.84 Mcps TDD IMB function.

#### 6.1.3.8.2 Conformance requirement

If the cell is operating in MBSFN mode according to subclause 8.1.1.6.3 the UE shall:

- 1> if for two or more services included in variable MBMS\_ACTIVATED\_SERVICES the IE "MBSFN cluster frequency" is available:
  - 2> request from upper layers the priorities of the different MBMS services included in variable MBMS\_ACTIVATED\_SERVICES for which the IE "MBSFN cluster frequency" is available;
  - 2> if the IE "MBSFN cluster frequency" is available for the service with the highest priority included in variable MBMS\_ACTIVATED\_SERVICES:
    - 3> tune to the frequency indicated in the IE "MBSFN cluster frequency" of that service.

...

The UE may:

- 1> monitor the MBMS notification Indicator Channel (MICH);
- 1> if a notification on the MICH for one or more of the MBMS services included in the variable MBMS\_ACTIVATED\_SERVICES is detected:
  - 2> acquire the MBMS MODIFIED SERVICES INFORMATION message with delaying the reading of MCCH until the next modification period and with stopping at the end of the modification period, in accordance with subclause 8.7.1.3;
  - 2> handle the MBMS MODIFIED SERVICES INFORMATION message as specified in subclause 8.7.3.4.

The UE shall:

- 1> if in idle mode, URA\_PCH, CELL\_PCH or CELL\_FACH state:
  - 2> if not monitoring MICH during the current or the previous modification period:
    - 3> acquire the MBMS MODIFIED SERVICES INFORMATION message from MCCH at the start of every modification period, in accordance with subclause 8.7.1.3;
    - 3> handle the MBMS MODIFIED SERVICES INFORMATION message as specified in subclause 8.7.3.4.

...

Upon receiving the MBMS MODIFIED SERVICES INFORMATION message, the UE shall act as follows for each of the services included in this messages provided that the service is included in variable MBMS\_ACTIVATED\_SERVICES and upper layers indicate that the session has not yet been received correctly (referred to as 'applicable services'):

...

- 1> act upon all received information elements as specified in subclause 8.6, unless specified otherwise in the following

...

- 1> perform the MBMS frequency selection procedure as specified in subclause 8.5.27;

#### Reference

3GPP TS 25.331 clauses 8.6.9.9ab, 8.7.3.3.1, 8.7.3.4.

## 6.1.3.8.3 Test purpose

1. To verify that the UE correctly handles the notification procedure after receiving the MBMS MODIFIED SERVICES INFORMATION message via MCCH indicating a change in available services.
2. To verify that the UE acts upon service priority indications from upper layers that require a change in MBSFN cluster frequency.
3. To verify that the UE acquires the MBMS information on MCCH after selecting the new MBSFN cluster.
4. To verify that the UE, after acquiring the MBMS information on MCCH, starts the p-t-m reception of the higher priority MBMS service.

## 6.1.3.8.4 Method of test

## Initial condition

## System Simulator:

- MBSFN carrier: 2 cells, Cell 31 (PLMN1) and Cell 33 (PLMN1). Cell 31 is powered off. In addition to broadcasting System Information, MCCH messages are transmitted by the SS on Cell 33 using MBMS configuration C1 and Default1 MCCH scheduling (No ongoing session) according to subclause 11.2 of TS 34.108.
- Unicast carrier : 1 cell, Cell 1 with default parameters.

## User Equipment:

- On the unicast carrier cell the UE is in registered Idle Mode on PS (state 3) if the UE only supports PS domain or registered Idle Mode on CS/PS (state 7) if the UE supports both CS and PS domains, as specified in clause 7.2.2 of TS 34.108.
  - The UE is in MBSFN Idle mode with one activated service as specified in clause 7.6.4 of TS 34.108. The UE has selected (i.e. it is included in MBMS\_ACTIVATED\_SERVICES variable) a local service that will start on MBSFN Cell 33 (see TS 34.108 clause 11.2.4) during the test. The UE has configured this MBMS service to have a low priority.

## Related ICS/IXIT statements

- MBMS Broadcast services in MBSFN mode application available on UE Yes/No.
- Support of TDD transmit and receive functions available on UE Yes/No.
- Support of TDD MBSFN receive only function available on UE Yes/No.

## Test procedure

Table 8.5.1.14

Parameter	Unit	Cell 1		Cell 31		Cell 33	
		T0	T1	T0	T1	T0	T1
UTRA RF Channel Number		Ch. 1		Ch. 2		Ch. 3	
CPICH Ec (FDD)	dBm / 3.84MHz	-60	-60	-	-	-	-
P-CCPCH RSCP (TDD)	dBm	-60	-60	OFF	-60	-60	-60
P-CPICH (IMB)	dBm / 3.84MHz			OFF	-60	-60	-60
T-CPICH (IMB)	dBm / 3.84MHz			OFF	-50.5	-50.5	-50.5

Table 8.5.1.1 illustrates the downlink power to be applied for the 3 cells at various time instants of the test execution.

- a) The UE is camping on Cell 1 and Cell 33. The SS sends ACTIVATE RB TEST MODE on the unicast carrier and the UE responds with ACTIVATE RB TEST MODE COMPLETE.

- b) The SS sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH of Cell 33 (Transmission identity of the activated local service)
- c) The SS notifies on MCCH about the start of an MBMS session, corresponding to the national service activated by the UE. For one modification period, MCCH messages are transmitted by the SS on Cell 33 using MBMS configuration C4 (one PTM session starting) and Default1 MCCH scheduling according to clause 11.2 of TS 34.108.
- d) MCCH messages are then transmitted by the SS on Cell 33 using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.2 of TS 34.108. The service is carried on a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- e) The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.
- f) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for the selected local service on Cell 33.
- g) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is  $> 0$ .
- h) The SS sends OPEN UE TEST LOOP. The UE responds with OPEN UE TEST LOOP COMPLETE.
- i) The SS sends CLOSE UE TEST LOOP to activate RLC SDU counting on the MTCH (Transmission identity corresponding to National Service 1).
- j) The SS powers on Cell 31 (T1). In addition to broadcasting System Information, MCCH messages are transmitted by the SS on Cell 31 using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.2 of TS 34.108. National Service 1 is carried on a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- k) National Service 1 is activated at the UE and is configured to have a high priority.
- l) The UE determines from the MBMS UNMODIFIED SERVICES INFORMATION and MBMS GENERAL INFORMATION message that the activated local service is available on inter frequency neighbour cell 31. The UE requests from upper layers the priorities of the activated national service on Cell 31 and the activated local service on Cell 33. The UE decides that reselection to Cell 31 is required in order to receive the higher priority national service. The UE reselects to MBSFN carrier on URFCN Ch. 2 and camps on Cell 31.
- m) On Cell 31 the SS transmits the SYSTEM INFORMATION BLOCK TYPE 5 message indicating the configuration of the S-CCPCH carrying MCCH within the IE "Secondary CCPCH system information MBMS". In addition to broadcasting System Information, MCCH messages are transmitted by the SS on Cell 31 using MBMS configuration C2 (one PTM session ongoing) and Default1 MCCH scheduling according to clause 11.2 of TS 34.108. The service is carried on a 124 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.10.3.4.4.9 (3.84 Mcps TDD) or 124.4 kbps RB for MBSFN MTCH with 80ms TTI as specified in clause 6.11.7.2.2.1 (3.84 Mcps TDD IMB) or clause 6.11.5.4.4.9 (1.28 Mcps TDD) or clause 6.11.6.4.4.9 (7.68 Mcps TDD).
- n) The UE shall perform the MCCH acquisition procedure. The UE shall start receiving the p-t-m radio bearer for the ongoing activated MBMS service indicated in the MBMS UNMODIFIED SERVICES INFORMATION message according to the configuration defined in the MBMS CURRENT CELL P-T-M INFORMATION (one ongoing session corresponding to the service activated at the UE). The UE closes the test loop and starts counting successfully received RLC PDUs on the MTCH. The UE will send CLOSE UE TEST LOOP COMPLETE.

- o) The SS broadcasts 10 RLC SDUs on the MTCH configured on the MBMS p-t-m radio bearer for National Service 1 on Cell 31.
- p) The SS sends UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST and waits for the UE to respond with UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE. The SS shall check that the counter returned by the UE for the MTCH of the activated service in the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE is  $> 0$ .

## Expected sequence

Step	Direction		Carrier	Message	Comment
	UE	SS			
1	←		U	ACTIVATE RB TEST MODE	
2	→		U	ACTIVATE RB TEST MODE COMPLETE	
3	←		U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for the selected local service
4	←		M	MBMS MCCH Message Configuration C4	Includes the national service activated at UE in the modified services list for one modification period.
5	←		M	MBMS MCCH Message Configuration C2	No modified services. One ongoing national service corresponding to that activated at the UE. 124 kbps PS RAB, 124.4 kbps (IMB)
6	→		U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
7		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 33.
8	←		U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
9	→		U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
10	←		U	OPEN UE TEST LOOP	
11	→		U	OPEN UE TEST LOOP COMPLETE	
12	←		U	CLOSE UE TEST LOOP	Loop back mode 3 is activated. Short Transmission Identity for National service 1 on Cell 31.
13		SS	M		The SS powers on Cell 31 (T1).
14		UE	M		National Service 1 ongoing on Cell 31 is activated at the UE and configured to have a high priority.
15		UE	M		The UE reselects to Cell 31 and starts to acquire the MCCH.
16	←		M	MBMS MCCH Message Configuration C2	Cell 31: No modified services. One ongoing national service corresponding to that activated at the UE. 124 kbps PS RAB, 124.4 kbps (IMB)
17	→		U	CLOSE UE TEST LOOP COMPLETE	The UE shall establish the indicated p-t-m radio bearer and close the test loop.
18		SS	M		The SS transmits 10 RLC SDUs on the MTCH of Cell 31.
19	←		U	UE TEST LOOP MODE 3 RLC SDU COUNTER REQUEST	
20	→		U	UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE	The SS checks that the number of reported RLC SDUs received on the MTCH is greater than zero.
21	←		U	OPEN UE TEST LOOP	
22	→		U	OPEN UE TEST LOOP COMPLETE	
23	←		U	DEACTIVATE RB TEST MODE	
24	→		U	DEACTIVATE RB TEST MODE COMPLETE	

## Specific message contents

All messages have the same content as defined in 34.108 clause 9.1 with the following exceptions:

There are no exceptions for this test case.

### 6.1.3.8.5 Test requirements

- 1) After step 9, the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.
- 2) After step 20, the UE TEST LOOP MODE 3 RLC SDU COUNTER RESPONSE message shall report a number > 0.

## 6.2 Multi-mode environment (2G/3G case)

For Inter-RAT idle mode test cases cells belonging to different RAT shall use different LAC and RAC.

### 6.2.1 PLMN and RAT selection

#### 6.2.1.1 Selection of the correct PLMN and associated RAT

##### 6.2.1.1.1 Definition

Test to verify that the UE selects the correct combination of PLMN and associated access technology according to the fields on the USIM.

##### 6.2.1.1.2 Conformance requirement

1. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see TS 23.122, clause 4.5.2) attempts to perform a Location Registration.  
  
If successful registration is achieved, the MS indicates the selected PLMN.  
  
If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows either Automatic or Manual Network Selection Mode Procedure depending on its operating mode.
2. The "HPLMN Selector with Access Technology", "User Controlled PLMN Selector with Access Technology" and "Operator Controlled PLMN Selector with Access Technology" data fields in the SIM include associated access technologies for each PLMN entry. The PLMN/access technology combinations are listed in priority order. If an entry includes more than one access technology, then no priority is defined for the preferred access technology and the priority is an implementation issue.
3. To allow provision for multiple HPLMN codes, the HPLMN access technologies are stored on the SIM together with PLMN codes. This version of the specification does not support multiple HPLMN codes and the "HPLMN Selector with Access Technology" data field is only used by the MS to get the HPLMN access technologies. The HPLMN code is the PLMN code included in the IMSI.

#### 4. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMNs, if available and allowable in the following order:

- i) HPLMN (if not previously selected);
- ii) Each PLMN in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- iii) Each PLMN in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- iv) Other PLMN/access technology combinations with received high quality signal in random order;
- v) Other PLMN/access technology combinations in order of decreasing signal quality.

5. In i [HPLMN (if not previously selected)], the MS shall search for all access technologies it is capable of. No priority is defined for the preferred access technology and the priority is an implementation issue, but "HPLMN Selector with Access Technology" data field on the SIM may be used to optimise the procedure.

#### References

1. TS 23.122, clause 4.4.3.1.
2. TS 23.122, clause 4.4.3
3. TS 23.122, clause 4.4.3
4. TS 23.122, clause 4.4.3.1.1
5. TS 23.122 (Rel-6), clause 4.4.3.1.1 f)

NOTE: TS 31.102 defines the USIM fields.

#### 6.2.1.1.3 Test purpose

1. To verify that the UE selects the correct combination of HPLMN/access technology combination according to the fields on the USIM. If the UE is not using HPLMN Selector with Access Technology data field on the USIM there is no priority order for the RAT.

#### 6.2.1.1.4 Method of test

#### Related ICS/IXIT statements

- Access technology priority supported in HPLMNwACT field – yes/no.

#### Initial conditions

The UE is in automatic PLMN selection mode.

Cell levels are from tables 6.3, 6.4 and 6.5.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	Test Channel	PLMN	Radio Access Technology
Cell 2	-70	-59	1	PLMN 1	UTRAN
Cell 3	-75	-64	2	PLMN 2	UTRAN

Cell	RF signal level [dBm]	Test Channel	PLMN	Radio Access Technology
Cell 1	-48	1	PLMN 1	GSM
Cell 4	-50	2	PLMN 2	GSM

The UE is equipped with a USIM containing default values except for those listed below.

#### USIM A

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>HPLMNwACT</sub>	1 <sup>st</sup>	PLMN1	GSM
	2 <sup>nd</sup>	PLMN1	UTRAN

The HPLMN (MCC+MNC) of the IMSI for USIM A is set to PLMN1.

#### USIM B

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>HPLMNwACT</sub>	1 <sup>st</sup>	PLMN2	UTRAN
	2 <sup>nd</sup>	PLMN2	GSM

The HPLMN (MCC+MNC) of the IMSI for USIM B is set to PLMN2.

#### Test procedure

Method C is applied.

- a) The SS activates cells 1-4 and monitors the cells for random access requests from the UE. The UE shall have a USIM with settings according to USIM A.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The UE is switched off and a USIM with settings according to USIM B is inserted.
- e) The UE is switched on.
- f) The SS waits for random access requests from the UE.

#### 6.2.1.1.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN1 (GSM). If the UE is not using HPLMN Selector with Access Technology data field on the USIM or if the UE is Rel-6 or higher, the response from the UE shall be either on Cell 1 or Cell 2. The displayed PLMN shall be either PLMN1 (GSM) or PLMN1 (UTRAN).
- 2) In step f), the response from the UE shall be on Cell 3. The displayed PLMN shall be PLMN2 (UTRAN). If the UE is not using HPLMN Selector with Access Technology data field on the USIM or if the UE is Rel-6 or higher, the response from the UE shall be either on Cell 3 or Cell 4. The displayed PLMN shall be either PLMN2 (GSM) or PLMN2 (UTRAN).

#### 6.2.1.2 Selection of RAT for HPLMN; Manual mode

##### 6.2.1.2.1 Definition

Test to verify that the UE selects the HPLMN RAT according to the HPLMN RAT priority list on the USIM. If no RAT on the list is available, the UE shall try to obtain registration on the same PLMN using other UE-supported RATs.

##### 6.2.1.2.2 Conformance requirement

1. To allow provision for multiple HPLMN codes, the HPLMN access technologies are stored on the SIM together with PLMN codes. This version of the specification does not support multiple HPLMN codes and the "HPLMN Selector with Access Technology" data field is only used by the MS to get the HPLMN access technologies. The HPLMN code is the PLMN code included in the IMSI.
2. For HPLMN, the MS shall search for all access technologies it is capable of. The MS shall start its search using the access technologies stored in the "HPLMN Selector with Access Technology" data field on the SIM in priority order (i.e. the PLMN/access technology combinations are listed in priority order, if an entry includes more than one access technology then no priority is defined for the preferred access technology and the priority is an implementation issue).
3. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS.

If displayed, PLMNs meeting the criteria above are presented in the following order:

3.1 HPLMN;

3.2 PLMNs contained in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);

3.3 PLMNs contained in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);

3.4 Other PLMN/access technology combinations with received high quality signal in random order;

3.5 Other PLMN/access technology combinations in order of decreasing signal quality.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

NOTE: It is an MS implementation option whether to indicate access technologies to the user. If the MS does display access technologies, then the access technology used should be the access technology chosen by the user for that PLMN. If the MS does not display access technologies, then the access technology chosen for a particular PLMN should be the highest priority available access technology for that PLMN, if the associated access technologies have a priority order.

## References

1. TS 23.122, clause 4.4.3.
2. TS 23.122, clause 4.4.3.1.1 (f).
3. TS 23.122, clause 4.4.3.1.2.

NOTE: TS 31.102 defines the USIM fields.

### 6.2.1.2.3 Test purpose

1. To verify that:
  - 1.1 the UE searches for a HPLMN RAT according to the HPLMN Selector with Access Technology data field on the USIM in priority order.
  - 1.2 If no RAT on the priority list is available, the UE tries to obtain registration on the same PLMN using other UE-supported RATs.

### 6.2.1.2.4 Method of test

#### Initial conditions

The UE is in manual PLMN selection mode.

Cell levels are from tables 6.3, 6.4 and 6.5.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	Test Channel	PLMN	Radio Access Technology
Cell 1	-72	-59	1	PLMN 2	UTRAN
Cell 3	-75	-64	2	PLMN 3	UTRAN

Cell	RF signal level [dBm]	Test Channel	PLMN	Radio Access Technology
Cell 2	-48	1	PLMN 2	GSM
Cell 4	-50	2	PLMN 3	GSM

The UE is equipped with a USIM containing default values except for those listed below.

#### USIM A

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>LOCI</sub>		PLMN 1	
EF <sub>HPLMNwAcT</sub>	1 <sup>st</sup>	PLMN2	UTRAN
	2 <sup>nd</sup>	PLMN2	GSM

The HPLMN (MCC+MNC) of the IMSI for USIM A is set to PLMN2.

USIM B

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>LOCI</sub>		PLMN 1	
EF <sub>HPLMNwAcT</sub>	1 <sup>st</sup>	PLMN2	UTRAN
	2 <sup>nd</sup>	PLMN2	

The HPLMN (MCC+MNC) of the IMSI for USIM B is set to PLMN2.

Test procedure

Method C is applied.

- a) The SS activates cells 1-4 and monitors the cells for random access requests from the UE. The UE shall have a USIM with settings according to USIM A.
- b) The UE is switched on.
- c) PLMN2 (UTRAN) shall be selected when the PLMN list is presented.
- d) The SS waits for random access requests from the UE.
- e) Cell 1 is switched off.
- f) PLMN2 (GSM) shall be selected when the PLMN list is presented.
- g) The SS waits for random access requests from the UE.
- h) The UE is switched off and a USIM with settings according to USIM B is inserted. All cells except Cell 1 are active.
- i) The UE is switched on.
- j) PLMN2 (GSM) shall be selected when the PLMN list is presented.
- k) The SS waits for random access requests from the UE.

#### 6.2.1.2.5 Test Requirements

- 1) In step c), the list shall be presented. It shall contain as highest priority PLMN2 (UTRAN as number 1 on the list and GSM as number 2).
- 2) In step d), the response from the UE shall be on Cell 1 (1<sup>st</sup> priority RAT for EF<sub>HPLMNwAcT</sub>). The displayed PLMN shall be PLMN2 (UTRAN).
- 3) In step f), the list shall be presented. It shall contain as highest priority PLMN2 (GSM).
- 4) In step g), the response from the UE shall be on Cell 2 (2<sup>nd</sup> priority RAT for EF<sub>HPLMNwAcT</sub>). The displayed PLMN shall be PLMN2 (GSM).
- 5) In step j), the list shall be presented. It shall contain as highest priority PLMN2 (GSM).
- 6) In step k), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN2 (GSM). (PLMN2 is not available on UTRAN so registration on the same PLMN is attempted using other UE-supported RATs).

6.2.1.2a Selection of RAT for HPLMN; Different ITU regions; Manual mode

6.2.1.2a.1 Definition and applicability

Test to verify that a Multi-Band Multi-RAT device using manual network mode supports the Multi-Band Multi-RAT PLMN selection between frequency bands of different ITU regions.

Test is applicable for UEs supporting FDD and GSM, at least one FDD frequency band in ITU region 2 and at least one GSM frequency band in ITU region 1.

6.2.1.2a.2 Conformance requirement

1. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see clause 4.5.2) attempts to perform a Location Registration.

...

If successful registration is achieved, the MS indicates the selected PLMN.

2. The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS. An MS which supports GSM COMPACT shall also indicate GSM COMPACT PLMNs (which use PBCCH).

If displayed, PLMNs meeting the criteria above are presented in the following order:

- i)- either the HPLMN (if the EHPLMN list is not present or is empty) or, if one or more of the EHPLMNs are available then based on an optional data field on the SIM either only the highest priority available EHPLMN is to be presented to the user or all available EHPLMNs are presented to the user in priority order. If the data field is not present on the SIM, then only the highest priority available EHPLMN is presented;
- ii)- PLMN/access technology combinations contained in the " User Controlled PLMN Selector with Access Technology " data file in the SIM (in priority order);
- iii)- PLMN/access technology combinations contained in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
- iv)- other PLMN/access technology combinations with received high quality signal in random order;
- v)- other PLMN/access technology combinations in order of decreasing signal quality.

#### References

1. TS 23.122, clause 4.4.3.1.

NOTE: TS 31.102 defines the USIM fields.

6.2.1.2a.3 Test purpose

1. To verify that in Manual Network Selection Mode Procedure:
  - 1.1 the UE indicates PLMN/access technology combinations with received high quality signal in random order if none of PLMNs contained in EF<sub>IMSI</sub>, EF<sub>HPLMNwAcT</sub>, EF<sub>PLMNwAcT</sub> or EF<sub>OPLMNwAcT</sub> are available
  - 1.2 the UE registers in the PLMN selected by the user

6.2.1.2a.4 Method of test

NOTE: The test may be executed with frequency bands of various ITU region combinations.

#### Initial conditions

The UE is in automatic PLMN selection mode.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

UTRA (FDD) test frequencies for the selection of RAT for HPLMN between frequency bands of different ITU regions.

Test Channel:	1	2	3	Comment
Band II	9263	9313	9263	Uplink UARFCN
Band IV	1313	1363	1313	Uplink UARFCN
Band V (*)	4133	4158	4133	Uplink UARFCN
Band X	FFS	FFS	FFS	Uplink UARFCN
Band XII	FFS	FFS	FFS	Uplink UARFCN
Band XIII	FFS	FFS	FFS	Uplink UARFCN
Band XIV	FFS	FFS	FFS	Uplink UARFCN
Band II / I	9263	9313	9613	Uplink UARFCN
Band II / VIII	9263	9313	2713	Uplink UARFCN
Band IV / I	1313	1363	9613	Uplink UARFCN
Band IV / VIII	1313	1363	2713	Uplink UARFCN
Band V / I	4133	4158	9613	Uplink UARFCN
Band V / VIII	4133	4158	2713	Uplink UARFCN

NOTE: Bands marked with (\*) use a 5 MHz spacing between test channels because the total available bandwidth is limited. Other bands use a 10 MHz spacing between test channels. Test Channel combinations defined for single FDD frequency band (e.g. Band II) are used if the UE does not support any FDD frequency band in ITU region 1 (e.g. UE supports FDD II for ITU region 2 and doesn't support FDD I or FDD VIII for ITU region 1). Test Channel combinations of two FDD frequency bands are used if the UE supports at least one FDD frequency band of ITU region 2 and at least one FDD frequency band of ITU region 1.

GSM Cell 2 uses test channel 1 as specified in Table 6.6 as primary GSM for ITU region 2 or alternatively as primary GSM band for ITU region 1 if the UE does not support any GSM band in ITU region 2. GSM Cell 4 uses test channel 2 as specified in Table 6.6 as secondary GSM band for ITU region 1. Primary GSM band for ITU region 1, secondary GSM band for ITU region 1 and primary GSM band for ITU region 2 are selected according to PIXIT parameters.

Step a-e:

Cell	CPICH <sub>Ec</sub> [dBm/3.84 MHz] (FDD)	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 1	-70	1	2	PLMN 2	UTRAN

Step f-i:

Cell	CPICH <sub>Ec</sub> [dBm/3.84 MHz] (FDD)	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 3	-70	2	2	PLMN 3	UTRAN
Cell 5	-76	3	1 else 2	PLMN 4	UTRAN
Note: For Cell 5 FDD frequency band of ITU region 2 may be configured if the UE does not support any FDD frequency band of ITU region 1.					

Cell	RF signal level [dBm]	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 2	-48	1	2 else 1	PLMN 5	GSM
Cell 4	-52	2	1	PLMN 6	GSM
Note: For Cell 2 GSM frequency band of ITU region 1 may be configured if the UE does not support any GSM frequency band of ITU region 2.					

The UE is equipped with a USIM containing default values according to TS 34.108 section 8 except for those listed below.

USIM field	Priority	PLMN (Note)	Access Technology Identifier
EF <sub>HPLMNwAcT</sub>	1 <sup>st</sup>	PLMN 1 (ITU region 2)	UTRAN
	2 <sup>nd</sup>	PLMN 1 (ITU region 2)	GSM
NOTE: 3 <sup>rd</sup> digit of MNC value is equal to '1'.			

The EF<sub>HPLMNwAcT</sub> list shall be empty according to 3GPP TS 31.102, Annex E. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN 1 (ITU region 2). 3<sup>rd</sup> digit of MNC value is equal to '1'.

UE is previously registered on PLMN 2, before switched off .

Related ICS/IXIT statement(s)

None

Test procedure

Method C is applied.

- a) The SS activates Cell 1 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) Set the network selection mode to manual and then power off the UE.
- e) Cell 1 is switched off.
- f) The SS activates Cell 2, Cell 3, Cell 4 and Cell 5.
- g) The UE is switched on.
- h) If the UE supports FDD frequency band used in ITU region 1 then PLMN4 (UTRAN) shall be selected manually when PLMN list is indicated. Otherwise, if the UE does not support FDD frequency band used in ITU region 1, then PLMN6 (GSM) shall be selected when PLMN list is indicated.
- i) The SS waits for random access requests from the UE.

#### 6.2.1.2a.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1 (registered PLMN). The indicated PLMN shall be PLMN 2 (UTRAN).
- 2) In step g), confirm that the UE after performing manual search, indicates following PLMNs and RATs in any order:
  - PLMN3, FDD UTRAN Frequency band used in ITU region 2
  - PLMN4, FDD UTRAN Frequency band used in ITU region 1 or 2.
  - PLMN5, GSM Frequency band used in ITU region 2 or 1.
  - PLMN6, GSM Frequency band used in ITU region 1
- 3) In step i)
  - if the UE supports FDD frequency band used in ITU region 1 the response from the UE shall be on Cell 5 and the indicated PLMN shall be PLMN4
  - otherwise, if the UE does not support FDD frequency band used in ITU region 1 the response from the UE shall be on Cell 4 and the indicated PLMN shall be PLMN6.

### 6.2.1.3 Selection of RAT for UPLMN; Manual mode

#### 6.2.1.3.1 Definition

Test to verify that the UE selects the UPLMN RAT according to the UPLMN RAT priority list on the USIM. If no PLMN/RAT on the UPLMN RAT priority list is available then the UE shall search for PLMNs in the OPLMN list.

#### 6.2.1.3.2 Conformance requirement

##### 1. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS.

If displayed, PLMNs meeting the criteria above are presented in the following order:

1.1 HPLMN;

1.2 PLMNs contained in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);

1.3 PLMNs contained in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);

1.4 Other PLMN/access technology combinations with received high quality signal in random order;

1.5 Other PLMN/access technology combinations in order of decreasing signal quality.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

**NOTE:** It is an MS implementation option whether to indicate access technologies to the user. If the MS does display access technologies, then the access technology used should be the access technology chosen by the user for that PLMN. If the MS does not display access technologies, then the access technology chosen for a particular PLMN should be the highest priority available access technology for that PLMN, if the associated access technologies have a priority order.

#### References

1. TS 23.122, clause 4.4.3.1.2.

**NOTE:** TS 31.102 defines the USIM fields.

#### 6.2.1.3.3 Test purpose

1. To verify that:

1.1 the UE selects the UPLMN RAT according to the UPLMN RAT priority list on the USIM.

1.2 If no RAT on the UPLMN RAT priority list is available, the UE searches for PLMNs in the OPLMN list.

#### 6.2.1.3.4 Method of test

##### Initial conditions

The UE is in manual PLMN selection mode.

Cell levels are from tables 6.3, 6.4 and 6.5.

Cell	CPICH Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	Test Channel	PLMN	Radio Access Technology
Cell 1	-72	-59	1	PLMN 3	UTRAN
Cell 3	-75	-64	2	PLMN 4	UTRAN
Cell 5	-78	-69	3	PLMN 5	UTRAN

Cell	RF signal level [dBm]	Test Channel	PLMN	Radio Access Technology
Cell 2	-48	1	PLMN 3	GSM
Cell 4	-50	2	PLMN 4	GSM

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>LOCI</sub>		PLMN 1	
EF <sub>HPLMNwAcT</sub>	1 <sup>st</sup>	PLMN2	UTRAN
	2 <sup>nd</sup>	PLMN2	GSM
EF <sub>PLMNwAcT</sub>	1 <sup>st</sup>	PLMN 3	UTRAN
	2 <sup>nd</sup>	PLMN 4	GSM
EF <sub>OPLMNwAcT</sub>	1 <sup>st</sup>	PLMN 5	UTRAN
	2 <sup>nd</sup>	PLMN 6	GSM

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN2.

#### Test procedure

Method C is applied.

- a) The SS activates cells 1-5 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) PLMN3 (UTRAN) shall be selected when the PLMN list is presented.
- d) The SS waits for random access requests from the UE.
- e) Cell 1 and Cell 2 are switched off. See note.
- f) PLMN4 (GSM) shall be selected when the PLMN list is presented.
- g) The SS waits for random access requests from the UE.
- h) Cell 4 and Cell 3 are switched off. See note.
- i) PLMN5 (UTRAN) shall be selected when the PLMN list is presented.
- j) The SS waits for random access requests from the UE.

NOTE: When the serving cell (Cell 1 in step e and Cell 4 in step h) is switched off then the UE will trigger the recovery from lack of coverage scenario (TS 23.122 clause 4.4.3.1). The UE will search for a cell within the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the UE is capable of. Thus Cell 2 in step e and Cell 3 in step h need to be switched off.

#### 6.2.1.3.5 Test Requirements

- 1) In step c), the list shall be presented. It shall contain in priority PLMN3 (UTRAN), PLMN4 (GSM), other PLMNs.
- 2) In step d), the response from the UE shall be on Cell 1 (1<sup>st</sup> priority RAT for EF<sub>PLMNwAcT</sub>). The displayed PLMN shall be PLMN3 (UTRAN).

- 3) In step f), the list shall be presented. It shall contain in priority PLMN4 (GSM), PLMN5 (UTRAN), other PLMNs.
- 4) In step g), the response from the UE shall be on Cell 4 (2<sup>nd</sup> priority RAT for EF<sub>PLMNwACT</sub>). The displayed PLMN shall be PLMN4 (GSM).
- 5) In step i), the list shall be presented. It shall contain as highest priority PLMN5 (UTRAN).
- 6) In step j), the response from the UE shall be on Cell 5 (1<sup>st</sup> priority RAT for EF<sub>OPLMNwACT</sub>). The displayed PLMN shall be PLMN5 (UTRAN).

#### 6.2.1.4 Selection of RAT for OPLMN; Manual mode

##### 6.2.1.4.1 Definition

Test to verify that the UE selects the OPLMN RAT according to the OPLMN RAT priority list on the USIM. If no PLMN/RAT on the OPLMN RAT priority list is available then the UE shall search for other PLMN/access technology combinations with received high quality signal in random order.

##### 6.2.1.4.2 Conformance requirement

###### 1. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS.

If displayed, PLMNs meeting the criteria above are presented in the following order:

1.1 HPLMN;

1.2 PLMNs contained in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);

1.3 PLMNs contained in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);

1.4 Other PLMN/access technology combinations with received high quality signal in random order;

1.5 Other PLMN/access technology combinations in order of decreasing signal quality.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

**NOTE:** It is an MS implementation option whether to indicate access technologies to the user. If the MS does display access technologies, then the access technology used should be the access technology chosen by the user for that PLMN. If the MS does not display access technologies, then the access technology chosen for a particular PLMN should be the highest priority available access technology for that PLMN, if the associated access technologies have a priority order.

#### References

1. TS 23.122, clause 4.4.3.1.2.

**NOTE:** TS 31.102 defines the USIM fields.

## 6.2.1.4.3 Test purpose

## 1. To verify that:

1.1 the UE selects the OPLMN RAT according to the OPLMN RAT priority list on the USIM.

1.2 If no PLMN/RAT on the OPLMN RAT priority list is available, the UE searches for "other PLMN/access technology combinations with received high quality signal in random order".

## 6.2.1.4.4 Method of test

## Initial conditions

The UE is in manual PLMN selection mode.

Cell levels are from tables 6.3, 6.4 and 6.5.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	Test Channel	PLMN	Radio Access Technology
Cell 1	-72	-59	1	PLMN 5	UTRAN
Cell 3	-75	-64	2	PLMN 6	UTRAN
Cell 5	-78	-69	3	PLMN 7	UTRAN

Cell	RF signal level [dBm]	Test Channel	PLMN	Radio Access Technology
Cell 2	-48	1	PLMN 5	GSM
Cell 4	-50	2	PLMN 6	GSM

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>LOCI</sub>		PLMN 1	
EF <sub>HPLMNwAcT</sub>	1 <sup>st</sup>	PLMN2	UTRAN
	2 <sup>nd</sup>	PLMN2	GSM
EF <sub>PLMNwAcT</sub>	1 <sup>st</sup>	PLMN 3	UTRAN
	2 <sup>nd</sup>	PLMN 4	GSM
EF <sub>OPLMN wAcT</sub>	1 <sup>st</sup>	PLMN 5	UTRAN
	2 <sup>nd</sup>	PLMN 6	GSM

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN2.

## Test procedure

Method C is applied.

- a) The SS activates cells 1-5 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) PLMN5 (UTRAN) shall be selected when the PLMN list is presented.
- d) The SS waits for random access requests from the UE.
- e) Cell 1 and Cell2 are switched off. See note.
- f) PLMN6 (GSM) shall be selected when the PLMN list is presented.
- g) The SS waits for random access requests from the UE.
- h) Cell 4 and Cell 3 are switched off. See note.
- i) PLMN7 (UTRAN) shall be selected when the PLMN list is presented.

j) The SS waits for random access requests from the UE.

NOTE: When the serving cell (Cell 1 in step e and Cell 4 in step h) is switched off then the UE will trigger the recovery from lack of coverage scenario (TS 23.122 clause 4.4.3.1). The UE will search for a cell within the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the UE is capable of. Thus Cell 2 in step e and Cell 3 in step h need to be switched off.

#### 6.2.1.4.5 Test Requirements

- 1) In step c), the list shall be presented. It shall contain in priority PLMN5 (UTRAN), PLMN6 (GSM), other PLMNs.
- 2) In step d), the response from the UE shall be on Cell 1 (1<sup>st</sup> priority RAT for EF<sub>OPLMNwAcT</sub>). The displayed PLMN shall be PLMN5 (UTRAN).
- 3) In step f), the list shall be presented. It shall contain as highest priority PLMN6 (GSM) followed by PLMN5 (GSM), PLMN6 (UTRAN) and PLMN7 (UTRAN) in random order.
- 4) In step g), the response from the UE shall be on Cell 4 (2<sup>nd</sup> priority RAT for EF<sub>OPLMNwAcT</sub>). The displayed PLMN shall be PLMN6 (GSM).
- 5) In step i), the list shall be presented. It shall contain PLMN5 (GSM), PLMN6 (UTRAN) and PLMN7 (UTRAN) in random order.
- 6) In step j), the response from the UE shall be on Cell 5. The displayed PLMN shall be PLMN7 (UTRAN).

#### 6.2.1.5 Selection of "Other PLMN / access technology combinations"; Manual mode

##### 6.2.1.5.1 Definition

Test to verify that if neither RPLMN, HPLMN, UPLMN nor OPLMN is available, the UE tries to obtain registration on "Other PLMN/access technology combinations with received high quality signal in random order". Forbidden PLMNs shall also be displayed in the list.

##### 6.2.1.5.2 Conformance requirement

###### 1. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS.

If displayed, PLMNs meeting the criteria above are presented in the following order:

- 1.1 HPLMN;
- 1.2 PLMNs contained in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 1.3 PLMNs contained in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 1.4 Other PLMN/access technology combinations with received high quality signal in random order;
- 1.5 Other PLMN/access technology combinations in order of decreasing signal quality.

In 1.5, the MS shall order the PLMN/access technology combinations in order of decreasing signal quality within each access technology. The order between PLMN/access technology combinations with different access technologies is an MS implementation issue.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

NOTE: It is an MS implementation option whether to indicate access technologies to the user. If the MS does display access technologies, then the access technology used should be the access technology chosen by the user for that PLMN. If the MS does not display access technologies, then the access technology chosen for a particular PLMN should be the highest priority available access technology for that PLMN, if the associated access technologies have a priority order.

2. UTRA case: The UE shall scan all RF channels in the UTRA band according to its capabilities to find available PLMNs. On each carrier, the UE shall search for the strongest cell according to the cell search procedures (for FDD, see TS 25.214, and TDD, see TS 25.224) and read its system information, in order to find out which PLMN the cell belongs to. If the UE can read the PLMN identity, the found PLMN shall be reported to the NAS as a high quality PLMN (but without the RSCP value), provided that the following high quality criterion is fulfilled:

- For an FDD cell, the measured primary CPICH RSCP value shall be greater than or equal to -95 dBm.
- For a TDD cell, the measured P-CCPCH RSCP value shall be greater than or equal to -84 dBm.

Found PLMNs that do not satisfy the high quality criterion, but for which the UE has been able to read the PLMN identities are reported to the NAS together with the CPICH RSCP value for UTRA FDD cells and P-CCPCH RSCP for UTRA TDD cells.

3. GSM case: A PLMN shall be understood to be received with high quality signal if the signal level is above -85 dBm.

#### References

1. TS 23.122, clause 4.4.3.1.2.
2. TS 25.304, clause 5.1.2.2.
3. TS 03.22, clause 4.4.3.

NOTE: TS 31.102 defines the USIM fields.

#### 6.2.1.5.3 Test purpose

1. To verify that if neither RPLMN, HPLMN, UPLMN nor OPLMN is available, the UE tries to obtain registration on "Other PLMN/access technology combinations with received high quality signal in random order".
2. To verify that forbidden PLMNs are also displayed in the list.

#### 6.2.1.5.4 Method of test

##### Initial conditions

The UE is in manual PLMN selection mode.

Cell levels are from tables 6.3, 6.4 and 6.5.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	High Quality signal	Test Channel	PLMN	Radio Access Technology
Cell 1	-80	-74	Yes	1	PLMN 7	UTRAN
Cell 3	-80	-69	Yes	2	PLMN 9	UTRAN

Cell	RF signal level [dBm]	High Quality signal	Test Channel	PLMN	Radio Access Technology
Cell 2	-65	Yes	1	PLMN 8	GSM
Cell 4	-65	Yes	3	PLMN 11	GSM

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>LOCI</sub>		PLMN 7	
EF <sub>FPLMN</sub>		PLMN 8	
		PLMN 9	

### Test procedure

Method C is applied.

- a) The SS activates cells 1-4 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) PLMN7 shall be selected when the PLMN list is presented.
- d) The SS waits for random access requests from the UE.
- e) Cell 1 is switched off.
- f) PLMN8 shall be selected when the PLMN list is presented. The SS shall accept the Registration Request from the UE.
- g) The SS waits for random access requests from the UE.
- h) Cell 2 is switched off.
- i) PLMN9 shall be selected when the PLMN list is presented. The SS shall accept the Registration Request from the UE.
- j) The SS waits for random access requests from the UE.
- k) Cell 3 is switched off.
- l) PLMN11 shall be selected when the PLMN list is presented.
- m) The SS waits for random access requests from the UE.
- n) Cell 4 is switched off.

#### 6.2.1.5.5 Test Requirements

In all steps, the PLMN priority list shall be as follows: PLMN7, PLMN8, PLMN9 and PLMN11 in random order.

- 1) In step c), the list shall be presented and contain PLMN7, 8, 9, 11.
- 2) In step d), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN7.
- 3) In step f), the list shall be presented and contain PLMN 8, 9, 11.
- 4) In step g), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN8.

- 5) In step i), the list shall be presented and contain PLMN9, 11.
- 6) In step j), the response from the UE shall be on Cell 3. The displayed PLMN shall be PLMN9.
- 7) In step l), the list shall be presented and contain PLMN11. The displayed PLMN shall be PLMN11.
- 8) After step n), the UE shall inform that no network is available

### 6.2.1.6 Selection of RAT for HPLMN; Automatic mode

#### 6.2.1.6.1 Definition

Test to verify that the UE selects the HPLMN RAT according to the HPLMN RAT priority list on the USIM. If no RAT on the list is available, the UE shall try to obtain registration on the same PLMN using other UE-supported RATs.

#### 6.2.1.6.2 Conformance requirement

1. To allow provision for multiple HPLMN codes, the HPLMN access technologies are stored on the SIM together with PLMN codes. This version of the specification does not support multiple HPLMN codes and the "HPLMN Selector with Access Technology" data field is only used by the MS to get the HPLMN access technologies. The HPLMN code is the PLMN code included in the IMSI.
2. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMNs, if available and allowable in the following order:

- i) HPLMN (if not previously selected);
- ii) Each PLMN in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- iii) Each PLMN in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- iv) Other PLMN/access technology combinations with received high quality signal in random order;
- v) Other PLMN/access technology combinations in order of decreasing signal quality.

If successful registration is achieved, the MS indicates the selected PLMN.

If registration cannot be achieved because no PLMNs are available and allowable, the MS indicates "no service" to the user, waits until a new PLMN is available and allowable and then repeats the procedure.

If there were one or more PLMNs which were available and allowable, but an LR failure made registration on those PLMNs unsuccessful or an entry in the "forbidden LAs for regional provision of service" list prevented a registration attempt, the MS selects the first such PLMN again and enters a limited service state.

Alternative 3a for R99, Rel-4 and Rel-5:

- 3a. In i [HPLMN (if not previously selected)], the MS shall search for all access technologies it is capable of. The MS shall start its search using the access technologies stored in the "HPLMN Selector with Access Technology" data field on the SIM in priority order as defined in 23.122 clause 4.4.3 (i.e. the PLMN/access technology combinations are listed in priority order, if an entry includes more than one access technology then no priority is defined for the preferred access technology and the priority is an implementation issue).

Alternative 3b for all releases (from R99 onwards):

- 3b. In i [HPLMN (if not previously selected)], the MS shall search for all access technologies it is capable of. No priority is defined for the preferred access technology and the priority is an implementation issue, but "HPLMN Selector with Access Technology" data field on the SIM may be used to optimise the procedure.

### References

1. TS 23.122, clause 4.4.3.
2. TS 23.122, clause 4.4.3.1.1.

3a. TS 23.122, clause 4.4.3.1.1 f)

3b. TS 23.122 (Rel-6), clause 4.4.3.1.1 f)

NOTE: TS 31.102 defines the USIM fields.

#### 6.2.1.6.3 Test purpose

1. To verify that:

1.1 the UE searches for a HPLMN RAT according to the HPLMN Selector with Access Technology data field on the USIM in priority order. If the UE is not using HPLMN Selector with Access Technology data field on the USIM, there is no priority order for the RAT.

1.2 If no RAT on the priority list is available, the UE tries to obtain registration on the same PLMN using other UE-supported RATs.

#### 6.2.1.6.4 Method of test

##### Related ICS/IXIT statements

- Access technology priority supported in HPLMNwACT field – yes/no.

##### Initial conditions

The UE is in automatic PLMN selection mode.

Cell levels are from tables 6.3, 6.4 and 6.5.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	Test Channel	PLMN	Radio Access Technology
Cell 1	-70	-59	1	PLMN 2	UTRAN
Cell 3	-60	-60	2	PLMN 3	UTRAN

Cell	RF signal level [dBm]	Test Channel	PLMN	Radio Access Technology
Cell 2	-48	1	PLMN 2	GSM

The UE is equipped with a USIM containing default values except for those listed below.

##### USIM A

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>HPLMNwACT</sub>	1 <sup>st</sup>	PLMN2	UTRAN
	2 <sup>nd</sup>	PLMN2	GSM
EF <sub>PLMNwACT</sub>	1 <sup>st</sup>	PLMN3	UTRAN

The HPLMN (MCC+MNC) of the IMSI for USIM A is set to PLMN2.

##### USIM B

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>HPLMNwACT</sub>	1 <sup>st</sup>	PLMN2	UTRAN
	2 <sup>nd</sup>	PLMN2	
EF <sub>PLMNwACT</sub>	1 <sup>st</sup>	PLMN3	UTRAN

The HPLMN (MCC+MNC) of the IMSI for USIM B is set to PLMN2.

##### Test procedure

Method C is applied.

- a) The SS activates cells 1-3 and monitors the cells for random access requests from the UE. The UE shall have a USIM with settings according to USIM A.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The UE is switched off. All cells except Cell 1 are active. The UE is switched on.
- e) The SS waits for random access requests from the UE.
- f) The UE is switched off and a USIM with settings according to USIM B is inserted. All cells except Cell 1 are active.
- g) The UE is switched on.
- h) The SS waits for random access requests from the UE.

#### 6.2.1.6.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1 (1<sup>st</sup> priority RAT for EF<sub>HPLMNwAcT</sub>). The displayed PLMN shall be PLMN2 (UTRAN). If the UE is not using HPLMN Selector with Access Technology data field on the USIM or if UE is Rel-6 or higher, the response from the UE shall be either on Cell 1 or Cell 2. The displayed PLMN shall be PLMN2 (either UTRAN or GSM).
- 2) In step e), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN2 (GSM).
- 3) In step h), the response from the UE shall be on Cell 2. The displayed PLMN shall be PLMN2 (GSM).

### 6.2.1.7 Selection of RAT for UPLMN; Automatic mode

#### 6.2.1.7.1 Definition

Test to verify that the UE selects the UPLMN RAT according to the UPLMN RAT priority list on the USIM. If no PLMN/RAT on the UPLMN RAT priority list is available then the UE shall search for PLMNs in the OPLMN list.

#### 6.2.1.7.2 Conformance requirement

1. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMNs, if available and allowable in the following order:

- 1.1 HPLMN (if not previously selected);
- 1.2 Each PLMN in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 1.3 Each PLMN in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 1.4 Other PLMN/access technology combinations with received high quality signal in random order;
- 1.5 Other PLMN/access technology combinations in order of decreasing signal quality.

If successful registration is achieved, the MS indicates the selected PLMN.

If registration cannot be achieved because no PLMNs are available and allowable, the MS indicates "no service" to the user, waits until a new PLMN is available and allowable and then repeats the procedure.

If there were one or more PLMNs which were available and allowable, but an LR failure made registration on those PLMNs unsuccessful or an entry in the "forbidden LAs for regional provision of service" list prevented a registration attempt, the MS selects the first such PLMN again and enters a limited service state.

#### References

1. TS 23.122, clause 4.4.3.1.1.

NOTE: TS 31.102 defines the USIM fields.

## 6.2.1.7.3 Test purpose

1. To verify that:

1.1 the UE selects the UPLMN RAT according to the UPLMN RAT priority list on the USIM.

1.2 If no PLMN/RAT on the UPLMN RAT priority list is available, the UE searches for PLMNs in the OPLMN list.

## 6.2.1.7.4 Method of test

Initial conditions

The UE is in automatic PLMN selection mode.

Cell levels are from tables 6.3, 6.4 and 6.5.

In system information broadcast in each cell, the neighbouring cell list does not contain any other cell belonging to the same PLMN.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH [dBm] (TDD)	Test Channel	PLMN	Radio Access Technology
Cell 1	-70	-59	1	PLMN 3	UTRAN
Cell 3	-75	-64	2	PLMN 4	UTRAN
Cell 5	-80	-69	3	PLMN 5	UTRAN

Cell	RF signal level [dBm]	Test Channel	PLMN	Radio Access Technology
Cell 2	-48	1	PLMN 3	GSM
Cell 4	-50	2	PLMN 4	GSM

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>HPLMNwAcT</sub>	1 <sup>st</sup>	PLMN2	UTRAN
	2 <sup>nd</sup>	PLMN2	GSM
EF <sub>PLMNwAcT</sub>	1 <sup>st</sup>	PLMN 3	UTRAN
	2 <sup>nd</sup>	PLMN 4	GSM
EF <sub>OPLMNwAcT</sub>	1 <sup>st</sup>	PLMN 5	UTRAN
	2 <sup>nd</sup>	PLMN 6	GSM

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN2.

UE is previously registered on PLMN 1, before switched off.

Test procedure

Method C is applied.

- a) The SS activates cells 1-5 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE. As no cell exists for neither registered PLMN (PLMN1) nor home PLMN/RAT (PLMN2, UTRAN or GSM) the UE shall select Cell 1 (1<sup>st</sup> priority PLMN/RAT in EF<sub>PLMNwAcT</sub>).
- d) Cell 1 and Cell 2 are switched off. See note.

- e) The SS waits for random access requests from the UE. As no cell exists for neither registered PLMN (PLMN3 registered at step c), home PLMN (PLMN2, UTRAN or GSM) nor any cells for the 1<sup>st</sup> priority PLMN/RAT in EF<sub>PLMNwAcT</sub> (PLMN3/UTRAN) then UE shall select Cell 4 (2<sup>nd</sup> priority PLMN/RAT in EF<sub>PLMNwAcT</sub>).
- f) Cell 4 and Cell 3 are switched off. See note.
- g) The SS waits for random access requests from the UE. As no cell exists for neither registered PLMN (PLMN4 registered at step e), home PLMN (PLMN2, UTRAN or GSM) nor user controlled PLMN/RAT (PLMN3/UTRAN or PLMN4/GSM) then UE shall select Cell 5 (1<sup>st</sup> priority RAT for EF<sub>OPLMNwAcT</sub>).

NOTE: When the serving cell (Cell 1 in step d and Cell 4 in step f) is switched off then the UE will trigger the recovery from lack of coverage scenario (TS 23.122 clause 4.4.3.1). The UE will search for a cell within the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the UE is capable of. Thus need Cell 2 in step d and Cell 3 in step f to be switched off.

#### 6.2.1.7.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1 (1<sup>st</sup> priority RAT for EF<sub>PLMNwAcT</sub>). The displayed PLMN shall be PLMN3 (UTRAN).
- 2) In step e), the response from the UE shall be on Cell 4 (2<sup>nd</sup> priority RAT for EF<sub>PLMNwAcT</sub>). The displayed PLMN shall be PLMN4 (GSM).
- 3) In step g), the response from the UE shall be on Cell 5 (1<sup>st</sup> priority RAT for EF<sub>OPLMNwAcT</sub>). The displayed PLMN shall be PLMN5 (UTRAN).

### 6.2.1.8 Selection of RAT for OPLMN; Automatic mode

#### 6.2.1.8.1 Definition

Test to verify that the UE selects the OPLMN RAT according to the OPLMN RAT priority list on the USIM. If no PLMN/RAT on the OPLMN list is available then the UE shall search for other PLMN/access technology combinations with received high quality signal in random order.

#### 6.2.1.8.2 Conformance requirement

1. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMNs, if available and allowable in the following order:

- 1.1 HPLMN (if not previously selected);
- 1.2 Each PLMN in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 1.3 Each PLMN in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 1.4 Other PLMN/access technology combinations with received high quality signal in random order;
- 1.5 Other PLMN/access technology combinations in order of decreasing signal quality.

If successful registration is achieved, the MS indicates the selected PLMN.

If registration cannot be achieved because no PLMNs are available and allowable, the MS indicates "no service" to the user, waits until a new PLMN is available and allowable and then repeats the procedure.

If there were one or more PLMNs which were available and allowable, but an LR failure made registration on those PLMNs unsuccessful or an entry in the "forbidden LAs for regional provision of service" list prevented a registration attempt, the MS selects the first such PLMN again and enters a limited service state.

#### References

1. TS 23.122, clause 4.4.3.1.1.

NOTE: TS 31.102 defines the USIM fields.

## 6.2.1.8.3 Test purpose

1. To verify that:

1.1 the UE selects the OPLMN RAT according to the OPLMN RAT priority list on the USIM.

1.2 If no PLMN/RAT on the OPLMN RAT priority list is available, the UE searches for "other PLMN/access technology combinations with received high quality signal in random order".

## 6.2.1.8.4 Method of test

## Initial conditions

The UE is in automatic PLMN selection mode.

Cell levels are from tables 6.3, 6.4 and 6.5.

In system information broadcast in each cell, the neighbouring cell list does not contain any other cell belonging to the same PLMN.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	Test Channel	PLMN	Radio Access Technology
Cell 1	-70	-59	1	PLMN 5	UTRAN
Cell 3	-75	-64	2	PLMN 6	UTRAN
Cell 5	-80	-69	3	PLMN 7	UTRAN

Cell	RF signal level [dBm]	Test Channel	PLMN	Radio Access Technology
Cell 2	-48	1	PLMN 5	GSM
Cell 4	-50	2	PLMN 6	GSM

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>HPLMNwAcT</sub>	1 <sup>st</sup>	PLMN2	UTRAN
	2 <sup>nd</sup>	PLMN2	GSM
EF <sub>PLMNwAcT</sub>	1 <sup>st</sup>	PLMN 3	UTRAN
	2 <sup>nd</sup>	PLMN 4	GSM
EF <sub>OPLMNwAcT</sub>	1 <sup>st</sup>	PLMN 5	UTRAN
	2 <sup>nd</sup>	PLMN 6	GSM

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN2.

UE is previously registered on PLMN 1, before switched off.

## Test procedure

Method C is applied.

- a) The SS activates cells 1-5 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE. As no cell exists for neither registered PLMN (PLMN1), home PLMN/RAT (PLMN2, UTRAN or GSM) nor user controlled PLMN/RAT (PLMN3/UTRAN or PLMN4/GSM) then the UE shall select Cell 1 (1<sup>st</sup> priority RAT for EF<sub>OPLMNwAcT</sub>).
- d) Cell 1 and Cell 2 are switched off. See note.
- e) The SS waits for random access requests from the UE. As no cell exists for neither registered PLMN (PLMN5 registered in step c), home PLMN/RAT (PLMN2, UTRAN or GSM), user controlled PLMN/RAT

(PLMN3/UTRAN or PLMN4/GSM) nor any cells for the 1<sup>st</sup> priority PLMN/RAT in  $EF_{OPLMNwAcT}$  (PLMN5/UTRAN) then UE shall select Cell 4 (2<sup>nd</sup> priority PLMN/RAT in  $EF_{OPLMNwAcT}$ ).

- f) Cell 4 and Cell 3 are switched off. See note.
- g) The SS waits for random access requests from the UE. As no cell exists for neither registered PLMN (PLMN6 registered in step e), home PLMN/RAT (PLMN2, UTRAN or GSM), user controlled PLMN/RAT (PLMN3/UTRAN or PLMN4/GSM) nor operator controlled PLMN/RAT (PLMN5/UTRAN or PLMN6/GSM) then UE shall select another PLMN/access technology combinations with received high quality signal in random order (Cell 5).

NOTE: When the serving cell (Cell 1 in step d and Cell 4 in step f) is switched off then the UE will trigger the recovery from lack of coverage scenario (TS 23.122 clause 4.4.3.1). The UE will search for a cell within the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the UE is capable of. Thus need Cell 2 in step d and Cell 3 in step f to be switched off.

#### 6.2.1.8.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1 (1<sup>st</sup> priority RAT for  $EF_{OPLMNwAcT}$ ). The displayed PLMN shall be PLMN5 (UTRAN).
- 2) In step e), the response from the UE shall be on Cell 4 (2<sup>nd</sup> priority RAT for  $EF_{OPLMNwAcT}$ ). The displayed PLMN shall be PLMN6 (GSM).
- 3) In step g), the response from the UE shall be on either Cell 5 (other PLMN/access technology combination) with associated PLMN7 (UTRAN) shown.

#### 6.2.1.8a Selection of RAT for OPLMN; Different ITU regions

In the initial conditions the assignment of ITU region A and ITU region B depends on the selected operation band under test. The FDD frequency bands used in different ITU regions are indicated in table 6.2A. Test channel configurations for the FDD frequency bands are specified in Table 6.3B.

For the case that operation band under test belongs to ITU region 2 (A=2, B=1) following channel configuration is used:

- UTRAN test channel 1 and UTRAN test channel 4 uses primary FDD band for ITU region 2.
- UTRAN test channel 2 and UTRAN test channel 3 uses secondary FDD band for ITU region 2.
- Test channel configurations for the GSM frequency bands are specified in Table 6.6.
  - GSM test channel 1 uses primary GSM band for ITU region 2 or alternatively as secondary GSM band for ITU region 1 if the UE does not support any GSM band in ITU region 2.
  - GSM test channel 2 uses primary GSM band for ITU region 1.
  - GSM test channel 3 uses secondary GSM band for ITU region 1.

For the case that operation band under test belongs to ITU region 1 (A=1, B=2) following channel configuration is used:

- UTRAN test channel 1 and UTRAN test channel 4 uses primary FDD band for ITU region 1.
- UTRAN test channel 2 and UTRAN test channel 3 uses secondary FDD band for ITU region 1.
- Test channel configurations for the GSM frequency bands are specified in Table 6.7.
  - GSM test channel 1 uses primary GSM band for ITU region 1 or alternatively as secondary GSM band for ITU region 2 if the UE does not support any GSM band in ITU region 1.
  - GSM test channel 2 uses primary GSM band for ITU region 2.
  - GSM test channel 3 uses secondary GSM band for ITU region 2.

Primary and secondary FDD and GSM bands for both ITU regions are selected according to PIXIT parameters.

The definition of each PLMN code is found in table below.

PLMN	MCC1	MCC2	MCC3	MNC1	MNC2	MNC3 (Note 1)	LAC (Note 3)
1	0	0	1	0	1	ITU region A	x
2	0	0	1	0	2	ITU region A	x
3	0	0	1	0	3	ITU region A else ITU region B (Note 2)	x
4	0	0	1	0	4	ITU region A	x
5	0	0	1	0	5	ITU region B	x
6	0	0	1	0	6	ITU region B	x
7	0	0	1	0	7	ITU region B	x
8	0	0	1	0	8	ITU region A	x

NOTE 1: 3<sup>rd</sup> digit of MNC value is equal to '1' if used PLMN is for ITU region 2.  
NOTE 2: ITU region B may be configured if the UE does not support any GSM frequency band of ITU region A.  
NOTE 3: 'x' denotes any value.

#### 6.2.1.8a.1 Selection of RAT for OPLMN; Different ITU regions; Automatic mode

##### 6.2.1.8a.1.1 Definition and applicability

Test to verify that at switch on or following recovery from lack of coverage, the UE selects the registered PLMN. The UE performs Multi-Band Multi-RAT PLMN selection between frequency bands of different ITU regions according to the "Operator Controlled PLMN Selector with Access Technology" priority list on the USIM. If the UE is in a VPLMN it periodically attempts to obtain service on its HPLMN or higher priority PLMN according HPLMN Search Period on the USIM.

Test is applicable for UEs supporting FDD and GSM and at least one frequency band of different ITU region in each RAT.

##### 6.2.1.8a.1.2 Conformance requirement

1. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see clause 4.5.2) attempts to perform a Location Registration.

...

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its operating mode.

2. The MS selects and attempts registration on other PLMN/access technology combinations, if available and allowable, in the following order:
  - i) either the HPLMN (if the EHPLMN list is not present or is empty) or the highest priority EHPLMN that is available (if the EHPLMN list is present);
  - ii) each PLMN/access technology combination in the "User Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
  - iii) each PLMN/access technology combination in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);

...

If successful registration is achieved, the MS indicates the selected PLMN.

3. If the MS is in a VPLMN, the MS shall periodically attempt to obtain service on its HPLMN (if the EHPLMN list is not present or is empty) or one of its EHPLMNs (if the EHPLMN list is present) or a higher priority PLMN/access technology combinations listed in "user controlled PLMN selector" or "operator controlled PLMN selector" by scanning in accordance with the requirements that are applicable to i), ii) and iii) as defined in the Automatic Network Selection Mode in clause 4.4.3.1.1.

...

The attempts to access the HPLMN or an EHPLMN or higher priority PLMN shall be as specified below:

- a) The periodic attempts shall only be performed in automatic mode when the MS is roaming;
- b) After switch on, a period of at least 2 minutes and at most T minutes shall elapse before the first attempt is made;
- c) The MS shall make an attempt if the MS is on the VPLMN at time T after the last attempt;
- d) Periodic attempts shall only be performed by the MS while in idle mode;
- e) If the HPLMN (if the EHPLMN list is not present or is empty) or a EHPLMN (if the list is present) or a higher priority PLMN is not found, the MS shall remain on the VPLMN.
- f) In steps i), ii) and iii) of subclause 4.4.3.1.1 the MS shall limit its attempts to access higher priority PLMN/access technology combinations to PLMN/access technology combinations of the same country as the current serving VPLMN, as defined in Annex B.

References

- 1. TS 23.122, clause 4.4.3.1.

NOTE: TS 31.102 defines the USIM fields.

6.2.1.8a.1.3 Test purpose

- 1. To verify that in Automatic Network Selection Mode Procedure:
  - 1.1 at switch on the UE selects the registered PLMN using all access technologies that the UE is capable of.
  - 1.2 the UE selects the OPLMN RAT between frequency bands of different ITU regions according to the OPLMN RAT priority list on the USIM.
  - 1.3 the UE attempts to obtain service on its HPLMN or higher priority PLMN according to HPLMN Search Period on the USIM

6.2.1.8a.1.4 Method of test

Initial conditions

The UE is in automatic PLMN selection mode.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

The definition of each PLMN code is found in table above under section 6.2.1.8a

Step a-f:

Cell	CPICH Ec [dBm/3.84 MHz] (FDD)	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 1	-70	1	A	PLMN 2	UTRAN
Cell 3	-76	2	A	PLMN 4	UTRAN

Note: The test may be executed with frequency bands of various ITU region combinations. Different FDD frequency bands shall be defined for the cells if the UE supports two FDD frequency bands of same ITU region (e.g. FDD II for Cell 1 and FDD V for Cell 3 for ITU region 2).

Cell	RF signal level [dBm]	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 2	-48	1	A else B	PLMN 3	GSM
Cell 4	-52	2	B	PLMN 5	GSM

Note: The test may be executed with frequency bands of various ITU region combinations. GSM frequency band of ITU region B may be configured if the UE does not support any GSM frequency band of ITU region A.

Step g-h:

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 5	-70	3	A	PLMN 8	UTRAN
Cell 7	-76	4	A	PLMN 3	UTRAN

Note: The test may be executed with frequency bands of various ITU region combinations. Different FDD frequency bands shall be defined for the cells if the UE supports two FDD frequency bands of same ITU region (e.g. FDD II for Cell 7 and FDD V for Cell 5 for ITU region 2). Different FDD frequency bands shall be defined for FDD Cell 1 and Cell 5 if the UE supports two FDD frequency bands of same ITU region (e.g. in case of ITU region 2 FDD II for Cell 1 and FDD V for Cell 5 may be configured).

Cell	RF signal level [dBm]	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 6	-48	3	B	PLMN 7	GSM
Cell 4	-52	2	B	PLMN 5	GSM

Note: The test may be executed with frequency bands of various ITU region combinations. Different GSM frequency bands shall be defined for the cells if the UE supports two GSM frequency bands of same ITU region (e.g. in case of ITU region 1 GSM 900 for Cell 6 and GSM 1800 for Cell 4 may be configured).

The HPLMN Search Period on the USIM shall be set to 6 minutes. The UE is equipped with a USIM containing default values according to TS 34.108 section 8 except for those listed below.

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>HPLMNwACT</sub>	1 <sup>st</sup>	PLMN 1	UTRAN
	2 <sup>nd</sup>	PLMN 1	GSM
EF <sub>OPLMNwACT</sub>	1 <sup>st</sup>	PLMN 8	UTRAN
	2 <sup>nd</sup>	PLMN 8	GSM
	3 <sup>rd</sup>	PLMN 7	GSM
	4 <sup>th</sup>	PLMN 6	UTRAN
	5 <sup>th</sup>	PLMN 6	GSM
	6 <sup>th</sup>	PLMN 5	UTRAN
	7 <sup>th</sup>	PLMN 5	GSM
	8 <sup>th</sup>	PLMN 4	UTRAN
	9 <sup>th</sup>	PLMN 3	UTRAN
	10 <sup>th</sup>	PLMN 3	GSM
	11 <sup>th</sup>	PLMN 2	UTRAN
	12 <sup>th</sup>	PLMN 2	GSM

The EF<sub>PLMNwACT</sub> list shall be empty according to 3GPP TS 31.102, Annex E.

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN 1.

UE is previously registered on PLMN 2, before switched off.

Related ICS/IXIT statement(s)

None

Test procedure

Method C is applied.

- a) The SS activates Cell 1, Cell 2, Cell 3 and Cell 4 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The SS starts timer of  $t_{min} = 2$  minutes and  $t_{max} = (6 \text{ minutes} + \text{cell selection time})$  after the previous registration.
- e) The SS waits for random access requests from the UE.
- f) Cell 1, Cell 2 and Cell 3 are switched off.
- g) The SS activates Cell 5, Cell 6 and Cell 7.
- h) The SS waits for random access requests from the UE.

#### 6.2.1.8a.1.5 Test Requirements

1. In step c), the response from the UE shall be on Cell 1 (registered PLMN). The indicated PLMN shall be PLMN 2 (UTRAN).
2. In step e), the response from the UE shall be on Cell 4 (7<sup>th</sup> priority RAT for  $E_{F_{OPLMNwACT}}$ ) between  $t_{min} = 2$  minutes and  $t_{max} = (6 \text{ minutes} + \text{cell selection time})$  seconds after the previous registration. The indicated PLMN shall be PLMN5 (GSM).
3. In step h), the response from the UE shall be on Cell 5 (1<sup>st</sup> priority RAT for  $E_{F_{OPLMNwACT}}$ ) within a maximum of  $t_{max} = (6 \text{ minutes} + \text{cell selection time})$  after the previous registration. The indicated PLMN shall be PLMN8 (UTRAN).

6.2.1.8a.2 Selection of RAT for OPLMN; Different ITU regions; Limited service; Automatic mode

#### 6.2.1.8a.2.1 Definition and applicability

Test to verify that at switch on or following recovery from lack of coverage, the UE selects the registered PLMN. The UE performs Multi-Band Multi-RAT PLMN selection between frequency bands of different ITU regions according to the "Operator Controlled PLMN Selector with Access Technology" priority list on the USIM. When the network rejects the idle update procedure with reject cause "PLMN not allowed" the UE shall attempt to obtain service on its HPLMN or higher priority PLMN according to the entries on the USIM.

Test is applicable for UEs supporting FDD and GSM and at least one frequency band of different ITU region in each RAT.

#### 6.2.1.8a.2.2 Conformance requirement

1. If a message with cause value "PLMN not allowed" is received by an MS in response to an LR request from a VPLMN, that VPLMN is added to a list of "forbidden PLMNs" in the SIM and thereafter that VPLMN will not be accessed by the MS when in automatic mode.
2. The behaviour of the MS in the roaming not allowed state is dependent on the LR reject cause as shown in table 2 in clause 5. Additionally:
  - in automatic mode, "PLMN not allowed" and "roaming not allowed in this location area" cause the Automatic Network Selection procedure of clause 4.4.3.1.1 to be started;
3. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see clause 4.5.2) attempts to perform a Location Registration.

...

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its operating mode.

4. The MS selects and attempts registration on other PLMN/access technology combinations, if available and allowable, in the following order:
  - i) either the HPLMN (if the EHPLMN list is not present or is empty) or the highest priority EHPLMN that is available (if the EHPLMN list is present) ;
  - ii) each PLMN/access technology combination in the "User Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
  - iii) each PLMN/access technology combination in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);

...

If successful registration is achieved, the MS indicates the selected PLMN.

**References**

1. TS 23.122, clause 3.1, 4.3.3, 4.4.3.1.
- NOTE: TS 31.102 defines the USIM fields.

**6.2.1.8a.2.3 Test purpose**

1. To verify that in Automatic Network Selection Mode Procedure:
  - 1.1 the UE selects the registered PLMN using all access technologies that the UE is capable of.
  - 1.2 the UE selects the OPLMN RAT between frequency bands of different ITU regions according to the OPLMN RAT priority list on the USIM.
  - 1.3 the UE attempts to obtain service on its HPLMN or higher priority PLMN when registration attempt is rejected with "PLMN not allowed" cause.

**6.2.1.8a.2.4 Method of test**

**Initial conditions**

The UE is in automatic PLMN selection mode.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

The definition of each PLMN code is found in table above under section 6.2.1.8a

Step a-g:

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 1	-70	1	A	PLMN 2	UTRAN
Cell 3	-76	2	A	PLMN 4	UTRAN
Note: The test may be executed with frequency bands of various ITU region combinations. Different FDD frequency bands shall be defined for the cells if the UE supports two FDD frequency bands of same ITU region (e.g. FDD II for Cell 1 and FDD V for Cell 3 for ITU region 2).					

Cell	RF signal level [dBm]	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 2	-48	1	A else B	PLMN 3	GSM
Cell 4	-52	2	B	PLMN 5	GSM

Note: The test may be executed with frequency bands of various ITU region combinations. GSM frequency band of ITU region B may be configured if the UE does not support any GSM frequency band of ITU region A.

Step h-k:

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 5	-70	3	A	PLMN 8	UTRAN
Cell 7	-76	4	A	PLMN 3	UTRAN

Note: The test may be executed with frequency bands of various ITU region combinations. Different FDD frequency bands shall be defined for the cells if the UE supports two FDD frequency bands of same ITU region (e.g. FDD II for Cell 7 and FDD V for Cell 5 for ITU region 2). Different FDD frequency bands shall be defined for FDD Cell 1 Cell 5 if the UE supports two FDD frequency bands of same ITU region (e.g. in case of ITU region 2 FDD II for Cell 1 and FDD V for Cell 5 may be configured).

Cell	RF signal level [dBm]	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 6	-48	3	B	PLMN 7	GSM
Cell 4	-52	2	B	PLMN 5	GSM

Note: The test may be executed with frequency bands of various ITU region combinations. Different GSM frequency bands shall be defined for the cells if the UE supports two GSM frequency bands of same ITU region (e.g. in case of ITU region 1 GSM 900 for Cell 6 and GSM 1800 for Cell 4 may be configured).

The UE is equipped with a USIM containing default values according to TS 34.108 section 8 except for those listed below.

USIM field	Priority	PLMN (Note)	Access Technology Identifier
EF <sub>H</sub> PLMN <sub>w</sub> ACT	1 <sup>st</sup>	PLMN 1 (ITU region A)	UTRAN
	2 <sup>nd</sup>	PLMN 1 (ITU region A)	GSM
EF <sub>O</sub> PLMN <sub>w</sub> ACT	1 <sup>st</sup>	PLMN 8 (ITU region A)	UTRAN
	2 <sup>nd</sup>	PLMN 8 (ITU region A)	GSM
	3 <sup>rd</sup>	PLMN 7 (ITU region B)	GSM
	4 <sup>th</sup>	PLMN 6 (ITU region B)	UTRAN
	5 <sup>th</sup>	PLMN 6 (ITU region B)	GSM
	6 <sup>th</sup>	PLMN 5 (ITU region B)	UTRAN
	7 <sup>th</sup>	PLMN 5 (ITU region B)	GSM
	8 <sup>th</sup>	PLMN 4 (ITU region A)	UTRAN
	9 <sup>th</sup>	PLMN 3 (ITU region A else B)	UTRAN
	10 <sup>th</sup>	PLMN 3 (ITU region A else B)	GSM
	11 <sup>th</sup>	PLMN 2 (ITU region A)	UTRAN
	12 <sup>th</sup>	PLMN 2 (ITU region A)	GSM

NOTE: 3<sup>rd</sup> digit of MNC value is equal to '1' if used PLMNs are for ITU region 2. ITU region B may be configured if the UE does not support any GSM frequency band of ITU region A.

The EF<sub>PLMNwACT</sub> list shall be empty according to 3GPP TS 31.102, Annex E.

The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN 1 (ITU region A). 3<sup>rd</sup> digit of MNC value is equal to '1' if used PLMNs are for ITU region 2.

UE is previously registered on PLMN 2, before switched off (ITU region A). 3<sup>rd</sup> digit of MNC value is equal to '1' if used PLMNs are for ITU region 2.

Related ICS/IXIT statement(s)

None

Test procedure

Method C is applied.

- a) The SS activates Cell 1, Cell 2, Cell 3 and Cell 4 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The registration attempt on Cell 1 is rejected by the SS using cause "PLMN not allowed" (#11).
- e) The SS waits for the next random access requests from the UE.
- f) The UE is switched off.
- g) Cell 1, Cell 2 and Cell 3 are switched off.
- h) The SS activates Cell 5, Cell 6 and Cell 7.
- i) The SS waits for random access requests from the UE.
- j) The registration attempt on Cell 4 is rejected by the SS using cause "PLMN not allowed" (#11).
- k) The SS waits for the next random access requests from the UE.

#### 6.2.1.8a.2.5 Test Requirements

1. In step c), the response from the UE shall be on Cell 1 (registered PLMN).
2. In step e), the response from the UE shall be on Cell 4 (7<sup>th</sup> priority RAT for EF<sub>OPLMNwAcT</sub>) after rejection of previous registration attempt. The indicated PLMN shall be PLMN5 (GSM).
3. In step i), the response from the UE shall be on Cell 4 (registered PLMN).
4. In step k), the response from the UE shall be on Cell 5 (1<sup>st</sup> priority RAT for EF<sub>OPLMNwAcT</sub>) after rejection of previous registration attempt. The indicated PLMN shall be PLMN8 (UTRAN).

#### 6.2.1.8a.3 Selection of RAT for OPLMN; Different ITU regions; No service; Automatic mode

##### 6.2.1.8a.3.1 Definition and applicability

Test to verify that at switch on or following recovery from lack of coverage, the UE selects the registered PLMN. If there is no registered PLMN or if registration is not possible due to the PLMN being unavailable the UE shall attempt to obtain service on its HPLMN or higher priority PLMN according to the entries on the USIM. The UE performs Multi-Band Multi-RAT PLMN selection between frequency bands of different ITU regions according to the "Operator Controlled PLMN Selector with Access Technology" priority list on the USIM.

Test is applicable for UEs supporting FDD and GSM and at least one frequency band of different ITU region in each RAT.

##### 6.2.1.8a.3.2 Conformance requirement

1. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see clause 4.5.2) attempts to perform a Location Registration.

...

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its operating mode.

2. The MS selects and attempts registration on other PLMN/access technology combinations, if available and allowable, in the following order:
  - i) either the HPLMN (if the EHPLMN list is not present or is empty) or the highest priority EHPLMN that is available (if the EHPLMN list is present);
  - ii) each PLMN/access technology combination in the "User Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
  - iii) each PLMN/access technology combination in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);

...

If successful registration is achieved, the MS indicates the selected PLMN.

References

1. TS 23.122, clause 4.4.3.1.

NOTE: TS 31.102 defines the USIM fields.

6.2.1.8a.3.3 Test purpose

1. To verify that in Automatic Network Selection Mode Procedure:
  - 1.1 the UE selects the registered PLMN using all access technologies that the UE is capable of.
  - 1.2 the UE selects the OPLMN RAT between frequency bands of different ITU regions according to the OPLMN RAT priority list on the USIM.
  - 1.3 the UE attempts to obtain service on its HPLMN or higher priority PLMN when following recovery from lack of coverage (registration not possible due to the PLMN being unavailable).

6.2.1.8a.3.4 Method of test

Initial conditions

The UE is in automatic PLMN selection mode.

In the System Information broadcast in each cell, the neighbouring cell list does not contain any cell belonging to the other PLMN's.

The definition of each PLMN code is found in table above under section 6.2.1.8a

Step a-f:

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 1	-70	1	A	PLMN 2	UTRAN
Cell 3	-76	2	A	PLMN 4	UTRAN
Note: The test may be executed with frequency bands of various ITU region combinations. Different FDD frequency bands shall be defined for the cells if the UE supports two FDD frequency bands of same ITU region (e.g. FDD II for Cell 1 and FDD V for Cell 3 for ITU region 2).					

Cell	RF signal level [dBm]	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 2	-48	1	A else B	PLMN 3	GSM
Cell 4	-52	2	B	PLMN 5	GSM

Note: The test may be executed with frequency bands of various ITU region combinations. GSM frequency band of ITU region B may be configured if the UE does not support any GSM frequency band of ITU region A.

Step g-i:

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 5	-70	3	A	PLMN 8	UTRAN
Cell 7	-76	4	A	PLMN 3	UTRAN

Note: The test may be executed with frequency bands of various ITU region combinations. Different FDD frequency bands shall be defined for the cells if the UE supports two FDD frequency bands of same ITU region (e.g. FDD II for Cell 7 and FDD V for Cell 5 for ITU region 2). Different FDD frequency bands shall be defined for FDD Cell 1 and Cell 5 if the UE supports two FDD frequency bands of same ITU region (e.g. in case of ITU region 2 FDD II for Cell 1 and FDD V for Cell 5 may be configured).

Cell	RF signal level [dBm]	Test Channel	Frequency band used in ITU region (Note)	PLMN	Radio Access Technology
Cell 6	-48	3	B	PLMN 7	GSM
Cell 4	-52	2	B	PLMN 5	GSM

Note: The test may be executed with frequency bands of various ITU region combinations.

The UE is equipped with a USIM containing default values according to TS 34.108 section 8 except for those listed below.

USIM field	Priority	PLMN (Note)	Access Technology Identifier
EF <sub>HPLMNwAcT</sub>	1 <sup>st</sup>	PLMN 1 (ITU region A)	UTRAN
	2 <sup>nd</sup>	PLMN 1 (ITU region A)	GSM
EF <sub>OPLMNwAcT</sub>	1 <sup>st</sup>	PLMN 8 (ITU region A)	UTRAN
	2 <sup>nd</sup>	PLMN 8 (ITU region A)	GSM
	3 <sup>rd</sup>	PLMN 7 (ITU region B)	GSM
	4 <sup>th</sup>	PLMN 6 (ITU region B)	UTRAN
	5 <sup>th</sup>	PLMN 6 (ITU region B)	GSM
	6 <sup>th</sup>	PLMN 5 (ITU region B)	UTRAN
	7 <sup>th</sup>	PLMN 5 (ITU region B)	GSM
	8 <sup>th</sup>	PLMN 4 (ITU region A)	UTRAN
	9 <sup>th</sup>	PLMN 3 (ITU region A else B)	UTRAN
	10 <sup>th</sup>	PLMN 3 (ITU region A else B)	GSM
	11 <sup>th</sup>	PLMN 2 (ITU region A)	UTRAN
	12 <sup>th</sup>	PLMN 2 (ITU region A)	GSM

NOTE: 3<sup>rd</sup> digit of MNC value is equal to '1' if used PLMNs are for ITU region 2. ITU region B may be configured if the UE does not support any GSM frequency band of ITU region A.

The EF<sub>PLMNwAcT</sub> list shall be empty according to 3GPP TS 31.102, Annex E. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN 1 (ITU region A). 3<sup>rd</sup> digit of MNC value is equal to '1' if used PLMNs are for ITU region 2.

UE is previously registered on PLMN 2, before switched off (ITU region A). 3<sup>rd</sup> digit of MNC value is equal to '1' if used PLMNs are for ITU region 2.

Related ICS/IXIT statement(s)

None

Test procedure

Method C is applied.

- a) The SS activates Cell 1, Cell 2, Cell 3 and Cell 4 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) Cell 1 is switched off by the SS, after the previous registration.
- e) The SS waits for random access requests from the UE.
- f) Cell 2 and Cell 3 are switched off by the SS.
- g) The SS activates Cell 5, Cell 6 and Cell 7 after the previous test step.
- h) Cell 4 is switched off by the SS.
- i) The SS waits for random access requests from the UE.

#### 6.2.1.8a.3.5 Test Requirements

1. In step c), the response from the UE shall be on Cell 1 (registered PLMN). The indicated PLMN shall be PLMN 2 (UTRAN).
2. In step e), the response from the UE shall be on Cell 4 (7<sup>th</sup> priority RAT for EF<sub>OPLMNwACT</sub>). The indicated PLMN shall be PLMN5 (GSM).
3. In step i), the response from the UE shall be on Cell 5 (1<sup>st</sup> priority RAT for EF<sub>OPLMNwACT</sub>). The indicated PLMN shall be PLMN8 (UTRAN).

#### 6.2.1.9 Selection of "Other PLMN / access technology combinations"; Automatic mode

##### 6.2.1.9.1 Definition

Test to verify that if neither RPLMN, HPLMN, UPLMN nor OPLMN is available, the UE tries to obtain registration on "Other PLMN/access technology combinations with received high quality signal in random order".

##### 6.2.1.9.2 Conformance requirement

1. Automatic Network Selection Mode Procedure:

The MS selects and attempts registration on other PLMNs, if available and allowable in the following order:

- 1.1 HPLMN (if not previously selected);
- 1.2 Each PLMN in the "User Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 1.3 Each PLMN in the "Operator Controlled PLMN Selector with Access Technology" data field in the SIM (in priority order);
- 1.4 Other PLMN/access technology combinations with received high quality signal in random order;
- 1.5 Other PLMN/access technology combinations in order of decreasing signal quality.

In 1.5, the MS shall order the PLMN/access technology combinations in order of decreasing signal quality within each access technology. The order between PLMN/access technology combinations with different access technologies is an MS implementation issue.

If successful registration is achieved, the MS indicates the selected PLMN.

If registration cannot be achieved because no PLMNs are available and allowable, the MS indicates "no service" to the user, waits until a new PLMN is available and allowable and then repeats the procedure.

If there were one or more PLMNs which were available and allowable, but an LR failure made registration on those PLMNs unsuccessful or an entry in the "forbidden LAs for regional provision of service" list prevented a registration attempt, the MS selects the first such PLMN again and enters a limited service state.

2. UTRA case: The UE shall scan all RF channels in the UTRA band according to its capabilities to find available PLMNs. On each carrier, the UE shall search for the strongest cell according to the cell search procedures (for FDD, see TS 25.214, and TDD, see TS 25.224) and read its system information, in order to find out which PLMN the cell belongs to. If the UE can read the PLMN identity, the found PLMN shall be reported to the NAS as a high quality PLMN (but without the RSCP value), provided that the following high quality criterion is fulfilled:
  - For an FDD cell, the measured primary CPICH RSCP value shall be greater than or equal to -95 dBm.
  - For a TDD cell, the measured P-CCPCH RSCP shall be greater than or equal to -84 dBm.

Found PLMNs that do not satisfy the high quality criterion, but for which the UE has been able to read the PLMN identities are reported to the NAS together with the CPICH RSCP value for UTRA FDD cells and P-CCPCH RSCP for UTRA TDD cells.

3. GSM case: A PLMN shall be understood to be received with high quality signal if the signal level is above -85 dBm.

## References

1. TS 23.122, clause 4.4.3.1.1.
2. TS 25.304, clause 5.1.2.2.
3. TS 03.22, clause 4.4.3.

NOTE: TS 31.102 defines the USIM fields.

### 6.2.1.9.3 Test purpose

1. To verify that if neither RPLMN, HPLMN, UPLMN nor OPLMN is available, the UE tries to obtain registration on "Other PLMN/access technology combinations with received high quality signal in random order".

### 6.2.1.9.4 Method of test

#### Initial conditions

The UE is in automatic PLMN selection mode.

Cell levels are from tables 6.3, 6.4 and 6.5.

Cell	CPICH_Ec [dBm/3.84 MHz] (FDD)	P-CCPCH_RSCP [dBm] (TDD)	"High Quality signal"	Test Channel	PLMN	Radio Access Technology
Cell 1	-80	-69	Yes	1	PLMN 7	UTRAN
Cell 3	-80	-69	Yes	2	PLMN 9	UTRAN

Cell	RF signal level [dBm]	"High Quality signal"	Test Channel	PLMN	Radio Access Technology
Cell 2	-65	Yes	1	PLMN 8	GSM

UE is previously registered on PLMN7, before switched off.

#### Test procedure

Method C is applied.

- a) The SS activates cells 1-3 and monitors the cells for random access requests from the UE.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The cell on which a response was received, is switched off.
- e) Step c-d) is repeated until the UE informs that no network is available.

#### 6.2.1.9.5 Test Requirements

- 1) In step c), the displayed PLMN is noted.
- 2) When the test procedure has finished, the noted PLMNs shall have appeared in the following order: PLMN7 first, then PLMN8 or PLMN9 in random order.

#### 6.2.1.10 Void

#### 6.2.1.11 Selection of PLMN and RAT in shared network environment, Manual Mode

##### 6.2.1.11.1 Definition

Test to verify that the UE can present the available PLMNs in priority order to the user when asked to do so in multi-mode Shared Network environment (Manual Mode). This includes PLMNs broadcasted in UTRAN cells (IE “PLMN Identity”, UTRAN IE “Multiple PLMN list” ) and in GSM cells. The test also verifies that displayed PLMNs can be selected by the user and that the UE attempts to access the selected PLMN. After successful registration, the selected PLMN shall be displayed to the user. The order of the displayed PLMNs shall be as specified by TS 23.122.

##### 6.2.1.11.2 Conformance requirement

###### 1a. At switch on or recovery from lack of coverage

At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see clause 4.5.2) attempts to perform a Location Registration.

EXCEPTION: In A/Gb mode an MS with voice capability, shall not search for CPBCCCH carriers. In A/Gb mode an MS not supporting packet services shall not search for CPBCCCH carriers.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its operating mode.

EXCEPTION: If registration is not possible on recovery from lack of coverage due to the registered PLMN being unavailable, a MS attached to GPRS services may, optionally, continue looking for the registered PLMN for an implementation dependent time.

NOTE: A MS attached to GPRS services should use the above exception only if one or more PDP contexts are currently active.

###### 1b. At switch on, or following recovery from lack of coverage, the MS selects the registered PLMN or equivalent PLMN (if it is available) using all access technologies that the MS is capable of and if necessary (in the case of recovery from lack of coverage, see clause 4.5.2) attempts to perform a Location Registration.

EXCEPTION: In A/Gb mode an MS with voice capability, shall not search for CPBCCCH carriers. In A/Gb mode an MS not supporting packet services shall not search for CPBCCCH carriers.

If successful registration is achieved, the MS indicates the selected PLMN.

If there is no registered PLMN, or if registration is not possible due to the PLMN being unavailable or registration failure, the MS follows one of the following two procedures depending on its PLMN selection operating mode.

**EXCEPTION:** At switch on, if the MS is in manual mode and neither registered PLMN nor PLMN that is equivalent to it is available but EHPLMN is available, then instead of performing the manual network selection mode procedure of clause 4.4.3.1.2 the MS may select and attempt registration on the highest priority EHPLMN. If the EHPLMN list is not available or is empty and the HPLMN is available, then the MS may select and attempt registration on the HPLMN. The MS shall remain in manual mode.

**NOTE 1:** If successful registration is achieved, then the current serving PLMN becomes the registered PLMN and the MS does not store the previous registered PLMN for later use.

**EXCEPTION:** If registration is not possible on recovery from lack of coverage due to the registered PLMN being unavailable, an MS attached to GPRS services may, optionally, continue looking for the registered PLMN for an implementation dependent time.

**NOTE2:** An MS attached to GPRS services should use the above exception only if one or more PDP contexts are currently active.

## 2. Manual Network Selection Mode Procedure:

The MS indicates whether there are any PLMNs, which are available using all supported access technologies. This includes PLMNs in the "forbidden PLMNs" list and PLMNs which only offer services not supported by the MS. An MS which supports GSM COMPACT shall also indicate GSM COMPACT PLMNs (which use PBCCH).

If displayed, PLMNs meeting the criteria above are presented in the following order:

- i)- HPLMN;
- ii)- PLMN/access technology combinations contained in the " User Controlled PLMN Selector with Access Technology " data file in the SIM (in priority order);
- iii)- PLMN/access technology combinations contained in the "Operator Controlled PLMN Selector with Access Technology" data file in the SIM (in priority order);
- iv)- other PLMN/access technology combinations with received high quality signal in random order;
- v)- other PLMN/access technology combinations in order of decreasing signal quality.

In ii and iii, an MS using a SIM without access technology information storage (i.e. the "User Controlled PLMN Selector with Access Technology" and the "Operator Controlled PLMN Selector with Access Technology" data files are not present) shall instead present the PLMNs contained in the "PLMN Selector" data file in the SIM (in priority order).

In v, requirement h) in clause 4.4.3.1.1 applies.

In GSM COMPACT, the non support of voice services shall be indicated to the user.

The user may select his desired PLMN and the MS then initiates registration on this PLMN using the access technology chosen by the user for that PLMN or using the highest priority available access technology for that PLMN, if the associated access technologies have a priority order. (This may take place at any time during the presentation of PLMNs). For such a registration, the MS shall ignore the contents of the "forbidden LAs for roaming", "forbidden LAs for regional provision of service", "forbidden PLMNs for GPRS service" and "forbidden PLMNs" lists.

Once the UE has registered on a PLMN selected by the user, the UE shall not automatically register on a different PLMN unless:

- i) the new PLMN is declared as an equivalent PLMN by the registered PLMN; or
- ii) the user selects automatic mode.

NOTE 1: It is an MS implementation option whether to indicate access technologies to the user. If the MS does display access technologies, then the access technology used should be the access technology chosen by the user for that PLMN. If the MS does not display access technologies, then the access technology chosen for a particular PLMN should be the highest priority available access technology for that PLMN, if the associated access technologies have a priority order.

If the user does not select a PLMN, the selected PLMN shall be the one that was selected before the PLMN selection procedure started. If no such PLMN was selected or that PLMN is no longer available, then the MS shall attempt to camp on any acceptable cell and enter the limited service state.

NOTE 2: High quality signal is defined in the appropriate AS specification.

3. If a "PLMN not allowed" message is received by an MS in response to an LR request from a VPLMN, that VPLMN is added to a list of "forbidden PLMNs" in the SIM and thereafter that VPLMN will not be accessed by the MS when in automatic mode. A PLMN is removed from the "forbidden PLMNs" list if, after a subsequent manual selection of that PLMN, there is a successful LR. This list is retained when the MS is switched off or the SIM is removed. The HPLMN shall not be stored on the list of "forbidden PLMNs".

## References

- 1a. TS 23.122, clause 4.4.3.1
- 1b. TS 23.122 (Rel-7), clause 4.4.3.1
2. TS 23.122, clause 4.4.3.1.2

NOTE: TS 31.102 defines the USIM fields.

### 6.2.1.11.3 Test purpose

1. To verify that all PLMNs available are displayed to the user in multi-mode Shared Network environment (Manual Mode). This includes for the UTRAN cells, PLMNs broadcasted in IE "PLMN Identity" and IE "Multiple PLMN list", as well as the PLMNs broadcasted by GSM cells. The available PLMNs shall be displayed in priority order according to TS 23.122.
2. To verify that it is possible to manually select any PLMN, regardless of RAT, from the displayed list, and that the UE subsequently attempts to register on the selected PLMN/RAT.
3. To verify that the UE in general behaves according to TS 23.122 in multi-mode Shared Network environment (Manual Mode).

### 6.2.1.11.4 Method of test

#### Initial conditions

Cell levels are from table 6.5 (GSM) and 6.3 (UTRAN FDD).

Cell	RF signal level [dBm]	Test Channel	PLMN	Radio Access Technology
Cell 9	-48	1	PLMN 9	GSM
Cell 10	-50	2	PLMN 10	GSM

Cell	CPICH <sub>E</sub> c [dBm/3.84 MHz] (FDD)	Test Channel	PLMN	Radio Access Technology
Cell 1	-60	1	See below	UTRAN
Cell 4	-65	2	See below	UTRAN

The reference system configuration from TS 34.108 clause 6.1 is used in the UTRAN cells, with the following modifications:

#### Master Information Block

- MIB value tag	1 Set to (Current MIB value tag + 1)
- Supported PLMN types	

- PLMN type	GSM-MAP
- PLMN identity	
- MCC digit	See table below
- MNC digit	See table below
- Multiple PLMN List	
- MIB PLMN Identity	See table below
- Multiple PLMNs (1)	
- MCC	See table below
- MNC	See table below
- Multiple PLMNs (2)	
- MCC	See table below
- MNC	See table below

The MIB PLMN Identity and PLMN codes broadcasted on the BCCH in each cell shall be configured as defined in the table below.

Cell	MIB PLMN Identity	PLMN Identity		Multiple PLMNs (1)		Multiple PLMNs (2)	
		MCC digits	MNC digits	MCC digits	MNC digits	MCC digits	MNC digits
1	TRUE	PLMN 1	PLMN 1	-	PLMN 2	-	PLMN 3
4	FALSE	PLMN 4	PLMN 4	-	PLMN 5	-	PLMN 10

NOTE: “-“ (dash) denotes “not present”

The definition of each PLMN code is found in table below.

PLMN	MCC digit			MNC digit		
	1	2	3	1	2	3
1	0	0	1	0	1	-
2	0	0	1	0	2	-
3	0	0	1	0	3	-
4	0	0	1	0	4	-
5	0	0	1	0	5	-
6	0	0	1	0	6	-
9	0	0	1	0	9	-
10	0	0	1	1	0	-

NOTE: “-“ (dash) denotes “not present”

The UE is in manual PLMN selection mode and equipped with a USIM containing default values except for those listed below. The UE has successfully selected a PLMN in manual PLMN selection mode. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

USIM field	Priority	PLMN	Access Technology Identifier
EF <sub>PLMNwACT</sub>	1 <sup>st</sup>	PLMN 10	GSM
	2 <sup>nd</sup>	PLMN 9	GSM
EF <sub>OPLMNwACT</sub>	1 <sup>st</sup>	PLMN 2	UTRAN

## Test procedure

Method C is applied.

- The SS activates all cells and monitors the cells for random access requests from the UE.
- The UE is switched on. Instead of performing the manual network selection mode procedure the UE may select and attempt registration on the HPLMN (PLMN 1). The SS shall complete the registration procedure, the UE shall remain in manual mode and the test execution shall continue.
- PLMN 9 shall be selected when the list is displayed.

- d) The SS waits for random access requests from the UE.
- e) Cell 9 is switched off.
- f) PLMN 2 shall be selected when the list is displayed.
- g) The SS waits for random access requests from the UE.
- h) Cell 1 is switched off.
- i) PLMN 10 shall be selected when the list is displayed.
- j) The SS waits for random access requests from the UE.

#### 6.2.1.11.5 Test Requirements

- 1) In step c), the list shall be presented. The priority shall be as follows PLMN 1, PLMN 10, PLMN 9, PLMN 2, other PLMNs.
- 2) In step d), the response from the UE shall be on Cell 9. The displayed PLMN shall be PLMN 9. If indication of RAT is supported, the displayed PLMN shall be PLMN 9 (GSM)
- 3) In step f), the list shall be presented. The priority shall be as follows: PLMN 1, PLMN 10, PLMN 2, other PLMNs.
- 4) In step g), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 2. If indication of RAT is supported, the displayed PLMN shall be PLMN 2 (UTRAN).
- 5) In step i), the list shall be presented. The priority shall be as follows: PLMN 10, PLMN 5.
- 6) In step j), the response from the UE shall be on either Cell 4 or Cell 10. The displayed PLMN shall be PLMN 10.

## 6.2.2 Cell selection and reselection

### 6.2.2.1 Cell reselection if cell becomes barred or $S < 0$ ; UTRAN to GSM

#### 6.2.2.1.1 Definition

Test to verify that if both a GSM and UTRAN network is available, the UE performs cell reselection from UTRAN to GSM if the UTRAN cell becomes barred or  $S$  falls below zero.

#### 6.2.2.1.2 Conformance requirement

- 1. When camped on a cell, the UE shall regularly search for a better cell according to the cell reselection criteria. If a better cell is found, that cell is selected. The change of cell may imply a change of RAT.
- 2. A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.
  - 2.1 The cell is part of the selected PLMN or, of a PLMN considered as equivalent by the UE according to the information provided by the NAS.
  - 2.2 The cell is not barred.
  - 2.3 The cell is not part of the list of "forbidden LAs for roaming".
  - 2.4 The cell selection criteria are fulfilled.
- 3. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 3.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD and TS 25.123 for TDD.
  - 3.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
- 4. Cell Reselection Criteria:

- 4.1 The UE shall perform ranking of all cells that fulfil the S criterion.
- 4.2 The cells shall be ranked according to the R criteria, deriving  $Q_{meas,n}$  and  $Q_{meas,s}$  and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in TS 25.133 and TS 25.123 for FDD, TDD and GSM cells, respectively.

The offset  $Q_{offset1_{s,n}}$  is used for  $Q_{offset_{s,n}}$  to calculate  $R_n$ , the hysteresis  $Q_{hyst1_s}$  is used for  $Q_{hyst_s}$  to calculate  $R_s$ .

If the usage of HCS is indicated in system information,  $TEMP\_OFFSET1_n$  is used for  $TEMP\_OFFSET_n$  to calculate  $TO_n$ . If it is indicated in system information that HCS is not used,  $TEMP\_OFFSET_n$  is not applied when calculating  $R_n$ . The best ranked cell is the cell with the highest R value.

If a TDD or GSM cell is ranked as the best cell, then the UE shall perform cell re-selection to that TDD or GSM cell.

- 4.3 In all cases, the UE shall reselect the new cell, only if the following conditions are met:

- the new cell is better ranked than the serving cell during a time interval  $T_{reselection}$ .
- more than 1 second has elapsed since the UE camped on the current serving cell.

## References

1. TS 25.304, clause 5.2.1.
2. TS 25.304, clause 4.3.
3. TS 25.304, clause 5.2.5.1.
4. TS 25.304, clause 5.2.6.1.4.

### 6.2.2.1.3 Test purpose

1. To verify that the UE performs cell reselection from UTRAN to GSM on the following occasions:
  - 1.1 Serving cell becomes barred.
  - 1.2  $S < 0$  for serving cell.

### 6.2.2.1.4 Method of test

#### Initial conditions

UE is idle updated on cell 1.

All cells belong to the same PLMN.

The Inter-RAT Cell Info List of Cell 1 (UTRAN) refers to Cell 9 (GSM) and Cell 10 (GSM).

The 3G Neighbour Cell Description of Cell 9 (GSM) and Cell 10 (GSM) refers to Cell 1 (UTRAN)

Step a-c:

Parameter	Unit	Cell 1 (UTRAN)
Test Channel		1
CPICH_Ec (FDD)	dBm / 3.84 MHz	-60
P-CCPCH_RSCP (TDD)	dBm	-60
Qrxlevmin	dBm	-79
Srxlev*	dBm	19
CellBarred		Not barred
S-search RAT	dB	+20

Parameter	Unit	Cell 9 (GSM)	Cell 10 (GSM)
Test Channel		1	2
RF Signal Level	dBm	-80	-87
RXLEV_ACCESS_MIN	dBm	-100	-100
C1*	dBm	20	13
FDD_Qmin	dB	-20	-20
FDD_Qoffset	dBm	0	0

Step d-f:

Parameter	Unit	Cell 1 (UTRAN)
CellBarred		Not barred -> Barred
Tbarred	s	80

Step g:

Parameter	Unit	Cell 1 (UTRAN)
CPICH_Ec (FDD)	dBm/ 3.84 MHz	-90
P-CCPCH_RSCP (TDD)	dBm	-90
Srxlev*	dB	19->-11

#### Test procedure

Method B is applied.

- The SS activates cells 9, and 10. The SS monitors cells 9 and 10 for random access requests from the UE.
- Void
- Void
- The SS sets Cell 1 to be barred. The SS notifies UE of the BCCH modification
- The SS waits for random access request from the UE.
- The UE is switched off. The SS sets Cell 1 to be not barred
- Step a-e) is repeated except that in step d), the signal level is reduced, so S will become negative instead of being barred.

#### 6.2.2.1.5 Test Requirements

- In step a), after the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- In step e), the UE shall respond on Cell 9.
- In step g), the UE shall respond on Cell 9 after the signal level is reduced.

#### 6.2.2.1a Cell reselection if cell becomes barred or $S < 0$ ; UTRAN(1.28Mcps TDD) to GSM

##### 6.2.2.1a.1 Definition

Test to verify that if both a GSM and UTRAN network is available, the UE performs cell reselection from UTRAN to GSM if the UTRAN cell becomes barred or S falls below zero.

### 6.2.2.1a.2 Conformance requirement

1. When camped on a cell, the UE shall regularly search for a better cell according to the cell reselection criteria. If a better cell is found, that cell is selected. The change of cell may imply a change of RAT.
2. A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.
  - 2.1 The cell is part of the selected PLMN or, of a PLMN considered as equivalent by the UE according to the information provided by the NAS.
  - 2.2 The cell is not barred.
  - 2.3 The cell is not part of the list of "forbidden LAs for roaming".
  - 2.4 The cell selection criteria are fulfilled.
3. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 3.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD and TS 25.123 for TDD.
  - 3.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
4. Cell Reselection Criteria:
  - 4.1 The UE shall perform ranking of all cells that fulfil the S criterion.
  - 4.2 The cells shall be ranked according to the R criteria, deriving  $Q_{meas,n}$  and  $Q_{meas,s}$  and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in TS 25.133 and TS 25.123 for FDD, TDD and GSM cells, respectively.
 

The offset  $Q_{offset1,s,n}$  is used for  $Q_{offset,s,n}$  to calculate  $R_n$ , the hysteresis  $Q_{hyst1,s}$  is used for  $Q_{hyst,s}$  to calculate  $R_s$ .

If the usage of HCS is indicated in system information,  $TEMP\_OFFSET1_n$  is used for  $TEMP\_OFFSET_n$  to calculate  $TO_n$ . If it is indicated in system information that HCS is not used,  $TEMP\_OFFSET_n$  is not applied when calculating  $R_n$ . The best ranked cell is the cell with the highest R value.

If a TDD or GSM cell is ranked as the best cell, then the UE shall perform cell re-selection to that TDD or GSM cell.
  - 4.3 In all cases, the UE shall reselect the new cell, only if the following conditions are met:
    - the new cell is better ranked than the serving cell during a time interval  $T_{reselction}$ .
    - more than 1 second has elapsed since the UE camped on the current serving cell.

### References

1. TS 25.304, clause 5.2.1.
2. TS 25.304, clause 4.3.
3. TS 25.304, clause 5.2.5.1.
4. TS 25.304, clause 5.2.6.1.4.

### 6.2.2.1a.3 Test purpose

1. To verify that the UE performs cell reselection from UTRAN to GSM on the following occasions:
  - 1.1 Serving cell becomes barred.
  - 1.2  $S < 0$  for serving cell.

## 6.2.2.1a.4 Method of test

## Initial conditions

UE is idle updated on cell 1.

All cells belong to the same PLMN.

The Inter-RAT Cell Info List of Cell 1 (UTRAN) refers to Cell 9 (GSM) and Cell 10 (GSM).

The 3G Neighbour Cell Description of Cell 9 (GSM) and Cell 10 (GSM) refers to Cell 1 (UTRAN)

Step a-c:

Parameter	Unit	Cell 1 (UTRAN)
Test Channel		1
P-CCPCH_RSCP (TDD)	dBm	-65
Qrxlevmin	dBm	-84
Srxlev*	dBm	19
CellBarred		Not barred
S-search RAT	dB	+20

Parameter	Unit	Cell 9 (GSM)	Cell 10 (GSM)
Test Channel		1	2
RF Signal Level	dBm	-80	-87
RXLEV_ACCESS_MIN	dBm	-100	-100
C1*	dBm	20	13
TDD_Qoffset	dBm	-60	-60

Step d-f:

Parameter	Unit	Cell 1 (UTRAN)
CellBarred		Not barred -> Barred
Tbarred	s	80

Step g:

Parameter	Unit	Cell 1 (UTRAN)
P-CCPCH_RSCP (TDD)	dBm	-95
Srxlev*	dB	19->-11

## Test procedure

Method B is applied.

- a) The SS activates cells 9, and 10. The SS monitors cells 9 and 10 for random access requests from the UE.
- b) Void
- c) Void
- d) The SS sets Cell 1 to be barred. The SS notifies UE of the BCCH modification
- e) The SS waits for random access request from the UE.
- f) The UE is switched off. The SS sets Cell 1 to be not barred
- g) Step a-e) is repeated except that in step d), the signal level is reduced, so S will become negative instead of being barred.

### 6.2.2.1a.5 Test Requirements

- 1) In step a), after the UE has responded on Cell 1, it shall not respond on any other cell within 1 min.
- 2) In step e), the UE shall respond on Cell 9.
- 3) In step g), the UE shall respond on Cell 9 after the signal level is reduced.

### 6.2.2.2 Cell reselection if cell becomes barred or $C1 < 0$ ; GSM to UTRAN

#### 6.2.2.2.1 Definition

Test to verify that if both a GSM and UTRAN network is available, the UE performs cell reselection from GSM to UTRAN if the GSM cell becomes barred or the path loss criterion C1 falls below zero for a period of 5 s.

#### 6.2.2.2.2 Conformance requirement

1. At least every 5 s the MS shall calculate the value of C1 and C2 for the serving cell and re-calculate C1 and C2 values for non serving cells (if necessary). The MS shall then check whether:
  - 1.1 The path loss criterion (C1) for current serving cell falls below zero for a period of 5 s. This indicates that the path loss to the cell has become too high.
  2. While camped on a cell of the registered PLMN ("camped normally"), the MS may need to select a different cell ("normal cell reselection" state). The following events trigger a cell reselection:
    - 2.1 The path loss criterion parameter C1 (see TS 03.22, clause 3.6) indicates that the path loss to the cell has become too high;
    - 2.2 The cell camped on (current serving cell) has become barred.

#### References

1. TS 05.08, clause 6.6.2.
2. TS 03.22, clause 4.5.

#### 6.2.2.2.3 Test purpose

1. To verify that the UE performs cell reselection from GSM to UTRAN on the following occasions:
  - 1.1 Serving cell becomes barred.
  - 1.2 The path loss criterion C1 for serving cell falls below zero for a period of 5 s.

#### 6.2.2.2.4 Method of test

##### Initial conditions

UE is idle updated on Cell 9.

Cell 9:

The SS transmitted system information for Cell 1 and Cell 2 shall be according to TS 34.108, clause 6.1.4 with the following exceptions:

The 3G Neighbour Cell Description of Cell 9 (GSM) refers Cell 1 (UTRAN) and Cell 2 (UTRAN).

SYSTEM INFORMATION TYPE 3 REST OCTETS

- SI2q indicated on BCCH Extended

## SYSTEM INFORMATION TYPE 2QUATER

Information Element	Value/remark
< RR management Protocol Discriminator bit (4) >	'0110'B
< Skip Indicator : bit (4) >	'0000'B
< Message type : bit (8) >	'0000 0111'B
< SI2 quarter Rest Octets >	
< BA_IND : bit >	0
< 3G_BA_IND : bit >	0
< MP_CHANGE_MARK : bit >	0
< SI2quarter_INDEX : bit (4) >	'0000'B
< SI2quarter_COUNT : bit (4) >	'0000'B
0   1 < Measurement_Parameters Description >	0
0   1 < GPRS_Real Time Difference Description >	0
0   1 < GPSR_BSIC Description >	0
0   1 < GPRS_REPORT PRIORITY Description >	0
0   1 < GPRS_Measurement_Parameters Description >	0
0   1 < NC Measurement Parameters >	0
0   1 < extension length >	0
0   1 < 3G Neighbour Cell Description >	1
0   1 < Index_Start_3G : bit (7) >	0
0   1 < Absolute_Index_Start_EMR : bit (7) >	0
0   1 < UTRAN FDD Description >	1
0   1 < Bandwidth_FDD : bit (3) >	0
1 < Repeated UTRAN FDD Neighbour Cells > ** 0	1
0 < FDD-ARFCN : bit (14) >	0 See TS 34.108, clause 6.1.5, table 6.1.1
< FDD_Indic0 : bit >	0
< NR_OF_FDD_CELLS : bit (5) >	'00010'B
< FDD_CELL_INFORMATION Field >	19 bits Scrambling code according to TS 34.108, clause 6.1.4, Default settings for cell No.1 and cell No.2
1 < Repeated UTRAN FDD Neighbour Cells > ** 0	0
0   1 < UTRAN TDD Description >	0
0   1 < 3G MEASUREMENT Parameters Description >	1
< Qsearch_I : bit (4) >	'0111'B (Always)
< Qsearch_C_Initial : bit (1) >	0
0   1 < FDD_Qoffset : bit (4) >	1 '1000'B (0 dB)
< FDD_REP_QUANT : bit (1) >	0
< FDD_MULTIRAT_REPORTING : bit (2) >	'00'B
< FDD_Qmin : bit (3) >	'000'B (-20 dB)
0   1 < TDD_Qoffset : bit (4) >	0
0   1 < GPRS_3G_MEASUREMENT Parameters Description >	1
< Qsearch_P : bit (4) >	'1111'B (Never)
< 3G_SEARCH_PRIO : bit >	0
0   1 < FDD_REP_QUANT : bit >	0
0   1 < FDD_REPORTING_OFFSET : bit (3) >	0
0   1 < TDD_MULTIRAT_REPORTING : bit (2) >	0
0   1 < TDD_REPORTING_OFFSET : bit (3) >	0

Cell 1 and Cell 2:

The SS transmitted system information for Cell 1 and Cell 2 shall be according to TS 34.108, clause 6.1.4 with the following exceptions:

The Inter-RAT Cell Info List of Cell 1 (UTRAN) and Cell 2 (UTRAN) refers to Cell 9 (GSM).

Step a-c:

Parameter	Unit	Cell 9 (GSM)
Test Channel		1
RF Signal Level	dBm	-50
RXLEV_ACCESS_MIN	dBm	-70
MS_TXPWR_MAX_CCH	dBm	Max. output power of UE
FDD_Qmin	dB	-20
FDD_Qoffset	dB	0
CELL_BAR_ACCESS		Not barred
C1*	dB	20

Parameter	Unit	Cell 1 (UTRAN)	Cell 2 (UTRAN)
P-CCPCH_RSCP (TDD)	dBm	-65	-72
CPICH_Ec (FDD)	dBm/3.84 MHz	-65	-72
Qrxlevmin	dBm	-101	-101
Srxlev*	dB	36	29

Step d-e:

Parameter	Unit	Cell 9 (GSM)
CELL_BAR_ACCESS		Not barred -> Barred

Step f-g:

Parameter	Unit	Cell 9 (GSM)
RF Signal Level	dBm	-50 -> -80 (4sec) -> -50
C1*	dB	20 -> -10 (4sec) -> 20

Step h:

Parameter	Unit	Cell 9 (GSM)
RF Signal Level	dBm	-50 -> -80
C1*	dB	20 -> -10

### Test procedure

Method C is applied.

- The SS activates cells 1, and 2. The SS monitors cells 1 and 2 for random access requests from the UE.
- Void.
- Void
- The SS sets Cell 9 to be barred. The SS notifies UE of the BCCH modification
- The SS waits for random access request from the UE.
- The UE is switched off. The SS sets Cell 9 to be not barred and deactivates cells 1 and 2.
- The UE is switched on. The SS waits until UE is idle updated on Cell 9.

- h) Step a-e) is repeated except that in step d), the SS reduces signal level on Cell 9 to  $-80$  dBm for 4 s and then raises the level back to  $-50$  dBm (C1 becomes  $-10$  dBm during this period).
- i) The SS reduces signal level on Cell 9 to  $-80$  dBm.
- j) The SS waits for random access request from the UE.

#### 6.2.2.2.5 Test Requirements

- 1) In step a), there shall not be any random access requests on any cell within 1 min.
- 2) In step e), the UE shall respond on Cell 1, the RRC Connection Request cause shall be "interRAT\_CellReselection".
- 3) In step h), there shall be no access on Cell 1 within 30 s, after having reduced the signal level on Cell 9.
- 4) In step j), the UE shall respond on Cell 1, the RRC Connection Request cause shall be "interRAT\_CellReselection".

#### 6.2.2.2a Cell reselection if cell becomes barred or $C1 < 0$ ; GSM to UTRAN (1.28 Mcps TDD)

##### 6.2.2.2a.1 Definition

Test to verify that if both a GSM and UTRAN network is available, the UE performs cell reselection from GSM to UTRAN if the GSM cell becomes barred or the path loss criterion C1 falls below zero for a period of 5 s.

##### 6.2.2.2a.2 Conformance requirement

- 1. At least every 5 s the MS shall calculate the value of C1 and C2 for the serving cell and re-calculate C1 and C2 values for non serving cells (if necessary). The MS shall then check whether:
  - 1.1 The path loss criterion (C1) for current serving cell falls below zero for a period of 5 s. This indicates that the path loss to the cell has become too high.
  - 2. While camped on a cell of the registered PLMN ("camped normally"), the MS may need to select a different cell ("normal cell reselection" state). The following events trigger a cell reselection:
    - 2.1 The path loss criterion parameter C1 (see TS 03.22, clause 3.6) indicates that the path loss to the cell has become too high;
    - 2.2 The cell camped on (current serving cell) has become barred.

#### References

- 1. TS 05.08, clause 6.6.2.
- 2. TS 03.22, clause 4.5.

##### 6.2.2.2a.3 Test purpose

- 1. To verify that the UE performs cell reselection from GSM to UTRAN on the following occasions:
  - 1.1 Serving cell becomes barred.
  - 1.2 The path loss criterion C1 for serving cell falls below zero for a period of 5 s.

6.2.2.2a.4 Method of test

Initial conditions

UE is idle updated on Cell 9.

Cell 9:

The SS transmitted system information for Cell 1 and Cell 2 shall be according to TS 34.108, clause 6.1.4 with the following exceptions:

The 3G Neighbour Cell Description of Cell 9 (GSM) refers Cell 1 (UTRAN) and Cell 2 (UTRAN).

SYSTEM INFORMATION TYPE 3 REST OCTETS

- SI2q indicated on BCCH Extended

SYSTEM INFORMATION TYPE 2QUATER

Information Element	Value/remark
< RR management Protocol Discriminator bit (4) >	'0110'B
< Skip Indicator : bit (4) >	'0000'B
< Message type : bit (8) >	'0000 0111'B
< SI2 quarter Rest Octets >	
< BA_IND : bit >	0
< 3G_BA_IND : bit >	0
< MP_CHANGE_MARK : bit >	0
< SI2quater_INDEX : bit (4) >	'0000'B
< SI2quater_COUNT : bit (4) >	'0000'B
0   1 < Measurement_Parameters Description >	0
0   1 < GPRS_Real Time Difference Description >	0
0   1 < GPRS_BSIC Description >	0
0   1 < GPRS_REPORT PRIORITY Description >	0
0   1 < GPRS_Measurement_Parameters Description >	0
0   1 < NC Measurement Parameters >	0
0   1 < extension length >	0
0   1 < 3G Neighbour Cell Description >	1
0   1 < Index_Start_3G : bit (7) >	0
0   1 < Absolute_Index_Start_EMR : bit (7) >	0
0   1 < UTRAN FDD Description >	0
0   1 < UTRAN TDD Description >	1
0   1 < Bandwidth_TDD : bit (3) >	1
1 < Repeated UTRAN TDD Neighbour Cells > ** 0	1
0 < TDD-ARFCN : bit (14) >	0 See TS 34.108, clause 6.1.5, table 6.1.1
< TDD_Indic0 : bit >	0
< NR_OF_TDD_CELLS : bit (5) >	'00010'B
<TDD_CELL_INFORMATION Field >	17 bits Scrambling code according to TS 34.108, clause 6.1.4, Default settings for cell No.1 and cell No.2
1 < Repeated UTRAN TDD Neighbour Cells > ** 0	0
0   1 < 3G MEASUREMENT Parameters Description >	1
< Qsearch_I : bit (4) >	'0111'B (Always)
< Qsearch_C_Initial : bit (1) >	0
0   1 < FDD_Qoffset : bit (4) >	0
0   1 < TDD_Qoffset : bit (4) >	1 '1100'B (-69dbm)
< TDD_MULTIRAT_REPORTING : bit (2) >	'00'B
0   1 < GPRS_3G_MEASUREMENT Parameters Description >	1
< Qsearch_P : bit (4) >	'1111'B (Never)
< 3G_SEARCH_PRIO : bit >	0
0   1 < FDD_REP_QUANT : bit >	0
0   1 < FDD_REPORTING_OFFSET : bit (3) >	0
0   1 < TDD_MULTIRAT_REPORTING : bit (2) >	0
0   1 < TDD_REPORTING_OFFSET : bit (3) >	0

Cell 1 and Cell 2:

The SS transmitted system information for Cell 1 and Cell 2 shall be according to TS 34.108, clause 6.1.4 with the following exceptions:

The Inter-RAT Cell Info List of Cell 1 (UTRAN) and Cell 2 (UTRAN) refers to Cell 9 (GSM).

Step a-c:

Parameter	Unit	Cell 9 (GSM)
Test Channel		1
RF Signal Level	dBm	-50
RXLEV_ACCESS_MIN	dBm	-70
MS_TXPWR_MAX_CCH	dBm	Max. output power of UE
TDD_Qoffset	dBm	-69dbm
CELL_BAR_ACCESS		Not barred
C1*	dB	20

Parameter	Unit	Cell 1 (UTRAN)	Cell 2 (UTRAN)
P-CCPCH_RSCP (TDD)	dBm	-75	-80
Qrxlevmin	dBm	-101	-101
Srxlev*	dB	26	21

Step d-e:

Parameter	Unit	Cell 9 (GSM)
CELL_BAR_ACCESS		Not barred -> Barred

Step f-g:

Parameter	Unit	Cell 9 (GSM)
RF Signal Level	dBm	-50 -> -80 (4sec) -> -50
C1*	dB	20 -> -10 (4sec) -> 20

Step h:

Parameter	Unit	Cell 9 (GSM)
Test Channel		1
RF Signal Level	dBm	-50
RXLEV_ACCESS_MIN	dBm	-70
MS_TXPWR_MAX_CCH	dBm	Max. output power of UE
TDD_Qoffset	dB	-81
CELL_BAR_ACCESS		Not barred
C1*	dB	20

### Test procedure

Method C is applied.

- a) The SS activates cells 1, and 2. The SS monitors cells 1 and 2 for random access requests from the UE.
- b) Void.
- c) Void
- d) The SS sets Cell 9 to be barred. The SS notifies UE of the BCCH modification
- e) The SS waits for random access request from the UE.
- f) The UE is switched off. The SS sets Cell 9 to be not barred and deactivates cells 1 and 2.
- g) The UE is switched on. The SS waits until UE is idle updated on Cell 9.
- h) Step a-e) is repeated except that in step d), the SS reduces signal level on Cell 9 to  $-80$  dBm for 4 s and then raises the level back to  $-50$  dBm (C1 becomes  $-10$  dBm during this period).
- i) The SS sets "TDD\_Qoffset" to  $-81$  dBm. The SS notifies UE of the BCCH modification.
- j) The SS waits for random access request from the UE.

#### 6.2.2.2a.5 Test Requirements

- 1) In step a), there shall not be any random access requests on any cell within 1 min.
- 2) In step e), the UE shall respond on Cell 1, the RRC Connection Request cause shall be "interRAT\_CellReselection".
- 3) In step h), there shall be no access on Cell 1 within 30 s, after having reduced the signal level on Cell 9.
- 4) In step j), the UE shall respond on Cell 1, the RRC Connection Request cause shall be "interRAT\_CellReselection".

### 6.2.2.3 Cell reselection timings; GSM to UTRAN

#### 6.2.2.3.1 Definition

Test to verify that the UE meets the cell reselection timing requirements when both a GSM and UTRAN network is available.

### 6.2.2.3.2 Conformance requirement

1. If the 3G Cell Reselection list (see TS 04.18) includes UTRAN frequencies, the MS shall, at least every 5 s update the value RLA\_C for the serving cell and each of the at least 6 strongest non-serving GSM cells.
  - 1.1 The MS shall then reselect a suitable UTRAN cell if its measured RSCP value exceeds the value of RLA\_C for the serving cell and all of the suitable non-serving GSM cells by the value XXX\_Qoffset for a period of 5 s and, for FDD, the UTRAN cells measured Ec/No value is equal or greater than the value FDD\_Qmin.
    - Ec/No and RSCP are the measured quantities.
    - FDD\_Qmin and XXX\_Qoffset are broadcast on BCCH of the serving cell. XXX indicates other radio access technology/mode.
  - 1.2 In case of a cell reselection occurring within the previous 15 s, XXX\_Qoffset is increased by 5 dB.
  - 1.3 Cell reselection to UTRAN shall not occur within 5 s after the MS has reselected a GSM cell from an UTRAN cell if a suitable GSM cell can be found.
  - 1.4 If more than one UTRAN cell fulfils the above criteria, the UE shall select the cell with the greatest RSCP value.
2. The MS shall be able to identify and select a new best UTRAN cell on a frequency, which is part of the 3G Cell Reselection list, within 30 s after it has been activated under the condition that there is only one UTRAN frequency in the list and under good radio conditions.
 

The allowed time is increased by 30 s for each additional UTRAN frequency in the 3G Cell Reselection list. However, multiple UTRAN cells on the same frequency in the neighbour cell list does not increase the allowed time.

NOTE: Definitions of measurements are in TS 25.215 and TS 25.101 for FDD mode, in TS 25.225 and TS 25.102 for TDD mode, clause 3.2 and TS 05.08, clause 6.1.

### References

1. TS 05.08, clause 6.6.5.
2. TS 05.08, clause 6.6.4.

### 6.2.2.3.3 Test purpose

1. To verify that:
  - 1.1 The UE meets conformance requirement 1.1 and additionally, that no cell reselection is performed if the period is less than 5 s
  - 1.3 The UE meets conformance requirement 1.3.

### 6.2.2.3.4 Method of test

UE is idle updated on Cell 1.

Cell 9:

The SS transmitted system information for Cell 1 shall be according to TS 34.108, clause 6.1.4 with the following exceptions:

The 3G Neighbour Cell Description of Cell 9 (GSM) refers to Cell 1 (UTRAN).

SYSTEM INFORMATION TYPE 3 REST OCTETS

- SI2q indicated on BCCH Norm

## SYSTEM INFORMATION TYPE 2QUATER

Information Element	Value/remark
< RR management Protocol Discriminator bit (4) >	'0110'B
< Skip Indicator : bit (4) >	'0000'B
< Message type : bit (8) >	'0000 0111'B
< SI2 quarter Rest Octets >	
< BA_IND : bit >	0
< 3G_BA_IND : bit >	0
< MP_CHANGE_MARK : bit >	0
< SI2quarter_INDEX : bit (4) >	'0000'B
< SI2quarter_COUNT : bit (4) >	'0000'B
0   1 < Measurement Parameters Description >	0
0   1 < GPRS_Real Time Difference Description >	0
0   1 < GPSR_BSIC Description >	0
0   1 < GPRS_REPORT PRIORITY Description >	0
0   1 < GPRS_Measurement Parameters Description >	0
0   1 < NC Measurement Parameters >	0
0   1 < extension length >	0
0   1 < 3G Neighbour Cell Description >	1
0   1 < Index_Start_3G : bit (7) >	0
0   1 < Absolute_Index_Start_EMR : bit (7) >	0
0   1 < UTRAN FDD Description >	1
0   1 < Bandwidth_FDD : bit (3) >	0
1 < Repeated UTRAN FDD Neighbour Cells > ** 0	1
0 < FDD-ARFCN : bit (14) >	0 See TS 34.108, clause 6.1.5, table 6.1.1
< FDD_Indic0 : bit >	0
< NR_OF_FDD_CELLS : bit (5) >	'00001'B
< FDD_CELL_INFORMATION Field >	10 bits Scrambling code according to TS 34.108, clause 6.1.4, Default settings for cell No.1
1 < Repeated UTRAN FDD Neighbour Cells > ** 0	0
0   1 < UTRAN TDD Description >	0
0   1 < 3G MEASUREMENT Parameters Description >	1
< Qsearch_I : bit (4) >	'0111'B (Always)
< Qsearch_C_Initial : bit (1) >	0
0   1 < FDD_Qoffset : bit (4) >	1 '1001'B (4dB)
< FDD_REP_QUANT : bit (1) >	0
< FDD_MULTIRAT_REPORTING : bit (2) >	'00'B
< FDD_Qmin : bit (3) >	'000'B (-20 dB)
0   1 < TDD_Qoffset : bit (4) >	0
0   1 < GPRS_3G_MEASUREMENT Parameters Description >	1
< Qsearch_P : bit (4) >	'1111'B (Never)
< 3G_SEARCH_PRIO : bit >	0
0   1 < FDD_REP_QUANT : bit >	0
0   1 < FDD_REPORTING_OFFSET : bit (3) >	0
0   1 < TDD_MULTIRAT_REPORTING : bit (2) >	0
0   1 < TDD_REPORTING_OFFSET : bit (3) >	0

Cell 1:

The SS transmitted system information for Cell 1 shall be according to TS 34.108, clause 6.1.4 with the following exceptions:

The Inter-RAT Cell Info List of Cell 1 (UTRAN) refers to Cell 9 (GSM).

Step a-c:

Parameter	Unit	Cell 9 (GSM)
Test Channel		1
RF Signal Level	dBm	-66
RXLEV_ACCESS_MIN	dBm	-100
MS_TXPWR_MAX_CCH	dBm	Max. output power of UE
FDD_Qmin	dBm	-20
FDD_Qoffset	dB	4

Parameter	Unit	Cell 1 (UTRAN)
Test Channel		1
CPICH_Ec (FDD)	dBm / 3.84 MHz	-74
P-CCPCH_RSCP (TDD)	dBm	-74
Qrxlevmin	dBm	-101
Srxlev*	dB	27
S-search RAT	dB	+20

Step d:

Parameter	Unit	Cell 9 (GSM)
RF Signal Level	dBm	-66 -> -85 (4 s) -> -66

Step f-g:

Parameter	Unit	Cell 9 (GSM)
RF Signal Level	dBm	-66 -> -83 (4 s) -> -66

Step h-i:

Parameter	Unit	Cell 9 (GSM)
RF Signal Level	dBm	-66 -> -83

Test procedure

NOTE: Step a-d): Test purpose 1.3. Step f-i): test purpose 1.1.

A combination of Method B and Method C is applied.

- a) The SS activates Cell 9.
- b) Void
- c) Void.
- d) Once the random access request is received on Cell 9, the SS starts paging the UE continuously on Cell 1, and changes the power level of cell 9 to -85 dBm for 4 s (RSCP will then exceed RLA\_C value of Cell 9 by 11dB,

which is more than  $XXX\_Qoffset+5dB$ ) and then change back to  $-66$  dBm and see if there is any random access request on cell 1 for 20 s. To avoid that the UE enters dedicated mode (performing the Location Update procedure) during this time, the SS rejects the random access received on Cell 9 with wait indication set to 30 s.

- e) When the second random access request is received on Cell 9 (after 30 s), the SS stops paging and performs the Location Update procedure to register the UE on Cell 9.
- f) The SS decreases the transmit level of Cell 9 to  $-83$  dBm for a period of 4 s (RSCP will then exceed  $RLA\_C$  value of Cell 9 by 9dB, which is more than  $XXX\_Qoffset$ ) and then changes the level back to  $-66$  dBm.
- g) The SS waits 20 s to see if there is any random access request from the UE on Cell 1.
- h) The SS sets the transmit level of Cell 9 to  $-83$  dBm.
- i) The SS waits 20 s to see if there is any random access request from the UE on Cell 1. (The UE should revert to Cell 1 due to cell reselection).
- j) The SS performs the Location Update procedure (or Routing Area Update procedure for UE that supports PS) to register the UE on Cell 1.

#### 6.2.2.3.5 Test Requirements

- 1) In step d), there shall be no access on Cell 1.
- 2) In step g), there shall be no access on Cell 1.
- 3) In step i), the UE shall send random access on Cell 1.

#### 6.2.2.3a Cell reselection timings; GSM to UTRAN (1.28 Mcps TDD)

##### 6.2.2.3a.1 Definition

Test to verify that the UE meets the cell reselection timing requirements when both a GSM and UTRAN network is available.

##### 6.2.2.3a.2 Conformance requirement

1. If the 3G Cell Reselection list includes UTRAN frequencies, the MS shall, at least every 5 s update the value  $RLA\_C$  for the serving cell and each of the at least 6 strongest non serving GSM cells.

1.1 The MS shall then reselect a suitable (see 3GPP TS 25.304) UTRAN cell if:

- for a TDD cell the measured RSCP value is equal to or greater than  $TDD\_Qoffset$  for a period of 5 s and
- for an FDD cell the following criteria are all met for a period of 5 s:
  - a) its measured RSCP value exceeds the value of  $RLA\_C$  for the serving cell and all of the suitable (see 3GPP TS 43.022) non-serving GSM cells by the value  $FDD\_Qoffset$ ,
  - b) its measured  $E_c/N_0$  value is equal or greater than the value  $FDD\_Qmin - FDD\_Qmin\_Offset$ , and
  - c) its measured RSCP value is equal to or greater than  $FDD\_RSCP\_threshold$ .

1.2 In case of a cell reselection occurring within the previous 15 seconds,  $FDD\_Qoffset$  or  $TDD\_Qoffset$  is increased by 5 dB.

- $E_c/N_0$  and RSCP are the measured quantities, see subclause 8.1.5.
- $FDD\_RSCP\_threshold$  equals  $FDD\_RSCPmin - \min((P\_MAX - 21 \text{ dBm}), 3 \text{ dB})$  if  $FDD\_RSCPmin$  is broadcast on the serving cell, else  $Qrxlevmin + Pcompensation + 10 \text{ dB}$ , if these parameters are available, otherwise the default value of  $FDD\_RSCPmin$ .
- $Qrxlevmin$  is the minimum required RX level in the UTRAN FDD cell (dBm), see 3GPP TS 25.304.
- $Pcompensation$  is  $\max(UE\_TXPWR\_MAX\_RACH - P\_MAX, 0)$  (dB), see 3GPP TS 25.304.

- UE\_TXPWR\_MAX\_RACH is the maximum TX power level an MS may use when accessing the UTRAN FDD cell on RACH (dBm), see 3GPP TS 25.304.
- P\_MAX is the maximum RF output power of the MS (dBm) in UTRAN FDD mode, see 3GPP TS 25.304.
- FDD\_Qmin, FDD\_Qoffset and optionally FDD\_RSCPmin and FDD\_Qmin\_Offset are broadcast on BCCH of the serving cell.
- TDD\_Qoffset is broadcast on BCCH of the serving cell.

NOTE 1: The parameters required to determine if the UTRAN cell is suitable are broadcast on BCCH of the UTRAN cell. An MS may start reselection towards the UTRAN cell before decoding the BCCH of the UTRAN cell, leading to a short interruption of service if the UTRAN cell is not suitable.

NOTE 2: If FDD\_RSCPmin is broadcast, optimum GSM to UTRAN reselection performance is achieved if UTRAN cells at UTRAN coverage border areas are planned for +24 dBm UE power.

NOTE 3: The parameter TDD\_Qoffset is an absolute threshold for reselection towards a target UTRAN TDD cell.

The MS shall store the UTRAN cell RSCP suitability criterion parameters above, whenever decoded from a UTRAN FDD cell of an equivalent PLMN while attempting to camp on the UTRAN FDD cell. The most recently decoded parameters from one UTRAN FDD cell of an equivalent PLMN are valid reselection criteria towards all UTRAN FDD cells. This list of parameters shall be cleared after PLMN selection (see 3GPP TS 23.122).

- 1.3 Cell reselection to UTRAN shall not occur within 5 seconds after the MS has reselected a GSM cell from an UTRAN cell if a suitable GSM cell can be found.
2. A UTRAN capable MS shall be able to identify and select a new best UTRAN cell on a frequency, which is part of the 3G Cell Reselection list, within 30 seconds after it has been activated under the condition that there is only one UTRAN frequency in the list (and no E-UTRAN frequencies in the E-UTRAN Neighbour Cell list) and that no new GSM cells are activated at the same time and under good radio conditions. As an exception, the time is increased to [70] seconds in case of a UTRAN capable MS performing cell reselection based on priority information (see subclause 6.6.6) if the UTRAN frequency has higher priority than the serving cell. A E-UTRAN capable MS shall be able to identify and select a new best E-UTRAN cell on a frequency, which is part of the E-UTRAN Neighbour Cell list, within 30 seconds after it has been activated if the frequency has lower priority than the serving cell, or within [70] seconds after it has been activated if the frequency has higher priority than the serving cell, under the condition that there is only one E-UTRAN frequency in the list (and no UTRAN frequencies in the 3G Cell Reselection list) and that no new GSM cells are activated at the same time and under good radio conditions. For test purposes the following radio conditions can be used: Serving GSM cell at RXLEV= -70 dBm, with 6 GSM neighbours at RXLEV= -75 dBm. Then either an UTRAN FDD neighbour cell or an UTRAN TDD neighbour cell or an E-UTRAN FDD neighbour cell or an E-UTRAN TDD neighbour cell is switched on.

NOTE: Definitions of measurements are in TS 25.215 and TS 25.101 for FDD mode, in TS 25.225 and TS 25.102 for TDD mode, clause 3.2 and TS 05.08, clause 6.1.

## References

1. TS 45.008, clause 6.6.5.
2. TS 45.008, clause 6.6.4.

### 6.2.2.3a.3 Test purpose

1. To verify that:
  - 1.1 The UE meets conformance requirement 1.1 and additionally, that no cell reselection is performed if the period is less than 5 s
  - 1.3 The UE meets conformance requirement 1.3.

## 6.2.2.3a.4 Method of test

UE is idle updated on Cell 1.

Cell 9:

The SS transmitted system information for Cell 1 shall be according to TS 34.108, clause 6.1.4 with the following exceptions:

The 3G Neighbour Cell Description of Cell 9 (GSM) refers to Cell 1 (UTRAN).

SYSTEM INFORMATION TYPE 3 REST OCTETS

- SI2q indicated on BCCH Norm

SYSTEM INFORMATION TYPE 2QUATER

Information Element	Value/remark
< RR management Protocol Discriminator bit (4) >	'0110'B
< Skip Indicator : bit (4) >	'0000'B
< Message type : bit (8) >	'0000 0111'B
< SI2 quarter Rest Octets >	
< BA_IND : bit >	0
< 3G_BA_IND : bit >	0
< MP_CHANGE_MARK : bit >	0
< SI2quarter_INDEX : bit (4) >	'0000'B
< SI2quarter_COUNT : bit (4) >	'0000'B
0   1 < Measurement Parameters Description >	0
0   1 < GPRS_Real Time Difference Description >	0
0   1 < GPRS_BSIC Description >	0
0   1 < GPRS_REPORT PRIORITY Description >	0
0   1 < GPRS_Measurement Parameters Description >	0
0   1 < NC Measurement Parameters >	0
0   1 < extension length >	0
0   1 < 3G Neighbour Cell Description >	1
0   1 < Index_Start_3G : bit (7) >	0
0   1 < Absolute_Index_Start_EMR : bit (7) >	0
0   1 < UTRAN FDD Description >	0
0   1 < UTRAN TDD Description >	1
0   1 < Bandwidth_TDD : bit (3) >	1
1 < Repeated UTRAN TDD Neighbour Cells > ** 0	1
0 < TDD-ARFCN : bit (14) >	0 See TS 34.108, clause 6.1.5, table 6.1.1
< TDD_Indic0 : bit >	0
< NR_OF_TDD_CELLS : bit (5) >	'00001'B
< TDD_CELL_INFORMATION Field >	9 bits Cell parameters ID according to TS 34.108, clause 6.1.4, Default settings for cell No.1
1 < Repeated UTRAN TDD Neighbour Cells > ** 0	0
0   1 < 3G MEASUREMENT Parameters Description >	1
< Qsearch_I : bit (4) >	'0101'B (-78dbm)
< Qsearch_C_Initial : bit (1) >	0
0   1 < FDD_Qoffset : bit (4) >	0
0   1 < TDD_Qoffset : bit (4) >	1 '0100'B(-81dbm)
< TDD_MULTIRAT_REPORTING : bit (2) >	'00'B
0   1 < GPRS_3G_MEASUREMENT Parameters Description >	1
< Qsearch_P : bit (4) >	'1111'B (Never)
< 3G_SEARCH_PRIO : bit >	0
0   1 < FDD_REP_QUANT : bit >	0
0   1 < FDD_REPORTING_OFFSET : bit (3) >	0
0   1 < TDD_MULTIRAT_REPORTING : bit (2) >	0
0   1 < TDD_REPORTING_OFFSET : bit (3) >	0

Cell 1:

The SS transmitted system information for Cell 1 shall be according to TS 34.108, clause 6.1.4 with the following exceptions:

The Inter-RAT Cell Info List of Cell 1 (UTRAN) refers to Cell 9 (GSM).

Step a-c:

Parameter	Unit	Cell 9 (GSM)
Test Channel		1
RF Signal Level	dBm	-70
RXLEV_ACCESS_MIN	dBm	-100
MS_TXPWR_MAX_CCH	dBm	Max. output power of UE
TDD_Qoffset	dBm	-81

Parameter	Unit	Cell 1 (UTRAN)
Test Channel		1
P-CCPCH_RSCP (TDD)	dBm	-74
Qrxlevmin	dBm	-101
Srxlev*	dB	27
S-search RAT	dB	+20

Step d:

Parameter	Unit	Cell 9 (GSM)
RF Signal Level	dBm	-70 -> -85 (4 s) -> -70

Step f-g:

Parameter	Unit	Cell 9 (GSM)
RF Signal Level	dBm	-70 -> -83 (4 s) -> -70

Step h-i:

Parameter	Unit	Cell 9 (GSM)
RF Signal Level	dBm	-70 -> -83

Test procedure

NOTE: Step a-d): Test purpose 1.3. Step f-i): test purpose 1.1.

A combination of Method B and Method C is applied.

- a) The SS activates Cell 9.
- b) Void
- c) Void.
- d) Once the random access request is received on Cell 9, the SS starts paging the UE continuously on Cell 1, and changes the power level of cell 9 to -85 dBm for 4 s (GSM RF signal level will then be lower than Qsearch\_I and UTRA signal level is higher than TDD\_Qoffset) and then change back to -70 dBm and see if there is any random access request on cell 1 for 20 s. To avoid that the UE enters dedicated mode (performing the Location Update procedure) during this time, the SS rejects the random access received on Cell 9 with wait indication set to 30 s.

- e) When the second random access request is received on Cell 9 (after 30 s), the SS stops paging and performs the Location Update procedure to register the UE on Cell 9.
- f) The SS decreases the transmit level of Cell 9 to  $-83$  dBm for a period of 4 s (GSM RF signal level will then be lower than  $Q_{search\_I}$  and UTRA signal level is higher than  $TDD\_Qoffset$ ) and then changes the level back to  $-70$  dBm.
- g) The SS waits 20 s to see if there is any random access request from the UE on Cell 1.
- h) The SS sets the transmit level of Cell 9 to  $-83$  dBm.
- i) The SS waits 20 s to see if there is any random access request from the UE on Cell 1. (The UE should revert to Cell 1 due to cell reselection).
- j) The SS performs the Location Update procedure (or Routing Area Update procedure for UE that supports PS) to register the UE on Cell 1.

#### 6.2.2.3a.5 Test Requirements

- 1) In step d), there shall be no access on Cell 1.
- 2) In step g), there shall be no access on Cell 1.
- 3) In step i), the UE shall send random access on Cell 1.

### 6.2.2.4 Cell reselection in multi-mode shared network environment

#### 6.2.2.4.1 Definition

Test to verify that the UE performs cell reselection according to core specification 25.304 in multi-mode shared network environment (FDD). It is verified that the UE reselects from a shared UTRAN cell in case of a higher ranked GSM cell or if the serving UTRAN cell becomes unsuitable. It is also verified that the UE is able to return to a shared UTRAN cell in case of loss of GSM coverage.

#### 6.2.2.4.2 Conformance requirement

##### 1. suitable cell:

A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.

- The cell shall be part of either:
  - the selected PLMN, or:
  - the registered PLMN, or:
  - a PLMN of the Equivalent PLMN list
 according to the latest information provided by the NAS.
- The cell is not barred, see subclause 5.3.1.1;
- The cell is part of at least one LA that is not part of the list of "forbidden LAs for roaming" [9], which belongs to a PLMN that fulfils the first bullet above;
- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2.

If the IE "Multiple PLMN List" [4] is broadcast in the cell, the cell is considered to be part of all LAs with LAIs constructed from the PLMN identities in the "Multiple PLMN List" and the LAC broadcast in the cell.

- 2. When camped on a cell, the UE shall regularly search for a better cell according to the cell reselection criteria. If a better cell is found, that cell is selected. The change of cell may imply a change of RAT.
- 3. When camped normally, the UE shall perform the following tasks:

- select and monitor the indicated PICH and PCH of the cell as specified in clause 8 according to information sent in system information;
- monitor relevant System Information. This is specified in [4];
- perform necessary measurements for the cell reselection evaluation procedure;
- execute the cell reselection evaluation process on the following occasions/triggers:
  - 1) UE internal triggers, so as to meet performance as specified in [10] and [11];
  - 2) When information on the BCCH used for the cell reselection evaluation procedure has been modified

#### 4. Cell Reselection Criteria:

4.1 If HCS is not used in the serving cell the UE shall perform ranking of all cells that fulfil the criterion  $S$ , among:

- all measured cells (see subclause 5.2.6.1.1).

4.2 The cells shall be ranked according to the R criteria, deriving  $Q_{meas,n}$  and  $Q_{meas,s}$  and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in TS 25.133 and TS 25.123 for FDD, TDD and GSM cells, respectively.

The offset  $Q_{offset1,s,n}$  is used for  $Q_{offset,s,n}$  to calculate  $R_n$ , the hysteresis  $Q_{hyst1,s}$  is used for  $Q_{hyst,s}$  to calculate  $R_s$ .

...

If the usage of HCS is indicated in system information,  $TEMP\_OFFSET1_n$  is used for  $TEMP\_OFFSET_n$  to calculate  $TO_n$ . If it is indicated in system information that HCS is not used,  $TEMP\_OFFSET_n$  is not applied when calculating  $R_n$ . The best ranked cell is the cell with the highest R value.

...

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH RSCP, the UE shall perform cell re-selection to that FDD cell.

4.3 In all cases, the UE shall reselect the new cell, only if the following conditions are met:

- the new cell is better ranked than the serving cell during a time interval  $T_{reselection}$ .

...

- more than 1 second has elapsed since the UE camped on the current serving cell.

#### 5. Location Registration

In the UE, the AS shall report registration area information to the NAS.

If the UE reads more than one PLMN identity in the current cell, the UE shall report the found PLMN identities that make the cell suitable in the registration area information to NAS.

#### ,References

1. TS 25.304, 4.3
2. TS 25.304, 5.2.1
3. TS 25.304, 5.2.5.1
4. TS 25.304, 5.2.6.1.4
5. TS 25.304, 5.5

## 6.2.2.4.3 Test purpose

1. To verify that the UE is able to reselect to a higher ranked cell (UTRAN->GSM) in multi-mode shared network environment.
3. To verify that the UE is able to reselect to a GSM cell when the serving shared network UTRAN cell becomes unsuitable ( $S < 0$ ).
4. To verify that the UE is able to return to a shared network UTRAN cell when coverage is lost while camping on a GSM cell.

## 6.2.2.4.4 Method of test

## Initial conditions

The UE is equipped with a USIM containing default values. The HPLMN (MCC+MNC) of the IMSI for the USIM is set to PLMN1.

Cell reselection parameters are set to default values, so the cell-ranking criterion R equals CPICH\_RSCP / RF Signal Level.

The Inter-RAT Cell Info List of Cell 1 (UTRAN) refers to Cell 9 (GSM) and Cell 10 (GSM).

The 3G Neighbour Cell Description of Cell 9 (GSM) and Cell 10 (GSM) refers to Cell 1 (UTRAN)

Cell parameters are defined in the table below. Cell 9 and 10 are switched off.

Parameter	Unit	Cell 1 (UTRAN)
Test Channel		1
PLMN		See below MIB PLMN Identity table
LAC		0001
CPICH_Ec (FDD)	dBm / 3.84 MHz	-60
Qrxlevmin	dBm	-99
Srxlev*	dB	39
S-search RAT	dB	Not sent

Parameter	Unit	Cell 9 (GSM)	Cell 10 (GSM)
Test Channel		1	2
PLMN		PLMN 1	PLMN 1
LAC		0009	0010
RF Signal Level	dBm	-75	-80
RXLEV_ACCESS_MIN	dBm	-100	-100
C1*	dB	25	20
FDD_Qmin	dB	-20	-20
FDD_Qoffset	dBm	0	0

The reference system configuration from TS 34.108 clause 6.1 is used in all cells, with the following modifications:

## Master Information Block

- MIB value tag	Set to (Current MIB value tag + 1)
- Supported PLMN types	
- PLMN type	GSM-MAP
- PLMN identity	
- MCC digit	See table below
- MNC digit	See table below
- Multiple PLMN List	
- MIB PLMN Identity	See table below
- Multiple PLMNs (1)	
- MCC	See table below
- MNC	See table below

- Multiple PLMNs (2)	
- MCC	See table below
- MNC	See table below

The MIB PLMN Identity and PLMN codes broadcasted on the BCCH in each cell shall be configured as defined in the table below.

Cell	MIB PLMN Identity	PLMN Identity		Multiple PLMNs (1)		Multiple PLMNs (2)	
		MCC digits	MNC digits	MCC digits	MNC digits	MCC digits	MNC digits
1	FALSE	PLMN 3	PLMN 3	-	PLMN 2	-	PLMN 1

The definition of each PLMN code is found in table below.

PLMN	MCC digit			MNC digit		
	1	2	3	1	2	3
1	0	0	1	0	1	-
2	0	0	1	0	2	-
3	0	0	1	0	3	-
4	0	0	2	0	1	-

NOTE: “-“ (dash) denotes “not present”

Step e-h

Parameter	Unit	Cell 1 (UTRAN)
CPICH_Ec	dBm / 3.84 MHz	-60 -> -85

Step i-k

Parameter	Unit	Cell 1 (UTRAN)
CPICH_Ec	dBm / 3.84 MHz	-85 -> -60
Qrxlevmin	dBm	-99 -> -65
Srxlev*	dB	6

Step k-m

Parameter	Unit	Cell 9 (GSM)
PLMN		PLMN 1 -> PLMN 4

Step l-m

Parameter	Unit	Cell 1 (UTRAN)
CPICH_Ec	dBm / 3.84 MHz	-60 -> -70

Test procedure

Method C is applied.

- a) The UE is switched on.

- b) The SS waits for random access requests from the UE. A complete Location Update is done. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- c) The SS activates Cell 9 and Cell 10.
- d) The SS waits for random access requests from the UE.
- e) The SS changes the level of Cell 1.
- f) The SS waits for random access requests from the UE.
- g) Cell 9 and Cell 10 are switched off.
- h) The SS waits for random access requests from the UE.
- i) The UE is switched off. The SS modifies the level and Qrxlevmin of Cell 1.
- j) The UE is switched on. A complete Location Update is done. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- k) Cell 9 and Cell 10 are activated using new PLMN 4 in Cell 9.
- l) The SS changes the level of Cell 1.
- m) The SS waits for random access requests from the UE.

#### 6.2.2.4.5 Test requirements

- 1) In step b), the UE shall respond on Cell 1. The displayed PLMN shall be PLMN 1 (UTRAN).
- 2) In step d), the UE shall not respond on Cell 9 or Cell 10 for 1 min.
- 3) In step f), the UE shall respond on Cell 9. The displayed PLMN shall be PLMN 1 (GSM).
- 4) In step h), the UE shall respond on Cell 1. The displayed PLMN shall be PLMN 1 (UTRAN).
- 5) In step m), the UE shall respond on Cell 10. The displayed PLMN shall be PLMN 1 (GSM).

NOTE: The RAT requirements (within brackets) apply only if UE supports indication of RAT to the user.

### 6.2.2.5 Cell reselection using SIB18; UTRAN to GSM

#### 6.2.2.5.1 Definition

Test to verify that the UE performs cell reselection according to core specifications 25.331 and 25.304 in multi-mode environment (FDD) when SIB18 present. It is verified that the UE reselects from a UTRAN cell to the GSM cell allowed by SIB18, even if other GSM cells are better ranked.

#### 6.2.2.5.2 Conformance requirement

##### 1. suitable cell:

A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.

- The cell shall be part of either:
  - the selected PLMN, or
  - the registered PLMN, or
  - a PLMN of the Equivalent PLMN list
 according to the latest information provided by the NAS.
- The cell is not barred, see subclause 5.3.1.1;

- The cell is part of at least one LA that is not part of the list of "forbidden LAs for roaming" [9], which belongs to a PLMN that fulfils the first bullet above;
  - The cell selection criteria are fulfilled, see subclause 5.2.3.1.2.
- If the IE "Multiple PLMN List" [4] is broadcast in the cell, the cell is considered to be part of all LAs with LAIs constructed from the PLMN identities in the "Multiple PLMN List" and the LAC broadcast in the cell.
2. When camped on a cell, the UE shall regularly search for a better cell according to the cell reselection criteria. If a better cell is found, that cell is selected. The change of cell may imply a change of RAT.
  3. When camped normally, the UE shall perform the following tasks:
    - select and monitor the indicated PICH and PCH of the cell as specified in clause 8 according to information sent in system information;
    - monitor relevant System Information. This is specified in [4];
    - perform necessary measurements for the cell reselection evaluation procedure;
    - execute the cell reselection evaluation process on the following occasions/triggers:
      - 1) UE internal triggers, so as to meet performance as specified in [10] and [11];
      - 2) When information on the BCCH used for the cell reselection evaluation procedure has been modified
  4. Cell Reselection Criteria:
    - 4.1 If HCS is not used in the serving cell the UE shall perform ranking of all cells that fulfil the criterion  $S_n$  among:
      - all measured cells (see subclause 5.2.6.1.1).
    - 4.2 The cells shall be ranked according to the R criteria, deriving  $Q_{meas,n}$  and  $Q_{meas,s}$  and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in TS 25.133 and TS 25.123 for FDD, TDD and GSM cells, respectively.
 

The offset  $Q_{offset1,s,n}$  is used for  $Q_{offset,s,n}$  to calculate  $R_n$ , the hysteresis  $Q_{hyst1,s}$  is used for  $Q_{hyst,s}$  to calculate  $R_s$ .

...

If the usage of HCS is indicated in system information,  $TEMP\_OFFSET1_n$  is used for  $TEMP\_OFFSET_n$  to calculate  $TO_n$ . If it is indicated in system information that HCS is not used,  $TEMP\_OFFSET_n$  is not applied when calculating  $R_n$ . The best ranked cell is the cell with the highest R value.

...

If an FDD cell is ranked as the best cell and the quality measure for cell selection and re-selection is set to CPICH RSCP, the UE shall perform cell re-selection to that FDD cell.
    - 4.3 In all cases, the UE shall reselect the new cell, only if the following conditions are met:
      - the new cell is better ranked than the serving cell during a time interval  $T_{reselection}$ .
      - ...
      - more than 1 second has elapsed since the UE camped on the current serving cell.
  5. Location Registration
 

In the UE, the AS shall report registration area information to the NAS.

If the UE reads more than one PLMN identity in the current cell, the UE shall report the found PLMN identities that make the cell suitable in the registration area information to NAS.

6. If the System Information Block type 18 is present, a UE shall obtain knowledge of the PLMN identity of the neighbour cells to be considered for cell reselection, and shall behave as specified in this subclause and in subclause 8.5.14a.

The UE should store all the relevant IEs included in this system information block.

A UE in idle mode shall act according to the following rules:

- 1> any PLMN list of a given type (IEs "PLMNs of intra-frequency cells list", "PLMNs of inter-frequency cells list", "PLMNs of inter-RAT cell lists") included in the IE "Idle mode PLMN identities" is paired with the list of cells of the same type derived from System Information Block type 11;
- 1> the PLMN identity located at a given rank in the PLMN list is that of the cell with the same ranking in the paired list of cells, the cells being considered in the increasing order of their associated identities ("Intra-frequency cell id", "Inter-frequency cell id", "Inter-RAT cell id");
- 1> if no identity is indicated for the first PLMN in a list, the UE shall assume that the neighbouring cell broadcasts the same PLMN configuration (i.e. IE "PLMN Identity" and IE "Multiple PLMN List") as the current cell;
- 1> if no identity is indicated for another entry in the list, the UE shall assume that the neighbouring cell broadcasts the same PLMN configuration (i.e. IE "PLMN Identity" and IE "Multiple PLMN List") as the previous cell in the list;
- 1> if the number of identities in a PLMN list exceeds the number of neighbour cells in the paired list (if any), the extra PLMN identities are considered as unnecessary and ignored;
- 1> if the number of identities in a PLMN list (if any) is lower than the number of neighbour cells in the paired list, the missing PLMN identities are replaced by the PLMN configuration for the last cell in the list.

#### 7. Neighbour cells list narrowing for cell reselection

While a UE is camping on a suitable cell, a UE having performed the PLMN identification of the neighbour cells as specified in subclause 8.1.1.6.18 shall narrow the cell list to be used for cell reselection ([4]) to those neighbour cells for which:

The PLMN identity is part of the PLMNs that can make a cell suitable as defined in [4].

## References

1. TS 25.304, 4.3
2. TS 25.304, 5.2.1
3. TS 25.304, 5.2.5.1
4. TS 25.304, 5.2.6.1.4
5. TS 25.304, 5.5
6. TS 25.331, 8.1.1.6.18
7. TS 25.331, 8.5.14

#### 6.2.2.5.3 Test purpose

To verify that the UE is able to read the information broadcasted in SIB18 and use the information for cell reselection according to core spec 25.331.

#### 6.2.2.5.4 Method of test

##### Initial conditions

The UE is equipped with a USIM containing default values.

Cell reselection parameters are set to default values, so the cell-ranking criterion R equals CPICH\_RSCP / RF Signal Level.

The Inter-RAT Cell Info List of Cell 1 (UTRAN) refers to Cell 9 (GSM) and Cell 10 (GSM).

The 3G Neighbour Cell Description of Cell 9 (GSM) and Cell 10 (GSM) refers to Cell 1 (UTRAN)

Cell parameters are defined in the table below. Cell 9 and 10 are switched off.

Parameter	Unit	Cell 1 (UTRAN)
Test Channel		1
PLMN		PLMN 1
LAC		0001
CPICH_Ec (FDD)	dBm / 3.84 MHz	-60
Qrxlevmin	dBm	-99
Srxlev*	dB	39
S-search RAT	dB	Not sent

Parameter	Unit	Cell 9 (GSM)	Cell 10 (GSM)
Test Channel		1	2
PLMN		PLMN 1	PLMN 1
LAC		0009	0010
RF Signal Level	dBm	-70	-80
RXLEV_ACCESS_MIN	dBm	-100	-100
C1*	dB	30	20
FDD_Qmin	dB	-20	-20
FDD_Qoffset	dBm	0	0

The reference system configuration from TS 34.108 clause 6.1 is used in all cells, with the following modifications:

#### SYSTEM INFORMATION BLOCK TYPE18

- Idle mode PLMN identities	
- PLMNs of intra-frequency cells list	Not present
- PLMNs of inter-frequency cells list	Not present
- PLMNs of inter-RAT cells list	
- PLMN identity (1)	PLMN2
- PLMN identity (2)	PLMN1
- Connected mode PLMN identities	Not present

Step e-f

Parameter	Unit	Cell 1 (UTRAN)
CPICH_Ec	dBm / 3.84 MHz	-60 -> -85
Srxlev*	dB	39 ->14

#### Test procedure

Method C is applied.

- The UE is switched on.
- The SS waits for random access requests from the UE. A complete Location Update is done. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- The SS activates Cell 9 and Cell 10.
- The SS checks during 1 minute for random access requests from the UE.

- e) The SS changes the level of Cell 1.
- f) The SS waits for random access requests from the UE.

#### 6.2.2.5.5 Test requirements

- 1) In step b), the UE shall respond on Cell 1
- 2) In step d), the UE shall not respond on Cell 9 or Cell 10.
- 3) In step f), the UE shall respond on Cell 10.

### 6.2.2.5a Cell reselection using SIB18; UTRAN(1.28Mcps TDD) to GSM

#### 6.2.2.5a.1 Definition

Test to verify that the UE performs cell reselection according to core specifications 25.331 and 25.304 in multi-mode environment (1.28Mcps TDD) when SIB18 present. It is verified that the UE reselects from a UTRAN cell to the GSM cell allowed by SIB18, even if other GSM cells are better ranked.

#### 6.2.2.5a.2 Conformance requirement

##### 1. suitable cell:

A "suitable cell" is a cell on which the UE may camp on to obtain normal service. Such a cell shall fulfil all the following requirements.

- The cell shall be part of either:
  - the selected PLMN, or:
  - the registered PLMN, or:
  - a PLMN of the Equivalent PLMN list
 according to the latest information provided by the NAS.
- The cell is not barred, see subclause 5.3.1.1;
- The cell is part of at least one LA that is not part of the list of "forbidden LAs for roaming" [9], which belongs to a PLMN that fulfils the first bullet above;
- The cell selection criteria are fulfilled, see subclause 5.2.3.1.2.

If the IE "Multiple PLMN List" [4] is broadcast in the cell, the cell is considered to be part of all LAs with LAs constructed from the PLMN identities in the "Multiple PLMN List" and the LAC broadcast in the cell.

- 2. When camped on a cell, the UE shall regularly search for a better cell according to the cell reselection criteria. If a better cell is found, that cell is selected. The change of cell may imply a change of RAT.
- 3. When camped normally, the UE shall perform the following tasks:
  - select and monitor the indicated PICH and PCH of the cell as specified in clause 8 according to information sent in system information;
  - monitor relevant System Information. This is specified in [4];
  - perform necessary measurements for the cell reselection evaluation procedure;
  - execute the cell reselection evaluation process on the following occasions/triggers:
    - 1) UE internal triggers, so as to meet performance as specified in [10] and [11];
    - 2) When information on the BCCH used for the cell reselection evaluation procedure has been modified
- 4. Cell Reselection Criteria:

4.1 If HCS is not used in the serving cell the UE shall perform ranking of all cells that fulfil the criterion S, among:

- all measured cells (see subclause 5.2.6.1.1).

4.2 The cells shall be ranked according to the R criteria, deriving  $Q_{meas,n}$  and  $Q_{meas,s}$  and calculating the R values using CPICH RSCP, P-CCPCH RSCP and the averaged received signal level as specified in TS 25.133 and TS 25.123 for FDD, TDD and GSM cells, respectively.

The offset  $Q_{offset1_{s,n}}$  is used for  $Q_{offset_{s,n}}$  to calculate  $R_n$ , the hysteresis  $Q_{hyst1_s}$  is used for  $Q_{hyst_s}$  to calculate  $R_s$ .

...

If the usage of HCS is indicated in system information,  $TEMP\_OFFSET1_n$  is used for  $TEMP\_OFFSET_n$  to calculate  $TO_n$ . If it is indicated in system information that HCS is not used,  $TEMP\_OFFSET_n$  is not applied when calculating  $R_n$ . The best ranked cell is the cell with the highest R value.

...

4.3 In all cases, the UE shall reselect the new cell, only if the following conditions are met:

- the new cell is better ranked than the serving cell during a time interval  $T_{reselection}$ .

...

- more than 1 second has elapsed since the UE camped on the current serving cell.

## 5. Location Registration

In the UE, the AS shall report registration area information to the NAS.

If the UE reads more than one PLMN identity in the current cell, the UE shall report the found PLMN identities that make the cell suitable in the registration area information to NAS.

6. If the System Information Block type 18 is present, a UE shall obtain knowledge of the PLMN identity of the neighbour cells to be considered for cell reselection, and shall behave as specified in this subclause and in subclause 8.5.14a.

The UE should store all the relevant IEs included in this system information block.

A UE in idle mode shall act according to the following rules:

- 1> any PLMN list of a given type (IEs "PLMNs of intra-frequency cells list", "PLMNs of inter-frequency cells list", "PLMNs of inter-RAT cell lists") included in the IE "Idle mode PLMN identities" is paired with the list of cells of the same type derived from System Information Block type 11;
- 1> the PLMN identity located at a given rank in the PLMN list is that of the cell with the same ranking in the paired list of cells, the cells being considered in the increasing order of their associated identities ("Intra-frequency cell id", "Inter-frequency cell id", "Inter-RAT cell id");
- 1> if no identity is indicated for the first PLMN in a list, the UE shall assume that the neighbouring cell broadcasts the same PLMN configuration (i.e. IE "PLMN Identity" and IE "Multiple PLMN List") as the current cell;
- 1> if no identity is indicated for another entry in the list, the UE shall assume that the neighbouring cell broadcasts the same PLMN configuration (i.e. IE "PLMN Identity" and IE "Multiple PLMN List") as the previous cell in the list;
- 1> if the number of identities in a PLMN list exceeds the number of neighbour cells in the paired list (if any), the extra PLMN identities are considered as unnecessary and ignored;
- 2> if the number of identities in a PLMN list (if any) is lower than the number of neighbour cells in the paired list, the missing PLMN identities are replaced by the PLMN configuration for the last cell in the list.

### 7. Neighbour cells list narrowing for cell reselection

While a UE is camping on a suitable cell, a UE having performed the PLMN identification of the neighbour cells as specified in subclause 8.1.1.6.18 shall narrow the cell list to be used for cell reselection ([4]) to those neighbour cells for which:

The PLMN identity is part of the PLMNs that can make a cell suitable as defined in [4].

### References

1. TS 25.304, 4.3
2. TS 25.304, 5.2.1
3. TS 25.304, 5.2.5.1
4. TS 25.304, 5.2.6.1.4
5. TS 25.304, 5.5
6. TS 25.331, 8.1.1.6.18
7. TS 25.331, 8.5.14

#### 6.2.2.5a.3 Test purpose

To verify that the UE is able to read the information broadcasted in SIB18 and use the information for cell reselection according to core spec 25.331.

#### 6.2.2.5a.4 Method of test

#### Initial conditions

The UE is equipped with a USIM containing default values.

Cell reselection parameters are set to default values, so the cell-ranking criterion R equals P-CCPCH RSCP / RF Signal Level.

The Inter-RAT Cell Info List of Cell 1 (UTRAN) refers to Cell 9 (GSM) and Cell 10 (GSM).

The 3G Neighbour Cell Description of Cell 9 (GSM) and Cell 10 (GSM) refers to Cell 1 (UTRAN)

Cell parameters are defined in the table below. Cell 9 and 10 are switched off.

Parameter	Unit	Cell 1 (UTRAN)
Test Channel		1
PLMN		PLMN 1
LAC		0001
P-CCPCH RSCP(TDD)	dBm	-65
Qrxlevmin	dBm	-104
Srxlev*	dB	39
S-search RAT	dB	Not sent

Parameter	Unit	Cell 9 (GSM)	Cell 10 (GSM)
Test Channel		1	2
PLMN		PLMN 3	PLMN 1
LAC		0009	0010
RF Signal Level	dBm	-70	-80
RXLEV_ACCESS_MIN	dBm	-100	-100
C1*	dB	30	20
TDD_Qoffset	dBm	-60	-60

The reference system configuration from TS 34.108 clause 6.1 is used in all cells, with the following modifications:

## SYSTEM INFORMATION BLOCK TYPE18

- Idle mode PLMN identities	
- PLMNs of intra-frequency cells list	Not present
- PLMNs of inter-frequency cells list	Not present
- PLMNs of inter-RAT cells list	
- PLMN identity (1)	PLMN2
- PLMN identity (2)	PLMN1
- Connected mode PLMN identities	Not present

Step e-f

Parameter	Unit	Cell 1 (UTRAN)
P-CCPCH RSCP(TDD)	dBm	-65 -> -90
Srxlev*	dB	39 ->14

## Test procedure

Method C is applied.

- a) The UE is switched on.
- b) The SS waits for random access requests from the UE. A complete Location Update is done. For UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.
- c) The SS activates Cell 9 and Cell 10.
- d) The SS checks during 1 minute for random access requests from the UE.
- e) The SS changes the level of Cell 1.
- f) The SS waits for random access requests from the UE.

## 6.2.2.5a.5 Test requirements

- 1) In step b), the UE shall respond on Cell 1
- 2) In step d), the UE shall not respond on Cell 9 or Cell 10.
- 3) In step f), the UE shall respond on Cell 10.

## 6.2.2.6 Cell reselection based on Absolute Priorities(both High priority and Low priority reselection) in SIB19; UTRAN to GSM

## 6.2.2.6.1 Definition

To verify that UE reselects from UTRAN to GSM cell when absolute priority of GSM cell is indicated in SIB19 and the cell reselection criteria is fulfilled.

## 6.2.2.6.2 Conformance requirement

If the cell is not operating in MBSFN mode according to subclause 8.1.1.6.3 the UE should store all relevant IEs included in this system information block. If the cell is not operating in MBSFN mode according to subclause 8.1.1.6.3 the UE shall:

- 1> if the value of the IE "Priority status" in the variable PRIORITY\_INFO\_LIST equals "dedicated\_priority":
  - 2> clear every stored value of "Thresh<sub>x,high</sub>", "Thresh<sub>x,low</sub>", "Thresh<sub>x,high2</sub>" and "Thresh<sub>x,low2</sub>" in every occurrence of the IE "Priority Info List" in the variable PRIORITY\_INFO\_LIST.
- 1> otherwise:
  - 2> clear the variable PRIORITY\_INFO\_LIST.

- 1> clear the variable EUTRA\_FREQUENCY\_INFO\_LIST;
- 1> act upon the received IE "UTRA priority info list" as described in subclause 8.6.7.3a;
- 1> if the IE "GSM priority info list" is present:
  - 2> act upon the received IE as described in subclause 8.6.7.3b.
- 1> if the IE "E-UTRA frequency and priority info list" is present:
  - 2> act upon the received IE as described in subclause 8.6.7.3c.

#### UTRA priority info list

If the IE "UTRA priority info list" is received in System Information Block Type 19, the UE shall:

- 1> if the value of the IE "Priority status" in the variable PRIORITY\_INFO\_LIST equals "dedicated\_priority":
  - 2> store the value of the IEs " $S_{\text{prioritysearch1}}$ ", " $S_{\text{prioritysearch2}}$ ", " $\text{Thresh}_{\text{serv,low}}$ " and " $\text{Thresh}_{\text{serv,low2}}$ " in the IE "UTRA Serving Cell" in the variable PRIORITY\_INFO\_LIST;
  - 2> if any of the values in any of the occurrences of the IE "Frequency List" in any occurrence of the IE "Priority Info List" within the variable PRIORITY\_INFO\_LIST is the frequency of the serving cell:
    - 3> store the value of the IE "priority" in the IE "UTRA Serving Cell" in the variable PRIORITY\_INFO\_LIST.
  - 2> otherwise:
    - 3> clear the value of the IE "priority" in the IE "UTRA Serving Cell" in the variable PRIORITY\_INFO\_LIST.
  - 2> for each occurrence of the IE "UTRAN FDD Frequencies":
    - 3> if the value of the IE "UARFCN" exists in the list of UTRA FDD priorities in the PRIORITY\_INFO\_LIST then, in the occurrence of IE "Frequency List" within the variable PRIORITY\_INFO\_LIST with that value of the IE "UARFCN":
      - 4> store the value of the IEs " $\text{Thresh}_{x,\text{high}}$ ", " $\text{Thresh}_{x,\text{low}}$ ", "QqualminFDD" and "Qrxlev minFDD".
  - 2> for each occurrence of the IE "UTRAN TDD Frequencies":
    - 3> if the value of the IE "UARFCN" exists in the list of UTRA TDD priorities in the PRIORITY\_INFO\_LIST then, in the occurrence of IE "Frequency List" within the variable PRIORITY\_INFO\_LIST with that value of the IE "UARFCN":
      - 4> store the value of the IEs " $\text{Thresh}_{x,\text{high}}$ ", " $\text{Thresh}_{x,\text{low}}$ " and "Qrxlev minTDD".
- 1> otherwise:
  - 2> update the PRIORITY\_INFO\_LIST IE "Priority status" to cause "sys\_info\_priority".
  - 2> store information in the IE "UTRA Serving Cell" in the IE "UTRA Serving Cell" within the variable PRIORITY\_INFO\_LIST;
  - 2> for each occurrence of the IE "UTRAN FDD Frequencies":
    - 3> if an entry already exists in the IE "Priority Info List" in the variable PRIORITY\_INFO\_LIST with the same priority value as indicated in the IE "priority" and has the CHOICE "Radio Access Technology" set to "UTRA FDD":
      - 4> create a new entry in the IE "Frequency List" in that occurrence of IE "Priority Info List", and store the value of "UARFCN" in the IE "UARFCN" in this occurrence of the IE "Frequency List" within the variable PRIORITY\_INFO\_LIST, and in that new entry:
        - 5> store the IEs " $\text{Thresh}_{x,\text{high}}$ ", " $\text{Thresh}_{x,\text{low}}$ ", "QqualminFDD" and "Qrxlev minFDD".

3> otherwise:

- 4> create a new entry in the IE "Priority Info List" and store the value of "priority" in the IE "priority" in this occurrence of the IE "Priority Info List" within the variable PRIORITY\_INFO\_LIST, and in that new entry:
  - 5> set the CHOICE "Radio Access Technology" to "UTRA FDD" and store the value of "UARFCN" in the IE "UARFCN" in the first occurrence of the IE "Frequency List";
  - 5> store the IEs "Thresh<sub>x,high</sub>", "Thresh<sub>x,low</sub>", "QqualminFDD" and "Qrxlev minFDD" in that occurrence of the IE "Frequency List".

2> for each occurrence of the IE "UTRAN TDD Frequencies":

- 3> if an entry already exists in the IE "Priority Info List" in the variable PRIORITY\_INFO\_LIST with the same priority value as indicated in the IE "priority" and has the CHOICE "Radio Access Technology" set to "UTRA TDD":
  - 4> create a new entry in the IE "Frequency List" in that occurrence of IE "Priority Info List", and store the value of "UARFCN" in the IE "UARFCN" in this occurrence of the IE "Frequency List" within the variable PRIORITY\_INFO\_LIST, and in that new entry:
    - 5> store the IEs "Thresh<sub>x,high</sub>", "Thresh<sub>x,low</sub>" and "Qrxlev minTDD".

3> otherwise:

- 4> create a new entry in the IE "Priority Info List" and store the value of "priority" in the IE "priority" in this occurrence of the IE "Priority Info List" within the variable PRIORITY\_INFO\_LIST, and in that new entry:
  - 5> set the CHOICE "Radio Access Technology" to "UTRA TDD" and store the value of "UARFCN" in the IE "UARFCN" in the first occurrence of the IE "Frequency List";
  - 5> store the IEs "Thresh<sub>x,high</sub>", "Thresh<sub>x,low</sub>" and "Qrxlev minTDD" in that occurrence of the IE "Frequency List".

#### GSM priority info list

If the IE "GSM priority info list" is received in System Information Block Type 19, the UE shall:

1> if the value of the IE "Priority status" in the variable PRIORITY\_INFO\_LIST equals "dedicated\_priority":

2> for each occurrence of the IE "GSM Priority Info":

- 3> store the IEs "Qrxlev min GSM", "Thresh<sub>x,high</sub>" and "Thresh<sub>x,low</sub>" in every entry of PRIORITY\_INFO\_LIST with CHOICE "Radio Access Technology" set to "GSM", which contains an IE "BCCH ARFCN" matching a BCCH ARFCN indicated in the IE "GSM cell group".

1> otherwise:

2> for each occurrence of the IE "GSM Priority Info":

- 3> create a new entry in the IE "Priority Info List" in the variable PRIORITY\_INFO\_LIST, and in this new entry:
  - 4> store the value of IE "priority" from the IE "GSM Priority Info", and set the CHOICE "Radio Access Technology" to "GSM";
  - 4> for each of the BCCH ARFCNs indicated by the IE "GSM cell group":
    - 5> create a new entry in the IE "Frequency List" and store the IEs "Band Indicator", "Qrxlev min GSM", "Thresh<sub>x,high</sub>" and "Thresh<sub>x,low</sub>" and store the indicated BCCH ARFCN in the IE "BCCH ARFCN".

If the UE has received absolute priority information for inter-RAT layers, the UE shall follow these rules:

- The UE shall perform measurements of inter-RAT layers with a priority higher than the priority of the current serving cell.

NOTE: The rate of these measurements may vary depending on whether  $S_{rxlev}$  and  $S_{qual}$  of the serving cell are above or below  $S_{prioritysearch1}$  and  $S_{prioritysearch2}$ . This is specified in [10].

- For inter-RAT layers with a priority lower than the priority of the current serving cell:
  - If  $S_{rxlev}^{ServingCell} > S_{prioritysearch1}$  and  $S_{qual}^{ServingCell} > S_{prioritysearch2}$  the UE may choose not to perform measurements of inter-RAT layers of lower priority.
  - If  $S_{rxlev}^{ServingCell} \leq S_{prioritysearch1}$  or  $S_{qual}^{ServingCell} \leq S_{prioritysearch2}$  the UE shall perform measurements of inter-RAT layers of lower priority.

Absolute priorities of different absolute priority layers may be provided to the UE. The following cell reselection criteria are used for inter-frequency cells if absolute priority information for inter-frequency is available to the UE, and inter-RAT cells if absolute priority information for inter-RAT is available to the UE.

...

The following definitions apply:

- Criterion 1: the  $S_{rxlev}_{nonServingCell,x}$  of a cell on an evaluated higher absolute priority layer is greater than  $Thresh_{x,high}$  during a time interval  $T_{reselection}$ ;

...

- Criterion 3:  $S_{rxlev}^{ServingCell} < Thresh_{serving,low}$  or  $S_{qual}^{ServingCell} < 0$  and the  $S_{rxlev}_{nonServingCell,x}$  of a cell on an evaluated lower absolute priority layer is greater than  $Thresh_{x,low}$  during a time interval  $T_{reselection}$ ;

Cell reselection to a cell on a higher absolute priority layer than the camped frequency shall be performed if criterion 1 is fulfilled.

...

Cell reselection to a cell on a lower absolute priority layer than the camped frequency shall be performed if criterion 3 is fulfilled.

If more than one cell meets the above criteria, the UE shall reselect the cell with the highest  $S_{rxlev}_{nonServingCell,x}$  among the cells meeting the criteria on the highest absolute priority layer.

The UE shall not perform cell reselection to cells for which the cell selection criterion S is not fulfilled.

The UE shall not perform cell reselection until more than 1 second has elapsed since the UE camped on the current serving cell.

## References

1. TS 25.331, clause 8.1.1.6.19
2. TS 25.331, clause 8.6.7.3a
3. TS 25.331, clause 8.6.7.3b
4. TS 25.304, clause 5.2.6.1.2a
5. TS 25.304, clause 5.2.6.1.4a

### 6.2.2.6.3 Test purpose

1. To verify that the UE performs cell reselection from UTRAN to GSM on the following occasions:
  - 1.1 Reselection criteria for low priority cell in SIB 19 are fulfilled.
  - 1.2 Reselection criteria for high priority cell in SIB 19 are fulfilled.

## 6.2.2.6.4 Method of test

## Initial Condition

UE is idle updated on Cell 1.

All cells belong to the same PLMN.

The Inter-RAT Cell Info List of Cell 1 (UTRAN) refers to Cell 9(GSM).

The 3G Neighbour Cell Description of Cell 9(GSM) refers to Cell 1(UTRAN).

UTRAN cell broadcasts SIB19 with default contents as per 34.108. ( FFS)

## Related ICS/IXIT statement

- UE supports both GSM and UTRAN Radio Access Technologies

Table 6.2.2.6-1

Parameter	Unit	Cell 1 (UTRAN)			
		T0	T1	T2	T3
Timing					
CPICH Ec (FDD)	dBm / 3.84 MHz	-60	-78	-60	-70
P-CCPCH RSCP (TDD)	dBm	-60	-78	-60	-70
Srxlev*	dB	19	1	19	9

Table 6.2.2.6-2

Parameter	Unit	Cell 92 (GSM)			
		T0	T1	T2	T3
Timing					
RF Signal Level	dBm	-105	-80	-105	-75
RXLEV_ACCESS_MIN	dBm	-100	-100	-100	-100
C1*	dBm	-5	20	-5	25

Table 6.2.2.6-1 and Table 6.2.2.6-2 illustrate the downlink power to be applied for the two cells at various time instants of the test execution. Columns marked "T0" denote the initial conditions, while columns marked "T1", "T2" and "T3" are to be applied subsequently. The exact instants on which these values shall be applied are described in the texts in this clause.

## Test Procedure

Method C is applied.

- SS transmits the MIB with the "MIB Value Tag" IE different from the original setting and modified SIB 19(Cell1 priority > Cell 9 priority - See specific message contents).
- SS transmits Paging Type 1 to notify UE of the change in system information on Cell1 and waits for 5s to ensure UE has read the new SIB information.
- SS reconfigures itself according to settings in Column T1 in tables 6.2.2.x-1 and 6.2.2.x-2. Reselection criteria for low priority cell reselection is fulfilled:  $Srxlev_{serving} < Thresh_{serving,low}$  AND  $C1 > Thresh_{x,low}$ .
- UE reselects to Cell9(GSM cell configured as low priority in SIB19) and SS checks for random access request on Cell9.
- SIB19 for Cell1 is configured with default contents as in 34.108. Then, to bring back UE to Cell1 (for verifying High priority cell reselection from UTRAN to GSM), SS reconfigures itself according to settings in Column T20 in table 6.2.2.x-1 and 6.2.2.x-2.
- UE reselects to Cell1. SS checks for random access request on Cell1.
- SS transmits the MIB with the "MIB Value Tag" IE different from the previous setting and modified SIB19(Cell9 priority > Cell1 priority – See specific message contents).

- h) Then, SS transmits Paging Type 1 to notify UE of the change in system information and waits for 5s to ensure UE has read the new SIB information.
- i) SS reconfigures itself according to settings in Column T3 in table 6.2.2.x-1 and 6.2.2.x-2. Reselection criterion for high priority cell reselection is fulfilled:  $C1 > \text{Thresh}_{x,\text{high}}$ .
- j) UE reselects to Cell9(GSM cell configured as high priority in SIB19). SS checks for random access request on Cell9

## Specific Message Contents

## System Information Block type 19(Step a)

Information Element	Value/remark
SysInfoType19	
utra-PriorityInfoList	
utra-ServingCell	
Priority	[4]
s-PrioritySearch1	[8 (16 dB)]
s-PrioritySearch2	Not present
threshServingLow	[4 (8 dB)]
utra-FDD-FrequencyList (SIZE(1..maxNumFDDFreqs))	Not present
utra-TDD-FrequencyList (SIZE(1..maxNumTDDFreqs))	Not present
gsm-PriorityInfoList	
gsmCellGroup	
startingARFCN	Value depending on ARFCN of the GSM band under test
bandIndicator	GSM/DCS-1800 or GSM/PCS-1900 (dependent on band used)
FollowingARFCNs : explicitListOfARFCNs	Value according to the GSM band under test (see 3GPP 34.123-1 table 6.5 for details on the ARFCN)
priority[n]	[3]
qRxLevMinGSM	[-50(-100dBm)]
threshXhigh	8 (16dB)
threshXlow	5 (10dB)
utra-FrequencyAndPriorityInfoList (SIZE(1..maxNumEUTRAFreqs))	Not present

## System Information Block type 19(Step g)

Information Element	Value/remark
SysInfoType19	
ultra-PriorityInfoList	
ultra-ServingCell	
Priority	[4]
s-PrioritySearch1	[8 (16 dB)]
s-PrioritySearch2	Not present
threshServingLow	[4 (8 dB)]
ultra-FDD-FrequencyList (SIZE(1..maxNumFDDFreqs))	Not present
ultra-TDD-FrequencyList (SIZE(1..maxNumTDDFreqs))	Not present
gsm-PriorityInfoList	
gsmCellGroup	
startingARFCN	Value depending on ARFCN of the GSM band under test
bandIndicator	GSM/DCS-1800 or GSM/PCS-1900 (dependent on band used)
FollowingARFCNs : explicitListOfARFCNs	Value according to the GSM band under test (see 3GPP 34.123-1 table 6.5 for details on the ARFCN)
priority[n]	[5]
qRxLevMinGSM	[-50(-100dBm)]
threshXhigh	8 (16dB)
threshXlow	5 (10dB)
ultra-FrequencyAndPriorityInfoList (SIZE(1..maxNumEUTRAFreqs))	Not present

## PAGING TYPE 1(Step b and Step h)

Use the message type reference found in clause 9.1.1 of TS 34.108, with the following exceptions:

Information Element	Value/Remark	Comment	Condition
PagingType1			
pagingRecordList	Not present		
bcch-ModificationInfo			
mib-ValueTag	Set to (Current MIB value tag + 1)		
bcch-ModificationTime	Not present		
laterNonCriticalExtensions	Not present		

## 6.2.2.6.5 Test requirements

At step d), UE reselects to Cell9(GSM) which is configured as low priority cell.

At step j), UE reselects to Cell9(GSM) which is configured as high priority cell.

## 6.3 HNB Environment

### 6.3.1 CSG Selection

#### 6.3.1.1 Manual CSG ID Selection

##### 6.3.1.1.1 Definition

##### 6.3.1.1.2 Conformance requirement

1. If the MS supports CSG it is provisioned with a list of allowed CSG identities and associated PLMN identities from the USIM if the list is available in the USIM or as described in 3GPP TS 24.285 if the list is not available in the USIM. This list has zero or more entries.

- Manual mode: In this mode, the MS indicates to the user the list of available CSGs in the currently selected PLMN. The list of CSGs presented to the user is not restricted by the allowed CSG list stored in the MS. After the user makes a selection, the MS camps on a cell with the selected CSG identity and attempts to register with the associated PLMN.
- 2. Manual CSG ID selection enables a human user to select a CSG ID. In manual CSG ID selection the UE may scan all frequencies in the supported frequency bands and display a list of found CSG IDs or the corresponding HNB Names if broadcast by the CSG cells, and indications as to whether the found CSG IDs are contained in the UE's Allowed CSG List. When the user selects an entry in the list, the UE selects the CSG cell with the best RF quality among the ones with same CSG ID. The UE may normally camp on the chosen cell if it is an allowed CSG cell.

During manual CSG ID selection a UE is allowed to perform Location Registration procedure on a CSG cell which CSD ID is not in the Allowed CSG List.

Based on the outcome of a Location Registration procedure initiated on a CSG cell the UE's Allowed CSG List is updated.

The UE is allowed to not support manual CSG selection in connected mode.

- 3. In the UE on request of NAS, the AS shall scan all RF channels in the UTRA and E-UTRA bands according to its capabilities to find available CSG IDs. On each carrier, the UE shall at least search for the strongest cell, read its system information and report available CSG ID(s) belonging to the registered PLMN together with their "HNB name" (if broadcast) to the NAS. The search for available CSG IDs may be stopped on request of the NAS.

If NAS has selected a CSG ID and provided this selection to AS, the UE shall search for an acceptable or suitable cell belonging to the selected CSG ID to perform the location registration.

Reference

- 1. TS 23.122 clause 3.1A
- 2. TS 25.367 clause 6.1.
- 3. TS 25.304 clause 5.6.

6.3.1.1.3 Test purpose

To verify that the UE could select a specific CSG by manual selection procedure and show/update the CSG list.

6.3.1.1.4 Method of test

Initial conditions

- 1. There exists 4 cells which belong to 3 different CSG IDs respectively- CSG1(cell1), CSG2(cell2), and CSG3(cell4, cell5), and cell4 has better RF quality than cell5. Cell levels are from the table below.

Cell	CPICH_Ec [dBm/3.84 MHz]	CSG ID	Test Channel	PLMN	LAC
Cell 1	-60	CSG 1	1	PLMN1	001
Cell 2	-65	CSG 2	3	PLMN1	002
Cell 4	-75	CSG 3	2	PLMN1	001
Cell 5	-80	CSG 3	2	PLMN1	002

- 2. On the UE side, CSG1 and CSG2 are in the UE's Allowed CSG List while CSG3 is not in the list.

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	PLMN	CSG ID
EFACSGL	PLMN 1	CSG 1, CSG 2

The UE is previously registered on PLMN1, before switched off.

- 3. On the SS side, CSG1 and CSG3 are in the Allowed CSG List which belongs to the UE, while CSG2 is not.

4. The UE is power off.

#### Test Procedure

Method C is applied.

- a) The SS activates 4 cells.
- b) The UE is switched on.
- c) The SS waits to see if there are any random access requests from the UE.
- d) Manual CSG ID selection is triggered at the UE, Wait for UE to display the available CSG cells.
- e) CSG2 is selected manually.
- f) The SS waits to see if there are any random access requests from the UE. The registration attempt on Cell 2 is rejected by the SS using cause "Not authorized for this CSG" (#25).
- g) CSG3 is selected manually.
- h) The SS waits to see if there are any random access requests from the UE. The registration attempt on cell 4 is accepted by the SS.

#### 6.3.1.1.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1.
- 2) In step d), the list is displayed on the UE with 3 CSG IDs and the indications of whether these CSG IDs are in the UE's Allowed CSG List. It indicates that CSG 1 and CSG 2 are accessible, while CSG 3 is inaccessible.
- 3) In step f), the response from the UE shall be on Cell 2. The allowed CSG list is updated by deleting CSG 2, and the list indicates now CSG 1 is accessible, while CSG 2 and CSG 3 are not.
- 4) In step h), the response from the UE shall be on Cell 4. The Allowed CSG List on UE is updated which indicates CSG 1 and CSG 3 are accessible while CSG 2 is not.

#### 6.3.1.2 UE in automatic network selection mode to select a suitable CSG cell

##### 6.3.1.2.1 Definition

##### 6.3.1.2.2 Conformance requirements

For an eCall only mobile station, Timers T3242 and T3243 are considered to have expired at power-on. When mobility management is activated after power-on, the service state is 19.7 PLMN SEARCH. The detailed processing in this state is described in detail in 3GPP TS 23.122, 3GPP TS 43.022, 3GPP TS 45.008 and 3GPP TS 25.304, where procedures for power on and selection of PLMN is described in detail. If the "Location update status" stored on the SIM/USIM is different from "updated", then the mobile shall act as if the "Location update status" stored on the SIM/USIM is "not updated".

If the mobile station is in automatic network selection mode and the selected cell is in a forbidden PLMN, is in a forbidden LA, or is a CSG cell whose CSG ID is not in the allowed CSG ID list stored in the MS, then the mobile station enters the LIMITED SERVICE state.

#### Reference

TS 24.008 clause 4.2.1.1

##### 6.3.1.2.3 Test purpose

Selection of the Service State after Power On: If the mobile station is in automatic network selection mode and the selected cell is a CSG cell whose CSG ID is not in the allowed CSG ID list stored in the MS, then the mobile station enters the LIMITED SERVICE state.

## 6.3.1.2.4 Method of test

## Initial conditions

1. There exists 2 cells which belong to 2 different CSG IDs respectively- CSG1(cell1), CSG2(cell2). Cell levels are from the table below.

Cell	CPICH_Ec [dBm/3.84 MHz]	CSG ID	Test Channel	PLMN	LAC
Cell 1	-60	CSG 1	1	PLMN1	001
Cell 2	-65	CSG2	1	PLMN1	001

2. There exists a UE whose Allowed CSG List does not contain CSG 1 but contains CSG 2.

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	PLMN	CSG ID
EFACSGL	PLMN 1	CSG 2

The UE is previously registered on PLMN1, before switched off.

3. UE is registered on Cell 2.
4. UE is in “automatic network selection mode” and is switched off.
5. Cell 1 and Cell 2 are both switched off.

## Test Procedure

- a) The SS activates Cell 1.
- b) UE is switched on.
- c) The SS waits to see if there are any random access requests from the UE.
- d) Cell 1 is switched off.
- e) The SS activates Cell 2.
- f) The SS waits to see if there are any random access requests from the UE.

## 6.3.1.2.5 Test Requirements

In step c) the UE shall inform that no service or no network is available.

In step f) the response from the UE shall be on Cell 2.

## 6.3.1.3 Manual CSG ID Selection across PLMNs

## 6.3.1.3.1 Definition

Test to verify that the UE performs the manual CSG ID selection whose CSG ID is not within the registered or selected PLMN in CSG or hybrid cells.

## 6.3.1.3.2 Conformance requirement

1. If the MS supports CSG, it is provisioned with an Allowed CSG list and an Operator CSG list and associated PLMN identities. Both lists can be retrieved either from the USIM if the lists are available in the USIM, or as described in 3GPP TS 24.285 [47] if the lists are not available in the USIM. These lists have zero or more entries.
  - Manual mode: In this mode, the MS indicates to the user the list of available CSGs and the associated PLMNs. The list of CSGs presented to the user is not restricted by the Allowed CSG list and the Operator CSG List stored in the MS. After the user makes a selection, the MS camps on a cell with the selected CSG identity and may attempt to register with the associated PLMN.

2. Manual CSG ID selection enables a human user to select a CSG ID. In manual CSG ID selection the UE may scan all frequencies in the supported frequency bands and display a list of found CSG IDs or the corresponding HNB Names if broadcast by the CSG cells or hybrid cells, and indications as to whether the found CSG IDs are contained in the UE's CSG white list. When the user selects an entry in the list, the UE selects any CSG cell or hybrid cell among the ones with same CSG ID. The UE may normally camp on the chosen cell if it is an allowed CSG cell or a hybrid cell.

During manual CSG ID selection a UE is allowed to perform Location Registration procedure on a CSG cell whose CSD ID is not in the CSG white list.

Based on the outcome of a Location Registration procedure initiated on a CSG cell, the UE's CSG white list is updated.

3. In the UE on request of NAS, the AS shall scan all RF channels in the UTRA bands according to its capabilities to find available CSG IDs. On each carrier, the UE shall at least search for the strongest cell, read its system information and report available CSG ID(s) together with their "HNB name" (if broadcast) and PLMN(s) to the NAS. The search for available CSG IDs may be stopped on request of the NAS.

If NAS has selected a CSG ID and provided this selection to AS, the UE shall search for an acceptable or suitable cell belonging to the selected CSG ID to camp on.

4. If the MS has initiated the location updating procedure due to manual CSG selection and receives a LOCATION UPDATING ACCEPT message, and the MS sent the LOCATION UPDATING REQUEST message in a CSG cell, the MS shall check if the CSG ID of the cell is contained in the Allowed CSG list. If not, the MS shall add that CSG ID to the Allowed CSG list.

5. If the user selects a CSG in a PLMN that is different from the RPLMN, then the following applies:

- i) The MS shall store a duplicate of the RPLMN and a duplicate of the current PLMN selection mode;
- ii) The MS shall enter into Manual mode of PLMN selection in state M4 (Trying PLMN) as defined in subclause 4.3.1.2 of TS 23.122;
- iii) The MS shall select the PLMN corresponding to the CSG and attempt to register on the selected CSG cell in the PLMN; and
- iv) If the registration fails or the MS is no longer in the coverage of the CSG, then the MS shall return to the stored duplicate PLMN selection mode and use the stored duplicate value of RPLMN for further action.

## Reference

1. TS 23.122 clause 3.1A
2. TS 25.367 clause 6.1.
3. TS 25.304 clause 5.6.
4. TS 24.008 clause 4.4.4.6
5. TS 23.122 clause 4.4.3.1.3.3

### 6.3.1.3.3 Test purpose

1. To verify that the UE could select a specific CSG by manual selection procedure across PLMNs and update the Allowed CSG list.
2. To verify that the UE could select a specific CSG ID of a hybrid cell by manual selection procedure and does not update the Allowed CSG list.
3. To verify that, after having selected a CSG or hybrid cell not belonging to the initial Registered PLMN, when the UE is no longer within the coverage of the CSG cell, it returns to the stored duplicate PLMN selection mode and selects a cell on the initial Registered PLMN

## 6.3.1.3.4 Method of test

## Initial conditions

1. There exists 3 cells which belong to 3 different CSG IDs respectively - CSG1(cell1), CSG2(cell4), and CSG3(cell8). Cell levels are from the table below.

Cell	CPICH_Ec [dBm/3.84 MHz]	CSG ID	CSG Indicator	Test channel	PLMN	LAC
Cell 1	-70	CSG 1	Enumerated (TRUE)	1	PLMN1	001
Cell 4	-65	CSG 2	Enumerated (TRUE)	2	PLMN2	001
Cell 8	-70	CSG 3	Not present	3	PLMN3	002

Cell 1 and Cell 4 shall also broadcast “CSG PSC Split Information” in its System Information Block type 3 with following parameters:

Parameters	Cell 1	Cell 4
Start PSC	100	250
Number of PSCs	5	5

There exists 2 cells which do not belong to any CSG Their cell levels are given in the table below.

Cell	CPICH_Ec [dBm/3.84 MHz]	CSG ID	CSG Indicator	Test channel	PLMN	LAC
Cell 5	-65	Not present	Not present	2	PLMN2	003
Cell 7	-70	Not present	Not present	3	PLMN3	003

Cell 4 shall include Cell 5 as a neighbouring cell in its System Information Block Type 11.

Cell 8 shall include Cell 7 as a neighbouring cell in its System Information Block Type 11.

2. On the UE side, CSG1 is in the UE’s Allowed CSG List while CSG2 and CSG3 are not in the list. UE’s Operator CSG List is empty.

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	PLMN	CSG ID
EF <sub>ACSGL</sub>	PLMN 1	CSG 1

The UE is previously registered on PLMN1, before switched off.

3. On the SS side, CSG1, CSG2 and CSG3 are in the Allowed CSG List which belongs to the UE.

4. The UE is power off.

## Test Procedure

Method C is applied.

- a) The SS activates 3 cells 1, 4 and 8.
- b) The UE is switched on
- c) The SS waits to see if there are any random access requests from the UE.
- d) Manual CSG ID selection is triggered at the UE. Wait for UE to display the available CSG cells.
- e) CSG2 is selected manually.
- f) The SS waits to see if there are any random access requests from the UE. The registration attempt on Cell 4 is accepted by the SS.

- g) Cell-8 is switched off.
- h) The SS activates Cell-5. Cell-4 is switched off. The SS waits to see if there are any random access requests from the UE.
- i) Cell-5 is switched off. The SS activates Cell-8.
- j) CSG3 is selected manually via Manual CSG ID selection.
- k) The SS waits to see if there are any random access requests from the UE. The registration attempt on cell 8 is accepted by the SS.
- l) The SS activates Cell-7. Cell-8 is switched off. The SS waits to see if there are any random access requests from the UE.

#### 6.3.1.3.5 Test Requirements

- 1) In step c), the response from the UE shall be on Cell 1. The displayed PLMN shall be PLMN 1.
- 2) In step d) the list is displayed on the UE with 3 CSG IDs and their associated PLMNs and the indications of whether these CSG IDs are in the UE's CSG whitelist. It indicates that CSG 1 is accessible, while CSG2 and CSG 3 are inaccessible.
- 3) In step f), the response from the UE shall be on Cell 4. The CSG 2 is added to the Allowed CSG list, and the list indicates now CSG 1 and CSG 2 are accessible, while CSG 3 is not. The displayed PLMN shall be PLMN 2.
- 4) In step h), the UE shall respond on Cell-1 and not Cell-5.
- 5) In step k), the response from the UE shall be on Cell 8. The Allowed CSG List on UE is not updated. The displayed PLMN shall be PLMN 3.
- 6) In step l), the UE shall respond on Cell-1 and not Cell-7.

#### 6.3.1.4 Suitable Cell checking for reselection to the CSG Cell

##### 6.3.1.4.1 Definition

Test to verify the UE can check whether a Cell is a CSG suitable Cell according to the CSG id and ePLMN identity.

##### 6.3.1.4.2 Conformance requirement

###### 1: Definitions

For the purposes of the present document, the following definitions and the definitions in [12] apply.

**Absolute priority layer:** A priority level can be defined for a UTRA frequency, a group of GSM frequencies or a E-UTRA frequency.

**CSG whitelist:** A list provided by NAS containing all the CSG identities and their associated PLMN IDs of the CSGs to which the subscriber belongs.

NOTE: This list is known as Allowed CSG List in Rel-8 Access Stratum specifications.

**Acceptable Cell:** A Cell that satisfies certain conditions as specified in 4.3. A UE can always attempt emergency calls on an acceptable Cell.

**Available PLMN:** A PLMN for which the UE has found at least one Cell and read its PLMN identity.

**Barred Cell:** A Cell a UE is not allowed to camp on.

**Camped on a Cell:** UE has completed the Cell selection/reselection process and has chosen a Cell. The UE monitors system information and (in most cases) paging information.

**Camped on any Cell:** UE is in idle mode and has completed the Cell selection/reselection process and has chosen a Cell irrespective of PLMN identity.

**Camped on MBSFN cluster:** UE has completed the MBSFN Cluster selection/reselection process and has chosen a MBSFN Cluster. The UE monitors system information and receives notifications for MBMS services and possibly receives a MBMS service.

**Closed Subscriber Group (CSG):** A Closed Subscriber Group identifies subscribers of an operator who are permitted to access one or more Cells of the PLMN but which have restricted access (CSG Cells).

**CSG Cell:** A Cell broadcasting a CSG Indicator that is set to TRUE and a specific CSG identity. All the UTRAN CSG Cells sharing the same identity and PLMN identity are identifiable as a single group for the purposes of mobility management and charging.

**CSG identity:** An identifier broadcast by a CSG or hybrid Cell/Cells and used by the UE to facilitate access for authorised members of the associated Closed Subscriber Group.

## 2. Service type in Idle and Connected Mode

This clause defines the level of service that may be provided by the network to a UE in Idle mode and Connected Mode.

The action of camping on a Cell is necessary to get access to some services. Three levels of services are defined for UE:

- Limited service (emergency calls and ETWS if supported on an acceptable Cell)
- Normal service (for public use on a suitable Cell)
- Operator service (for operators only on a reserved Cell)

Furthermore, the Cells are categorised according to which services they offer:

### acceptable Cell:

An "acceptable Cell" is a Cell on which the UE may camp to obtain limited service (originate emergency calls and receive ETWS if supported). Such a Cell shall fulfil the following requirements, which is the minimum set of requirements to initiate an emergency call and to receive ETWS primary notification either with or without security in a UTRAN network:

- The Cell is not barred, see subclause 5.3.1.1;
- The Cell selection criteria are fulfilled, see subclause 5.2.3.1.2;

### suitable Cell:

A "suitable Cell" is a Cell on which the UE may camp on to obtain normal service. Such a Cell shall fulfil all the following requirements.

- The Cell shall be part of either:

the selected PLMN, or:

the registered PLMN, or:

a PLMN of the Equivalent PLMN list

- For a CSG Cell, the CSG ID broadcast by the Cell is present in the CSG whitelist associated with the PLMN for which the above condition is satisfied;

According to the latest information provided by the NAS.

- The Cell is not barred, see subclause 5.3.1.1;
- The Cell is part of at least one LA that is not part of the list of "forbidden LAs for roaming" [9], which belongs to a PLMN that fulfils the first bullet above;
- The Cell selection criteria are fulfilled, see subclause 5.2.3.1.2.

If the IE "Multiple PLMN List" [4] is broadcast in the Cell, the Cell is considered to be part of all LAs with LAIs constructed from the PLMN identities in the "Multiple PLMN List" and the LAC broadcast in the Cell.

barred Cell:

A Cell is barred if it is so indicated in the system information [4].

reserved Cell:

A Cell is reserved if it is so indicated in system information [4].

Following exceptions to these definitions are applicable for UEs:

- camped on a Cell that belongs to a LA that is forbidden for regional provision of service, and during emergency calls.
- as an outcome of the manual CSG selection procedure the UE is allowed to access an acceptable Cell which fulfils the Cell selection criteria and is not barred or reserved for operator use for UEs not belonging to AC 11 or 15 and inform NAS that access is possible (for location registration procedure).

NOTE: UE is not required to support manual search and selection of CSG(s) while in RRC CONNECTED state.

A Cell that belongs to a LA that is forbidden for regional provision service ([5], [16]) is suitable but provides only limited service.

If a UE has an ongoing emergency call, all acceptable Cells of that PLMN are treated as suitable for Cell reselection for the duration of the emergency call.

suitable MBSFN cluster:

A Cell is part of an MBSFN cluster if it is indicated in system information [4]. An MBSFN cluster provides exclusively MBMS services. A suitable MBSFN cluster shall fulfil all the following requirements:

- For FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD the MBSFN cluster shall be part of either:

the registered PLMN, or:

a PLMN of the Equivalent PLMN list

The MBSFN cluster shall be indicated as:

- providing MBSFN only service

For FDD, 3.84 Mcps TDD IMB and 3.84/7.68 Mcps TDD MBSFN cluster selection/reselection process for MBSFN clusters operating on the same frequency shall be based on reception quality. Details of the process are not specified.

### 3. Cell reselection with CSG Cells

#### Cell reselection from a non-CSG Cell to a CSG Cell

In addition to normal Cell reselection, the UE shall use an autonomous search function to detect at least previously visited allowed CSG Cells on non-serving frequencies, including inter-RAT frequencies, according to the performance requirements specified in [10], when at least one CSG ID with associated PLMN identity is included in the UE's CSG whitelist. The UE is required to perform autonomous search function in Idle, Cell\_PCH and URA\_PCH states. The UE shall disable the autonomous search function for CSG Cells if the UE's CSG whitelist is empty. If "Dedicated CSG frequency(ies)" IE is present, the UE may use the autonomous search function only on these dedicated frequencies and on the other frequencies listed in the system information.

NOTE: The UE autonomous search function, per UE implementation, determines when and/or where to search for allowed CSG Cells.

When the UE has no or an empty CSG whitelist, the UE may ignore Cells with PSC in the stored range "CSGPSC Split Information" [4] reserved for CSG Cells for intra-frequency and inter-frequency measurements and Cell re-selections.

If the UE detects a suitable CSG Cell on the same frequency it shall reselect this Cell if the concerned CSG Cell is the highest ranked Cell, according to 5.2.6.1.4.

If the UE detects a suitable CSG Cell on a different frequency it shall reselect this Cell irrespective of the Cell reselection rules applicable for the Cell the UE is currently camped on, if the detected suitable CSG Cell is the strongest

Cell on that frequency. If suitable CSG Cells are detected on different frequencies and these are the strongest Cells on their frequencies, then the UE shall reselect to any one of them.

If the UE detects one or more suitable CSG Cell on another RAT, the UE shall reselect to one of them according to [18].

Cell reselection from a CSG Cell to non-CSG Cell

While camped on a suitable CSG Cell, the UE shall consider the frequency of the serving Cell to be the highest priority frequency (i.e. higher than the eight network configured values or highest HCS priority) and shall not reselect to non-CSG Cell as long as the serving Cell remains the highest ranked Cell on that frequency (This includes the case when the UE has only dedicated priorities for other frequencies but not for the current frequency, i.e. the UE does not consider the current frequency to be the lowest priority frequency according to rules in 5.2.6.1.2a and 5.2.6.1.4a). Cell reselection rules as defined in section 5.2.6.1 are applied for Cell reselection from a CSG Cell to non-CSG Cell.

Cell reselection from a CSG Cell to a CSG Cell

To search for CSG Cells not listed in the system information of the serving CSG Cell, the UE may use the autonomous search function when at least one CSG ID with associated PLMN identity is included in the UE's CSG whitelist. The UE is required to perform autonomous search function in Idle, Cell\_PCH and URA\_PCH states. If "Dedicated CSG frequency(ies)" IE is present, the UE may use the autonomous search function only on dedicated frequencies and on other frequencies listed in the system information.

If the UE detects a suitable CSG Cell on the same frequency, it shall reselect to this Cell if the concerned CSG Cell is the highest ranked Cell, according to 5.2.6.1.4.

While camped on a suitable CSG Cell, the UE shall consider the frequency of the serving Cell to be the highest priority frequency (i.e. higher than the eight network configured values or highest HCS priority) as long as the serving Cell is the highest ranked Cell on that frequency (This includes the case when the UE has only dedicated priorities for other frequencies but not for the current frequency, i.e. the UE does not consider the current frequency to be the lowest priority frequency according to rules in 5.2.6.1.2a and 5.2.6.1.4a).

If the UE detects one or more suitable CSG Cell on another RAT, the UE may reselect to one of them according to [18].

For reselection to neighbour CSG Cells listed in the system information of the serving CSG Cell the UE shall apply Cell measurement rules according to 5.2.6. If the UE detects a suitable CSG Cell that is listed in the system information of the serving Cell on other frequencies, and the detected CSG Cell is the strongest Cell on that frequency, then the UE shall consider these frequencies to have a priority equal to the current frequency and shall follow Cell reselection rules according to 5.2.6.1.4 and 5.2.6.1.4a.

Cell Reselection with Hybrid Cells

In addition to normal Cell reselection rules, the UE shall use an autonomous search function to detect at least previously visited hybrid Cells whose CSG ID and associated PLMN identity is in the UE's CSG whitelist according to the performance requirements specified in [10]. The UE shall treat detected hybrid Cells as CSG Cells if the CSG ID and associated PLMN of the hybrid Cell is in the UE's CSG whitelist and as normal Cells otherwise.

Reference

1. 3GPP TS 25.304 clause 3.1 v9.6
2. 3GPP TS 25.304 clause 4.3 v9.6
3. 3GPP TS 25.304 clause 5.2.6.4. v9.6

6.3.1.4.3 Test purpose

1. To confirm that a CSG Cell is considered as a suitable Cell when the CSG ID with associated PLMN identity of the CSG Cell is included in the UE's CSG whitelist.

6.3.1.4.4 Method of test

Initial conditions

There exist 2 Cells: Cell 1 and Cell 2.

Cell 1 shall include Cell 2 as neighbouring Cell in its System Information Block Type 11.

Cell 1 belongs to PLMN 1

Cell 2 is a CSG Cell with the CSG ID of CSG 2. “CSG PSC Split Information” is also included in SIB3 with “Start PSC” set to 144 and “Number of PSCs” set to 10.

The Primary Scrambling Code of Cell 2 is 150.

Cell 2 belongs to PLMN2.

UE’s white list is set as below:

**Table 6.3.1.4-1**

CSG ID	PLMN ID
2	2

Related ICS/IXIT statement(s)

- UE supports FDD and CSG.

Test Procedure

For FDD only:

Step a-d:

Parameter	Unit	Cell 1	Cell 2
Test Channel		1	2
LAC		0001	0002
CPICH_Ec	dBm/3.84 MHz	-60	-75
Qhyst1 <sub>s</sub>	dB	0	10
Qoffset1 <sub>s,n</sub>	dBm	0	10
Sintrasearch	dB	0	not present
Sintersearch	dB	0	not present
CSG Identity			0000002
Start PSC			144
Number of PSCs			10

Step e:

CPICH_Ec	dBm/3.84 MHz	-60->-85	-75->-55
Qhyst1 <sub>s</sub>	dB	0	10
Qoffset1 <sub>s,n</sub>	dBm	0	10

Test procedure

- The SS activates Cell 1.
- The UE is switched on.
- The SS waits for random access requests from the UE. A complete Location Update is done. A Location Update Accept message shall be sent on reception of a Location Update message from the UE. The Location Update Accept message shall include PLMN2 in the equivalent PLMN list. For a UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure. In these cases, the GMM Attach Accept message shall include PLMN2 in the equivalent PLMN list.
- The SS activates Cell 2 and monitors it for random access requests from the UE.

- e) The UE selects Cell 2. A complete Location Updating procedure is done. A Location Update Accept message shall be sent on reception of a Location Update message from the UE. For a UE that supports both CS and PS domain or PS domain only, the Location Updating procedure could be replaced by the appropriate GMM registration procedure.

#### 6.3.1.4.5 Test requirements

- 1) In step c, the UE shall respond and camp on Cell 1.
- 2) In step d, the UE shall not respond on Cell 2.
- 3) In step e, the UE shall respond and camp on Cell 2.

### 6.3.2 Reselection from a non-CSG cell to an allowed CSG cell

#### 6.3.2.1 Intra-frequency cell reselection from a non-CSG cell to an allowed CSG cell

##### 6.3.2.1.1 Definition

Test to verify that the UE performs the intra-frequency cell reselection from a non-CSG cell to an allowed CSG cell correctly for non-hierarchical cell structures in FDD.

##### 6.3.2.1.2 Conformance requirement

1. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 1.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode.
  - 1.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
2. Intra-frequency Cell Reselection Criteria from a non-CSG cell to a CSG cell:
  - 2.1 In addition to normal cell reselection the UE shall use an autonomous search function for CSG cells when at least one CSG ID is included in the UE's 'Allowed CSG list'.
  - 2.2 The UE is required to perform autonomous search function in Idle, Cell\_PCH and URA\_PCH states.
  - 2.3 For a CSG cell to be suitable, the CSG ID of the CSG cell has to be part of the Allowed CSG list of the UE.
  - 2.3 If the UE detects a suitable CSG cell on the same frequency it shall reselect to this cell if the concerned CSG cell is the highest ranked cell.
  - 2.4 The cells shall be ranked according to the R criteria. The best ranked cell is the cell with the highest R value. The cell-ranking criterion R is derived from Q, Qhyst, Qoffset.
  - 2.5 If a CSG cell is not listed in system information, then Qoffset will have the value 0.
  - 2.5 In all cases, the UE shall reselect the new cell, only if the cell reselection criteria are fulfilled during a time interval T<sub>reselction</sub>.

#### References

1. TS 25.304, clause 5.2.5.1.
2. TS 25.304, clause 5.2.6.4.1.
3. TS 25.304, clause 5.2.6.1.4.

##### 6.3.2.1.3 Test purpose

1. Verify that in FDD, the UE performs intra-frequency measurements for CSG cells even when the normal measurement rules mentioned in Section 5.2.6.1.1 of TS 25.304 do not mandate it.
2. Verify that in FDD, the UE reselects to an allowed CSG cell on the same frequency if the concerned CSG cell is the highest ranked cell, according to 5.2.6.1.4 of TS 25.304.

## 6.3.2.1.4 Method of test

## Initial conditions

Cell 1 shall not include Cell 2 as a neighbouring cell in its System Information Block Type 11.

Cell 2 shall include Cell 1 as a neighbouring cell in its System Information Block Type 11.

Cell 2 shall also include:

- “CSG Indicator” in its Master Information Block
- “CSG Identity” and “CSG PSC Split Information” in its System Information Block type 3.

“Allowed CSG List” of the test UE shall be empty.

EF<sub>ACSGL</sub> data is not on the USIM.

For FDD only:

Step a-e:

Parameter	Unit	Cell 1	Cell 2
Test Channel		1	1
LAC		0001	0002
CPICH_Ec	dBm/3.84 MHz	-60	-55
Qhyst1 <sub>s</sub>	dB	0	10
Qoffset1 <sub>s,n</sub>	dBm	0	10
R <sub>s</sub> *	dB	-60	-45
R <sub>n</sub> *	dB	-55	-70
Sintrasearch	dB	0	not present
Sintersearch	dB	0	not present
CSG Identity			0000001
Start PSC			144
Number of PSCs			alltheRest

Step f-g:

CPICH_Ec	dBm/3.84 MHz	-60->-50	-55->-75
Qhyst1 <sub>s</sub>	dB	0	10
Qoffset1 <sub>s,n</sub>	dBm	0	10
R <sub>s</sub> *	dB	-50	-65
R <sub>n</sub> *	dB	-75	-60

Step h-i:

CPICH_Ec	dBm/3.84 MHz	-50->-70	-75->-65
Qhyst1 <sub>s</sub>	dB	0	10
Qoffset1 <sub>s,n</sub>	dBm	0	10
R <sub>s</sub> *	dB	-70	-55
R <sub>n</sub> *	dB	-65	-80

## Test procedure

Method C is applied.

- a) The SS activates Cell 1.
- b) The UE is switched on.

- c) The SS waits for random access requests from the UE.
- d) The SS activates Cell 2 and monitors it for random access requests from the UE.
- e) The UE is made to perform manual CSG ID selection and select Cell 2. A complete Location Updating procedure is done where SS sends LOCATION UPDATING ACCEPT message.
- f) The SS changes the level of Cell 1 and 2.
- g) The SS waits for random access requests from the UE
- h) The SS changes the level of Cell 1 and 2
- i) The SS waits for random access requests from the UE

#### 6.3.2.1.5 Test requirements

- 1) In step c, the UE shall respond on Cell 1.
- 2) In step d, the UE shall not respond on Cell 2.
- 3) In step e, the UE shall respond and camp on Cell 2.
- 4) In step g, the UE shall respond on Cell 1.
- 5) In step i, the UE shall respond on Cell 2 within 10 mins.

### 6.3.2.2 Inter-frequency cell reselection from a non-CSG cell to an allowed CSG cell

#### 6.3.2.2.1 Definition

Test to verify that the UE performs the inter-frequency cell reselection using autonomous search from a non-CSG cell to an allowed CSG cell correctly for non-hierarchical cell structures in FDD.

#### 6.3.2.2.2 Conformance requirement

- 1. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 1.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode.
  - 1.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
- 2. Inter-frequency Cell Reselection Criteria from a non-CSG cell to a CSG cell:
  - 2.1. In addition to normal cell reselection the UE shall use an autonomous search function for CSG cells when at least one CSG ID is included in the UE's 'Allowed CSG list'.
  - 2.2 The UE is required to perform autonomous search function in Idle, Cell\_PCH and URA\_PCH states.
  - 2.3 For a CSG cell to be suitable, the CSG ID of the CSG cell has to be part of the Allowed CSG list of the UE.
  - 2.4 If the UE detects a suitable CSG cell on a different frequency it shall reselect this cell irrespective of the cell reselection rules applicable for the cell the UE is currently camped on, if the detected suitable CSG cell is the strongest cell on that frequency.
  - 2.5 If suitable CSG cells are detected on different frequencies and these are the strongest cells on their frequencies, then the UE shall reselect to any one of them.
  - 2.6 While camped on a suitable CSG cell, the UE shall consider the frequency of the serving cell to be the highest priority frequency (i.e. higher than the eight network configured values or highest HCS priority) and shall not reselect to non-CSG cell as long as the serving cell remains the highest ranked cell on that frequency.
- 3. The UE shall perform search and reselection to an allowed inter-frequency CSG cell that has met CSG reselection criterion defined in [1] and that is in its whitelist, within 6 minutes.

## References

1. TS 25.304, clause 5.2.5.1.
2. TS 25.304, clause 5.2.6.4.1.
3. TS 25.304, clause 5.2.6.1.4.
4. TS 25.304, clause 4.3
5. TS 25.304, clause 5.2.6.4.2
6. TS 25.133, clause 4.2.2.11.1

## 6.3.2.2.3 Test purpose

1. Verify that in FDD, the UE performs inter-frequency measurements for CSG cells using autonomous search, even when the normal measurement rules mentioned in Section 5.2.6.1.1 of TS 25.304 do not mandate it.
2. Verify that in FDD, the UE reselects to an allowed CSG cell on a different frequency irrespective of the cell reselection rules applicable for the cell the UE is currently camped on, if the concerned CSG cell is the strongest cell on that frequency.

## 6.3.2.2.4 Method of test

## Initial conditions

Cell 1 shall include Cell 2 and Cell 4 as neighbouring cell in its System Information Block Type 11.

Cell 2 shall include Cell 1 and Cell 4 as neighbouring cell in its System Information Block Type 11.

Cell 4 shall include Cell 1 and Cell 2 as neighbouring cells in its System Information Block Type 11.

Cell 4 shall not include Cell 5 as neighbouring cells in its System Information Block Type 11.

Cell 5 shall include Cell 1, Cell 2 and Cell 4 as neighbouring cells in its System Information Block Type 11.

Cell 5 shall also include:

- “CSG Indicator” in its Master Information Block
- “CSG Identity” and “CSG PSC Split Information” in its System Information Block type 3.

“Allowed CSG List” of the test UE shall be empty.

EF<sub>ACSGL</sub> data is not on the USIM.

UE is Powered Off.

Cell 1, 2, 4 and 5 are Powered Off.

Cell 1, 2, 4 and 5 have the same RAI.

For FDD only:

Step a-m:

Parameter	Unit	Cell 1	Cell 2	Cell 4	Cell 5
Test Channel		1	1	2	2
LAC		0001	0002	0003	0004
CPICH_Ec	dBm/3.84 MHz	-54	-60	-72	-66
Qhyst1 <sub>s</sub>	dB	0	0	0	0
Qoffset1 <sub>s,n</sub>	dBm	0	0	0	0
R <sub>s</sub> *	dB	-54	-60	-72	-66
R <sub>n=1</sub> *	dB	n/a	-54	-54	-54
R <sub>n=2</sub> *	dB	-60	n/a	-60	-60
R <sub>n=4</sub> *	dB	-72	-72	n/a	-72
R <sub>n=5</sub> *	dB	-66	-66	-66	n/a
Sintrasearch	dB	0	not present	not present	not present
Sintersearch	dB	0	not present	not present	not present
CSG Identity					000001
Start PSC					300
Number of PSCs					alltheRest

### Test procedure

Method C is applied.

- a) The SS activates Cell 1.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The SS activates Cell 4 and Cell 5 and monitors them for random access requests from the UE.
- e) The UE is made to perform manual CSG ID selection and select Cell 5. A complete Location Updating procedure is done where SS sends LOCATION UPDATING ACCEPT message.
- f) Cell 1 is switched off. The SS activates Cell 2.
- h) Cell 4 and 5 are switched off.
- i) The SS waits for random access requests from the UE.
- j) The SS activates Cell 1 and 4 and monitors them for random access requests from the UE.
- k) Cell 2 is switched off.
- l) The SS activates Cell 5.
- m) The SS waits for random access requests from the UE.

#### 6.3.2.2.5 Test requirements

- 1) In step c, the UE shall respond on Cell 1.
- 2) In step d, the UE shall not respond on Cell 4 or Cell 5.
- 3) In step e, the UE shall respond and camp on Cell 5.
- 4) In step i, the UE shall respond on Cell 2.
- 5) In step j, the UE shall respond on Cell 1.
- 6) In step m, the UE shall respond on Cell 5 within 6 mins.

### 6.3.2.3 Inter-RAT Cell Reselection / from GSM\_Idle / GPRS Packet\_Idle to a UTRA idle CSG cell

#### 6.3.2.3.1 Definition

Test to verify that the UE performs the inter-RAT cell reselection from GSM\_Idle/GPRS Packet\_Idle to an allowed UTRA CSG cell correctly in FDD.

#### 6.3.2.3.2 Conformance requirement

1. Inter-RAT reselection to an allowed CSG cell is supported when the UE is camped on another RAT. The UE requirements are defined in the specifications of the concerned RAT.
2. If a mobile station is a member of at least one Closed Subscriber Group, i.e. at least one CSG ID is included in the MS's "Allowed CSG list", then, in addition to normal cell reselection, the MS shall use an autonomous search function to detect UTRAN and/or E-UTRAN CSG cells. The autonomous search function shall at least detect previously visited allowed CSG cells.

If the strongest cell which the MS has detected on a UTRAN or E-UTRAN frequency during a time interval  $T_{\text{reselection}}$  is a suitable CSG cell, the MS shall reselect to this cell irrespective of the cell reselection rules applicable for the cell on which the MS is currently camped.

The following requirements are valid for reselection to allowed CSG cells previously visited by the MS when the radio configuration parameters, including the carrier frequency and PSC/PCI (whichever and if it is applicable) of the CSG cell, non CSG cell and other neighbour cells, are unchanged from the most recent previous visit. The autonomous search and cell re-selection to a previously visited allowed CSG cell shall meet the performance requirements defined as follows:

- the MS shall perform search and re-selection to a previously visited allowed UTRAN FDD CSG cell, that has met the CSG cell re-selection criterion defined above, within 6 minutes in the radio conditions specified for an UTRAN FDD CSG cell in 3GPP TS 36.133 in terms of parameters for CSG inter-RAT UTRAN FDD reselection; UARFCN and PSC shall be unchanged from the most recent previous visit of the UTRAN FDD CSG cell; Serving GSM cell at  $RXLEV = -70$  dBm, with 6 GSM neighbours at  $RXLEV = -75$  dBm;
- the MS shall perform search and re-selection to a previously visited allowed E-UTRAN CSG cell, that has met the CSG cell re-selection criterion defined above, within 6 minutes in the radio conditions specified for an E-UTRAN CSG cell in 3GPP TS 25.133 in terms of parameters for CSG inter-RAT E-UTRA reselection; E-UARFCN and PCI shall be unchanged from the most recent previous visit of the E-UTRAN CSG cell; Serving GSM cell at  $RXLEV = -70$  dBm, with 6 GSM neighbours at  $RXLEV = -75$  dBm.

NOTE 4: The above performance requirements are minimum requirements defined to ensure the testability of autonomous CSG search.

3. If NAS requests AS to search for available CSG IDs, the MS shall perform the search and report the results to NAS as described in 3GPP TS 25.304 for UTRAN and as described in 3GPP TS 36.304 for E-UTRAN.

If a CSG ID is manually selected by NAS, the MS shall behave as specified in 3GPP TS 25.304 or in 3GPP TS 36.304, depending on the RAT type of the selected CSG cell.

4. If a mobile station is a member of at least one Closed Subscriber Group, i.e. at least one CSG ID is included in the MS's "Allowed CSG list", then, in addition to normal cell reselection, the MS shall use an autonomous search function to detect UTRAN and/or E-UTRAN CSG cells. The autonomous search function shall at least detect previously visited allowed CSG cells.

#### Reference

1. TS 25.367, clause 7.2.3
2. TS 45.008, clause 6.6.7.1
3. TS 45.008, clause 6.6.7.2
4. TS 45.008, clause 10.1.3.4

## 6.3.2.3.3 Test purpose

To test the behaviour of the UE idle mode reselection from GSM cell to an allowed UTRA CSG Cell.

## 6.3.2.3.4 Method of test

## Initial condition

Three Cells, Cell 1, Cell 2 and Cell 9:

Cell	Radio Access Technology	CSG Identity	PLMN	LAC
Cell 9	GSM	-	PLMN 1	-
Cell 1	UTRAN	CSG1	PLMN 1	001
Cell 2	UTRAN	-	PLMN 1	002

Cell 1(UTRAN) is not in the 3G Neighbour Cell Description of Cell 9 (GSM).

Cell 1 is not in the cell info list of Cell 2.

Cell 1 shall include:

- “CSG Indicator” with value of “TRUE” in its Master Information Block
- “CSG Identity” and “CSG PSC Split Information” in its System Information Block type 3.

On the UE side, UE’s Allowed CSG List is empty.

The UE is equipped with a USIM containing default values.

For FDD only:

Step a-f:

Parameter	Unit	Cell 9
Test Channel		1
RXLEV_ACCESS_MIN	dBm	-81
RF Signal Level	dBm	-48

Parameter	Unit	Cell 1	Cell 2
Test Channel		2	2
Qhyst1 <sub>s</sub>	dB	0	0
Qoffset1 <sub>s,n</sub>	dBm	0	0
Ssearch,RAT	dB	16	16
CPICH_Ec	dBm/3.84 MHz	-65	-75
Qrxlevmin	dBm	-79	-79
Srxlev*	dB	14	4
CSG Identity		'000 0000 0000 0000 0000 0000 0001'B (CSG 1)	-
Start PSC		144	-
Number of PSCs		alltheRest	-

Step g-h:

Parameter	Unit	Cell 9
RF Signal Level	dBm	-48->-54

Parameter	Unit	Cell 1	Cell 2
CPICH_Ec	dBm/3.84 MHz	-65->-75	-75->-70
Srxlev*	dB	4	9

Step i-j:

Parameter	Unit	Cell 9
RF Signal Level	dBm	-54->-48

Parameter	Unit	Cell 1	Cell 2
CPICH_Ec	dBm/3.84 MHz	-75->-65	-70->-75
Srxlev*	dB	14	4

## Test procedure

Method C is applied.

- a) The SS activates Cell 9. The UE is switched on.
- b) The SS waits for random access requests from the UE.
- c) The SS activates Cell 1 and Cell 2.
- d) The SS waits for random access requests from the UE.
- e) Make UE perform manual CSG ID selection and CSG 1 is selected manually.
- f) The SS waits for random access requests from the UE.
- g) The SS changes the level of Cell 1, Cell 2 and Cell 9.
- h) The SS waits for random access requests from the UE.
- i) The SS changes the level of Cell 1, Cell 2 and Cell 9.
- j) The SS waits for random access requests from the UE.

### 6.3.2.3.5 Test requirements

- 1) In step b, the UE shall respond and camp on Cell 9.
- 2) In step d, the UE shall not respond and camp on Cell 1 or Cell 2.
- 3) In step f, the UE shall respond and camp on Cell 1. CSG 1 is added in UE's Allowed CSG list.
- 4) In step h, the UE shall respond and camp on Cell 9.
- 5) In step j, the UE shall respond and camp on Cell 1 in 6 mins.

## 6.3.3 Reselection from CSG Cell to CSG Cell

### 6.3.3.1 Intra frequency CSG Cell Reselection / UE is in Idle, Cell\_PCH and URA\_PCH states

#### 6.3.3.1.1 Definition

#### 6.3.3.1.2 Conformance requirement

1. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 1.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode.
  - 1.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.
2. Intra-frequency Cell Reselection Criteria between CSG cells:
  - 2.1 In addition to normal cell reselection the UE shall use an autonomous search function for CSG cells when at least one CSG ID is included in the UE's 'Allowed CSG list'.
  - 2.2 The UE is required to perform autonomous search function in Idle, Cell\_PCH and URA\_PCH states.

- 2.3 For a CSG cell to be suitable, the CSG ID of the CSG cell has to be part of the Allowed CSG list of the UE.
- 2.4 If the UE detects a suitable CSG cell on the same frequency, it shall reselect to this cell if the concerned CSG cell is the highest ranked cell.
- 2.5 The cells shall be ranked according to the R criteria. The best ranked cell is the cell with the highest R value. The cell-ranking criterion R is derived from Q, Q<sub>hyst</sub>, Q<sub>offset</sub>.
- 2.6 If a CSG cell is not listed in system information, then Q<sub>offset</sub> will have the value 0.
- 2.7 In all cases, the UE shall reselect the new cell, only if the cell reselection criteria are fulfilled during a time interval T<sub>reselction</sub>.

## References

1. TS 25.304, clause 5.2.5.1.
2. TS 25.304, clause 5.2.6.4.3.
3. TS 25.304, clause 5.2.6.1.4.

### 6.3.3.1.3 Test purpose

To verify that the UE reselects from a CSG cell to an allowed CSG cell on the same frequency if the detected CSG cell is the highest ranked cell, according to clause 5.2.6.1.4 of TS 25.304.

### 6.3.3.1.4 Method of test

#### Initial conditions

Two Cells, Cell 1 and Cell 2. Cell 1 and Cell 2 will be mapped to Cell 1 and Cell 2 respectively as found in TS 34.108 clause 6.1.4.

Cell 1 shall not include Cell 2 as a neighbouring cell in its System Information Block Type 11.

Cell 1 shall also include:

- “CSG Indicator” in its Master Information Block
- “CSG Identity” and “CSG PSC Split Information” in its System Information Block type 3.

Cell 2 shall include Cell 1 as a neighbouring cell in its System Information Block Type 11.

Cell 2 shall also include:

- “CSG Indicator” in its Master Information Block.
- “CSG Identity” and “CSG PSC Split Information” in its System Information Block type 3.

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	PLMN	CSG ID
EF <sub>ACSG</sub>	PLMN 1	CSG 1

For FDD only:

Step a-e:

Parameter	Unit	Cell 1	Cell 2
Test Channel		1	1
LAC		0001	0002
CPICH_Ec	dBm/3.84 MHz	-65	-50
Qhyst1 <sub>s</sub>	dB	6	6
Qoffset1 <sub>s,n</sub>	dBm	5	5
R <sub>s</sub> <sup>*</sup>	dB	-59	-44
R <sub>n</sub> <sup>*</sup>	dB	-55	-70
Sintrasearch	dB	not present	not present
Sintersearch	dB	not present	not present
CSG Identity		0000001	0000002
Start PSC		80	80
Number of PSCs		alltheRest	alltheRest

Step f-g:

CPICH_Ec	dBm/3.84 MHz	-65->-50	-50->-67
Qhyst1 <sub>s</sub>	dB	6	6
Qoffset1 <sub>s,n</sub>	dBm	5	5
R <sub>s</sub> <sup>*</sup>	dB	-44	-61
R <sub>n</sub> <sup>*</sup>	dB	-72	-55

#### Test procedure

Method C is applied.

- a) The SS activates Cell 1.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The SS activates Cell 2 and monitors it for random access requests from the UE.
- e) The UE is made to perform manual CSG ID selection and select Cell 2. A complete Location Updating procedure is done where SS sends LOCATION UPDATING ACCEPT message.
- f) The SS changes the level of Cell 1 and 2.
- g) The SS waits for random access requests from the UE.

#### 6.3.3.1.5 Test requirements

- 1) In step c, the UE shall respond on Cell 1.
- 2) In step d, the UE shall not respond on Cell 2.
- 3) In step e, the UE shall respond and camp on Cell 2.
- 4) In step g, the UE shall respond on Cell 1.

#### 6.3.3.2 Inter frequency CSG Cell Reselection / UE is in Idle, Cell\_PCH and URA\_PCH states

##### 6.3.3.2.1 Definition

##### 6.3.3.2.2 Conformance requirement

1. When camped normally, the UE shall execute the cell reselection evaluation process on the following occasions/triggers:
  - 1.1 UE internal triggers, so as to meet performance as specified in TS 25.133 for FDD mode.
  - 1.2 When information on the BCCH used for the cell reselection evaluation procedure has been modified.

## 2. Inter-frequency Cell Reselection Criteria from between CSG cells:

- 2.1 In addition to normal cell reselection the UE shall use an autonomous search function for CSG cells when at least one CSG ID is included in the UE's 'Allowed CSG list'.
- 2.2 The UE is required to perform autonomous search function in Idle, Cell\_PCH and URA\_PCH states.
- 2.3 For a CSG cell to be suitable, the CSG ID of the CSG cell has to be part of the Allowed CSG list of the UE.
- 2.4 While camped on a suitable CSG cell, the UE shall consider the frequency of the serving cell to be the highest priority frequency (i.e. higher than the eight network configured values) as long as the serving cell is the highest ranked cell on that frequency.
- 2.5 If the UE detects a suitable CSG cell that is listed in the system information of the serving cell on other frequencies, and the detected CSG cell is the strongest cell on that frequency, then the UE shall consider these frequencies to have a priority equal to the current frequency and shall follow normal cell reselection rules.
- 2.6 The cells shall be ranked according to the R criteria. The best ranked cell is the cell with the highest R value. The cell-ranking criterion R is derived from Q, Q<sub>hyst</sub>, Q<sub>offset</sub>.
- 2.7 If a CSG cell is not listed in system information, then Q<sub>offset</sub> will have the value 0.
- 2.8 In all cases, the UE shall reselect the new cell, only if the cell reselection criteria are fulfilled during a time interval T<sub>reselction</sub>.

## References

1. TS 25.304, clause 5.2.5.1.
2. TS 25.304, clause 5.2.6.4.3.
3. TS 25.304, clause 5.2.6.1.4.

### 6.3.3.2.3 Test purpose

To verify that the UE reselects from a CSG cell to an allowed CSG cell on another frequency if the detected CSG cell is the highest ranked cell, according to clause 5.2.6.1.4 of TS 25.304.

### 6.3.3.2.4 Method of test

#### Initial conditions

Two Cells, Cell 1 and Cell 4. Cell 1 and Cell 4 will be mapped to Cell 1 and Cell 4 respectively as found in TS 34.108 clause 6.1.4.

Cell 1 shall not include Cell 4 as a neighbouring cell in its System Information Block Type 11.

Cell 1 shall also include:

- "CSG Indicator" in its Master Information Block
- "CSG Identity" and "CSG PSC Split Information" in its System Information Block type 3.

Cell 4 shall include Cell 1 as a neighbouring cell in its System Information Block Type 11.

Cell 4 shall also include:

- "CSG Indicator" in its Master Information Block
- "CSG Identity" and "CSG PSC Split Information" in its System Information Block type 3.

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	PLMN	CSG ID
EF <sub>ACSG</sub>	PLMN 1	CSG 1

For FDD only:

Step a-e:

Parameter	Unit	Cell 1	Cell 4
Test Channel		1	2
LAC		0001	0002
CPICH_Ec	dBm/3.84 MHz	-65	-50
Qhyst1 <sub>s</sub>	dB	5	10
Qoffset1 <sub>s,n</sub>	dBm	5	10
R <sub>s</sub> *	dB	-60	-40
R <sub>n</sub> *	dB	-55	-75
Sintrasearch	dB	not present	not present
Sintersearch	dB	not present	not present
CSG Identity		000001	000004
Start PSC		80	80
Number of PSCs		alltheRest	alltheRest

Step f-g:

CPICH_Ec	dBm/3.84 MHz	-65->-50	-50->-76
Qhyst1 <sub>s</sub>	dB	5	10
Qoffset1 <sub>s,n</sub>	dBm	5	10
R <sub>s</sub> *	dB	-45	-66
R <sub>n</sub> *	dB	-81	-60

## Test procedure

Method C is applied.

- a) The SS activates Cell 1.
- b) The UE is switched on.
- c) The SS waits for random access requests from the UE.
- d) The SS activates Cell 4 and monitors it for random access requests from the UE.
- e) The UE is made to perform manual CSG ID selection and select Cell 4. A complete Location Updating procedure is done where SS sends LOCATION UPDATING ACCEPT message.
- f) The SS changes the level of Cell 1 and 4.
- g) The SS waits for random access requests from the UE.

### 6.3.3.2.5 Test requirements

- 1) In step c, the UE shall respond on Cell 1.
- 2) In step d, the UE shall not respond on Cell 4.
- 3) In step e, the UE shall respond and camp on Cell 4.
- 4) In step g, the UE shall respond on Cell 1.

## 6.3.4 Cell Reselection with Hybrid Cells

### 6.3.4.1 Inter-frequency Cell Reselection with Hybrid Cells

#### 6.3.4.1.1 Definition

Test to verify that the UE shall use an autonomous search function to detect hybrid cells whose CSG IDs are in the UE's CSG whitelist and reselect it as a CSG cell correctly in FDD.

### 6.3.4.1.2 Conformance requirement

1. In case the UE has CSG ID of the hybrid cell in its CSG whitelist, cell reselection procedures will be the same as for a CSG cell as described in Chapter 7.2.
2. In addition to normal cell reselection rules, the UE shall use an autonomous search function to detect at least previously visited hybrid cells whose CSG IDs are in the UE's CSG whitelist according to the performance requirements specified in [10]. The UE shall treat detected hybrid cells as CSG cells if the CSG ID of the hybrid cell is in the UE's CSG whitelist and as normal cells otherwise.
3. The UE shall perform search and reselection to an allowed inter-frequency CSG cell that has met CSG reselection criterion defined in [1] and that is in its whitelist, within 6 minutes.

### Reference

1. TS 25.367, clause 9.2
2. TS 25.304, clause 5.2.6.5
3. TS 25.133, clause 4.2.2.11.1

### 6.3.4.1.3 Test purpose

To test the behaviour of the UE idle mode inter-frequency cell reselection from non-CSG cell to a hybrid Cell whose CSG ID is in the UE's CSG whitelist.

### 6.3.4.1.4 Method of test

#### Initial condition

1. Three Cells, Cell 1, Cell 4, Cell 5 as defined in TS 34.108 clause 6.1.4:

Cell	Radio Access Technology	PLMN	CSG Identity
Cell 1	UTRAN	PLMN 1	-
Cell 4	UTRAN	PLMN 1	-
Cell 5	UTRAN	PLMN 1	CSG 1

Cell 5 is not in the inter-frequency cell info list of Cell 1 in its System Information Block Type 11.

Cell 5 is not in the intra-frequency cell info list of Cell 4 in its System Information Block Type 11.

Cell 5 should not include "CSG Indicator" in its Master Information Block.

Cell 5 shall include "CSG Identity" in its System Information Block type 3.

Cell 1 has higher frequency priority 4 than Cell 4 with frequency priority 3 in its System Information Block Type 19.

2. On the UE side, CSG1 is in the UE's Operator CSG List, while the Allowed CSG List is empty.

The UE is equipped with a USIM containing default values except for those listed below.

USIM field	PLMN	CSG ID
EFOCSGL	PLMN 1	CSG 1

For FDD only:

Step a-d:

Parameter	Unit	Cell 1	Cell 4	Cell 5
Test Channel		1	2	2
LAC		0001	0002	0002
CPICH_Ec	dBm/3.84 MHz	-55	-70	-60
Qhyst1 <sub>s</sub>	dB	0	0	0
Qoffset1 <sub>s,n</sub>	dBm	0	0	0
R <sub>s</sub> *	dB	-55	-70	-60
CSG Identity	-	-	-	000001

Step e-f:

CPICH_Ec	dBm/3.84 MHz	-55	-70	-60->-80
Qhyst1 <sub>s</sub>	dB	0	0	0
Qoffset1 <sub>s,n</sub>	dBm	0	0	0
R <sub>s</sub> *	dB	-55	-70	-80

Step g-h:

CPICH_Ec	dBm/3.84 MHz	-55	-70	-80->-60
Qhyst1 <sub>s</sub>	dB	0	0	0
Qoffset1 <sub>s,n</sub>	dBm	0	0	0
R <sub>s</sub> *	dB	-55	-70	-60

Test procedure

Method C is applied.

- The SS activates Cell 1. The UE is switched on.
- The SS waits for random access requests from the UE.
- The SS activates Cell 4 and Cell 5. Make UE perform manual CSG ID selection and CSG 1 is selected manually.
- The SS waits for random access requests from the UE.
- The SS changes the level of Cell 5 and Cell 5 is not the strongest cell on frequency f2.
- The UE is in "automatic network selection mode" and performs the normal cell selection procedure and the SS waits for random access requests from the UE.
- The SS changes the level of Cell 5 and Cell 5 becomes the strongest cell on frequency f2.
- The UE performs autonomous search procedure and the SS waits for random access requests from the UE.

#### 6.3.4.1.5 Test requirements

- In step b, the UE shall respond and camp on Cell 1.
- In step d, the UE shall respond and camp on Cell 5.
- In step f, the UE shall respond and camp on Cell 1.
- In step h, the UE shall respond and camp on Cell 5 in 6 mins.

## Specific Message Contents

The contents of the SYSTEM INFORMATION BLOCK TYPE 19 message in this test case is identical to TS 34.108 clause 6.1.0b, with the following exceptions:

System Information Block type 19 of Cell1 (all steps)

Information Element	Value/remark	Version
SysInfoType19		REL-8 or later
utra-PriorityInfoList		
utra-ServingCell		
Priority	4	
s-PrioritySearch1	0 (0dB)	
s-PrioritySearch2	Not present	
threshServingLow	0 (0dB)	
utran-FDD-FrequencyList		
uarfcn	Same downlink uarfcn as used for cell 4	
priority	3	
threshXhigh	0 (0dB)	
threshXlow	0 (0dB)	
qQualMinFDD	-24 dB	
qRxLevMinFDD	-79dBm	
utran-TDD-FrequencyList	Not present	
gsm-PriorityInfoList	Not present	
eutra-FrequencyAndPriorityInfoList (SIZE (1..maxNumEUTRAFreqs))	Not present	

### 6.3.4.2 Cell Reselection with Hybrid Cells for non-member UEs

#### 6.3.4.2.1 Definition

Test to verify that the non-member UE detects the cell is a hybrid cell and reselects it according to normal cell reselection rules correctly.

#### 6.3.4.2.2 Conformance requirement

1. In case the UE has CSG ID of the hybrid cell in its CSG whitelist, cell reselection procedures will be the same as for a CSG cell as described in Chapter 7.2.

For all other UEs, cell reselection procedures will utilise normal cell reselection rules.

2. In addition to normal cell reselection rules, the UE shall use an autonomous search function to detect at least previously visited hybrid cells whose CSG IDs are in the UE's CSG whitelist according to the performance requirements specified in [10]. The UE shall treat detected hybrid cells as CSG cells if the CSG ID of the hybrid cell is in the UE's CSG whitelist and as normal cells otherwise.

#### Reference

1. TS 25.367, clause 9.2
2. TS 25.304, clause 5.2.6.5

#### 6.3.4.2.3 Test purpose

To test the behaviour of the UE idle mode cell reselection from non-CSG cell to a hybrid Cell whose CSG ID is not in the UE's CSG whitelist.

#### 6.3.4.2.4 Method of test

##### Initial condition

Same initial conditions as in clause 6.1.2.1.4 except the following:

1. Cell 2 shall include:

- “CSG Identity” in its System Information Block type 3 with the value “000 0000 0000 0000 0000 0000 0001”.

Cell 4 shall include:

- “CSG Identity” in its System Information Block type 3 with the value “000 0000 0000 0000 0000 0000 0002”.

2. On the UE side, the Allowed CSG List and the Operator CSG List are empty.

The UE is equipped with a USIM containing default values.

##### Test procedure

Same test procedure as in clause 6.1.2.1.4.

#### 6.3.4.2.5 Test requirements

Same test requirement as in clause 6.1.2.1.5.