

33 Mobile station features

GSM 02.07 defines mandatory and optional MS features. Their presence and appropriate functioning are verified by the following tests.

33.1 Entry and display of called number

33.1.1 Definition and applicability

The entry and display of a called number is the ability of a MS to correctly display and signal to the network the user required number.

The requirements and this test apply to all MS.

33.1.2 Conformance requirement

- 1) The number of the called subscriber is included in the Called party BCD number Information element of the SETUP message for an outgoing call.

The "Display of Called number" shall be implemented in an MS where a human interface is provided.

- 2) The "Numbering plan identification" is included in the Called party BCD number Information element of the SETUP message for an outgoing call.

An MS with MMI shall as default use the Numbering Plan Identification CCITT E164, unless otherwise indicated by the user.

- 3) The "Type of number" is included in the Called party BCD number Information element of the SETUP message for an outgoing call.

An MS with MMI shall, if the "+" is not entered, and a number is entered, set the Type of Number to "unknown".

- 4) The "Type of number" is included in the Called party BCD number Information element of the SETUP message for an outgoing call.

An MS with MMI shall, if the "+" is entered, and a number is entered, set the Type of Number to "International".

33.1.3 Test purpose

- 1) To verify that an MS with human interface, in a SETUP message sent to originate a call, includes the same "Number digits" in the "Called party BCD number" of the SETUP message as displayed.
- 2) To verify that an MS with MMI, when made to establish a call sends a SETUP message, which includes the "Numbering plan identification" in the "Called party BCD number" of the SETUP message for an outgoing call with the value "ISDN/telephony numbering plan (E.164/E.163)".
- 3) To verify that an MS with MMI, when made to establish a call without use of the "+-key" function, sends a SETUP message, which includes the "Type of number" in the "Called party BCD number" of the SETUP message for an outgoing call with the value "unknown".
- 4) To verify that an MS with MMI, implementing the "+-key" function, when made to establish a call with use of the "+-key" function, sends a SETUP message, which includes the "Type of number" in the "Called party BCD number" of the SETUP message for an outgoing call with the value "international number".

33.1.4 Method of test**33.1.4.1 Initial conditions**

The MS is registered in a cell of the SS.

33.1.4.2 Procedure

- a) A number (not including "+ function") is entered and then a call is set up.
- b) After the SS has accepted the call the number displayed on the MS and the number received in the SS are compared.
- c) The NPI and TON are examined in the SS.
- d) Steps a) to c) are repeated, but in a), the number entered starts with the "+ function".

NOTE 1: This test may also be performed automatically using the EMMI.

33.1.5 Test requirements

- 1) In step b), both numbers shall be identical.
- 2) In step c), the NPI shall be "E164" and the TON shall be "unknown".
- 3) In step d), the NPI shall be "E164" and the TON shall be "international".

33.2 Indication of call progress signals**33.2.1 Definition and applicability****33.2.2 Conformance requirement****33.2.3 Test purpose****33.2.4 Ringing tone****33.2.4.1 Method of test**

- a) According to section "Structured procedures, Mobile originating call, early assignment, Method of test", paragraphs a) to j).

33.2.4.2 Requirements

- 1) According to section "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 7).
- 2) The ringing tone characteristics shall be as follows:

Tone	Frequency	Tolerance	Type
Ringing tone	425 Hz	15 Hz	Periodic tone on 1 s, silence 4 s

33.2.5 Busy tone**33.2.5.1 Method of test**

- a) According to section "Structured procedures, Mobile originating call, early assignment, Method of test", paragraphs a) to h).

- b) The SS then sends message DISCONNECT with cause number 17.

Message: DISCONNECT	(GSM 04.08, 9.3.7) to the MS:
Information element	<u>Comment</u>
Protocol discriminator	CM
Transaction identifier	MS orig.
Message type	
Cause	
- Coding standard	GSM
- Location	User
- Cause value	#17 "user busy"

33.2.5.2 Requirements

- 1) According to section "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 5).
- 2) After the reception of DISCONNECT a busy tone shall be generated. The busy tone characteristics shall be as follows:

Tone	Frequency	Tolerance	Type
Busy tone	425 Hz	15 Hz	Periodic tone on 500 ms, silence 500 ms

33.2.6 Congestion tone

33.2.6.1 Method of test

- a) According to section "Structured procedures, Mobile originating call, early assignment, Method of test", paragraphs a) to h).
- b) The SS then sends message DISCONNECT with cause number 42.

DISCONNECT message: As in 33.2.3.1 with cause value #42 "Switching equipment congestion" (0101010).

33.2.6.2 Requirements

- 1) According to section "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 5).
- 2) After the reception of DISCONNECT a congestion tone shall be generated.
- 3) The congestion tone characteristics shall be as follows:

Tone	Frequency	Tolerance	Type
Congestion tone	425 Hz	15 Hz	Periodic tone on 200 ms, silence 200 ms

33.2.7 Authentication failure tone

33.2.7.1 Method of test

- a) According to section "Structured procedures, Mobile originating call, early assignment, Method of test", paragraphs a) to e).
- b) After reception of message AUTHENTICATION RESPONSE the SS sends message AUTHENTICATION REJECT.

Message: AUTHENTICATION REJECT	(GSM 04.08, 9.2.1) to the MS:
<u>Information element</u>	<u>Comment</u>
Protocol discriminator	MM
Transaction identifier	not relevant
Message type	

33.2.7.2 Requirements

- 1) According to section "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 4).
- 2) After reception of AUTHENTICATION REJECT a tone shall be generated indicating authentication failure.
- 3) The authentication failure tone is the error/special information tone with characteristics as follows:

Tone	Frequency	Tolerance	Type
Error/Special	950 Hz	50 Hz	Triple tone
Information tone	1400 Hz	50 Hz	tones on 330 ms
	1800 Hz	50 Hz	silence 1,0 s

33.2.8 Number unobtainable tone

33.2.8.1 Method of test

- a) According to section "Structured procedures, Mobile originating call, early assignment, Method of test", paragraphs a) to h).
- b) The SS then sends message DISCONNECT with cause number 1.

DISCONNECT message: As in 33.2.3.1 with cause value #1 "Unassigned (unallocated) number" (0000001).

33.2.8.2 Requirements

- 1) According to section "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 5).
- 2) After reception of DISCONNECT a tone shall be generated indicating that the called number is unobtainable.

The number unobtainable tone is the error/special information tone with characteristics as in 33.2.5.2.

33.2.9 Call dropped tone

33.2.9.1 Method of test

- a) According to section "Structured procedures, Mobile originating call, early assignment, Method of test", paragraphs a) to l). However, it shall be indicated in the system information messages that call re-establishment shall not be attempted (RACH control parameters).
- b) When the call has been established the SS stops transmitting on the TCH/SACCH.

33.2.9.2 Requirements

- 1) According to section "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 8).
- 2) After the radio link time-out period has expired a tone shall be generated indicating that the call has been dropped.

The call dropped tone characteristics shall be as follows:

Tone	Frequency	Tolerance	Type
Call dropped tone	425 Hz	15 Hz	Tone on 200 ms, silence 200 ms 3 bursts of on/off

33.3 Network selection / indication

33.3.1 Definition and applicability

Network selection and indication is the ability of the MS to correctly select a network and display to the user in accordance with GSM 02.11 and GSM 03.22.

The requirements and this test apply to all MS.

Tests concerning the MS behaviour after having received a location updating reject message with specific causes are included in section 26.7.4.2.

Tests concerning the MS handling of the forbidden PLMN list are also included in section 26.7.4.

33.3.2 Conformance requirement

- 1) Upon switching on, when an IMSI is available and there is no registered PLMN on the SIM, the MS shall select its Home PLMN and perform the cell selection procedure.
- 2) If the MS loses radio coverage for its registered PLMN, and the MS is in automatic PLMN selection mode, it shall attempt to select its Home PLMN.
- 3) If the Registered PLMN is unavailable due to the loss of radio coverage and the MS is in automatic PLMN selection mode and the HPLMN is also unavailable, it shall attempt to select a suitable cell and access the PLMNs in turn, in the order of priority as stored in the SIM,.
- 4) If there is no registered PLMN in the SIM or the registered PLMN is unavailable and If the Home PLMN is unavailable and the MS is in automatic PLMN selection mode, it shall attempt to select a suitable cell and accesses the PLMNs in turn, in the order of priority as stored in the SIM, upon switching on and when the IMSI is available.
- 5) An MS, roaming in a VPLMN whose MCC is the same as the MCC of the IMSI, shall periodically attempt to obtain service on its Home PLMN in automatic mode. For this purpose, a value T minutes, which is the HPLMN search period, may be stored in the SIM; T is either in the range 6 minutes to 8 hours in 6 minutes step or it indicates that no periodic attempt shall be made. If no HPLMN search value is available on the SIM the mobile equipment shall use a default value of 30 minutes.
- 6) At switch on, the MS selects and attempts to perform a Location Update on the Registered PLMN if it exists. If the registered PLMN is a VPLMN of the SIM's home country, the MS shall wait at least 2 minutes before attempting to obtain service on its home PLMN.

33.3.3 Test purpose

- 1) To verify that the MS with SIM containing in the PLMN selector field at least one PLMN different from the Home PLMN and containing no registered PLMN, when in automatic PLMN selection mode, selects its Home PLMN, if available, upon switching on and when the IMSI is available. (This is verified by observation of the location updating procedure).(Steps 1.1 through 1.5).
- 2) To verify that if the MS loses radio coverage for its registered PLMN, and the MS is in automatic PLMN selection mode, it shall attempt to select its Home PLMN. (Steps 1.14C through 1.16C).
- 3) To verify that the MS, when it loses radio coverage for its selected PLMN (i.e. Registered PLMN) and in automatic PLMN selection mode, selects the PLMN with the highest priority among the PLMNs stored on the SIM, if the Home PLMN is unavailable. (Steps 1.10 through 1.12).

- 4) If there is no registered PLMN in the SIM or the registered PLMN is unavailable and If the Home PLMN is unavailable and the MS is in automatic PLMN selection mode, it shall attempt to select a suitable cell and accesses the PLMNs in turn, in the order of priority as stored in the SIM, upon switching on and when the IMSI is available. (Steps 1.22 through 1.25).
- 5) To verify that an MS, roaming in a VPLMN whose MCC is the same as the MCC of the IMSI, shall attempt to obtain service on its Home PLMN in automatic mode with a period of T. To verify that the MS shall not attempt to obtain service on its home PLMN in automatic mode when T is set to "no periodic attempts shall be made". To verify that a default value of 30 min is used when no HPLMN search timer value is available on the SIM. (Steps 1.13 A through 1.15A, 1.13B through 1.15B and 1.13C.)
- 6) To verify that, at switch on, the MS selects and attempts to perform a Location Update on the registered PLMN if it exists. If the registered PLMN is a VPLMN of the SIM's home country, the MS shall wait at least 2 minutes before attempting to obtain service on its home PLMN. (Steps 1.25 through 1.28).

Reference

Requirements 1, 2, 3: see GSM 03.22 section 4.4.3.1.

Requirements 4: see GSM 03.22 section 3.1.

Requirement 5, 6: see GSM 03.22 section 4.4.3.3.

33.3.4 Method of Test

Procedure 1: This procedure applies to both automatic and manual mode for PLMN selection. This procedure is run for each of the following cases:

case A) Timer T is set to 6 min in the SIM.

case B) No HPLMN search timer value is available on the SIM.

case C) Timer T is set to "no periodic attempt to obtain service on the HPLMN shall be made" in the SIM.

Procedure 2: This procedure applies to the manual mode for PLMN selection.

33.3.4.1 Procedure 1

- 1.1) The MS is set up with a SIM which contains, in the "PLMN selector" data field, a list of 3 PLMN in the priority order PLMN2 (highest priority), PLMN3, PLMN4 (lowest priority). PLMN1 is the Home PLMN of the MS as defined in the IMSI. The "Forbidden PLMN" data field shall contain NULL values. "registered PLMN" data field shall contain Null values.

case A) Timer T is set to 6 min in the SIM.

case B) No HPLMN search timer value is available on the SIM.

case C) Timer T is set to "no periodic attempt to obtain service on the HPLMN shall be made" in the SIM.

- 1.2) The SS transmits 4 BCCH carriers with the following parameters:

	<u>PLMN</u>	<u>Level dBμVemf()</u>
Carrier 1	PLMN1 any value for MCC	28
Carrier 2	PLMN2 any value for MCC	33
Carrier 3	PLMN3 with the same MCC as PLMN1	38
Carrier 4	PLMN4 any value for MCC	43

Each carrier has the "IMSI attach" (ATT) flag set in the BCCH data. (The purpose of this is to force the MS to do location updating whenever it is switched on, so that the SS can determine which PLMN has been selected).

The other system information parameters are as in table 33-1.

- 1.3) The MS is brought into the "on" condition with automatic selection mode active.
- 1.4) The SS checks that the MS sends a "location updating request" on carrier 1.
- 1.5) The SS sends a "location updating accept" message to the MS on carrier 1. After 5 s, the MS "selected PLMN indicator" is checked.
- 1.6) The SS switches off carriers 1.
- 1.7) The SS checks that the MS sends a "location updating request" on carrier2.
- 1.8) The SS sends a "location updating accept" message to the MS on carrier 2. After 5 s, the MS "selected PLMN indicator" is checked.
- 1.9) Carrier 2 is turned off.
- 1.10) The SS checks that the MS sends a "location updating request" on carrier 3.
- 1.11) The SS sends a "location updating accept" message on carrier 3. After 5 s, the MS "selected PLMN indicator" is checked.
- 1.12) Carriers 1 and 2 are turned on with the same parameters as in step 1.2) above.

In case A for which T is set to 6 min, take branch A.

In case B for which default value for T is applied take branch B.

In case C for which T is set to "no periodic attempt shall be made", take branch C.

Branch A

- 1.13A) The SS checks that the MS does not send a "location updating request" on either carrier 1 or 2 during 6 minutes after step 1.11 is completed.
- 1.14A) The SS checks that the MS sends a "location updating request" on channel 1 between 6 and 12 min after step 1.11 is completed.
- 1.15A) The SS sends a "location updating accept" message on carrier 1. After 5 s, the MS "selected PLMN indicator" is checked.

Branch B

- 1.13B) The SS checks that the MS does not send a "location updating request" on either carrier 1 or 2 during 30 minutes after step 1.11 is completed.
- 1.14B) The SS checks that the MS sends a "location updating request" on channel 1 between 30 and 60 min after step 1.11 is completed.
- 1.15B) The SS sends a "location updating accept" message on carrier 1. After 5 s, the MS "selected PLMN indicator" is checked.

Branch C

- 1.13C) The SS checks that the MS does not send a "location updating request" on either carrier 1 or 2 during 40 min.
- 1.14C) The SS switches off carrier 3.

- 1.15C) The SS checks that the MS sends a "location updating request" on channel 1.
- 1.16C) The SS sends a "location updating accept" message on carrier 1. After 5 s, the MS "selected PLMN indicator" is checked.
- 1.17) The SS switches off carrier 1 and switches on carrier 3.
- 1.18) The SS checks that the MS sends a "location updating request" on carrier 2.
- 1.19) The SS sends a "location updating accept" message on carrier 2. After 5 s, the MS "selected PLMN indicator" is checked.
- 1.20) The mobile station is switched off.
- 1.21) The SS switches off carrier 2.
- 1.22) The mobile station is switched on.
- 1.23) The SS checks that the MS sends a "location updating request" on carrier 3.
- 1.24) The SS sends a "location updating accept" message on carrier 3. After 5 s, the MS "selected PLMN indicator" is checked.
- 1.25) The MS is switched off.
- 1.26) The SS switches on carrier 1.
- 1.27) The mobile station is switched on.
- 1.28) The SS checks that the MS does not send a "location updating request" on carrier 1. After 2 min, the MS "selected PLMN indicator" is checked.

33.3.4.2 Requirements 1

Requirement 1.1) is mandatory for all MS. Requirements 1.2) and 1.3) only apply to MS with a human interface.

- 1.1) The MS shall make a response as indicated in steps 1.4, 1.7, 1.10, 1.13A, 1.13B, 1.14A, 1.14B, 1.15C, 1.18, 1.23 above. In cases 1.4, 1.7, 1.10, 1.15C, 1.18 and 1.23, the MS shall respond within 30 s.

- 1.2) The selected PLMN shall be indicated:

End of Step	1.5	1.8	1.11	1.15A/B	1.16C
PLMN indicated:	PLMN1	PLMN2	PLMN3	PLMN1	PLMN1
End of Step	1.19	1.24	1.28		
PLMN indicated:	PLMN2	PLMN3	PLMN3		

33.3.4.3 Procedure 2

- 2a) The MS is set up with a SIM which contains NULL values in the "PLMN selector" data field. PLMN1 is the Home PLMN of the MS as defined in the IMSI. The "forbidden PLMN" data field shall contain PLMN3. the "registered PLMN" field is set to PLMN2.

2b) The SS transmits 4 BCCH carriers with the following parameters:

	<u>PLMN</u>	<u>Level dBμVemf()</u>
Carrier 1	PLMN1	28
Carrier 2	PLMN2	33
Carrier 3	PLMN3	38
Carrier 4	PLMN4	43

Each carrier has the "IMSI attach" (ATT) flag set in the BCCH data. (The purpose of this is to force the MS to do location updating whenever it is switched on, so that the SS can determine which PLMN has been selected.)

The other system information parameters are as in table 33-1.

2c) The MS is brought into the "on" condition with manual selection mode active.

2d) The SS checks that the MS sends a "location updating request" on carrier 2.

33.3.4.4 Requirements 2

2.1) The MS shall make a response as indicated in step 2d). The MS shall respond within 30 s.

Table 33-1: Normal system information fields

Parameter	Reference in GSM 04.08	Abbreviation	Normal setting
Cell Channel Description	10.5.2.1	-	Any values
Max retrans	10.5.2.17	-	1
Tx-integer	10.5.2.17	-	Any value
CELL_BAR_ACCESS	10.5.2.17	CBA	0 (i.e. no barred)
AC CN	10.5.2.17	AC	All 0
RE	10.5.2.17	RE	0 (i.e. re-establishment allowed)
BA ARFCN	10.5.2.13	BA	One entry equal to the ARFCN of the carrier
NCC	10.5.2.15	NCC	Any value
Cell Identity	10.5.1.1	-	Any value
MCC, MNC	10.5.1.3	PLMN	Ref. 33.3.2, 1b) and 33.3.2, 2b)
LAC	10.5.1.3	LAC	1111 (Hex)
ATT, B_AG_BLKES_RES,T3212, CCCH_CONF	10.5.2.8	-	ATT = "1"
BS_PA_MFRMS	10.5.2.8	BPM	5 frames
Cell Options	10.5.2.3	-	Any values
CELL_RESELECT_HYSTERESIS	10.5.2.4	CRH	10 dB
MS_TXPWR_MAX_CCH	10.5.2.4	MTMC	Maximum RF output power of MS.
RXLEV_ACCESS_MIN	10.5.2.4	RAM	-95 dBm

33.4 Invalid and blocked PIN indicators

33.4.1 Definition and applicability

The requirements and this test apply to all MS.

33.4.2 Conformance requirement**33.4.3 Test purpose****33.4.4 Method of test****33.4.4.1 Initial conditions**

The MS contains a SIM with the PIN enabled, and the SIM unblocking counter set to zero by previous presentation of the personal unblocking key.

33.4.4.2 Procedure

- a) The MS is switched on.
- b) Three wrong PIN are entered.

Activation may be either manual or via the EMMI.

33.4.5 Test requirements

For the first and second incorrect PIN the MS shall indicate that the PIN code has been rejected

For the third incorrect PIN the MS shall indicate that the PIN is blocked.

33.5 Service indicator**33.5.1 Definition and applicability**

The requirements and this test apply to all MS.

33.5.2 Conformance requirement**33.5.3 Test purpose****33.5.4 Method of test****33.5.4.1 Initial conditions**

- a) The MS is in idle mode, unregistered.
- b) The SS shall emulate perfect radio conditions so that the MS is able to register and to set up or receive a call.

33.5.4.2 Procedure

- a) The MS is brought in an active state by either switching it on or by inserting a SIM.

33.5.5 Test requirements

- 1) The successful registration and the good condition shall be indicated by the MS indicator and by the SS.

33.6 Subscription identity management**33.6.1 Definition and applicability**

Subscription identity management is the ability of the MS to prevent the establishment of MO (except MO emergency calls) and MT calls without a valid subscription.

The requirements and this test apply to all MS.

33.6.2 Conformance requirement

An MS can only be operated, if a valid IMSI is present.

33.6.3 Test purpose

- 1) To verify that during an established call:
either
 - 1.1) on removal of the SIM from an MS, the MS will perform an IMSI detach;
 - or
 - 1.2) after removing the power source from the MS, removing the SIM, and restoring the power source to the MS, the MS may perform an IMSI detach.
- 2) To verify that an MS without SIM card will not establish a MO call which is not an emergency call.
- 3) To verify that an MS without SIM card will not accept an incoming call.

33.6.4 Method of test

33.6.4.1 Initial conditions

33.6.4.2 Procedure

- a) A call is set up.
- b) (Reserved).
- c) Either
 - (i) the SIM is removed;
 - or
 - (ii) where this is not possible, the power source is removed from the MS, the SIM is removed and the power source is restored to the MS.The SS observes whether or not the MS performs IMSI detach.
- d) An attempt to establish a MO call is made (not an emergency call).
- e) An attempt to establish a MT call is made.

33.6.5 Test requirements

- 1) Either
in step c(i), the MS shall perform an IMSI detach;
or
in step c(ii), the MS may perform an IMSI detach.
- 2) In step d) the MS shall not attempt to set up a new call via the Um interface.
- 3) In step e), the MS shall not respond to the attempt to set up a new call via the Um interface.

33.7 Barring of outgoing calls

33.7.1 Definition and applicability

The barring of outgoing calls is an optional feature. It is the ability of the MS to prevent all MO calls except emergency calls.

The requirements and this test apply to all MS supporting this feature.

33.7.2 Conformance requirement

An MS may have an optional facility to bar outgoing calls. Such barring facility shall not prevent the transmission on emergency calls.

33.7.3 Test purpose

To verify that an MS for which a local facility to bar outgoing calls has been declared as being implemented, is able to establish an emergency call if this facility is activated.

33.7.4 Method of test**33.7.4.1 Initial conditions****33.7.4.2 Procedure**

- a) The local facility to bar outgoing calls is activated.
- b) Via MMI, the MS is actioned to establish an emergency call.

33.7.5 Test requirements

- 1) The MS shall establish an emergency call.

33.8 Prevention of unauthorized calls**33.8.1 Definition and applicability**

The prevention of unauthorized calls is an optional feature in the MS. It is the ability of the MS to prevent unauthorized use by using a key or keyword protection facility. When activated the MS does not prevent the establishment of except emergency calls.

The requirements and this test apply to all MS supporting this feature.

33.8.2 Conformance requirement

An MS may have an optional facility to prevent unauthorized use. Such facility shall not prevent the transmission on emergency calls.

33.8.3 Test purpose

To verify that an MS for which a local facility to prevent unauthorized use has been declared to be implemented, is able to establish an emergency call, if this facility is activated.

33.8.4 Method of test**33.8.4.1 Initial conditions****33.8.4.2 Procedure**

- a) The local facility to restrict operation such that the MS can only be operated by using a key or a keyword is activated. The most restrictive situation is created.
- b) Via MMI, the MS is actioned to establish an emergency call.

33.8.5 Test requirements

- 1) The MS shall establish an emergency call.