20 Cell selection and reselection

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

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

The SS transmits one BCCH carrier per cell as indicated in the initial conditions for each test. These are referred to as carrier 1, carrier 2, etc. Each of these cell control channels are non-combined with SDCCHs. It is assumed that the SS can simultaneously transmit seven BCCH carriers and monitor three random access channels. For multiband tests it is assumed that at least one of the BCCH carriers and one of the monitored random access channels is in a different frequency band from the others. In some cases, a test is performed in multiple stages in order that the requirements can be tested within the above constraints.

For any MS all the carriers are in its supported band(s) of operation. For an E-GSM mobile station at least one of the carriers is in the extension band and one of the carriers is in the primary band.

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

- The SS is continuously paging the MS on all carriers at the start of the test and does not respond to RACH requests from the MS. Where a test specifies that the MS is not paged on a particular carrier, only idle paging is transmitted according to GSM 04.08, 3.2.2.2.
- The default values of the system information data fields given in table 20.1 are used.
- The SIM is in the idle updated state in the default location area with a TMSI assigned at the beginning of each test.
- The ARFCNs used for the carriers in each test are chosen from those in table 20.1 with adjacent carriers separated by a minimum of three channels.

The absolute accuracy of the MS signal level measurements is assumed to be +/-6 dB. A difference of at least 8 dB is allowed for cases of discrimination between C1 or C2 values and 0.

The relative accuracy of the MS signal level measurements is assumed to be +/-3 dB for the signal levels used in the tests of this section, except for section 20.20, where the relative accuracy is assumed to be +/-5 dB if the measurements are on different frequency bands. A difference of at least 5 dB is allowed for cases of discrimination between C1 or C2 values on different carriers, except for section 20.20, where a difference of at least 10 dB is allowed if the measurements are on different frequency bands.

NOTE 1: The accuracy of MS signal level measurements is specified in GSM 05.08. For all of the tests in this section, the signal levels used are greater than 1 dB above reference sensitivity level.

NOTE 2: The tolerance on timers specified in GSM 05.08 is +/-10 % except for PENALTY_TIME where it is +/-2 seconds. In the tests of this section, the test requirements include these tolerances. Consequently, the times stated in the test requirement sometimes differ from the corresponding timer in the conformance requirement.

Where pulsed signals are specified, the SS tolerance on pulse width is +/-2 % and the SS tolerance on power level +/-1 dB.

Table 20.1: Default values of the system information fields

Parameter	GSM 04.08 reference	Abbr.	Normal Setting
Cell channel description	10.5.2.1	-	Any values
MAX retrans	10.5.2.29	-	1
TX-integer	10.5.2.29	-	Any value
CELL_BAR_QUALIFY	10.5.2.35	CBQ	0
CELL_BAR_ACCESS	10.5.2.29	CBA	0 (not barred)
AC CN	10.5.2.29	AC	All 0
RE	10.5.2.29	RE	0 (re-establishment allowed)
NCC	10.5.2.2	NCC	Any value
Cell Identity	10.5.1.1	-	Any value
MCC, MNC	10.5.1.3	PLMN	MS Home PLMN
LAC	10.5.1.3	LAC	1111 (Hex)
ATT	10.5.2.11	-	0 (Attach/Detach not allowed)
BS_AG_BLKS_RES	10.5.2.11	-	Any values
CCCH_CONF	10.5.2.11	-	1 basic physical channel used for CCCH, non-combined with SDCCHs.
T3212	10.5.2.11	-	Any values
BS_PA_MFRMS	10.5.2.11	BPM	5 frames
Cell Options	10.5.2.3	-	Any values
CELL_RESELECT_HYSTERESIS	10.5.2.4	CRH	4 dB
MS_TXPWR_MAX_CCH	10.5.2.4	MTMC	Max. output power of MS
RXLEV_ACCESS_MIN	10.5.2.4	RAM	-90 dBm
CELL_RESELECT_OFFSET	10.5.2.35	CRO	0
TEMPORARY_OFFSET	10.5.2.35	TO	0
PENALTY_TIME	10.5.2.35	PT	0
Power Offset	10.5.2.35	PO	0
BA ARFCN	10.5.2.22	BA	All 0 except:
			GSM 450 ARFCNs 259, 263, 269, 275, 279, 283, 287, 292, broadcast in SYSTEM INFORMATION type 2 GSM 480 ARFCNs 306, 310, 316, 322, 326, 330, 334, 339, broadcast in SYSTEM INFORMATION type 2 For GSM900, both P-GSM and E-GSM ARFCNs are broadcast: GSM ARFCNs 3, 9, 18, 25, 41, 43, 49, 50, 54, 58, 62, 66, 70, 80, 92, 124, broadcast in SYSTEM INFORMATION type 2 E-GSM ARFCNs 985, 989, 995, 1010, 1014 broadcast in SYSTEM INFORMATION type 2bis
			For DCS1800 ARFCNs 512, 543, 568, 589, 602, 641, 662, 683, 696, 711, 732, 754, 794, 851, 870, 871, 872, 884 broadcast in SYSTEM INFORMATION TYPE 2.
			For multiband tests, ARFCNs 3, 18, 41, 49, 62, 70, 92, 124 broadcast in SYSTEM INFORMATION TYPE 2 (GSM 900 cell) and TYPE 2ter (other band cell), ARFCNs 259, 263, 269, 275, 279, 283, 287, 292 broadcast in SYSTEM INFORMATION TYPE 2 (GSM 450 cell) and SYSTEM INFORMATION TYPE 2ter (other band cell), ARFCNs 306, 310, 316, 322, 326, 330, 334, 339 broadcast in SYSTEM INFORMATION TYPE 2 (GSM 480 cell) and SYSTEM INFORMATION TYPE 2ter (other

	band cell), and ARFCNs 512, 568, 602, 662, 696, 732, 794, 870 broadcast in SYSTEM INFORMATION TYPE 2 (DCS cell) and TYPE 2ter (other band cell)

20.1 Cell selection

20.1.1 Definition and applicability

Cell selection is a process in which a MS, whenever a new PLMN is selected, attempts to find a suitable cell of that PLMN to camp on. Two methods of searching for a suitable cell are possible, normal cell selection and stored list cell selection. The process ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink. Once the MS is camped on a cell, access to the network is allowed.

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.1.2 Conformance requirement

1. The MS shall be able to select the correct (fourth strongest) cell and be able to respond to paging on that cell within 30 seconds of switch on, when the three strongest cells are not suitable. This assumes a valid SIM, with PIN disabled and ideal radio conditions; GSM 05.08, 6.1.

2. There are various requirements that a cell must satisfy before an MS can perform normal camping on it:

   2.1 (i) It should be a cell of the selected PLMN

   2.2 (ii) It should not be "barred" (see section 3.5.1)

   2.3 (iv) The radio path loss between MS and BTS must be below a threshold set by the PLMN operator. This is estimated as shown in section 3.6.

   GSM 03.22, 3.2.1.

   NOTE: Criteria (iii) is not applicable for Cell Selection.

3. Initially the MS looks for a cell which satisfies these 4 constraints ("suitable cell") by checking cells in descending order of received signal strength. If a suitable cell is found, the MS camps on it; GSM 03.22, 3.2.1.

4. The MS shall be able to calculate correctly the path loss criterion parameter C1, used for cell selection and reselection; GSM 05.08, 6.4.

20.1.3 Test purpose

1. To verify that the MS meets conformance requirement 1.

2. To verify that:

   2.1 The MS does not select a cell of a PLMN which is not the selected PLMN.

   2.2 The MS does not select a cell which is "barred".

   2.3 The MS does not select a cell with C1<0.

3. To verify that the MS selects suitable cells in descending order of received signal strength.

4. To verify that the MS does not select a cell with C1<0.

20.1.4 Method of test

20.1.4.1 Initial conditions

Parameters changed from the default values in table 20.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	48 / -65	38 / -75	43 / -70	33 / -80	28 / -85	OFF
CBA	1	0	0	0	0	
RXLEV_ACCESS_MIN (dBm)	-90	-67	-90	-88	-98	
MNC			01			
MCC			002			
C1	25	-8	20	8	13	
C2	25	-8	20	8	13	

For an E-GSM MS carrier 2 and carrier 4 ARFCNs are chosen in the E-GSM band, carrier 1 and carrier 3 ARFCNs in the P-GSM band.

20.1.4.2 Procedure

a) The SS activates the carriers and monitors carriers 2, 4 and 5 for RA requests from the MS.

b) The MS is switched on.

c) The MS is switched off.

d) The SS monitors carriers 1 and 3 for RA requests from the MS

e) The MS is switched on.

20.1.5 Test requirements

1) After step b), the first response from the MS shall be on carrier 4 within 33 seconds. There shall be no response from the MS on carrier 2.

2) After step e), there shall be no response from the MS on either carrier 1 or carrier 3 within 33 seconds.

20.2 Cell selection with varying signal strength values

20.2.1 Definition and applicability

For definition see conformance requirement.

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.2.2 Conformance requirement

1. The MS shall:

   The MS shall search all RF channels in the system (35 for GSM 450, 35 for GSM 480, 124 for GSM, 174 for E-GSM and 374 for DCS 1 800), take readings of received RF signal strength on each RF channel, and calculate the received level average for each. The averaging is based on at least five measurement samples per RF carrier spread over 3 to 5 s, the measurement samples from the different RF carriers being spread evenly during this period. GSM 05.08, 6.2.

1.1 The MS shall search all RF channels in the system (35 for GSM 450, 35 for GSM 480, 124 for GSM, 174 for E-GSM and 374 for DCS 1 800), take readings of received RF signal strength on each RF channel, and calculate the received level average for each.

1.2 The averaging is based on at least five measurement samples per RF carrier spread over Tav (3 to 5 s).

1.3 The measurement samples from the different RF carriers being spread evenly during this period.

2. These quantities are termed the "receive level averages", shall be unweighted averages of the received signal strengths measured in dBm. GSM 05.08, 6.1.

20.2.3 Test purpose

1. To verify that:

1.1 The MS meets conformance requirement 1.1.

1.2 The MS meets conformance requirement 1.2.

1.3 The MS meets conformance requirement 1.3.

2. To verify that the MS meets conformance requirement 2.

20.2.4 Method of test

20.2.4.1 Initial conditions

Parameters changed from the default values in table 20.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	23 / -90	58 / -55	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	13 / -100	13 / -100				
C1	10	53				

For an E-GSM MS carrier 1 ARFCN is chosen in the E-GSM band.

The manufacturer of the equipment shall declare his averaging time Tav. This time is the time between the first and the last measurement sample taken on one carrier during one averaging period.

20.2.4.2 Procedure

a) The SS transmits on carriers 1 and 2. After a period of b*Tav carrier 2 reduces its transmit level to -85 dBm (28 dBµV emf( )). After a further period of a*Tav, carrier 2 increases its transmit level again to -55 dBm (58 dBµV emf( )). Switching of carrier 2 continues with these levels and duty cycle until the end of the test.

Tav is the averaging time declared by the manufacturer.

The parameters a and b are chosen according to the following rules:

$(a + b) * Tav > Tav$

$0 < a * Tav < 2/3 * Tav$

$0{,}5 * Tav < b * Tav < Tav$

In the equations < and > means at least one TDMA frame less or greater than the given value.

While satisfying the conditions given above:

a is chosen to be as close as possible to 2/3.

b is chosen to be as close as possible to 0,5.

b) The MS is switched on.

c) The SS monitors all RA requests from MS on carriers 1 and 2.

20.2.5 Test requirements

In step c), the first response from the MS shall be on carrier 2 within 33 seconds.

NOTE 1: With the selected duty cycle it can be guaranteed that a "good" MS passes the test even at the worst case situations. The minimum averaged value of carrier 2 is in any case higher or equal to -75 dBm which is still 6 dB above carrier 1's level (for a "good" MS).

NOTE 2: With the selected levels and duty cycle the probability that a "bad" MS (i.e. MS that averages over shorter period than 3 s) fails the test is maximized. However, it can not be guaranteed that all the MSs not fulfilling the conformance requirement of averaging or uniform sampling will fail this test.

20.3 Basic cell reselection

20.3.1 Definition and applicability

While camped on a cell of the selected PLMN the MS may need to select a different cell in order to fulfil the normal service state. This ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink.

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.3.2 Conformance requirement

1. While camped on a cell of the selected PLMN ("camped normally"), the MS may need to select a different cell ("normal cell reselection" state). The following events trigger a cell reselection:

   1.1 (iii) The cell camped on (current serving cell) has become barred.

   1.2 (iv) There is a better cell (in terms of the path loss criterion C2) in the same LA, or a much better cell in another LA of the selected PLMN (using the CRH parameter).

   The MS will then reselect a new cell in order to fulfil the process goal.; GSM 03.22, 4.5.

NOTE 1: Criterion (i) is tested in section 20.8 (Cell reselection when C1(serving cell) < 0 for 5 seconds).

NOTE 2: Criterion (ii) is tested section 20.16 (Downlink signalling failure).

NOTE 3: Criterion (v) is tested in section 20.6 (Cell reselection timings).

2. There are various requirements that a cell must satisfy before an MS can perform normal camping on it:

   2.1 (ii) It should not be "barred".

   2.2 (iv) The radio path loss between MS and BTS must be below a threshold set by the PLMN operator. GSM 03.22, 3.2.1.

NOTE 4: Criterion (i) is not relevant for cell reselection and for cell selection it is tested in section 20.1.

NOTE 5: Criterion (iv) refers to the C1 parameter.

3. The MS shall be able to calculate correctly the path loss criterion parameter C2 used for cell reselection; GSM 05.08, 6.4.

4. At least every 5 s the MS shall calculate the value of C1 and C2 for the serving cell and recalculate C1 and C2 values for non serving cells (if necessary). The MS shall then check whether:

   i) The path loss criterion (C1) for current serving cell falls below zero for a period of 5 seconds. This indicates that the path loss to the cell has become too high.

   ii) The calculated value of C2 for a non-serving suitable cell exceeds the value of C2 for the serving cell for a period of 5 seconds, except in the case of the new cell being in a different location area in which case the C2 value for the new cell shall exceed the C2 value of the serving cell by at least CELL_RESELECT_HYSTERESIS dB as defined by the BCCH data from the current serving cell, for a period of 5 seconds. This indicates that it is a better cell. GSM 05.08, 6.6.2.

5. The MS shall attempt to decode the full BCCH data of the serving cell at least every 30 seconds; GSM 05.08, 6.6.1.

20.3.3 Test purpose

1. To verify that:

   1.1 The MS meets conformance requirement 1.1.

   1.2 The MS meets conformance requirement 1.2.

2. To verify that:

   2.1 The MS does not reselect a cell which is barred.

   2.2 The MS does not reselect a cell which has a C1<0.

3. To verify that the MS calculates the C2 parameter correctly when the CELL_RESELECT_OFFSET, TEMPORARY_OFFSET and PENALTY_TIME parameters are not used.

4. To verify that the MS takes into account the CELL_RESELECT_HYSTERESIS parameter when reselecting a cell in a different location area.

5. To verify that the MS decodes the CELL_BAR_ACCESS and CELL_BAR_QUALIFY parameters from the BCCH every 30 seconds.

20.3.4 Method of test

20.3.4.1 Initial conditions

Parameters changed from the default values in table 20.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	43 / -70	33 / -80	43 / -70	38 / -75	38 / -75	
RXLEV_ACCESS_MIN (dBm)	-85	-90	-90	-85	-67	
CRH	10 dB					
LAC			different from other carriers			
CBA				1		
CBQ				0		
C1	15	10	20	10	-8	
C2	15	10	20	10	-8	

The BA(BCCH) list only contains the ARFCNs of the carriers used during the test.

20.3.4.2 Procedure

a) The SS activates carriers 1, 2, 4 and 5. The MS is not paged on carrier 1. The SS monitors carriers 2, 4 and 5 for RA requests from the MS.

b) The MS is switched on.

c) The SS stops paging on all carriers except carrier 2. The level of carrier 2 is increased to 43 dBµVemf (C2 becomes 20 dB), and the SS monitors carrier 2 for RA requests from the MS.

d) When the SS receives a response from the MS on carrier 2, it stops paging the MS on this carrier.

e) The MS is switched off.

f) The SS is reconfigured and sets CBA = 1 on carriers 1 and 5.

g) The MS is switched on.

h) After 33 seconds, the SS starts paging continuously on carrier 1 and sets CBA=1 on carrier 2 and CBA=0 on carriers 1, 4 and 5.

i) When the SS receives a response on carrier 1, it stops paging the MS and waits for 25 seconds. (The MS should reselect and camp onto carrier 1).

j) The SS activates carrier 3, pages the MS continuously on this carrier and monitors carrier 3 for RA requests from the MS.

k) The SS increases the level of carrier 3 to 53 dBµVemf (C2 increases to 30 dB.).

20.3.5 Test requirements

1) After step b), there shall be no response from the MS on carriers 2, 4, or 5 within 50 seconds.

2) In step c), the MS shall respond on carrier 2 within 20 seconds of increasing the level of carrier 2.

NOTE 1: 5 seconds to perform running average, 10 seconds to detect C2 differences, 2,4 seconds to read BCCH of carrier 2, 1 second to perform RA. Total 18,4 seconds, allow 20 seconds.

3) In step h), the MS shall respond on carrier 1 within 50 seconds of setting CBA=1 on carrier 2.

NOTE 2: 33 seconds for the MS to read the BCCH of carrier 2 (30 seconds + 10 %), 15 seconds for the MS to reselect cell 1, since the MS already has a running average on carrier 1, allow 50 seconds.

4) After step j), there shall be no response from the MS within 50 seconds.

5) After step k), the MS shall respond on carrier 3 within 20 seconds.

20.4 Cell reselection using TEMPORARY_OFFSET, CELL_RESELECT_OFFSET, POWER_OFFSET and PENALTY_TIME parameters

20.4.1 Definition and applicability

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs

20.4.2 Conformance requirement

1. The MS shall be able to calculate correctly the path loss criterion parameter C2 used for cell reselection; GSM 05.08, 6.4.

20.4.3 Test purpose

1. To verify that the MS calculates the C2 parameter correctly when the CELL_RESELECT_OFFSET, TEMPORARY_OFFSET and PENALTY_TIME parameters are used.

2. To verify DCS 1 800 MS correctly calculate the C2 parameter when the POWER_OFFSET parameter is present.

20.4.4 Method of test

20.4.4.1 Initial conditions

Parameters changed from the default values in table 20.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	53 / -60	43 / -70	48 / -65	48 / -65		
RXLEV_ACCESS_MIN (dBm)	-80	-100	-85	-85		
PT		11111	40 s	60 s		
CRO		16 dB	20 dB	20 dB		
TO			20 dB	20 dB		
K = 1						
C1	20	30	20	20		
C2	20	14	20 -> 40	20 -> 40		
K = 2 (DCS1800 Class 3 MS only)						
POWER_OFFSET	0	2	6	6		

The BA(BCCH) list only contains the ARFCNs of the carriers used during the test.

20.4.4.2 Procedure

For testing of GSM MS, the test procedure is performed for execution counter K = 1.

For testing of DCS 1 800 MS, the test procedure is performed for execution counter K = 1 and 2

On execution counter K = 1, the POWER_OFFSET Parameter is not present.

On execution counter K = 2, the POWER_OFFSET parameter is present.

a) The SS activates carriers 1 and 2. The MS is not paged on carrier 1. The SS monitors carrier 2 for RA requests from the MS.

b) The MS is switched on.

c) The SS increases the level of carrier 2 to 54 dBµVemf (C2 becomes 25 dB).

d) When the SS receives a response on carrier 2, the SS stops paging on that carrier and waits for 20 seconds (The MS should reselect and camp onto carrier 2).

e) The SS activates carriers 3 and 4 and continuously pages the MS on these carriers. The SS monitors carriers 3 and 4 for RA requests from the MS.

20.4.4.3 Requirements

For execution counter K = 1 and K = 2.

1) After step b), there shall be no response from the MS on carrier 2 within 50 seconds.

2) After step c), the MS shall respond on carrier 2 within 20 seconds of increasing the level of carrier 2.

3) After step e), there shall be no response from the MS on carrier 3 within 38 seconds of activating the carriers but, the MS shall respond on carrier 3 within 90 seconds. The response on carrier 3 shall be before any response on carrier 4.

NOTE: Minimum time of 38 seconds set by penalty timer on carrier 3 less 2 second tolerance. Maximum time, total of 33 seconds to read BCCH of carrier 3, 42 seconds for expiry of penalty timer on carrier 3, 15 seconds for reselection, since the MS will already have running averages on carriers 3 and 4, when the penalty timers expire, allow 90 seconds.

20.5 Cell reselection using parameters transmitted in the System Information type 2bis, type 2ter, type 7 and type 8 messages

20.5.1 Definition and applicability

System information (SI) type 7 and 8 are transmitted on the BCCH Ext when the system information type 4 message does not contain all information needed for cell selection.

The system information type 2 bis message is used when the system information type 2 message does not conta in all neighbour cell ARFCNs.

The system information type 2 ter message is used when system information type 2 messages broadcast by one cell which are system information 2 or both system information 2 and 2bis do not contain all neighbour cell ARFCNs.

Test purposes 1 and 3 are applicable to all types of GSM 400, GSM900 and DCS1800 MS.

Test purpose 2 is only applicable for E-GSM and DCS 1 800 MS. This is reflected in initial conditions step d).

Test purpose 4 is only applicable to an E-GSM MS. This is reflected in initial conditions step f), test procedures d) and e) and test requirements clause 3).

20.5.2 Conformance requirement

1. The MS shall be able to calculate correctly the path loss criterion parameter C2 used for cell reselection. GSM 05.08, 6.4.

2 Whilst in idle mode, an MS shall continue to monitor all BCCH carriers as indicated by the BCCH allocation. GSM 05.08, 6.6.1.

3 Mobile stations shall treat all ARFCNs in the set {0, 1, 2 ... 1023} as valid ARFCN values even if the mobile station is unable to transmit or receive on that ARFCN. GSM 04.08, 10.5.2.1b.

4 An E-GSM MS shall correctly decodes parameters transmitted in the system information type 2 ter message. GSM 04.08, 9.1.34:

20.5.3 Test purpose

1. To verify that the MS correctly calculates the C2 criterion when the parameters affecting cell reselection are transmitted in the system information type 7 and 8 messages.

2. To verify that E-GSM and DCS 1 800 MS decode parameters transmitted in the system information type 2 bis message.

3. To verify that the MS treats ARFCNs as valid ARFCNs even if the MS is unable to transmit or receive on that ARFCN.

4. To verify that an E-GSM mobile correctly decode parameters transmitted in the system information type 2 ter message.

20.5.4 Method of test

20.5.4.1 Initial conditions

a) Parameters changed from the default values in table 20.1.

Parameter	Carrier 1	Carrier 2	Carrier 3 *)	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	53 / -60	32 / -81	40 / -73	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	23 / -90	23 / -90	30 / -83			
BS_AG_BLKS_RES	1	1	1			
PT		0	0			
CRO		16 dB	10 dB			
TO		0 dB	0 dB			
C1	30	9	10			
C2	30	25	20			

*) : Carrier 3 is off for P-GSM and DCS 1800 MS. Carrier 3 is only required for E-GSM MS.

The BA(BCCH) list only contains the ARFCNs of the carriers used during the test and the ARFCNs specified in d) below.

b) The ARFCNs of carriers 1, 2 and 3 are chosen from those in table 20.1.

c) The cell reselection parameters PENALTY_TIME, CELL_RESELECT_OFFSET and TEMPORARY_OFFSET are transmitted in the SI3, SI7 and SI8 messages on carrier 2. They are not transmitted in SI4 and the ADDITIONAL RESELECT PARAM IND parameter is set to 1.

d) The SI2bis message is transmitted on carrier 1 and contains the ARFCN of carrier 2 and ARFCNs 43, 70, 500, 550, 990 and 995. For an E-GSM MS and a DCS 1 800 MS, the ARFCN of carrier 2 is not transmitted in the SI2 message.

e) Carriers 1 and 2 are synchronized, but staggered in frame number so that the transmission of the SI3 message on carrier 2, coincides with the paging block which the MS is listening to on carrier 1.

NOTE: Under these conditions, the MS can only decode the parameters affecting cell reselection from the SI7 or SI8 messages.

To achieve this, the following conditions are used:

BS_PA_MFRMS = 4

IMSI mod 1000 = 12

FN carrier 1 = FN carrier 2-21, for simultaneously transmitted frames.

f) For an E-GSM MS, the SI3 message on carrier 2 indicates that SI2ter is used on carrier 2. SI2ter message contains the ARFCN of carrier 3 and ARFCNs 45, 76, 891, 905. The ARFCN of carrier 3 is transmitted neither in the SI2 nor in the SI2bis messages on carriers 1 and 2.

20.5.4.2 Test Procedure

a) The SS activates the channels. The MS is not paged on carrier 1.

b) The MS is switched on.

c) After 50 seconds, the SS increases the level of carrier 2 to 42 dBµVemf( ).

d) For an E-GSM MS only, when the SS receives a response on carrier 2, the SS stops paging on that carrier and after 30 seconds, the SS increases the level of carrier 3 to 60 dBµVemf( ).

20.5.5 Test Requirements

1) After step b), there shall be no response from the MS on carrier 2. For an E-GSM MS there shall also be no response on carrier 3.

2) After increasing the level of carrier 2 in step c), the MS shall respond on carrier 2 within 20 seconds.

3) After increasing the level of carrier 3 in step d), an E-GSM mobile shall respond on carrier 3 within 20 seconds.

20.6 Cell reselection timings

20.6.1 Definition and applicability

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.6.2 Conformance requirement

1. At least every 5 s the MS shall calculate the value of C1 and C2 for the serving cell and recalculate C1 and C2 values for non serving cells (if necessary). The MS shall then check whether:

   1.1 ii) The calculated value of C2 for a non-serving suitable cell exceeds the value of C2 for the serving cell for a period of 5 seconds,

   1.2 Cell reselection for any other reason (see GSM 03.22) shall take place immediately, but the cell that the MS was camped on shall not be returned to within 5 seconds if another suitable cell can be found.;

   GSM 05.08, 6.6.2.

20.6.3 Test purpose

1. To verify that:

   1.1 The MS does not perform a cell reselection when the C2 value for a non serving cell does not exceed the C2 value of the serving cell for a period of at least 5 seconds.

   1.2 When the MS performs an immediate cell reselection due to an unsuccessful random access attempt, the cell that the MS was camped onto is not returned to within 5 seconds when another suitable cell exists.

20.6.4 Method of test

20.6.4.1 Initial conditions

Parameters changed from the default values in table 20.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier
RF Signal Level (dBμV emf() / dBm)	56 / -57	46 / -67	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBμV emf() / dBm)	29 / -84	33 / -80				
Max. Retrans	00	00				
C1	27	13				
C2	27	13				

Below is an alternative table of parameters for use with test equipment that cannot reach the upper RF levels as specified in the table above. These carrier levels are reduced by 5 dB and will not effect the purpose of the test case:

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier
RF Signal Level (dBμV emf() / dBm)	51 / -62	41 / -72	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBμV emf() / dBm)	24 / -89	28 / -85				
Max. Retrans	00	00				
C1	27	13				
C2	27	13				

The BA(BCCH) list only contains 5 ARFCNs including the ARFCNs of the carriers used during the test.

NOTE: With 5 ARFCNs in the BA(BCCH) list and BS_PA_MFRMS=5 (default value) the MS will maintain a running average on surrounding cells over a period of 5 seconds.

20.6.4.2 Procedure

a) The SS activates the channels. The MS is not paged on any of the carriers.

b) The MS is switched on.

c) After 50 seconds, the SS starts paging continuously on carriers 1 and 2 for 20 seconds. The SS monitors carriers 1 and 2 for RA requests from the MS.

d) The SS stops paging on carriers 1 and 2 and waits for 20 seconds. (The MS should revert to carrier 1 due to cell reselection.)

e) The SS starts paging continuously on carrier 2.

f) The SS increases the transmit level of carrier 2 by 20 dB for a period of 4 s and then reduces the level back to the original value.

g) The SS increases the transmit level of carrier 2 by 20dB and waits for the MS to access on carrier 2.

20.6.5 Test requirements

1) In step c), the MS shall transmit 2 RA requests on carrier 1 followed by 2 RA requests on carrier 2. Subsequent RA requests on either carrier shall not occur within 4,5 s of the second RA request on that carrier.

2) In step f), there shall be no access on carrier 2 within 34 seconds of increasing the level of carrier 2.

3) After step g), the MS shall respond on carrier 2.

20.7 Priority of cells

20.7.1 Definition and applicability

In general, cell prioritization is a means of encouraging MSs to select some suitable cells in preference to others.

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.7.2 Conformance requirement

1. During cell selection a cell with low priority indication will only be selected if a suitable cell of normal priority cannot be found; GSM 03.22, 3.5.2.1.

2. Table 1a. Parameters affecting cell priority for cell selection

CELL_BAR_QUALIFY	CELL_BAR_ACCESS	Cell selection priority	Status for cell reselection
0	0	normal	normal
0	1	barred	barred
1	0	low	normal (see note 2)
1	1	low	normal (see note 2)

GSM 05.08, table 1.a

3. If all the following conditions are met then the "Cell selection priority" and the "Status for cell reselection" shall be set to normal:

   - the cell belongs to the MS HPLMN

   - the MS is in cell test operation mode

   - the CELL_BAR_ACCESS is set to "1"

   - the CELL_BAR_QUALIFY is set to "0"

   - the Access Control class 15 is barred

   GSM 05.08, table 1.a

20.7.3 Test purpose

1. To verify that the MS does not select a cell of low priority when a suitable cell of normal priority exists with a lower received signal strength.

2. To verify that the MS takes into account CELL_BAR_ACCESS and CELL BAR _QUALIFY when performing cell selection and reselection.

3. To verify that the MS meets conformance requirement 3.

20.7.4 Method of test

20.7.4.1 Initial conditions

Parameters changed from Default values table 20.1

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	33 / -80	43 / -70	33 / -80	23 / -90	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	3 / -110	23 / -90	13 / -100	13 / -100		
CBA	0	1	1	0		
CBQ	1	1	0	0		
Access class 15	barred	barred	barred	barred		
C1	30	20	20	10		

20.7.4.2 Procedure

a) The SS activates the carriers and monitors for RA requests from the MS on carriers 1, 2, and 4.

b) The MS is switched on.

c) The MS is switched off. The SS deactivates the carriers.

d) The MS is placed in cell test operation mode.

NOTE: Cell test mode is a mode of operation defined in SIM administrative data field.

e) The SS activates the carriers and monitors for RA requests from the MS on carriers 1, 2, and 3.

f) The MS is switched on.

20.7.5 Test requirements

1) After step b), the first response from the MS shall be on carrier 4 within 33 seconds, followed by a response on carrier 1 before a response (if any) on carrier 2 within 50 seconds.

2) After step f), the first response from the MS shall be on carrier 3 within 33 seconds, followed by a response on carrier 1 before a response (if any) on carrier 2 within 50 seconds.

20.8 Cell reselection when C1 (serving cell) < 0 for 5 seconds

20.8.1 Definition and applicability

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.8.2 Conformance requirement

1. At least every 5 s the MS shall calculate the value of C1 and C2 for the serving cell and recalculate C1 and C2 values for non serving cells (if necessary). The MS shall then check whether:

   i) The path loss criterion (C1) for current serving cell falls below zero for a period of 5 seconds. This indicates that the path loss to the cell has become too high. GSM 05.08, 6.6.2.

2. While camped on a cell of the selected PLMN ("camped normally"), the MS may need to select a different cell ("normal cell reselection" state). The following events trigger a cell reselection:

   (i) The path loss criterion parameter C1 (see section 3.6) indicates that the path loss to the cell has become too high.; GSM 03.22, 4.5.

20.8.3 Test purpose

1. To verify that the MS meets conformance requirement 1.

2. To verify that the MS meets conformance requirement 2.

20.8.4 Method of test

20.8.4.1 Initial conditions

Parameters changed from Default values table 20.1

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	63 / -50	33 / -80	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	43 / -70	23 / -90				
CRO	30 dB					
TO	0					
PT	0					
C1	20	10				
C2	50	10				

NOTE: With BS_PA_MFRMS = 5 (default value), the averaging time of the MS on the serving cell BCCH is 5,9s.

20.8.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2 for RA requests from the MS.

b) The MS is switched on.

c) The SS reduces signal level on carrier 1 to -80 dBm / 33 dBµV emf() for 4 s. Then, the SS raises the level back to -50 dBm / 63 dBµV emf(). (C1 becomes -10 dB and C2, 20 dB during this period).

d) The SS reduces signal level on carrier 1 to -80 dBm / 33 dBµV emf()

20.8.5 Test requirements

1) After step b), there shall be no access on carrier 1 or carrier 2, within 50 seconds.

2) After step c), there shall be no access on carrier 2 within 30 seconds.

3) After step d), the MS shall access on carrier 2 within 20 seconds.

20.9 Running average of the surrounding cell BCCH carrier signal levels

20.9.1 Definition and applicability

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.9.2 Conformance requirement

1. Whilst in idle mode an MS shall continue to monitor all BCCH carriers as indicated by the BCCH allocation (BA - See table 1). A running average of received level in the preceding 5 to

   Max. {5 , ((5 * N + 6) DIV 7) * BS_PA_MFRMS / 4}

   seconds shall be maintained for each carrier in the BCCH allocation. N is the number of non-serving cell BCCH carriers in BA and the parameter BS_PA_MFRMS is defined in GSM 05.02; GSM 05.08, 6.6.1.

2. The same number of measurement samples shall be taken for all non-serving cell BCCH carriers of the BA list, and the samples allocated to each carrier shall as far as possible be uniformly distributed over each evaluation period.; GSM 05.08, 6.6.1

20.9.3 Test purpose

1. To verify that if the MS calculates a received level average (over 5 seconds) for a non-serving suitable cell which results in the value of C2 exceeding the value of C2 for the serving cell, then cell reselection takes place to the non-serving cell.

2. To verify that by using suitable varying levels of signal strength for non serving cells, the MS samples on non serving cell BCCH carriers are as far as possible distributed uniformly over each evaluation period.

20.9.4 Method of test

20.9.4.1 Initial conditions

Parameters changed from Default values table 20.1

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	53 / -60	33 / -80	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	23 / -90	23 / -90				
C1	30	10				
C2	30	10				

BS_PA_MFRMS is set to 4 for this test.

The BA(BCCH) list only contains 7 ARFCNs including the ARFCNs of the carriers used during the test.

NOTE: With 7 ARFCNs in the BA(BCCH) list and BS_PA_MFRMS=4 the MS will maintain a running average on surrounding cells over a period of 5 seconds.

20.9.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2.

b) The MS is switched on.

c) The SS starts switching the level of carrier 2 between -80 dBm and -57 dBm every 2,7 seconds and continues to do so until the end of the test.

d) The SS decreases the level of carrier 1 to -76 dBm.

NOTE: As a result of the switching in levels, the running average on carrier 2 will be between -66dBm and -71dBm, assuming that samples are distributed over five consecutive paging blocks.

20.9.5 Test requirements

1) After step b), there shall be no access from the MS on carrier 1 or carrier 2, within 50 seconds..

2) After step c), there shall be no access from the MS on carrier 1 or 2 within 25 seconds

NOTE: Any potential access on is likely to occur within 20 seconds.

3) After step d), the MS shall access on carrier 2 within 20 seconds.

20.10 Running average of the serving cell BCCH carrier signal level

20.10.1 Definition and applicability

The MS is required to monitor continuously the BCCH carrier signal level of the serving cell (and to compare it to the BCCH carrier signal levels of the non-serving cells) to guarantee that it is camped on the most suitable cell.

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.10.2 Conformance requirement

1. For the serving cell, receive level measurement samples shall be taken at least for each paging block of the MS. The receive level average shall be a running average determined using samples collected over a period of 5 s or five consecutive paging blocks of that MS, whichever is the greater period. New receiving level average values shall be calculated as often as possible.; GSM 05.08, 6.6.1.

20.10.3 Test purpose

1. To verify that by using suitable varying levels of signal strength for the serving cell, the MS performs a running average over 5 consecutive paging blocks.

20.10.4 Method of test

20.10.4.1 Initial conditions

Parameters changed from Default values table 20.1 are below,

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	63 / -50	39 / -74	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBμV emf() / dBm)	23 / -90	23 / -90				
C1	40	16				
C2	40	16				

NOTE: With BS_PA_MFRMS = 5 (default value), the averaging time of the MS on the serving cell BCCH is 5,9s.

20.10.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2 for RA requests from the MS.

b) The MS is switched on.

c) After 50 seconds the SS starts switching the level of carrier 1 between -80 dBm and -50 dBm every 3 seconds.

NOTE: As a result of the switching in levels, the running average on carrier 1 will be between -62 dBm and -68 dBm over five consecutive paging blocks.

d) The SS increases the level of carrier 2 to -56 dBm.

20.10.5 Test requirement

1) After step c), the MS shall not access on carrier 2, within 25 seconds.

2) After step d), the MS shall access on carrier 2, within 30 seconds.

NOTE 1: 13,75 seconds to perform running average, 10 seconds to detect C2 differences, 2,4 seconds to read BCCH of carrier 2, 1 second to perform RA. Total 27,15 seconds, allow 30 seconds.

20.11 Updating the list of six strongest neighbour carriers and decoding the BCCH information of a new carrier on the list

20.11.1 Definition and applicability

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.11.2 Conformance requirement

1. The list of the 6 strongest non-serving carriers shall be updated at least as often as the duration of the running average defined for measurements on the BCCH allocation and may be updated more frequently; GSM 05.08, 6.6.1.

2. When the MS recognizes that a new BCCH carrier has become one of the 6 strongest, the BCCH data shall be decoded for the new carrier within 30 seconds; GSM 05.08, 6.6.1.

20.11.3 Test purpose

1. To verify that MS meets conformance requirement 1.

2. To verify that MS meets conformance requirement 2.

20.11.4 Method of test

20.11.4.1 Initial conditions

Six BCCH carriers are established with the system information contents of table 20.1.

Parameters changed from Default values table 20.1 are below,

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6	Carrier 7
RF signal level (dBμV emf ( )/dBm)	53 / -60	48 /-65	43 / -70	38 / -75	33 / -80	33 /-80	38 / -75
RXLEV_ACCESS_MIN	-90	-90	-90	-90	-90	-90	-110
C1	30	25	20	15	10	10	35
C2	30	25	20	15	10	10	35

The BA(BCCH) list contains only eight ARFCNs and includes those of carriers 1 to 7.

BS_PA_MFRMS is set to 3 during this test.

NOTE: The combination of 8 carriers on the BA list and BS_PA_MFRMS = 3 leads to averaging time of 5 seconds. Hence 5 seconds is also the updating time of the list of six strongest neighbour carriers.

20.11.4.2 Procedure

a) The SS activates carriers 1 to 6. The MS is not paged on any of the carriers.

b) The MS is switched on.

c) After 60 seconds, the SS activates carrier 7 and pages the MS continuously on this carrier. The SS monitors carrier 7 for RA requests from the MS.

20.11.5 Test requirements

1) The MS shall access on carrier 7 within 55 s of activating carrier 7.

NOTE: 5,5 seconds to notice new strongest carrier in top 6 (because the updating time for six strongest is 5 seconds (+10 %)), 33 seconds to read BCCH, 15 seconds for reselection, since the MS has already performed the running average on the new strongest carrier, allow 55 seconds.

20.12 Decoding the BCCH information of the neighbour carriers on the list of six strongest neighbour carriers

20.12.1 Definition and applicability

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.12.2 Conformance requirement

1. The MS shall attempt to decode the BCCH data block that contains the parameters affecting cell reselection for each of the 6 strongest non-serving cell BCCH carriers at least every 5 minutes; GSM 05.08, 6.6.1.

NOTE: Verification of cell reselection as implicitly tested here is performed in section 20.3.

20.12.3 Test purpose

1. To verify that the MS decodes the BCCH data block that contains the parameters affecting cell reselection for a non-serving cell BCCH carrier, (which is in the list of six strongest neighbour cells), at least every 5 minutes. This is achieved by changing the BCCH data such that the value of C2 for the non serving cell exceeds the value of C2 for the serving cell, and observing that the MS performs cell reselection within 5 minutes plus the time allowed for cell reselection after the change of the BCCH data.

20.12.4 Method of test

20.12.4.1 Initial conditions

Parameters changed from Default values table 20.1 are below,

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	38 / -75	33 / -80	OFF	OFF	OFF	OFF
C1	15	10				
C2	15	10				

20.12.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2.

b) The MS is switched on.

c) The SS changes the RXLEV_ACCESS_MIN in the BCCH data of carrier 2 to be -100 dBm.

NOTE: With the above change the C2 of carrier 2 becomes 20 whereas the C2 of carrier 1 stays at 15.

20.12.5 Test requirements

1) After step b), there shall be no access from the MS on carrier 1 or carrier 2 within 50 seconds.

2) After step c), the MS shall access on carrier 2 within 345 s of the change in the BCCH data of carrier 2.

NOTE: 330 s for decode of BCCH of carrier 2 (300 s +10 %), 15 seconds for reselection of carrier 2, since the MS already has a running average on carrier 2.

20.13 Decoding the BSIC of the neighbour carriers on the list of six strongest neighbour carriers

20.13.1 Definition and applicability

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.13.2 Conformance requirement

1. The MS shall attempt to check the BSIC for each of the 6 strongest non-serving cell BCCH carriers at least every 30 seconds, to confirm that it is monitoring the same cell. If a change of BSIC is detected then the carrier shall be treated as a new carrier and the BCCH data redetermined; GSM 05.08, 6.6.1.

NOTE: Verification of cell reselection as implicitly tested here is performed in section 20.3.

20.13.3 Test purpose

1. To verify that the MS will check the BSIC of the non-serving cell, which is in the list of six strongest neighbour cells, by changing the BSIC and the BCCH data of the non-serving cell such that the value of C2 for that cell exceeds the value of C2 of the serving cell, and observing that the MS performs cell reselection within the time allowed to check the BSIC, redetermine the BCCH data and perform cell reselection.

20.13.4 Method of test

20.13.4.1 Initial conditions

Parameters changed from Default values table 20.1 are below:

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	38 / -75	33 / -80	OFF	OFF	OFF	OFF
C1	15	10				
C2	15	10				

20.13.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2.

b) The MS is switched on.

c) The SS changes the BSIC of carrier 2 by changing the Base Station Colour Code (BCC) part of the BSIC. The SS also changes the RXLEV_ACCESS_MIN in the BCCH data of carrier 2 to be -100 dBm.

NOTE: With the above change to the BCCH data the C2 of carrier 2 becomes 20 whereas the C2 of carrier 1 stays at 15.

20.13.5 Test requirements

1) In step b), there shall be no access from the MS on carrier 1 or carrier 2 within 50 seconds.

2) After step c), the MS shall access on carrier 2 within 85 s of the change in the BSIC value (and BCCH data) of carrier 2.

NOTE: 33 seconds for check of BSIC on carrier 2, 33 seconds for decode of BCCH of carrier 2, 15 seconds for reselection of carrier 2, since the MS already has a running average on carrier 2, allow 85 seconds.

20.14 Emergency calls

20.14.1 Definition and applicability

This test is applicable for GSM 400, GSM 900 and DCS 1 800 MSs supporting speech.

20.14.2 Conformance requirement

1. When in a limited service state, the MS shall be able to initiate emergency calls; GSM 05.08, 6.8.

2. When in a limited service state and if not camped on a cell, the MS shall monitor the signal strength of all 35 (GSM 450), all 35 (GSM 480), all 124 (for GSM), all 174 (for E-GSM) or all 374 (for DCS 1 800) RF channels, and search for a BCCH carrier which has C1>0 and which is not barred. When such a carrier is found, the MS shall camp on that cell, irrespective of the PLMN identity; GSM 05.08, 6.8.

3. The MS shall perform cell reselection at least among the cells of the PLMN of the cell on which the MS has camped, according to the algorithm of GSM 03.22, 4.5 & 3.7, except that a zero value of CELL_RESELECT_HYSTERESIS shall be used; GSM 05.08, 6.8.

20.14.3 Test purpose

1. To verify that the MS 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 MS selects a cell with C1>0 and CBA = 0 when no suitable cells of the selected PLMN are available.

3. To verify that the MS, when performing cell reselection in the limited service state, uses CELL_RESELECT_HYSTERESIS = 0.

20.14.4 Method of test

20.14.4.1 Initial conditions

Parameters changed from Default values table 20.1 are below

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	38 / -75	33 / -80	33 / -80	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBμV emf() / dBm)	23 / -90	43 / -70	23 / -90			
CELL_BAR_ACCESS	1 (barred)	0	0			
MCC,MNC	forbidden	forbidden	forbidden			
CELL_RESELECT_HYST	0	0	14 dB			
C1	15	-10	10			

NOTE: All the BCCH carriers belong to the same PLMN, which is not the MS's home PLMN and is in the SIM's forbidden PLMN's list.

20.14.4.2 Procedure

a) The SS activates the carriers. The SS monitors for RA attempts from the MS on carriers 1, 2 and 3 for the duration of the test.

b) The MS is switched on.

c) 50 seconds after switch on, an emergency call is initiated on the MS.

d) The SS changes the CBA of carrier 1 to 0.

NOTE: The MS should reselect to carrier 1 because it should not take into account the CELL_RESELECT_HYST value of 14 but use 0 instead.

e) After 345 s an emergency call is initiated on the MS.

NOTE: 330 seconds to detect change of BCCH data, 15 seconds to perform reselection of carrier 1, since the MS already has a running average on carrier 1.

20.14.5 Test requirements

1) In step c), the first access by the MS shall be on carrier 3.

2) In step e), the first access from the MS shall be on carrier 1.

20.15 Cell reselection due to MS rejection "LA not allowed"

20.15.1 Definition and applicability

While camped on a cell of the selected PLMN the MS may need to select a different cell in order to fulfil the normal service state. This ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink.

This process goes on while camping on a cell which pertains to an LA which is placed in the list of "forbidden LAIs for regional provision of service".

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.15.2 Conformance requirement

1. In response to a registration attempt, when receiving an LU reject with cause value "LA not allowed", the MS stores this LAI in a list of "forbidden LAIs for regional provision of service", to prevent repeated attempts to access a cell of the forbidden LA, GSM 03.22, 3.3.

2. If the MS has received the cause 'LA not allowed', it shall ignore this fact when selecting a cell to camp on, i.e. it shall not reject a cell for camping on because that cell is part of a LA where this cause has been received, GSM 03.22, 3.5.4.

3. In response to a registration attempt, when receiving an LU reject with cause value "LA not allowed", the MS continues to perform normal cell-reselection, GSM 03.22, 4.4.2

4. A new LU attempt shall only be performed when a new LA (or new PLMN) is entered according to the cell reselection procedure, GSM 03.22, 3.3 & figure 4.

NOTE: LA stands for "Location Area" and LU stands for "Location Update".

20.15.3 Test purpose

1. To verify that if an LU is rejected with cause "LA not allowed" that the LAI of that cell is written into a forbidden list which prevents the MS from performing LU onto another cell in that LA. This is verified indirectly in test purposes 2,3 and 4.

2. To verify that the MS will not reject a cell for camping on because that cell is part of a LA in the list of "forbidden LAIs for regional provision of service". This is verified indirectly by making the MS attempt an emergency call and checking that the channel request message is transmitted on the correct cell.

3. To verify that the MS when receiving an LU reject with cause value "LA not allowed", the MS continues to perform normal cell-reselection:

   Cell reselection is triggered if there is a better cell (in terms of the path loss criterion C2) in the same LA, or a much better cell in another LA of the selected PLMN (using the CRH parameter). GSM 03.22, 3.4 & 4.5.

4. To verify that a new LU attempt will be performed when a new LA (or new PLMN) is entered, GSM 03.22, 3.3 & figure 4.

20.15.4 Method of test

20.15.4.1 Initial conditions

Parameters changed from Default values table (table 20.1)

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	63 / -50	54 / -59	44 / -69	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	53 / -60	35 / -78	29 / -84			
CRH	14	0	10			
LAC	H1111	H2222	H1111			
ATT	1	1	1			
C1	10	19	15			
C2	10	19	15			

20.15.4.2 Procedure

a) The SS activates the carriers. The SS monitors all RA requests from MS on carriers 1, 2 & 3 until step e) has been completed. Only idle-paging is sent on all channels.

b) The MS is switched on.

c) When the MS performs an IMSI attach onto carrier 1, the SS shall reject it with cause "LA not allowed"

d) 30 seconds after the MS has returned to idle mode (channel release after LU reject), the MS is manually commanded to set up an emergency call.

NOTE 1: C2 of carrier 3>C2 of carrier 1. Carriers 1 and 3 belong to the same LA.

e) The SS rejects the CM service request from the MS, with a CM service reject message with cause value #17 (Network Failure).

NOTE 2: Cause values #4 (IMSI unknown in VLR) or #6 (Illegal ME) lead to unwanted behaviour of the mobile.

f) 10 seconds after the MS has returned to idle mode (channel release after CM service reject), the SS increases the level of carrier 2 to 65 dBμV emf().

NOTE 3: C2 of carrier 2 = 30, now larger than C2 of carrier 3 + CRH.

g) The SS shall accept any LU on carrier 2.

20.15.5 Test requirements

1) After step b), the MS shall respond on carrier 1 within 33 s.

2) In step d), the MS shall access on carrier 3 with a channel request message, within 15 seconds of being commanded to set up the emergency call.

3) After increasing the level of carrier 2 in step f), the MS shall reselect and access onto carrier 2 requesting an LU within 30 seconds.

NOTE 1: 13,75 seconds to perform running average, 10 seconds to detect C2 differences, 2,4 seconds to read BCCH of carrier 2, 1 second to perform RA. Total 27,15 seconds, allow 30 seconds.

20.16 Downlink signalling failure

20.16.1 Definition and applicability

See conformance requirement.

20.16.2 Conformance requirement

The downlink signalling failure criterion is based on the downlink signalling failure counter DSC.

1. When the MS camps on a cell, DSC shall be initialized to a value equal to the nearest integer to 90/N where N is the BS_PA_MFRMS parameter for that cell (see GSM 05.02).

2. Thereafter, whenever the MS attempts to decode a message in its paging subchannel; if a message is successfully decoded DSC is increased by 1,(however never beyond the nearest integer to 90/N).

3. Whenever the MS can not successfully decode a message in its paging subchannel the DSC is decreased by 4.

4. When DSC reaches 0, a downlink signalling failure shall be declared. A downlink signalling failure shall result in cell reselection, GSM 03.22, 4.5 (ii) and GSM 05.08, 6.5.

NOTE: The network sends the paging subchannel for a given MS every BS_PA_MFRMS multiframes. The requirement for network transmission on the paging subchannel is specified in GSM 04.08. The MS is required to attempt to decode a message every time its paging subchannel is sent.

20.16.3 Test purpose

1. To verify that the MS initializes the DSC counter in accordance with the conformance requirement. This is verified indirectly.

2. To verify that whenever the MS successfully decodes a message on paging subchannel, the DSC is increased by 1, (however never beyond the nearest integer to 90/N). This is verified indirectly.

3 To verify that whenever the MS can not successfully decode a message on paging subchannel, the DSC decreased by 4. This is verified indirectly.

4. To verify that when the DSC reaches 0, a downlink signalling failure shall be declared and the MS will perform cell reselection.

20.16.4 Method of test

20.16.4.1 Initial conditions

Two BCCH carriers are established with the system information contents of table 20.1.

Parameters changed from Default values table (table 20.1) are below

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	43 / -70	33 / -80	OFF	OFF	OFF	OFF
C1 = C2	20	10				

NOTE: The DSC counter will have a value 18 (90/5).

20.16.4.2 Procedure

a) The MS is switched on. On carrier 1 valid layer 3 messages shall be sent in the paging blocks, but not paging the MS (idle paging). On carrier 2 the MS is paged continuously in all paging blocks.

b) After 40 s the SS sends corrupted data (using random data, wrong parity bits see GSM 05.03, 4.3 & 4.1.2 or other lower layer error) in four successive paging blocks to carrier 1 and then reverts to sending normal data.

NOTE 1: Sending corrupted, i.e. non-decodable data on four successive paging blocks should decrease the DSC to 2.

c) The SS monitors all accesses on both carriers for 30 s.

d) The SS sends corrupted data in five successive paging blocks to carrier 1 and then reverts to sending normal data.

NOTE 2: Sending random, data on five successive paging blocks should decrease the DSC to < 0 and cause a cell reselection.

e) The SS monitors all accesses on both carriers for 30 s.

20.16.5 Test requirements

1) There shall be no access to carrier 2 in test steps a) and c).

2) The MS shall access on carrier 2 at test step e) within 15 seconds.

20.17 Cell selection if no suitable cell found in 10 s

20.17.1 Definition and applicability

See conformance requirement.

20.17.2 Conformance requirement

If no suitable cell is found in cell reselection process within 10 seconds, the cell selection algorithm of GSM 03.22 shall be performed, GSM 05.08; 6.6.2.

20.17.3 Test purpose

To verify that the MS fulfils the conformance requirement

20.17.4 Method of test

20.17.4.1 Initial conditions

One BCCH carrier is established with the system information contents of table 20.1.

Parameters changed from Default values table (table 20.1) are below

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	43 / -70	OFF	OFF	OFF	OFF	OFF
C1 = C2	20					

20.17.4.2 Procedure

a) The MS is switched on. Idle paging is sent on carrier 1.

b) After the MS indicates service the SS reduces the transmit level of carrier 1 to 13 dBμV emf() (so that C1 of carrier 1 becomes -10) and turns on a new carrier (carrier 2) at a level of 33 dBμV emf(). Carrier 2 shall not be in the MS BA list (i.e. it shall not be one of the carriers that MS has been monitoring after camped on carrier 1)

c) The SS shall monitor all accesses on carriers 1 and 2 for 60 s.

NOTE: The access on carrier 2 should not take longer than 50 s. (5 seconds to rxlev averages, 5 s for C1<0 duration, 10 s for searching another suitable cell, 30 s for cell selection), 60 s is a safe time to wait.

20.17.5 Test requirements

The MS shall access on carrier 2 at test step c) within 60 s.

20.18 Cell reselection due to MS rejection "Roaming not allowed in this LA"

20.18.1 Definition and applicability

While camped on a cell of the selected PLMN the MS may need to select a different cell in order to fulfil the normal service state. This ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink.

The MS looks for suitable neighbour cells which satisfies 4 constraints including that It should not be in an LA which is in the list of "forbidden LAs for roaming".

This test is applicable for all types of GSM 400, GSM 900 and DCS 1 800 MSs.

20.18.2 Conformance requirement

1. To prevent repeated attempts to have roaming service on a not allowed LA, when the MS is informed that an LA is forbidden, the LA is added to a list of "forbidden LAs for roaming" which is stored in the MS, GSM 03.22; 3.1.

2. If the MS has received the cause "Roaming not allowed in this LA", in response to a LU attempt, the Network Selection Procedure shall be started, GSM 03.22; 4.3.3 L3, GSM 04.08; 4.4.4.7.

3. The MS can only perform camping on a suitable cell, which:

   - should not be in an LA which is in the list of "forbidden LAs for roaming" GSM 03.22, 3.2.1.

NOTE: LA stands for "Location Area" and LU stands for "Location Update".

20.18.3 Test purpose

1. To verify that if an LU is rejected with cause "Roaming not allowed in this LA", that the LAI of that cell is written into a forbidden list which prevents the MS from camping onto any cell in that LA.

2. To verify that if the MS has received the cause "Roaming not allowed in this LA", in response to a LU attempt, the Network Selection Procedure is initiated. This is verified indirectly by test purpose 3, in that the new LA is accessed as part of cell selection, hence CRH is disregarded.

3. To verify that if an LU is rejected, when attempting LU in a LA with LAI = LAI1, with cause "Roaming not allowed in this LA" and only cells of the selected PLMN are available, the MS will only camp and attempt LU in any LA with LAI <> LAI1.

20.18.4 Method of test

20.18.4.1 Initial conditions

Parameters changed from Default values table (table 20.1)

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	63 / -50	53 / -60	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	23 / -90	23 / -90				
MNC	MNC <> HPLMN	MNC <> HPLMN				
MCC	MCC of HPLMN	MCC of HPLMN				
CRH	0	0				
LAC	H1111	H2222				
ATT	1	1				
C1	40	30				
C2	40	30				

20.18.4.2 Procedure

a) The MS is switched on. Idle paging is sent on all carriers.

b) The SS monitors all RA requests from MS on carriers 1 & 2.

c) When the MS performs an IMSI attach onto carrier 1, the SS shall reject it with cause "Roaming not allowed in this LA".

d) The SS shall accept any LU on carrier 2.

e) The SS monitors all RA requests from MS on carriers 1 to 2.

20.18.5 Test requirements

1) The MS should respond on carrier 1 within 33 s of switch on.

2) After LU reject, the MS shall initiate the Network Selection Procedure and access onto Carrier 2 as part of cell selection within 33 seconds from returning to idle mode after the LU reject.

NOTE: The timing requirement in b) is given only for testing purposes only. No timing requirements are defined for the Network Selection Procedure, but the time allowed for cell selection (see 20.1) should be adequate.

3) After the LU reject on carrier 1, there shall be no more access attempts on this carrier.

20.19 Cell selection on release of SDCCH and TCH

20.19.1 Definition and applicability

20.19.2 Conformance requirement

1. When the SS releases a TCH or SDCCH and returns to idle mode, it shall, as quickly as possible camp on the BCCH carrier of the cell whose channel has just been released. If the full BCCH data for that cell was not decoded in the preceding 30s, the MS shall then attempt to decode the full BCCH data. Until the MS has decoded the BCCH data required for determining the paging group, it shall also monitor all paging blocks on timeslot 0 of the BCCH carrier for possible paging messages that might address it. If the MS receives a page before having decoded the full BCCH data for the cell, the MS shall store the page and respond once the full BCCH data has been decoded, provided that the cell is not barred and the MSs access class is allowed. GSM 05.08, 6.7.

20.19.3 Test purpose

1. To verify that on release of a TCH or an SDCCH, the MS camps as quickly as possible on the BCCH carrier of the cell whose channel has just been released.

NOTE: This is implicitly tested by the MS responding to a paging request. The decoding of BCCH data cannot be explicitly tested. However, the MS shall monitor for paging messages which may address it if it decodes the BCCH.

20.19.4 Method of test

20.19.4.1 Initial conditions

a) Parameters changed from default values in table 20.1

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBmV emf() / dBm)	53 / -60	33 / -80	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBmV emf() / dBm)	23 / -90	23 / -90				
BS_PA_MFRMS	2	2				
ATT	1					
C1	30	10				
C2	30	10				

b) Carrier 1 is configured to have a combined control channel.

c) Carrier 2 is configured to have a non combined control channel.

20.19.4.2 Test procedure

a) The SS activates the carriers. No paging messages are transmitted on carrier 1 or carrier 2.

b) The MS is switched on.

c) In response to the MS access for IMSI attach, the SS allocates a combined SDDCH/4, accepts the IMSI attach procedure and then releases the link. After 0,5 seconds but within 1 second of transmitting the UA frame on completion of the IMSI attach procedure, the SS transmits a single PAGING REQUEST in the appropriate paging block of the MS on carrier 1.

d) When the MS responds to paging, the SS establishes a call on a traffic channel.

e) The SS increases the level of carrier 2 to 63 dBmV emf().

f) After 10 seconds the SS performs a handover to another TCH, with the parameters of carrier 2 indicated in the CELL DESCRIPTION information element of the HANDOVER COMMAND message.

g) After a further 10 seconds, the SS clears down the call. After 0,5 seconds but within 1 second of transmitting the UA frame, the SS transmits a single PAGING REQUEST on carrier 2 in the appropriate paging block of the MS.

20.19.5 Test requirements

1) After step b) the MS shall access in order to commence an IMSI attach procedure on carrier 1 within 33 seconds.

2) In step c), the MS shall respond to paging within 3 seconds of transmitting the PAGING REQUEST.

3) In step g), the MS shall respond to paging within 3 seconds of transmitting the PAGING REQUEST.

20.20 Multiband cell selection and reselection

20.20.1 Multiband cell selection and reselection / Cell Selection

20.20.1.1 Definition and applicability

Multiband cell selection is a process in which a multiband MS, whenever a new PLMN is selected, attempts to find a suitable cell of that PLMN to camp on, irrespective of frequency band. Two methods of searching for a suitable cell are possible, normal cell selection and stored list cell selection. The process ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink. Once the MS is camped on a cell, access to the network is allowed.

This test is applicable for any multiband MSs supporting simultaneous multiband operation.

20.20.1.2 Conformance requirement

1. A multiband MS shall search all channels within its bands of operation (35 for GSM 450, 35 for GSM 480, 124 for P-GSM, 174 for E-GSM and 374 for DCS). The number of channels searched will be the sum of channels on each band of operation; GSM 05.08, 6.2.

2. The MS shall be able to select the correct (fourth strongest) cell and be able to respond to paging on that cell within 30 seconds of switch on, when the three strongest cells are not suitable. This assumes a valid SIM, with PIN disabled and ideal radio conditions; GSM 05.08, 6.1.

3. There are various requirements that a cell must satisfy before an MS can perform normal camping on it:

   3.1 (i) It should be a cell of the selected PLMN

   3.2 (ii) It should not be "barred" (see section 3.5.1)

3.3 (iv) The radio path loss between MS and BTS must be below a threshold set by the PLMN operator. This is estimated as shown in section 3.6.

GSM 03.22, 3.2.1.

NOTE: Criteria (iii) is not applicable for Cell Selection

4. Initially the MS looks for a cell which satisfies these 4 constraints ("suitable cell") by checking cells in descending order of received signal strength. If a suitable cell is found, the MS camps on it; GSM 03.22, 3.2.1.

5. The MS shall be able to calculate correctly the path loss criterion parameter C1, used for cell selection and reselection; GSM 05.08, 6.4.

20.20.1.3 Test purpose

1. To verify that the MS meets conformance requirement 1.

2. To verify that the MS meets conformance requirement 2 in a multiband environment.

3. To verify that:

   3.1 The MS does not select a cell of a PLMN which is not the selected PLMN.

   3.2 The MS does not select a cell which is "barred".

   3.3 The MS does not select a cell with C1<0.

4. To verify that the MS selects suitable cells in descending order of received signal strength, irrespective of frequency band.

5. To verify that the MS does not select a cell with C1<0.

20.20.1.4 Method of test

20.20.1.4.1 Initial conditions

Parameters changed from the default values in table 20.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBmV emf() / dBm)	48 / -65	36 / -77	43 / -70	33 / -80	23 / -90	OFF
CBA	1	0	0	0	0	
RXLEV_ACCESS_MIN (dBm)	-90	-69	-90	-88	-98	
MNC			01			
MCC			002			
MS_TXPWR_MAX_CCH	7	7		7		
C1	25	-8	20	8	8	
C2	25	-8	20	8	8	

Carrier 1, carrier 2 and carrier 4 ARFCNs are chosen in the lower band (GSM 400 or GSM 900), carrier 3 and carrier 5 ARFCNs in the higher band (GSM 900 or DCS 1800).

20.20.1.4.2 Procedure

a) The SS activates the carriers and monitors carriers 2, 4 and 5 for RA requests from the MS.

b) The MS is switched on.

c) The MS is switched off.

d) The SS monitors carriers 1 and 3 for RA requests from the MS

e) The MS is switched on.

f) The MS is switched off.

g) The SS is reconfigured and sets MCC of carrier 3 to 001 (same as the other carriers).

h) The SS activates the carriers and monitors carriers 3, 4 and 5 for RA requests from the MS.

i) The MS is switched on.

j) The MS is switched off.

k) For multiband MS supporting three or more bands all combinations of two bands shall be tested using the steps from a) to j).

20.20.1.4.3 Related PICS/PIXIT statement(s)

Support for stored list cell selection Yes/No.

20.20.1.5 Test requirements

1) After step b), the first response from the MS shall be on carrier 4 within 33 seconds. If the MS supports stored list cell selection MS may be also on carrier 5. There shall be no response from the MS on carrier 2.

2) After step e), there shall be no response from the MS on either carrier 1 or carrier 3 within 33 seconds.

3) After step i), the first response from the MS shall be on carrier 3 within 33 seconds. If the MS supports stored list cell selection the first response may be also on carrier 4 or carrier 5.

20.20.2 Multiband cell selection and reselection / Cell reselection

20.20.2.1 Definition and applicability

While camped on a cell of the selected PLMN the multiband MS may need to select a different cell (irrespective of frequency band used) in order to fulfil the normal service state. This ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink.

This test is applicable for any multiband MS supporting simultaneous multiband operation.

20.20.2.2 Conformance requirement

1. The list of the 6 strongest non-serving carriers shall be updated at least as often as the duration of the running average defined for measurements on the BCCH allocation and may be updated more frequently; GSM 05.08, 6.6.1.

2. When the MS recognizes that a new BCCH carrier has become one of the 6 strongest, the BCCH data shall be decoded for the new carrier within 30 seconds; GSM 05.08, 6.6.1.

3. The MS shall be able to calculate correctly the path loss criterion parameter C2 used for cell reselection; GSM 05.08, 6.4.

20.20.2.3 Test purpose

1. To verify that MS meets conformance requirement 1.

2. To verify that MS meets conformance requirement 2.

3. To verify that the MS calculates the C2 parameter correctly when the CELL_RESELECT_OFFSET, and PENALTY_TIME parameters are used to give different priorities to different frequency bands.

20.20.2.4 Method of test

20.20.2.4.1 Initial conditions

Six BCCH carriers are established with the system information contents of table 20.1.

Parameters changed from Default values table 20.1 are below:

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6	Carrier 7
RF signal level (dBmV emf ( )/dBm)	53 / -60	48 /-65	43 / -70	38 / -75	33 / -80	33 /-80	43 / -70
RXLEV_ACCESS_MIN (dBm)	-90	-90	-90	-90	-90	-90	-110
PT							11111
CRO							20 dB
MS_TXPWR_MAX_CCH	7	7	7				
C1	30	25	20	15	10	10	40
C2	30	25	20	15	10	10	20

Carrier 1, 2 and 3 ARFCNs are chosen in the lower band (GSM 400 or GSM 900), carrier 4, 5, 6 and 7 ARFCNs in the higher band (GSM 900 or DCS 1800).

The BA(BCCH) list contains only eight ARFCNs and includes those of carriers 1 to 7.

BS_PA_MFRMS is set to 3 during this test.

NOTE: The combination of 8 carriers on the BA list and BS_PA_MFRMS = 3 leads to averaging time of 5 seconds. Hence 5 seconds is also the updating time of the list of six strongest neighbour carriers.

20.20.2.4.2 Procedure

a) The SS activates carriers 1 to 6. The MS is not paged on any of the carriers.

b) The MS is switched on.

c) After 60 seconds, the SS deactivates carrier 4 and activates carrier 7 and pages the MS continuously on carrier 7. The SS monitors carrier 7 for RA requests from the MS.

d) The MS is switched off.

e) The SS is reconfigured and sets PT = 0 and CRO = 0 on carrier 7 (thus increasing C2 to 40 dB).

f) The SS activates carriers 1 to 6. The MS is not paged on any of the carriers.

g) The MS is switched on.

h) After 60 seconds, the SS deactivates carrier 4 and activates carrier 7 and pages the MS continuously on carrier 7. The SS monitors carrier 7 for RA requests from the MS.

i) 20 seconds after receiving an RA request on carrier 7 the SS sets PT = 11111 and CRO = 20 dB on carrier 7 (thus decreasing C2 to 20dB), stops paging on carrier 7, and pages the MS continuously on carrier 1. The SS monitors carrier 1 for RA requests from the MS.

j) The MS is switched off.

k) For multiband MS supporting three or more bands all combinations of two bands shall be tested using the steps from a) to j).

20.20.2.5 Test requirements

1) After step c) there shall be no response from the MS on carrier 7 within 55 s of activating carrier 7.

2) After step h) the MS shall access on carrier 7 within 55 s of activating carrier 7.

NOTE: 5,5 seconds to notice new strongest carrier in top 6 (because the updating time for six strongest is 5 seconds (+10 %)), 33 seconds to read BCCH, 15 seconds for reselection, since the MS has already performed the running average on the new strongest carrier, allow 55 seconds.

3) After step i) the MS shall access on carrier 1 within 55 s of setting PT and CRO on carrier 7.

20.21 R-GSM cell selection and reselection

This clause is applicable for the MS supporting R-GSM band except when otherwise stated.

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

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

The SS transmits one BCCH carrier per cell as indicated in the initial conditions for each test. These are referred to as carrier 1, carrier 2, etc. It is assumed that the SS can simultaneously transmit seven BCCH carriers and monitor three random access channels. For multiband tests it is assumed that at least one of the BCCH carriers and one of the monitored random access channels is in a different frequency band from the others. In some cases, a test is performed in multiple stages in order that the requirements can be tested within the above constraints.

For any MS all the carriers are in its supported band(s) of operation. For an R-GSM mobile station at least one of the carriers is chosen between ARFCN 955-974 and one of the carriers is in the primary band.

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

- The SS is continuously paging the MS on all carriers at the start of the test and does not respond to RACH requests from the MS. Where a test specifies that the MS is not paged on a particular carrier, only idle paging is transmitted according to GSM 04.08, 3.2.2.2.

- The default values of the system information data fields given in table 20.21.1 are used.

- The SIM is in the idle updated state in the default location area with a TMSI assigned at the beginning of each test.

- The ARFCNs used for the carriers in each test are chosen from those in table 20.21.1 with adjacent carriers separated by a minimum of three channels.

The absolute accuracy of the MS signal level measurements is assumed to be +/-6 dB. A difference of at least 8 dB is allowed for cases of discrimination between C1 or C2 values and 0.

The relative accuracy of the MS signal level measurements is assumed to be +/-3 dB for the signal levels used in the tests of this section, except for section 20.20, where the relative accuracy is assumed to be +/-5 dB if the measurements are on different frequency bands. A difference of at least 5 dB is allowed for cases of discrimination between C1 or C2 values on different carriers, except for section 20.20, where a difference of at least 10 dB is allowed if the measurements are on different frequency bands.

NOTE 1: The accuracy of MS signal level measurements is specified in GSM 05.08. For all of the tests in this section, the signal levels used are greater than 1 dB above reference sensitivity level.

NOTE 2: The tolerance on timers specified in GSM 05.08 is +/-10 % except for PENALTY_TIME where it is +/-2 seconds. In the tests of this section, the test requirements include these tolerances. Consequently, the times stated in the test requirement sometimes differ from the corresponding timer in the conformance requirement.

Where pulsed signals are specified, the SS tolerance on pulse width is +/-2 % and the SS tolerance on power level +/-1 dB.

Table 20.21.1: Default values of the system information fields

Parameter	GSM 04.08 reference	Abbr.	Normal Setting
Cell channel description	10.5.2.1	-	Any values
MAX retrans	10.5.2.29	-	1
TX-integer	10.5.2.29	-	Any value
CELL_BAR_QUALIFY	10.5.2.35	CBQ	0
CELL_BAR_ACCESS	10.5.2.29	CBA	0 (not barred)
AC CN	10.5.2.29	AC	All 0
RE	10.5.2.29	RE	0 (re-establishment allowed)
NCC	10.5.2.2	NCC	Any value
Cell Identity	10.5.1.1	-	Any value
MCC, MNC	10.5.1.3	PLMN	MS Home PLMN
LAC	10.5.1.3	LAC	1111 (Hex)
ATT	10.5.2.11	-	0 (Attach/Detach not allowed)
BS_AG_BLKS_RES	10.5.2.11	-	Any values
T3212	10.5.2.11	-	Any values
BS_PA_MFRMS	10.5.2.11	BPM	5 frames
Cell Options	10.5.2.3	-	Any values
CELL_RESELECT_HYSTERESIS	10.5.2.4	CRH	4 dB
MS_TXPWR_MAX_CCH	10.5.2.4	MTMC	Max. output power of MS
RXLEV_ACCESS_MIN	10.5.2.4	RAM	-90 dBm
CELL_RESELECT_OFFSET	10.5.2.35	CRO	0
TEMPORARY_OFFSET	10.5.2.35	TO	0
PENALTY_TIME	10.5.2.35	PT	0
Power Offset	10.5.2.35	PO	0
BA ARFCN	10.5.2.22	BA	All 0 except:
			For GSM900, both P-GSM and R-GSM ARFCNs are broadcast: GSM ARFCNs 3, 9, 18, 25, 41, 43, 49, 50, 54, 58, 62, 66, 70, 80, 92, 124, broadcast in SYSTEM INFORMATION type 2 R-GSM ARFCNs 956, 960, 969, 985, 989, 995, 1010, 1014 broadcast in SYSTEM INFORMATION type 2bis
			For DCS1800 ARFCNs 512, 543, 568, 589, 602, 641, 662, 683, 696, 711, 732, 754, 794, 851, 870, 871, 872, 884 broadcast in SYSTEM INFORMATION TYPE 2.
			For multiband tests, ARFCNs 3, 18, 41, 49, 62, 70, 92, 124 broadcast in SYSTEM INFORMATION TYPE 2 (GSM cell) and TYPE 2ter (DCS cell), and ARFCNs 512, 568, 602, 662, 696, 732, 794, 870 broadcast in SYSTEM INFORMATION TYPE 2 (DCS cell) and TYPE 2ter (GSM cell)

20.21.1 R-GSM cell selection

20.21.1.1 Definition and applicability

Cell selection is a process in which a MS, whenever a new PLMN is selected, attempts to find a suitable cell of that PLMN to camp on. Two methods of searching for a suitable cell are possible, normal cell selection and stored list cell

selection. The process ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink. Once the MS is camped on a cell, access to the network is allowed.

20.21.1.2 Conformance requirement

1. The MS shall be able to select the correct (fourth strongest) cell and be able to respond to paging on that cell within 30 seconds of switch on, when the three strongest cells are not suitable. This assumes a valid SIM, with PIN disabled and ideal radio conditions; GSM 05.08, 6.1.

2. There are various requirements that a cell must satisfy before an MS can perform normal camping on it:

   2.1 (i) It should be a cell of the selected PLMN

   2.2 (ii) It should not be "barred" (see section 3.5.1)

   2.3 (iv) The radio path loss between MS and BTS must be below a threshold set by the PLMN operator. This is estimated as shown in section 3.6.

   GSM 03.22, 3.2.1.

   NOTE: Criteria (iii) is not applicable for Cell Selection.

3. Initially the MS looks for a cell which satisfies these 4 constraints ("suitable cell") by checking cells in descending order of received signal strength. If a suitable cell is found, the MS camps on it; GSM 03.22, 3.2.1.

4. The MS shall be able to calculate correctly the path loss criterion parameter C1, used for cell selection and reselection; GSM 05.08, 6.4.

20.21.1.3 Test purpose

1. To verify that the MS meets conformance requirement 1.

2. To verify that:

   2.1 The MS does not select a cell of a PLMN which is not the selected PLMN.

   2.2 The MS does not select a cell which is "barred".

   2.3 The MS does not select a cell with C1<0.

3. To verify that the MS selects suitable cells in descending order of received signal strength.

4. To verify that the MS does not select a cell with C1<0.

20.21.1.4 Method of test

20.21.1.4.1 Initial conditions

Parameters changed from the default values in table 20.21.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	48 / -65	38 / -75	43 / -70	33 / -80	28 / -85	OFF
CBA	1	0	0	0	0	
RXLEV_ACCESS_MIN (dBm)	-90	-67	-90	-88	-98	
MNC			01			
MCC			002			
C1	25	-8	20	8	13	
C2	25	-8	20	8	13	

Carrier 2 and carrier 4 are chosen between ARFCN 955 - 974.Carrier 1 is chosen between 975 - 1023, 0; and carrier 3 remains in the P-GSM band.

20.21.1.4.2 Procedure

a) The SS activates the carriers and monitors carriers 2, 4 and 5 for RA requests from the MS.

b) The MS is switched on.

c) The MS is switched off.

d) The SS monitors carriers 1 and 3 for RA requests from the MS

e) The MS is switched on.

20.21.1.5 Test requirements

1) After step b), the first response from the MS shall be on carrier 4 within 33 seconds. There shall be no response from the MS on carrier 2.

2) After step e), there shall be no response from the MS on either carrier 1 or carrier 3 within 33 seconds.

20.21.2 R-GMS cell selection with varying signal strength values

20.21.2.1 Definition and applicability

For definition see conformance requirement.

20.21.2.2 Conformance requirement

1. The MS shall:

   The MS shall search all RF channels in the system (194 ARFCNs for R-GSM), take readings of received RF signal strength on each RF channel, and calculate the received level average for each. The averaging is based on at least five measurement samples per RF carrier spread over 3 to 5 s, the measurement samples from the different RF carriers being spread evenly during this period. GSM 05.08, 6.2.

   1.1 The MS shall search all RF channels in the system (194 ARFCNs for R-GSM), take readings of received RF signal strength on each RF channel, and calculate the received level average for each.

   1.2 The averaging is based on at least five measurement samples per RF carrier spread over Tav (3 to 5 s).

   1.3 The measurement samples from the different RF carriers being spread evenly during this period.

2. These quantities are termed the "receive level averages", shall be unweighted averages of the received signal strengths measured in dBm. GSM 05.08, 6.1.

20.21.2.3 Test purpose

1. To verify that:

   1.1 The MS meets conformance requirement 1.1.

   1.2 The MS meets conformance requirement 1.2.

   1.3 The MS meets conformance requirement 1.3.

2 To verify that the MS meets conformance requirement 2.

20.21.2.4 Method of test

20.21.2.4.1 Initial conditions

Parameters changed from the default values in table 20.21.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	23 / -90	58 / -55	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	13 / -100	13 / -100				
C1	10	53				

Carrier 1 is chosen between ARFCN 955 - 974.

The manufacturer of the equipment shall declare his averaging time Tav. This time is the time between the first and the last measurement sample taken on one carrier during one averaging period.

20.21.2.4.2 Procedure

a) The SS transmits on carriers 1 and 2. After a period of b*Tav carrier 2 reduces its transmit level to -85 dBm (28 dBµV emf( )). After a further period of a*Tav, carrier 2 increases its transmit level again to -55 dBm (58 dBµV emf( )). Switching of carrier 2 continues with these levels and duty cycle until the end of the test.

   Tav is the averaging time declared by the manufacturer.

   The parameters a and b are chosen according to the following rules:

   (a + b) * Tav > Tav

   0 < a * Tav < 2/3 * Tav

   0,5 * Tav < b * Tav < Tav

   In the equations < and > means at least one TDMA frame less or greater than the given value.

   While satisfying the conditions given above:

   a is chosen to be as close as possible to 2/3.

   b is chosen to be as close as possible to 0,5.

b) The MS is switched on.

c) The SS monitors all RA requests from MS on carriers 1 and 2.

20.21.2.5 Test requirements

In step c), the first response from the MS shall be on carrier 2 within 33 seconds.

NOTE 1: With the selected duty cycle it can be guaranteed that a "good" MS passes the test even at the worst case situations. The minimum averaged value of carrier 2 is in any case higher or equal to -75 dBm which is still 6 dB above carrier 1's level (for a "good" MS).

NOTE 2: With the selected levels and duty cycle the probability that a "bad" MS (i.e. MS that averages over shorter period than 3 s) fails the test is maximized. However, it can not be guaranteed that all the MSs not fulfilling the conformance requirement of averaging or uniform sampling will fail this test.

20.21.3 R-GSM basic cell reselection

20.21.3.1 Definition and applicability

While camped on a cell of the selected PLMN the MS may need to select a different cell in order to fulfil the normal service state. This ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink.

20.21.3.2 Conformance requirement

1. While camped on a cell of the selected PLMN ("camped normally"), the MS may need to select a different cell ("normal cell reselection" state). The following events trigger a cell reselection:

   1.1 (iii) The cell camped on (current serving cell) has become barred.

   1.2 (iv) There is a better cell (in terms of the path loss criterion C2) in the same LA, or a much better cell in another LA of the selected PLMN (using the CRH parameter).

   The MS will then reselect a new cell in order to fulfil the process goal.; GSM 03.22, 4.5.

NOTE 1: Criterion (i) is tested in section 20.21.8 (Cell reselection when C1(serving cell) < 0 for 5 seconds).

NOTE 2: Criterion (ii) is tested section 20.21.16 (Downlink signalling failure).

NOTE 3: Criterion (v) is tested in section 20.21.6 (Cell reselection timings).

2. There are various requirements that a cell must satisfy before an MS can perform normal camping on it:

   2.1 (ii) It should not be "barred".

   2.2 (iv) The radio path loss between MS and BTS must be below a threshold set by the PLMN operator. GSM 03.22, 3.2.1.

NOTE 4: Criterion (i) is not relevant for cell reselection and for cell selection it is tested in section 20.21.1.

NOTE 5: Criterion (iv) refers to the C1 parameter.

3. The MS shall be able to calculate correctly the path loss criterion parameter C2 used for cell reselection; GSM 05.08, 6.4.

4. At least every 5 s the MS shall calculate the value of C1 and C2 for the serving cell and recalculate C1 and C2 values for non serving cells (if necessary). The MS shall then check whether:

   i) The path loss criterion (C1) for current serving cell falls below zero for a period of 5 seconds. This indicates that the path loss to the cell has become too high.

   ii) The calculated value of C2 for a non-serving suitable cell exceeds the value of C2 for the serving cell for a period of 5 seconds, except in the case of the new cell being in a different location area in which case the C2 value for the new cell shall exceed the C2 value of the serving cell by at least CELL_RESELECT_HYSTERESIS dB as defined by the BCCH data from the current serving cell, for a period of 5 seconds. This indicates that it is a better cell. GSM 05.08, 6.6.2.

5. The MS shall attempt to decode the full BCCH data of the serving cell at least every 30 seconds; GSM 05.08, 6.6.1.

20.21.3.3 Test purpose

1. To verify that:

   1.1 The MS meets conformance requirement 1.1.

   1.2 The MS meets conformance requirement 1.2.

2. To verify that:

   2.1 The MS does not reselect a cell which is barred.

   2.2 The MS does not reselect a cell which has a C1<0.

3. To verify that the MS calculates the C2 parameter correctly when the CELL_RESELECT_OFFSET, TEMPORARY_OFFSET and PENALTY_TIME parameters are not used.

4. To verify that the MS takes into account the CELL_RESELECT_HYSTERESIS parameter when reselecting a cell in a different location area.

5. To verify that the MS decodes the CELL_BAR_ACCESS and CELL_BAR_QUALIFY parameters from the BCCH every 30 seconds.

20.21.3.4 Method of test

20.21.3.4.1 Initial conditions

Parameters changed from the default values in table 20.21.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	43 / -70	33 / -80	43 / -70	38 / -75	38 / -75	
RXLEV_ACCESS_MIN (dBm)	-85	-90	-90	-85	-67	
CRH	10 dB					
LAC			different from other carriers			
CBA				1		
CBQ				0		
C1	15	10	20	10	-8	
C2	15	10	20	10	-8	

The BA(BCCH) list only contains the ARFCNs of the carriers used during the test.

20.21.3.4.2 Procedure

a) The SS activates carriers 1, 2, 4 and 5. The MS is not paged on carrier 1. The SS monitors carriers 2, 4 and 5 for RA requests from the MS.

b) The MS is switched on.

c) The SS stops paging on all carriers except carrier 2. The level of carrier 2 is increased to 43 dBµVemf (C2 becomes 20 dB), and the SS monitors carrier 2 for RA requests from the MS.

d) When the SS receives a response from the MS on carrier 2, it stops paging the MS on this carrier.

e) The MS is switched off.

f) The SS is reconfigured and sets CBA = 1 on carriers 1 and 5.

g) The MS is switched on.

h) After 33 seconds, the SS starts paging continuously on carrier 1 and sets CBA=1 on carrier 2 and CBA=0 on carriers 1, 4 and 5.

i) When the SS receives a response on carrier 1, it stops paging the MS and waits for 25 seconds. (The MS should reselect and camp onto carrier 1).

j) The SS activates carrier 3, pages the MS continuously on this carrier and monitors carrier 3 for RA requests from the MS.

k) The SS increases the level of carrier 3 to 53 dBμVemf (C2 increases to 30 dB.).

20.21.3.5 Test requirements

1) After step b), there shall be no response from the MS on carriers 2, 4, or 5 within 50 seconds.

2) In step c), the MS shall respond on carrier 2 within 20 seconds of increasing the level of carrier 2.

NOTE 1: 5 seconds to perform running average, 10 seconds to detect C2 differences, 2,4 seconds to read BCCH of carrier 2, 1 second to perform RA. Total 18,4 seconds, allow 20 seconds.

3) In step h), the MS shall respond on carrier 1 within 50 seconds of setting CBA=1 on carrier 2.

NOTE 2: 33 seconds for the MS to read the BCCH of carrier 2 (30 seconds + 10 %), 15 seconds for the MS to reselect cell 1, since the MS already has a running average on carrier 1, allow 50 seconds.

4) After step j), there shall be no response from the MS within 50 seconds.

5) After step k), the MS shall respond on carrier 3 within 20 seconds.

20.21.4 R-GSM cell reselection using TEMPORARY_OFFSET, CELL_RESELECT_OFFSET, POWER_OFFSET and PENALTY_TIME parameters

20.21.4.1 Definition and applicability

20.21.4.2 Conformance requirement

1. The MS shall be able to calculate correctly the path loss criterion parameter C2 used for cell reselection; GSM 05.08, 6.4.

20.21.4.3 Test purpose

1. To verify that the MS calculates the C2 parameter correctly when the CELL_RESELECT_OFFSET, TEMPORARY_OFFSET and PENALTY_TIME parameters are used.

2. To verify DCS 1 800 MS correctly calculate the C2 parameter when the POWER_OFFSET parameter is present.

20.21.4.4 Method of test

20.21.4.4.1 Initial conditions

Parameters changed from the default values in table 20.21.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBμV emf() / dBm)	53 / -60	43 / -70	48 / -65	48 / -65		
RXLEV_ACCESS_MIN (dBm)	-80	-100	-85	-85		
PT		11111	40 s	60 s		
CRO		16 dB	20 dB	20 dB		
TO			20 dB	20 dB		
K = 1						
C1	20	30	20	20		
C2	20	14	20 -> 40	20 -> 40		
K = 2 (DCS1800 Class 3 MS only)						
POWER_OFFSET	0	2	6	6		

The BA(BCCH) list only contains the ARFCNs of the carriers used during the test.

20.21.4.4.2 Procedure

For testing of GSM MS, the test procedure is performed for execution counter K = 1.

For testing of DCS 1 800 MS, the test procedure is performed for execution counter K = 1 and 2

On execution counter K = 1, the POWER_OFFSET Parameter is not present.

On execution counter K = 2, the POWER_OFFSET parameter is present.

a) The SS activates carriers 1 and 2. The MS is not paged on carrier 1. The SS monitors carrier 2 for RA requests from the MS.

b) The MS is switched on.

c) The SS increases the level of carrier 2 to 54 dBμVemf (C2 becomes 25 dB).

d) When the SS receives a response on carrier 2, the SS stops paging on that carrier and waits for 20 seconds (The MS should reselect and camp onto carrier 2).

e) The SS activates carriers 3 and 4 and continuously pages the MS on these carriers. The SS monitors carriers 3 and 4 for RA requests from the MS.

20.21.4.4.3 Requirements

For execution counter K = 1 and K = 2.

1) After step b), there shall be no response from the MS on carrier 2 within 50 seconds.

2) After step c), the MS shall respond on carrier 2 within 20 seconds of increasing the level of carrier 2.

3) After step e), there shall be no response from the MS on carrier 3 within 38 seconds of activating the carriers but, the MS shall respond on carrier 3 within 90 seconds. The response on carrier 3 shall be before any response on carrier 4.

NOTE: Minimum time of 38 seconds set by penalty timer on carrier 3 less 2 second tolerance. Maximum time, total of 33 seconds to read BCCH of carrier 3, 42 seconds for expiry of penalty timer on carrier 3, 15 seconds for reselection, since the MS will already have running averages on carriers 3 and 4, when the penalty timers expire, allow 90 seconds.

20.21.5 R-GSM cell reselection using parameters transmitted in the System Information type 2bis, type 2ter, type 7 and type 8 messages

20.21.5.1 Definition and applicability

System information (SI) type 7 and 8 are transmitted on the BCCH Ext when the system information type 4 message does not contain all information needed for cell selection.

The system information type 2 bis message is used when the system information type 2 message does not contain all neighbour cell ARFCNs.

The system information type 2 ter message is used when system information type 2 messages broadcast by one cell which are system information 2 or both system information 2 and 2bis do not contain all neighbour cell ARFCNs.

20.21.5.2 Conformance requirement

1. The MS shall be able to calculate correctly the path loss criterion parameter C2 used for cell reselection. GSM 05.08, 6.4.

2 Whilst in idle mode, an MS shall continue to monitor all BCCH carriers as indicated by the BCCH allocation. GSM 05.08, 6.6.1.

3 Mobile stations shall treat all ARFCNs in the set {0, 1, 2 ... 1023} as valid ARFCN values even if the mobile station is unable to transmit or receive on that ARFCN. GSM 04.08, 10.5.2.1b.

4 The MS shall correctly decodes parameters transmitted in the system information type 2 ter message. GSM 04.08, 9.1.34:

20.21.5.3 Test purpose

1. To verify that the MS correctly calculates the C2 criterion when the parameters affecting cell reselection are transmitted in the system information type 7 and 8 messages.

2. To verify that the MS decodes parameters transmitted in the system information type 2 bis message.

3. To verify that the MS treats ARFCNs as valid ARFCNs even if the MS is unable to transmit or receive on that ARFCN.

4. To verify that the MS correctly decodes parameters transmitted in the system information type 2 ter message.

20.21.5.4 Method of test

20.21.5.4.1 Initial conditions

a) Parameters changed from the default values in table 20.21.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	53 / -60	32 / -81	40 / -73	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	23 / -90	23 / -90	30 / -83			
BS_AG_BLKS_RES	1	1	1			
PT		0	0			
CRO		16 dB	10 dB			
TO		0 dB	0 dB			
C1	30	9	10			
C2	30	25	20			

b) The ARFCNs of carriers 1, 2 and 3 are chosen from those in table 20.21.1 with carrier 3 chosen between ARFCN 955 - 974.

c) The cell reselection parameters PENALTY_TIME, CELL_RESELECT_OFFSET and TEMPORARY_OFFSET are transmitted in the SI3, SI7 and SI8 messages on carrier 2. They are not transmitted in SI4 and the ADDITIONAL RESELECT PARAM IND parameter is set to 1.

d) The SI2bis message is transmitted on carrier 1 and contains the ARFCN of carrier 2 and ARFCNs 43, 70, 500, 550, 958, 963, 990 and 995. The ARFCN of carrier 2 is not transmitted in the SI2 message.

e) Carriers 1 and 2 are synchronized, but staggered in frame number so that the transmission of the SI3 message on carrier 2, coincides with the paging block which the MS is listening to on carrier 1.

NOTE: Under these conditions, the MS can only decode the parameters affecting cell reselection from the SI7 or SI8 messages.

To achieve this, the following conditions are used:

BS_PA_MFRMS = 4

IMSI mod 1000 = 12

FN carrier 1 = FN carrier 2-21, for simultaneously transmitted frames.

f) The SI3 message on carrier 2 indicates that SI2ter is used on carrier 2. SI2ter message contains the ARFCN of carrier 3 and ARFCNs 45, 76, 891, 905. The ARFCN of carrier 3 is transmitted neither in the SI2 nor in the SI2bis messages on carriers 1 and 2.

20.21.5.4.2 Test Procedure

a) The SS activates the channels. The MS is not paged on carrier 1.

b) The MS is switched on.

c) After 50 seconds, the SS increases the level of carrier 2 to 42 dBµVemf( ).

d) When the SS receives a response on carrier 2, the SS stops paging on that carrier and after 30 seconds, the SS increases the level of carrier 3 to 60 dBµVemf( ).

20.21.5.5 Test Requirements

1) After step b), there shall be no response from the MS on carrier 2. There shall also be no response on carrier 3.

2) After increasing the level of carrier 2 in step c), the MS shall respond on carrier 2 within 33 seconds.

3) After increasing the level of carrier 3 in step d), the mobile shall respond on carrier 3 within 35 seconds.

20.21.6 R-GSM cell reselection timings

20.21.6.1 Definition and applicability

20.21.6.2 Conformance requirement

1. At least every 5 s the MS shall calculate the value of C1 and C2 for the serving cell and recalculate C1 and C2 values for non serving cells (if necessary). The MS shall then check whether:

1.1 ii) The calculated value of C2 for a non-serving suitable cell exceeds the value of C2 for the serving cell for a period of 5 seconds,

1.2 In case ii) above, cell reselection shall not take place if there was a cell reselection within the previous 15 seconds.

1.3 Cell reselection for any other reason (see GSM 03.22) shall take place immediately, but the cell that the MS was camped on shall not be returned to within 5 seconds if another suitable cell can be found.;

GSM 05.08, 6.6.2.

20.21.6.3 Test purpose

1. To verify that:

1.1 The MS does not perform a cell reselection when the C2 value for a non serving cell does not exceed the C2 value of the serving cell for a period of at least 5 seconds.

1.2 The MS meets conformance requirement 1.2 with an allowance for the uncertainty of the test.

1.3 When the MS performs an immediate cell reselection due to an unsuccessful random access attempt, the cell that the MS was camped onto is not returned to within 5 seconds when another suitable cell exists.

20.21.6.4 Method of test

20.21.6.4.1 Initial conditions

Parameters changed from the default values in table 20.21.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier
RF Signal Level (dBµV emf() / dBm)	56 / -57	46 / -67	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	29 / -84	33 / -80				
Max. Retrans	00	00				
C1	27	13				
C2	27	13				

Below is an alternative table of parameters for use with test equipment that cannot reach the upper RF levels as specified in the table above. These carrier levels are reduced by 5 dB and will not effect the purpose of the test case:

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier
RF Signal Level (dBµV emf() / dBm)	51 / -62	41 / -72	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	24 / -89	28 / -85				
Max. Retrans	00	00				
C1	27	13				
C2	27	13				

The BA(BCCH) list only contains 5 ARFCNs including the ARFCNs of the carriers used during the test.

NOTE: With 5 ARFCNs in the BA(BCCH) list and BS_PA_MFRMS=5 (default value) the MS will maintain a running average on surrounding cells over a period of 5 seconds.

20.21.6.4.2 Procedure

a) The SS activates the channels. The MS is not paged on any of the carriers.

b) The MS is switched on.

c) After 50 seconds, the SS starts paging continuously on carriers 1 and 2 for 20 seconds. The SS monitors carriers 1 and 2 for RA requests from the MS.

d) The SS stops paging on carriers 1 and 2 and waits for 20 seconds. (The MS should revert to carrier 1 due to cell reselection.)

e) The SS starts paging continuously on carrier 2.

f) The SS increases the transmit level of carrier 2 by 20 dB for a period of 4 s and then reduces the level back to the original value.

g) The SS increases the transmit level of carrier 2 by 20dB and waits for the MS to access on carrier 2. The SS records the time t from the increase in the level of carrier 2 to the first response from the MS.

h) The SS stops paging on carrier 2 and decreases the transmit level of carrier 2 back to the original value.

j) The SS waits 20 seconds. (The MS should revert to carrier 1 due to cell reselection.)

k) The SS increases the transmit level of carrier 2 by 20 dB. After t+2 seconds, the SS starts paging continuously on carrier 1 and reduces the level of carrier 2 back to the original level.

20.21.6.5 Test requirements

1) In step c), the MS shall transmit 2 RA requests on carrier 1 followed by 2 RA requests on carrier 2. Subsequent RA requests on carrier 1 shall not occur within 4,5 s of the second RA request on carrier 1.

2) In step f), there shall be no access on carrier 2 within 34 seconds of increasing the level of carrier 2.

3) After step g), the MS shall respond on carrier 2.

4) In step k) , there shall be no response on carrier 1 within 11 seconds after the level of carrier 2 is reduced back to the original level.

NOTE: The 11 seconds is derived from (t+15) seconds minimum cell reselection timer minus (t+2) seconds from the start of step k) up to the reduction of the level of carrier 2. A further 2 seconds are subtracted to cover for any uncertainty introduced by the RA process occurring after step g).

20.21.7 R-GSM priority of cells

20.21.7.1 Definition and applicability

In general, cell prioritization is a means of encouraging MSs to select some suitable cells in preference to others.

20.21.7.2 Conformance requirement

1. During cell selection a cell with low priority indication will only be selected if a suitable cell of normal priority cannot be found; GSM 03.22, 3.5.2.1.

2. Table 1a. Parameters affecting cell priority for cell selection

CELL_BAR_QUALIFY	CELL_BAR_ACCESS	Cell selection priority	Status for cell reselection
0	0	normal	normal
0	1	barred	barred
1	0	low	normal (see note 2)
1	1	low	normal (see note 2)

GSM 05.08, table 1.a

3. If all the following conditions are met then the "Cell selection priority" and the "Status for cell reselection" shall be set to normal:

- the cell belongs to the MS HPLMN
- the MS is in cell test operation mode
- the CELL_BAR_ACCESS is set to "1"
- the CELL_BAR_QUALIFY is set to "0"
- the Access Control class 15 is barred

GSM 05.08, table 1.a

20.21.7.3 Test purpose

1. To verify that the MS does not select a cell of low priority when a suitable cell of normal priority exists with a lower received signal strength.
2. To verify that the MS takes into account CELL_BAR_ACCESS and CELL BAR _QUALIFY when performing cell selection and reselection.
3. To verify that the MS meets conformance requirement 3.

20.21.7.4 Method of test

20.21.7.4.1 Initial conditions

Parameters changed from Default values table 20.21.1

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	33 / -80	43 / -70	33 / -80	23 / -90	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	3 / -110	23 / -90	13 / -100	13 / -100		
CBA	0	1	1	0		
CBQ	1	1	0	0		
Access class 15	barred	barred	barred	barred		
C1	30	20	20	10		

20.21.7.4.2 Procedure

a) The SS activates the carriers and monitors for RA requests from the MS on carriers 1, 2, and 4.

b) The MS is switched on.

c) The MS is switched off. The SS deactivates the carriers.

d) The MS is placed in cell test operation mode.

NOTE: Cell test mode is a mode of operation defined in SIM administrative data field.

e) The SS activates the carriers and monitors for RA requests from the MS on carriers 1, 2, and 3.

f) The MS is switched on.

20.21.7.5 Test requirements

1) After step b), the first response from the MS shall be on carrier 4 within 33 seconds, followed by a response on carrier 1 before a response (if any) on carrier 2 within 50 seconds.

2) After step f), the first response from the MS shall be on carrier 3 within 33 seconds, followed by a response on carrier 1 before a response (if any) on carrier 2 within 50 seconds.

20.21.8 R-GSM cell reselection when C1 (serving cell) < 0 for 5 seconds

20.21.8.1 Definition and applicability

20.21.8.2 Conformance requirement

1. At least every 5 s the MS shall calculate the value of C1 and C2 for the serving cell and recalculate C1 and C2 values for non serving cells (if necessary). The MS shall then check whether:

   i) The path loss criterion (C1) for current serving cell falls below zero for a period of 5 seconds. This indicates that the path loss to the cell has become too high. GSM 05.08, 6.6.2.

2. While camped on a cell of the selected PLMN ("camped normally"), the MS may need to select a different cell ("normal cell reselection" state). The following events trigger a cell reselection:

   (i) The path loss criterion parameter C1 (see section 3.6) indicates that the path loss to the cell has become too high.; GSM 03.22, 4.5.

20.21.8.3 Test purpose

1. To verify that the MS meets conformance requirement 1.

2. To verify that the MS meets conformance requirement 2.

20.21.8.4 Method of test

20.21.8.4.1 Initial conditions

Parameters changed from Default values table 20.21.1

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	63 / -50	33 / -80	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	43 / -70	23 / -90				
CRO	30 dB					
TO	0					
PT	0					
C1	20	10				
C2	50	10				

NOTE: With BS_PA_MFRMS = 5 (default value), the averaging time of the MS on the serving cell BCCH is 5,9s.

20.21.8.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2 for RA requests from the MS.

b) The MS is switched on.

c) The SS reduces signal level on carrier 1 to -80 dBm / 33 dBµV emf() for 4 s. Then, the SS raises the level back to -50 dBm / 63 dBµV emf(). (C1 becomes -10 dB and C2, 20 dB during this period).

d) The SS reduces signal level on carrier 1 to -80 dBm / 33 dBµV emf()

20.21.8.5 Test requirements

1) After step b), there shall be no access on carrier 1 or carrier 2, within 50 seconds.

2) After step c), there shall be no access on carrier 2 within 30 seconds.

3) After step d), the MS shall access on carrier 2 within 20 seconds.

20.21.9 R-GSM running average of the surrounding cell BCCH carrier signal levels

20.21.9.1 Definition and applicability

20.21.9.2 Conformance requirement

1. Whilst in idle mode an MS shall continue to monitor all BCCH carriers as indicated by the BCCH allocation (BA - See table 1). A running average of received level in the preceding 5 to

   Max. {5 , ((5 * N + 6) DIV 7) * BS_PA_MFRMS / 4}

   seconds shall be maintained for each carrier in the BCCH allocation. N is the number of non-serving cell BCCH carriers in BA and the parameter BS_PA_MFRMS is defined in GSM 05.02; GSM 05.08, 6.6.1.

2. The same number of measurement samples shall be taken for all non-serving cell BCCH carriers of the BA list, and the samples allocated to each carrier shall as far as possible be uniformly distributed over each evaluation period.; GSM 05.08, 6.6.1

20.21.9.3 Test purpose

1. To verify that if the MS calculates a received level average (over 5 seconds) for a non-serving suitable cell which results in the value of C2 exceeding the value of C2 for the serving cell, then cell reselection takes place to the non-serving cell.

2. To verify that by using suitable varying levels of signal strength for non serving cells, the MS samples on non serving cell BCCH carriers are as far as possible distributed uniformly over each evaluation period.

20.21.9.4 Method of test

20.21.9.4.1 Initial conditions

Parameters changed from Default values table 20.21.1

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBμV emf() / dBm)	53 / -60	33 / -80	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBμV emf() / dBm)	23 / -90	23 / -90				
C1	30	10				
C2	30	10				

BS_PA_MFRMS is set to 4 for this test.

The BA(BCCH) list only contains 7 ARFCNs including the ARFCNs of the carriers used during the test.

NOTE: With 7 ARFCNs in the BA(BCCH) list and BS_PA_MFRMS=4 the MS will maintain a running average on surrounding cells over a period of 5 seconds.

20.21.9.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2.

b) The MS is switched on.

c) The SS starts switching the level of carrier 2 between -80 dBm and -57 dBm every 2,7 seconds and continues to do so until the end of the test.

d) The SS decreases the level of carrier 1 to -76 dBm.

NOTE: As a result of the switching in levels, the running average on carrier 2 will be between -66dBm and -71dBm, assuming that samples are distributed over five consecutive paging blocks.

20.21.9.5 Test requirements

1) After step b), there shall be no access from the MS on carrier 1 or carrier 2, within 50 seconds..

2) After step c), there shall be no access from the MS on carrier 1 or 2 within 25 seconds

NOTE: Any potential access on is likely to occur within 20 seconds.

3) After step d), the MS shall access on carrier 2 within 20 seconds.

20.21.10 R-GSM running average of the serving cell BCCH carrier signal level

20.21.10.1 Definition and applicability

The MS is required to monitor continuously the BCCH carrier signal level of the serving cell (and to compare it to the BCCH carrier signal levels of the non-serving cells) to guarantee that it is camped on the most suitable cell.

20.21.10.2 Conformance requirement

1. For the serving cell, receive level measurement samples shall be taken at least for each paging block of the MS. The receive level average shall be a running average determined using samples collected over a period of 5 s or five consecutive paging blocks of that MS, whichever is the greater period. New receiving level average values shall be calculated as often as possible.; GSM 05.08, 6.6.1.

20.21.10.3 Test purpose

1. To verify that by using suitable varying levels of signal strength for the serving cell, the MS performs a running average over 5 consecutive paging blocks.

20.21.10.4 Method of test

20.21.10.4.1 Initial conditions

Parameters changed from Default values table 20.21.1 are below,

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	63 / -50	39 / -74	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBμV emf() / dBm)	23 / -90	23 / -90				
C1	40	16				
C2	40	16				

NOTE: With BS_PA_MFRMS = 5 (default value), the averaging time of the MS on the serving cell BCCH is 5,9s.

20.21.10.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2 for RA requests from the MS.

b) The MS is switched on.

c) After 50 seconds the SS starts switching the level of carrier 1 between -80 dBm and -50 dBm every 3 seconds.

NOTE: As a result of the switching in levels, the running average on carrier 1 will be between -62 dBm and -68 dBm over five consecutive paging blocks.

d) The SS increases the level of carrier 2 to -56 dBm.

20.21.10.5 Test requirement

1) After step c), the MS shall not access on carrier 2, within 25 seconds.

2) After step d), the MS shall access on carrier 2, within 30 seconds.

NOTE 1: 13,75 seconds to perform running average, 10 seconds to detect C2 differences, 2,4 seconds to read BCCH of carrier 2, 1 second to perform RA. Total 27,15 seconds, allow 30 seconds.

20.21.11 Updating the list of six strongest neighbour carriers and decoding the BCCH information of a new carrier on the list

20.21.11.1 Definition and applicability

20.21.11.2 Conformance requirement

1. The list of the 6 strongest non-serving carriers shall be updated at least as often as the duration of the running average defined for measurements on the BCCH allocation and may be updated more frequently; GSM 05.08, 6.6.1.

2. When the MS recognizes that a new BCCH carrier has become one of the 6 strongest, the BCCH data shall be decoded for the new carrier within 30 seconds; GSM 05.08, 6.6.1.

20.21.11.3 Test purpose

1. To verify that MS meets conformance requirement 1.

2. To verify that MS meets conformance requirement 2.

20.21.11.4 Method of test

20.21.11.4.1 Initial conditions

Six BCCH carriers are established with the system information contents of table 20.21.1.

Parameters changed from Default values table 20.21.1 are below,

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6	Carrier 7
RF signal level (dBμV emf ( )/dBm)	53 / -60	48 /-65	43 / -70	38 / -75	33 / -80	33 /-80	38 / -75
RXLEV_ACCESS_MIN	-90	-90	-90	-90	-90	-90	-110
C1	30	25	20	15	10	10	35
C2	30	25	20	15	10	10	35

The BA(BCCH) list contains only eight ARFCNs and includes those of carriers 1 to 7.

BS_PA_MFRMS is set to 3 during this test.

NOTE: The combination of 8 carriers on the BA list and BS_PA_MFRMS = 3 leads to averaging time of 5 seconds. Hence 5 seconds is also the updating time of the list of six strongest neighbour carriers.

20.21.11.4.2 Procedure

a) The SS activates carriers 1 to 6. The MS is not paged on any of the carriers.

b) The MS is switched on.

c) After 60 seconds, the SS activates carrier 7 and pages the MS continuously on this carrier. The SS monitors carrier 7 for RA requests from the MS.

20.21.11.5 Test requirements

1) The MS shall access on carrier 7 within 55 s of activating carrier 7.

NOTE: 5,5 seconds to notice new strongest carrier in top 6 (because the updating time for six strongest is 5 seconds (+10 %)), 33 seconds to read BCCH, 15 seconds for reselection, since the MS has already performed the running average on the new strongest carrier, allow 55 seconds.

20.21.12 R-GSM decoding the BCCH information of the neighbour carriers on the list of six strongest neighbour carriers

20.21.12.1 Definition and applicability

20.21.12.2 Conformance requirement

1. The MS shall attempt to decode the BCCH data block that contains the parameters affecting cell reselection for each of the 6 strongest non-serving cell BCCH carriers at least every 5 minutes; GSM 05.08, 6.6.1.

NOTE: Verification of cell reselection as implicitly tested here is performed in section 20.21.3.

20.21.12.3 Test purpose

1. To verify that the MS decodes the BCCH data block that contains the parameters affecting cell reselection for a non-serving cell BCCH carrier, (which is in the list of six strongest neighbour cells), at least every 5 minutes. This is achieved by changing the BCCH data such that the value of C2 for the non serving cell exceeds the value of C2 for the serving cell, and observing that the MS performs cell reselection within 5 minutes plus the time allowed for cell reselection after the change of the BCCH data.

20.21.12.4 Method of test

20.21.12.4.1 Initial conditions

Parameters changed from Default values table 20.21.1 are below,

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	38 / -75	33 / -80	OFF	OFF	OFF	OFF
C1	15	10				
C2	15	10				

20.21.12.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2.

b) The MS is switched on.

c) The SS changes the RXLEV_ACCESS_MIN in the BCCH data of carrier 2 to be -100 dBm.

NOTE: With the above change the C2 of carrier 2 becomes 20 whereas the C2 of carrier 1 stays at 15.

20.21.12.5 Test requirements

1) After step b), there shall be no access from the MS on carrier 1 or carrier 2 within 50 seconds.

2) After step c), the MS shall access on carrier 2 within 345 s of the change in the BCCH data of carrier 2.

NOTE: 330 s for decode of BCCH of carrier 2 (300 s +10 %), 15 seconds for reselection of carrier 2, since the MS already has a running average on carrier 2.

20.21.13 R-GSM decoding the BSIC of the neighbour carriers on the list of six strongest neighbour carriers

20.21.13.1 Definition and applicability

20.21.13.2 Conformance requirement

1. The MS shall attempt to check the BSIC for each of the 6 strongest non-serving cell BCCH carriers at least every 30 seconds, to confirm that it is monitoring the same cell. If a change of BSIC is detected then the carrier shall be treated as a new carrier and the BCCH data redetermined; GSM 05.08, 6.6.1.

NOTE: Verification of cell reselection as implicitly tested here is performed in section 20.21.3.

20.21.13.3 Test purpose

1. To verify that the MS will check the BSIC of the non-serving cell, which is in the list of six strongest neighbour cells, by changing the BSIC and the BCCH data of the non-serving cell such that the value of C2 for that cell exceeds the value of C2 of the serving cell, and observing that the MS performs cell reselection within the time allowed to check the BSIC, redetermine the BCCH data and perform cell reselection.

20.21.13.4 Method of test

20.21.13.4.1 Initial conditions

Parameters changed from Default values table 20.21.1 are below:

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	38 / -75	33 / -80	OFF	OFF	OFF	OFF
C1	15	10				
C2	15	10				

20.21.13.4.2 Procedure

a) The SS activates the carriers. The MS is not paged on carrier 1. The SS monitors carriers 1 and 2.

b) The MS is switched on.

c) The SS changes the BSIC of carrier 2 by changing the Base Station Colour Code (BCC) part of the BSIC. The SS also changes the RXLEV_ACCESS_MIN in the BCCH data of carrier 2 to be -100 dBm.

NOTE: With the above change to the BCCH data the C2 of carrier 2 becomes 20 whereas the C2 of carrier 1 stays at 15.

20.21.13.5 Test requirements

1) In step b), there shall be no access from the MS on carrier 1 or carrier 2 within 50 seconds.

2) After step c), the MS shall access on carrier 2 within 85 s of the change in the BSIC value (and BCCH data) of carrier 2.

NOTE: 33 seconds for check of BSIC on carrier 2, 33 seconds for decode of BCCH of carrier 2, 15 seconds for reselection of carrier 2, since the MS already has a running average on carrier 2, allow 85 seconds.

20.21.14 R-GSM emergency calls

20.21.14.1 Definition and applicability

This test is applicable for R-GSM MSs supporting speech.

20.21.14.2 Conformance requirement

1. When in a limited service state, the MS shall be able to initiate emergency calls; GSM 05.08, 6.8.

2. When in a limited service state and if not camped on a cell, the MS shall monitor the signal strength of all 194 RF channels, and search for a BCCH carrier which has C1>0 and which is not barred. When such a carrier is found, the MS shall camp on that cell, irrespective of the PLMN identity; GSM 05.08, 6.8.

3. The MS shall perform cell reselection at least among the cells of the PLMN of the cell on which the MS has camped, according to the algorithm of GSM 03.22, 4.5 & 3.7, except that a zero value of CELL_RESELECT_HYSTERESIS shall be used; GSM 05.08, 6.8.

20.21.14.3 Test purpose

1. To verify that the MS 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 MS selects a cell with C1>0 and CBA = 0 when no suitable cells of the selected PLMN are available.

3. To verify that the MS, when performing cell reselection in the limited service state, uses CELL_RESELECT_HYSTERESIS = 0.

20.21.14.4 Method of test

20.21.14.4.1 Initial conditions

Parameters changed from Default values table 20.21.1 are below

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBµV emf() / dBm)	38 / -75	33 / -80	33 / -80	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	23 / -90	43 / -70	23 / -90			
CELL_BAR_ACCESS	1 (barred)	0	0			
MCC,MNC	forbidden	forbidden	forbidden			
CELL_RESELECT_HYST	0	0	14 dB			
C1	15	-10	10			

NOTE: All the BCCH carriers belong to the same PLMN, which is not the MS's home PLMN and is in the SIM's forbidden PLMN's list.

20.21.14.4.2 Procedure

a) The SS activates the carriers. The SS monitors for RA attempts from the MS on carriers 1, 2 and 3 for the duration of the test.

b) The MS is switched on.

c) 50 seconds after switch on, an emergency call is initiated on the MS.

d) The SS changes the CBA of carrier 1 to 0.

NOTE: The MS should reselect to carrier 1 because it should not take into account the CELL_RESELECT_HYST value of 14 but use 0 instead.

e) After 345 s an emergency call is initiated on the MS.

NOTE: 330 seconds to detect change of BCCH data, 15 seconds to perform reselection of carrier 1, since the MS already has a running average on carrier 1.

20.21.14.5 Test requirements

1) In step c), the first access by the MS shall be on carrier 3.

2) In step e), the first access from the MS shall be on carrier 1.

20.21.15 R-GSM cell reselection due to MS rejection "LA not allowed"

20.21.15.1 Definition and applicability

While camped on a cell of the selected PLMN the MS may need to select a different cell in order to fulfil the normal service state. This ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink.

This process goes on while camping on a cell which pertains to an LA which is placed in the list of "forbidden LAIs for regional provision of service".

20.21.15.2 Conformance requirement

1. In response to a registration attempt, when receiving an LU reject with cause value "LA not allowed", the MS stores this LAI in a list of "forbidden LAIs for regional provision of service", to prevent repeated attempts to access a cell of the forbidden LA, GSM 03.22, 3.3.

2. If the MS has received the cause 'LA not allowed', it shall ignore this fact when selecting a cell to camp on, i.e. it shall not reject a cell for camping on because that cell is part of a LA where this cause has been received, GSM 03.22, 3.5.4.

3. In response to a registration attempt, when receiving an LU reject with cause value "LA not allowed", the MS continues to perform normal cell-reselection, GSM 03.22, 4.4.2

4. A new LU attempt shall only be performed when a new LA (or new PLMN) is entered according to the cell reselection procedure, GSM 03.22, 3.3 & figure 4.

NOTE: LA stands for "Location Area" and LU stands for "Location Update".

20.21.15.3 Test purpose

1. To verify that if an LU is rejected with cause "LA not allowed" that the LAI of that cell is written into a forbidden list which prevents the MS from performing LU onto another cell in that LA. This is verified indirectly in test purposes 2,3 and 4.

2. To verify that the MS will not reject a cell for camping on because that cell is part of a LA in the list of "forbidden LAIs for regional provision of service". This is verified indirectly by making the MS attempt an emergency call and checking that the channel request message is transmitted on the correct cell.

3. To verify that the MS when receiving an LU reject with cause value "LA not allowed", the MS continues to perform normal cell-reselection:

   Cell reselection is triggered if there is a better cell (in terms of the path loss criterion C2) in the same LA, or a much better cell in another LA of the selected PLMN (using the CRH parameter). GSM 03.22, 3.4 & 4.5.

4. To verify that a new LU attempt will be performed when a new LA (or new PLMN) is entered, GSM 03.22, 3.3 & figure 4.

20.21.15.4 Method of test

20.21.15.4.1 Initial conditions

Parameters changed from Default values table (table 20.21.1)

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBμV emf() / dBm)	63 / -50	54 / -59	44 / -69	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBμV emf() / dBm)	53 / -60	35 / -78	29 / -84			
CRH	14	0	10			
LAC	H1111	H2222	H1111			
ATT	1	1	1			
C1	10	19	15			
C2	10	19	15			

20.21.15.4.2 Procedure

a) The SS activates the carriers. The SS monitors all RA requests from MS on carriers 1, 2 & 3 until step e) has been completed. Only idle-paging is sent on all channels.

b) The MS is switched on.

c) When the MS performs an IMSI attach onto carrier 1, the SS shall reject it with cause "LA not allowed"

d) 30 seconds after the MS has returned to idle mode (channel release after LU reject), the MS is manually commanded to set up an emergency call.

NOTE 1: C2 of carrier 3>C2 of carrier 1. Carriers 1 and 3 belong to the same LA.

e) The SS rejects the CM service request from the MS, with a CM service reject message with cause value #17 (Network Failure).

NOTE 2: Cause values #4 (IMSI unknown in VLR) or #6 (Illegal ME) lead to unwanted behaviour of the mobile.

f) 10 seconds after the MS has returned to idle mode (channel release after CM service reject), the SS increases the level of carrier 2 to 65 dBµV emf().

NOTE 3: C2 of carrier 2 = 30, now larger than C2 of carrier 3 + CRH.

g) The SS shall accept any LU on carrier 2.

20.21.15.5 Test requirements

1) After step b), the MS shall respond on carrier 1 within 33 s.

2) In step d), the MS shall access on carrier 3 with a channel request message, within 15 seconds of being commanded to set up the emergency call.

3) After increasing the level of carrier 2 in step f), the MS shall reselect and access onto carrier 2 requesting an LU within 30 seconds.

NOTE 1: 13,75 seconds to perform running average, 10 seconds to detect C2 differences, 2,4 seconds to read BCCH of carrier 2, 1 second to perform RA. Total 27,15 seconds, allow 30 seconds.

20.21.16 R-GSM downlink signalling failure

20.21.16.1 Definition and applicability

See conformance requirement.

20.16.2 Conformance requirement

The downlink signalling failure criterion is based on the downlink signalling failure counter DSC.

1. When the MS camps on a cell, DSC shall be initialized to a value equal to the nearest integer to 90/N where N is the BS_PA_MFRMS parameter for that cell (see GSM 05.02).

2. Thereafter, whenever the MS attempts to decode a message in its paging subchannel; if a message is successfully decoded DSC is increased by 1,(however never beyond the nearest integer to 90/N).

3. Whenever the MS can not successfully decode a message in its paging subchannel the DSC is decreased by 4.

4. When DSC reaches 0, a downlink signalling failure shall be declared. A downlink signalling failure shall result in cell reselection, GSM 03.22, 4.5 (ii) and GSM 05.08, 6.5.

NOTE: The network sends the paging subchannel for a given MS every BS_PA_MFRMS multiframes. The requirement for network transmission on the paging subchannel is specified in GSM 04.08. The MS is required to attempt to decode a message every time its paging subchannel is sent.

20.21.16.3 Test purpose

1. To verify that the MS initializes the DSC counter in accordance with the conformance requirement. This is verified indirectly.

2. To verify that whenever the MS successfully decodes a message on paging subchannel, the DSC is increased by 1, (however never beyond the nearest integer to 90/N). This is verified indirectly.

3 To verify that whenever the MS can not successfully decode a message on paging subchannel, the DSC decreased by 4. This is verified indirectly.

4. To verify that when the DSC reaches 0, a downlink signalling failure shall be declared and the MS will perform cell reselection.

20.21.16.4 Method of test

20.21.16.4.1 Initial conditions

Two BCCH carriers are established with the system information contents of table 20.21.1.

Parameters changed from Default values table (table 20.21.1) are below

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	43 / -70	33 / -80	OFF	OFF	OFF	OFF
C1 = C2	20	10				

NOTE: The DSC counter will have a value 18 (90/5).

20.21.16.4.2 Procedure

a) The MS is switched on. On carrier 1 valid layer 3 messages shall be sent in the paging blocks, but not paging the MS (idle paging). On carrier 2 the MS is paged continuously in all paging blocks.

b) After 40 s the SS sends corrupted data (using random data, wrong parity bits see GSM 05.03, 4.3 & 4.1.2 or other lower layer error) in four successive paging blocks to carrier 1 and then reverts to sending normal data.

NOTE 1: Sending corrupted, i.e. non-decodable data on four successive paging blocks should decrease the DSC to 2.

c) The SS monitors all accesses on both carriers for 30 s.

d) The SS sends corrupted data in five successive paging blocks to carrier 1 and then reverts to sending normal data.

NOTE 2: Sending random, data on five successive paging blocks should decrease the DSC to < 0 and cause a cell reselection.

e) The SS monitors all accesses on both carriers for 30 s.

20.21.16.5 Test requirements

1) There shall be no access to carrier 2 in test steps a) and c).

2) The MS shall access on carrier 2 at test step e) within 15 seconds.

20.21.17 R-GSM cell selection if no suitable cell found in 10 s

20.21.17.1 Definition and applicability

See conformance requirement.

20.21.17.2 Conformance requirement

If no suitable cell is found in cell reselection process within 10 seconds, the cell selection algorithm of GSM 03.22 shall be performed, GSM 05.08; 6.6.2.

20.21.17.3 Test purpose

To verify that the MS fulfils the conformance requirement

20.21.17.4 Method of test

20.21.17.4.1 Initial conditions

One BCCH carrier is established with the system information contents of table 20.21.1.

Parameters changed from Default values table (table 20.21.1) are below

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF signal level (dBμV emf() / dBm)	43 / -70	OFF	OFF	OFF	OFF	OFF
C1 = C2	20					

20.21.17.4.2 Procedure

a) The MS is switched on. Idle paging is sent on carrier 1.

b) After the MS indicates service the SS reduces the transmit level of carrier 1 to 13 dBμV emf() (so that C1 of carrier 1 becomes -10) and turns on a new carrier (carrier 2) at a level of 33 dBμV emf(). Carrier 2 shall not be in the MS BA list (i.e. it shall not be one of the carriers that MS has been monitoring after camped on carrier 1)

c) The SS shall monitor all accesses on carriers 1 and 2 for 60 s.

NOTE: The access on carrier 2 should not take longer than 50 s. (5 seconds to rxlev averages, 5 s for C1<0 duration, 10 s for searching another suitable cell, 30 s for cell selection), 60 s is a safe time to wait.

20.21.17.5 Test requirements

The MS shall access on carrier 2 at test step c) within 60 s.

20.21.18 R-GSM cell reselection due to MS rejection "Roaming not allowed in this LA"

20.21.18.1 Definition and applicability

While camped on a cell of the selected PLMN the MS may need to select a different cell in order to fulfil the normal service state. This ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink.

The MS looks for suitable neighbour cells which satisfies 4 constraints including that It should not be in an LA which is in the list of "forbidden LAs for roaming".

20.21.18.2 Conformance requirement

1. To prevent repeated attempts to have roaming service on a not allowed LA, when the MS is informed that an LA is forbidden, the LA is added to a list of "forbidden LAs for roaming" which is stored in the MS, GSM 03.22; 3.1.

2. If the MS has received the cause "Roaming not allowed in this LA", in response to a LU attempt, the Network Selection Procedure shall be started, GSM 03.22; 4.3.3 L3, GSM 04.08; 4.4.4.7.

3. The MS can only perform camping on a suitable cell, which:

   - should not be in an LA which is in the list of "forbidden LAs for roaming" GSM 03.22, 3.2.1.

NOTE: LA stands for "Location Area" and LU stands for "Location Update".

20.21.18.3 Test purpose

1. To verify that if an LU is rejected with cause "Roaming not allowed in this LA", that the LAI of that cell is written into a forbidden list which prevents the MS from camping onto any cell in that LA.

2. To verify that if the MS has received the cause "Roaming not allowed in this LA", in response to a LU attempt, the Network Selection Procedure is initiated. This is verified indirectly by test purpose 3, in that the new LA is accessed as part of cell selection, hence CRH is disregarded.

3. To verify that if an LU is rejected, when attempting LU in a LA with LAI = LAI1, with cause "Roaming not allowed in this LA" and only cells of the selected PLMN are available, the MS will only camp and attempt LU in any LA with LAI <> LAI1.

20.21.18.4 Method of test

20.21.18.4.1 Initial conditions

Parameters changed from Default values table (table 20.21.1)

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBµV emf() / dBm)	63 / -50	53 / -60	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBµV emf() / dBm)	23 / -90	23 / -90				
MNC	MNC <> HPLMN	MNC <> HPLMN				
MCC	MCC of HPLMN	MCC of HPLMN				
CRH	0	0				
LAC	H1111	H2222				
ATT	1	1				
C1	40	30				
C2	40	30				

20.21.18.4.2 Procedure

a) The MS is switched on. Idle paging is sent on all carriers.

b) The SS monitors all RA requests from MS on carriers 1 & 2.

c) When the MS performs an IMSI attach onto carrier 1, the SS shall reject it with cause "Roaming not allowed in this LA".

d) The SS shall accept any LU on carrier 2.

e) The SS monitors all RA requests from MS on carriers 1 to 2.

20.21.18.5 Test requirements

1) The MS should respond on carrier 1 within 33 s of switch on.

2) After LU reject, the MS shall initiate the Network Selection Procedure and access onto Carrier 2 as part of cell selection within 33 seconds from returning to idle mode after the LU reject.

NOTE: The timing requirement in b) is given only for testing purposes only. No timing requirements are defined for the Network Selection Procedure, but the time allowed for cell selection (see 20.21.1) should be adequate.

3) After the LU reject on carrier 1, there shall be no more access attempts on this carrier.

20.21.19 R-GSM cell selection on release of SDCCH and TCH

20.21.19.1 Definition and applicability

20.21.19.2 Conformance requirement

1. When the SS releases a TCH or SDCCH and returns to idle mode, it shall, as quickly as possible camp on the BCCH carrier of the cell whose channel has just been released. If the full BCCH data for that cell was not decoded in the preceding 30s, the MS shall then attempt to decode the full BCCH data. Until the MS has decoded the BCCH data required for determining the paging group, it shall also monitor all paging blocks on timeslot 0 of the BCCH carrier for possible paging messages that might address it. If the MS receives a page before having decoded the full BCCH data for the cell, the MS shall store the page and respond once the full BCCH data has been decoded, provided that the cell is not barred and the MSs access class is allowed. GSM 05.08, 6.7.

20.21.19.3 Test purpose

1. To verify that on release of a TCH or an SDCCH, the MS camps as quickly as possible on the BCCH carrier of the cell whose channel has just been released.

NOTE: This is implicitly tested by the MS responding to a paging request. The decoding of BCCH data cannot be explicitly tested. However, the MS shall monitor for paging messages which may address it if it decodes the BCCH.

20.21.19.4 Method of test

20.21.19.4.1 Initial conditions

a) Parameters changed from default values in table 20.21.1

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBmV emf() / dBm)	53 / -60	33 / -80	OFF	OFF	OFF	OFF
RXLEV_ACCESS_MIN (dBmV emf() / dBm)	23 / -90	23 / -90				
BS_PA_MFRMS	2	2				
ATT	1					
C1	30	10				
C2	30	10				

b) Carrier 1 is configured to have a combined control channel.

c) Carrier 2 is configured to have a non combined control channel.

20.21.19.4.2 Test procedure

a) The SS activates the carriers. No paging messages are transmitted on carrier 1 or carrier 2.

b) The MS is switched on.

c) In response to the MS access for IMSI attach, the SS allocates a combined SDDCH/4, accepts the IMSI attach procedure and then releases the link. After 0,5 seconds but within 1 second of transmitting the UA frame on completion of the IMSI attach procedure, the SS transmits a single PAGING REQUEST in the appropriate paging block of the MS on carrier 1.

d) When the MS responds to paging, the SS establishes a call on a traffic channel.

e) The SS increases the level of carrier 2 to 63 dBmV emf().

f) After 10 seconds the SS performs a handover to another TCH, with the parameters of carrier 2 indicated in the CELL DESCRIPTION information element of the HANDOVER COMMAND message.

g) After a further 10 seconds, the SS clears down the call. After 0,5 seconds but within 1 second of transmitting the UA frame, the SS transmits a single PAGING REQUEST on carrier 2 in the appropriate paging block of the MS.

20.21.19.5 Test requirements

1) After step b) the MS shall access in order to commence an IMSI attach procedure on carrier 1 within 33 seconds.

2) In step c), the MS shall respond to paging within 3 seconds of transmitting the PAGING REQUEST.

3) In step g), the MS shall respond to paging within 3 seconds of transmitting the PAGING REQUEST.

20.22 GPRS Cell Selection and Reselection

The absolute accuracy of the MS signal level measurements is assumed to be +/-6 dB. A difference of at least 8 dB is allowed for cases of discrimination between C1, C31,C32 values and 0.

The relative accuracy of the MS signal level measurements is assumed to be +/-3 dB for the signal levels used in the tests of this section. A difference of at least 5 dB is allowed for cases of discrimination between C1 and C31 and C32 values on different carriers.

NOTE 1: The accuracy of MS signal level measurements is specified in GSM 05.08. For all of the tests in this section, the signal levels used are greater than 1 dB above reference sensitivity level.

NOTE 2: The tolerance on timers specified in GSM 05.08 is +/-10 % except for PENALTY_TIME where it is +/-2 seconds. In the tests of this section, the test requirements include these tolerances. Consequently, the times stated in the test requirement sometimes differ from the corresponding timer in the conformance requirement.

Where pulsed signals are specified, the SS tolerance on pulse width is +/-2 % and the SS tolerance on power level +/-1 dB.

The cell re-selection tests defined in the sections 20.22.1 to 20.22.7 apply to the MSs attached to GPRS if a PBCCH exists in the serving cell. The cell re-selection tests defined in the sections 20.22.8 and 20.22.9 apply to the MSs attached to GPRS when no PBCCH exists in the serving cell. Otherwise the MS shall perform cell re-selection according to the idle mode procedures defined in clause 6 of GSM 05.08 and therefore tests defined in section 20 of GSM 11.10 apply.

The support of GPRS in a cell is indicated by the presence of the field GPRS Indicator in the SI 3 Rest Octets (GSM 04.08, 10.5.2.34) or in SI 4 Rest Octets (GSM 04.08, 10.5.2.35). This means the SS has to include this field in one of the two Rest Octets in order to enable support of GPRS in a cell.

The following definitions are applicable to tests 20.22.1 to 20.22.9 :

- Carrier X supports GPRS : the SS includes the field GPRS Indicator in SI 3 Rest Octets and in SI 4 Rest Octets.

- The SS enables GPRS on carrier X : the SS starts including the field GPRS Indicator in SI 3 Rest Octets and in SI 4 Rest Octets.

- The SS disables GPRS on carrier X : the SS stops including the field GPRS Indicator in SI 3 Rest Octets and in SI 4 Rest Octets.

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

- The SIM is in the idle updated state in the default registration area with a PTMSI assigned at the beginning of each test.

- All carriers support GPRS on BCCH without a separate PBCCH channel

- The Scheduling of Packet System information should be such that a complete set of consistent PSI messages can be decoded within 8 multiframes.

- The MS is configured to automatically attach to GPRS at switch on by using the PICS/PIXIT Statement "Automatic GPRS attach procedure at switch on or power on Yes/No" as in GPRS Attach procedure tests (see section 44.2.1)

Table 20.22.1: Default values of the system information fields

Parameter	GSM 04.60 reference	Abbr.	Normal Setting
PRIORITY_CLASS	11.2.20	PC	1
C31_HYST	11.2.20	C31H	0
RA_RESELECT_HYSTERESIS	11.2.20	RARH	0 dB
HCS_THR	11.2.20	HT	-110dBm
GPRS_RESELECT_OFFSET	11.2.20	GRO	0 dB
REPORTING_PERIOD	11.2.23	RP	60s
NETWORK_CONTROL_ORDER	11.2.23	NCO	NC0
GPRS_CELL_RESELECT_HYST	11.2.20	GCRH	0 dB
GPRS_TEMPORARY_OFFSET	11.2.20	GTO	0 db
GPRS_PENALTY_TIME	11.2.20	GPT	0 s
SPLIT_PG_CYCLE	5.5.1.5	SPGC	0
GPRS_CELL_RESELECT_HYSTERESIS	11.2.20	GCRH	4 dB
GPRS_MS_TXPWR_MAX_CCH	11.2.20	GMTMC	Max. output power of MS
GPRS_RXLEV_ACCESS_MIN	11.2.20	GRAM	-90 dBm
C32_QUAL	11.2.20	C32Q	0
BA(GPRS) ARFCN	11.2.20	BA	All 0 except: For GSM 450 ARFCNs 259, 263, 269, 275, 279, 283, 287, 292, broadcast in PACKET SYSTEM INFORMATION type 3 For GSM 480 ARFCNs 306, 310, 316, 322, 326, 330, 334, 339, broadcast in PACKET SYSTEM INFORMATION type 3 For GSM900, both P-GSM and E-GSM ARFCNs are broadcast: GSM ARFCNs 3, 9, 18, 25, 41, 43, 49, 50, 54, 58, 62, 66, 70, 80, 92, 124, broadcast in PACKET SYSTEM INFORMATION type 3 E-GSM ARFCNs 985, 989, 995, 1010, 1014 broadcast in PACKET SYSTEM INFORMATION type 3 For DCS1800 ARFCNs 512, 543, 568, 589, 602, 641, 662, 683, 696, 711, 732, 754, 794, 851, 870, 871, 872, 884 broadcast in PACKET SYSTEM INFORMATION TYPE 3.

20.22.1 Cell selection

20.22.1.1 Definition and applicability

Cell selection is a process in which an MS, whenever a new PLMN is selected, attempts to find a suitable cell of that PLMN to camp on. Two methods of searching for a suitable cell are possible, normal cell selection and stored list cell selection. The process ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink. Once the MS is camped on a cell, access to the network is allowed.

20.22.1.2 Conformance requirement

1. The MS shall be able to select the strongest cell within 30 seconds of switch on. This assumes a valid SIM, with PIN disabled and ideal radio conditions, GSM 05.08, 6.1.

2. There are various requirements that a cell must satisfy before an MS can perform normal camping on it:

2.1 (i) It should be a cell of the selected PLMN

2.2 (ii) It should not be "barred" (see section 3.5.1)

2.3 (iii) It should not be in an LA which is in the list of "forbidden LAs for roaming";

2.4 (iv) The radio path loss between MS and BTS must be below a threshold set by the PLMN operator. This is estimated as shown in section 3.6. GSM 03.22, 3.2.1.

NOTE: Criteria 2.3 (iii) is not applicable for Cell Selection.

3. Initially the MS looks for a cell which satisfies these 4 constraints ("suitable cell") by checking cells in descending order of received signal strength. If a suitable cell is found, the MS camps on it, GSM 03.22, 3.2.1.

4. The MS shall be able to calculate correctly the path loss criterion parameter C1, used for cell selection and reselection, GSM 05.08, 6.4.

20.22.1.3 Test purpose

1. To verify that the MS meets conformance requirement 1. even when one of the other cells supports GPRS.

2. To verify that:

2.1 The MS does not select a cell of a PLMN, which is not the selected PLMN.

2.2 The MS does not select a cell which is "barred".

2.4 The MS does not select a cell with C1<0.

3. To verify that the MS selects suitable cells in descending order of received signal strength.

4. To verify that the MS does not select a cell with C1<0.

20.22.1.4 Method of test

20.22.1.4.1 Initial conditions

Parameters changed from the default values in table 20.22.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBm)	-75	-80	-70	-60	-70	-80
CBA	0	0	0	1	0	
RXLEV_ACCESS_MIN (dBm)	-90		-90	-90	-60	
GPRS_RXLEV_ACCESS_MIN		-90				-90
MNC			01			
MCC			002			
C1	15	10	20	30	-10	

NOTE 1: For an E-GSM MS carrier 1 and carrier 5 ARFCNs are chosen in the E-GSM band, carrier 3 and carrier 4 ARFCNs in the P-GSM band.

NOTE 2: Carrier 2 is the BCCH carrier which broadcasts the position of the PBCCH channel in the cell (Carrier 6.)

NOTE 3: Carriers 1,3,4 and 5 do not support GPRS.

20.22.1.4.2 Procedure

a) The SS activates and pages on the MS on all carriers. All Carriers are monitored for RA requests from the MS.

b) The MS is switched on.

20.22.1.5 Test requirements

1) After step b), the first response from the MS shall be on carrier 1 within 33 seconds. There shall be no response from the MS on any other carrier

20.22.2 Cell reselection in Packet Idle mode

20.22.2.1 Definition and applicability

This test is applicable for all types of GPRS mobiles

20.22.2.2 Conformance requirement

1. At least for every new sample or every second, whichever is the greatest, the MS shall update RLA_P and calculate the value of C1, C31 and C32 for the serving cell and the non-serving cells; GSM 05.08, 10.1.2 The MS shall make a cell re-selection if:

   (i) The path loss criterion parameter (C1) for the serving cell falls below zero.

   (ii) A non-serving suitable cell (see GSM 03.22) is evaluated to be better than the serving cell. The best cell is the cell with the highest value of C32 among

   - those cells that have the highest PRIORITY_CLASS among those that fulfil the criterion C31 ≥ 0, or

   all cells, if no cells fulfil the criterion C31 ≥ 0.

   If the parameter C32_QUAL is set, positive GPRS_RESELECT_OFFSET values shall only be applied to the neighbour cell with the highest RLA_P value of those cells for which C32 is compared above.

   PRIORITY_CLASS and C32_QUAL are broadcast on PBCCH of the serving cell.

   When evaluating the best cell, the following hysteresis values shall be subtracted from the C32 value for the neighbour cells:

   - in standby state, if the new cell is in the same routing area: 0.
   - in ready state, if the new cell is in the same routing area: GPRS_CELL_RESELECT_HYSTERESIS. If the parameter C31_HYST is set, GPRS_CELL_RESELECT_HYSTERESIS shall also be subtracted from the C31 value for the neighbour cells.
   - in standby or ready state, if the new cell is in a different routing area: RA_RESELECT_HYSTERESIS.
   - in case of a cell re-selection occurred within the previous 15 seconds: 5 dB.

     GPRS_CELL_RESELECT_HYSTERESIS, C31_HYST and RA_RESELECT_HYSTERESIS are broadcast on PBCCH of the serving cell.

20.22.2.3 Test purpose

To verify that the MS reselects the correct cell based on the C32 parameter when GPRS_RESELECT_OFFSET, TEMPORARY_OFFSET and PENALTY_TIME parameters are transmitted in the System information messages.

1. To verify MS does not reselect on the basis of C31 as there are no HCS threshold values transmitted in the System information messages.

20.22.2.4 Method of test

20.22.2.4.1 Initial conditions

Parameters changed from the default values in table 20.22.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5
RF Signal Level (dBm)	-70	-60	-70	-65	-60
GPRS_RXLEV_ACCESS_MIN (dBm)	-90	-90	-100	-85	-90
GPT				40 s	
GRO			-20 dB	20 dB	
GTO				20 dB	
C1	20		30	20	30
C32	20		10	20-40	30

NOTE 1: The BA(GPRS) list only contains the ARFCNs of the carriers used during the test.

NOTE 2: The HCS structure is omitted from the packet system information messages .

NOTE 3: Carrier 5 is the BCCH carrier which broadcasts the position of the PBCCH channel in the cell (Carrier 2.)

20.22.2.4.2 Procedure

a) The SS activates carriers 1, 2 and 5. The MS is paged on Carriers 1 and 2. The SS starts monitoring carriers 1 and 2 for RA requests from the MS.

b) The MS is switched on.

c) The SS activates carriers 3 and 4. The MS is paged on both carriers. The SS monitors carriers 3 and 4 for RA requests from the MS.

20.22.2.5 Test Requirements

1) After step b) there should be a response on carrier 2 within 33 seconds.

NOTE: The SS should ensure that the MS final state is in Packet Idle mode on carrier 2.

2) After step d) there should be no response on carrier 4 within 38 seconds of activating the carrier but MS should respond on carrier 4 within 50 seconds of activating the carrier.

NOTE: Minimum time of 38 seconds set by penalty timer on carrier 4 less 2 second tolerance. Maximum time includes 42 seconds (40 seconds + 2 second tolerance) for expiry of penalty timer on carrier 4, 2 seconds to decode BCCH, 1 second for reselection, since the MS will already have running averages on carrier 4, when the penalty timers expire, allow 50 seconds.

20.22.3 Priority of cells

20.22.3.1 Definition and applicability

This test is applicable for all types of GPRS mobiles

20.22.3.2 Conformance requirement

At least for every new sample or every second, whichever is the greatest, the MS shall update RLA_P and calculate the value of C1, C31 and C32 for the serving cell and the non-serving cells; GSM 05.08, 10.1.2 The MS shall make a cell re-selection if:

(i) The path loss criterion parameter (C1) for the serving cell falls below zero.

(ii) A non-serving suitable cell (see GSM 03.22) is evaluated to be better than the serving cell. The best cell is the cell with the highest value of C32 among

- those cells that have the highest PRIORITY_CLASS among those that fulfil the criterion C31 ≥ 0, or
- all cells, if no cells fulfil the criterion C31 ≥ 0.

If the parameter C32_QUAL is set, positive GPRS_RESELECT_OFFSET values shall only be applied to the neighbour cell with the highest RLA_P value of those cells for which C32 is compared above.

PRIORITY_CLASS and C32_QUAL are broadcast on PBCCH of the serving cell.

When evaluating the best cell, the following hysteresis values shall be subtracted from the C32 value for the neighbour cells:

- in standby state, if the new cell is in the same routing area: 0.
- in ready state, if the new cell is in the same routing area: GPRS_CELL_RESELECT_HYSTERESIS. If the parameter C31_HYST is set, GPRS_CELL_RESELECT_HYSTERESIS shall also be subtracted from the C31 value for the neighbour cells.
- in standby or ready state, if the new cell is in a different routing area: RA_RESELECT_HYSTERESIS.
- in case of a cell re-selection occurred within the previous 15 seconds: 5 dB.

GPRS_CELL_RESELECT_HYSTERESIS, C31_HYST and RA_RESELECT_HYSTERESIS are broadcast on PBCCH of the serving cell.

20.22.3.3 Test purpose

1. To verify that the MS reselects to the correct cell by calculating C31 correctly when C31_HYST is set on the network.

20.22.3.4 Method of Test

20.22.3.4.1 Initial Conditions

Parameters changed from the default values in table 20.22.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBm)	-60	-60	-80	-64	-70	-70
GPRS_RXLEV_ACCESS_MIN (dBm)	-100	-100	-100	-92	-100	-102
C31_HYST = 1						
Priority Class	1		1	1	1	3
GRO			10	4	10	14
HCS_THR	-90		-70	-80	-86	-86
GCRH	6					
C1	40 to 15		20	28	30	32
C31	30 to 5		-16	10	10	10
C32	40 to 15		24	26	34	40

NOTE 1: GRO = GPRS_RESELECT_OFFSET, GCRH = GPRS_CELL_RESELECT_HYSTERESIS, RARH = RA_RESELECT_HYSTERESIS.

NOTE 2: The BA(GPRS) list only contains the ARFCNs of the carriers used during the test. The HCS structure is transmitted in the Packet system information messages.

NOTE 3: Carrier 1 is the BCCH carrier which broadcasts the position of the PBCCH channel in the cell (Carrier 2.)

20.22.3.4.2 Procedure

a) The MS is switched on and a call is set-up on carrier 2

b) The SS waits 10 seconds.

c) The RF level of Carriers 1 & 2 are reduced to -85 dBm (C1=decreases to 15)

20.22.3.5 Test Requirements

After step c) the MS should respond on carrier 5 within 10 seconds. (Carrier 3 should be rejected as C31 <0, Carrier 6 has a lower priority class than Carrier 4 and Carrier 5 so is rejected, even though C32= 36, out of carrier 4 and 5, Carrier 5 has highest C32 value.

Note: Time allowed includes 5 sec for MS to determine C32 on neighbour cell is higher, 2 seconds to decode BCCH and 1 sec for re-selection.

20.22.4 Cell re-selection with cells in different routing area

20.22.4.1 Definition and applicability

This test is applicable for all types of GPRS mobiles

20.22.4.2 Conformance requirement

At least for every new sample or every second, whichever is the greatest, the MS shall update RLA_P and calculate the value of C1, C31 and C32 for the serving cell and the non-serving cells; GSM 05.08, 10.1.2 The MS shall make a cell re-selection if:

(i) The path loss criterion parameter (C1) for the serving cell falls below zero.

(ii) A non-serving suitable cell (see GSM 03.22) is evaluated to be better than the serving cell. The best cell is the cell with the highest value of C32 among

- those cells that have the highest PRIORITY_CLASS among those that fulfil the criterion C31 ≥ 0, or
- all cells, if no cells fulfil the criterion C31 ≥ 0.

If the parameter C32_QUAL is set, positive GPRS_RESELECT_OFFSET values shall only be applied to the neighbour cell with the highest RLA_P value of those cells for which C32 is compared above.

PRIORITY_CLASS and C32_QUAL are broadcast on PBCCH of the serving cell.

When evaluating the best cell, the following hysteresis values shall be subtracted from the C32 value for the neighbour cells:

- in standby state, if the new cell is in the same routing area: 0.
- in ready state, if the new cell is in the same routing area: GPRS_CELL_RESELECT_HYSTERESIS. If the parameter C31_HYST is set, GPRS_CELL_RESELECT_HYSTERESIS shall also be subtracted from the C31 value for the neighbour cells.
- in standby or ready state, if the new cell is in a different routing area: RA_RESELECT_HYSTERESIS.
- in case of a cell re-selection occurred within the previous 15 seconds: 5 dB.

GPRS_CELL_RESELECT_HYSTERESIS, C31_HYST and RA_RESELECT_HYSTERESIS are broadcast on PBCCH of the serving cell.

20.22.4.3 Test purpose

To verify that the MS reselects to the correct cell by calculating C32 correctly when one of the cells is in a different routing area.

20.22.4.4 Method of Test

20.22.4.4.1 Initial Conditions

Parameters changed from the default values in table 20.22.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6
RF Signal Level (dBm)	-60	-60	-70	-70	-70	-70
RAI					Different	
GPRS_RXLEV_ACCESS_MIN (dBm)	-100	-100	-80	-100	-100	-80
GRO			4	4	6	4
GCRH	4					
RARH	14					
C1	40 to 15		10	30	30	10
C32	40 to 15		14	34	22	14

Note 1: GRO = GPRS_RESELECT_OFFSET, GCRH = GPRS_CELL_RESELECT_HYSTERESIS, RARH = RA_RESELECT_HYSTERESIS.

Note 2: The BA(GPRS) list only contains the ARFCNs of the carriers used during the test. The HCS structure is transmitted in the Packet system information messages.

Note 3: Carrier 1 is the BCCH carrier which broadcasts the position of the PBCCH channel in the cell (Carrier 2.)

20.22.4.4.2 Procedure

a) The MS is switched on and a call is set-up on carrier 2

b) The SS waits 10 seconds.

c) The RF level of Carriers 1 & 2 are reduced to -85 dBm (C1=decreases to 15)

20.22.4.5 Test Requirements

After step c) the MS should respond on carrier 4 within 10 seconds. (Carrier 5 C32=22 if RA_RESELECT_HYSTERESIS is used correctly by MS otherwise it will be 36 and MS will select carrier 5 incorrectly)

Note: Time allowed includes 5 sec for MS to determine C32 on neighbour cell is higher, 2 seconds to decode BCCH and 1 sec for re-selection.

20.22.5 Network controlled Cell re-selection in Transfer Mode

20.22.5.1 Definition and applicability

This test is applicable for all types of GPRS mobiles

20.22.5.2 Conformance requirement

1. A cell re-selection command may be sent from the network to an MS. When the MS receives the command, it shall immediately re-select the cell according to the included cell description and change the network control mode according to the command (GSM 04. 60, GSM05.08: 10.1.4).

20.22.5.3 Test purpose

To verify the MS can correctly interpret the network control commands and reselect to the correct cell.

20.22.5.4 Method of Test

20.22.5.4.1 Initial Conditions

Parameters changed from the default values in table 20.22.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5
RF Signal Level (dBm)	-60	-60	-80	-70	-70
GPRS_RXLEV_ACCESS_MIN (dBm)	-100	-100	-100	-100	-100
NEWORK_CONTROL_ORDER	NC2	NC2	NC0	NC2	NC2
NC_REPORTING PERIOD_T (s)	0.96	0.96		0.96	0.96
C1	40-20		20-40	30	
C32	40-20		20-40	30	

Note 1: The HCS structure is omitted from the packet system information messages on all the cells. Therefore C31 is not used.

Note 2: Carrier 1 is a BCCH carrier which broadcasts the position of the PBCCH channel in the cell (Carrier 2.) and Carrier 4 is a BCCH carrier which broadcasts the position of the PBCCH channel in the cell (Carrier 5.)

20.22.5.4.2 Procedure

The MS is switched on and a call is set up on carrier 2.

The RF level of carriers 1 and 2 are reduced to –80dBm. (C32 becomes 20).

The SS waits 15 seconds after the RF level of carriers 1and 2 are reduced before sending a reselect command to the MS to select carrier 4.

The RF level of carrier 3 is increased to –60dBm. (C32 becomes 40).

The SS waits 15 seconds after increasing the RF level of carrier 3 before the Network Control Order is changed to NC0 on carriers 4 and 5. The SS sends a RESET command to the MS.

20.22.5.5 Test Requirements

1) After step b) there should be no response on carriers 3, 4 or 5.

2) After step c) there should be a response on carrier 5 within 5 seconds of the re-select command. (The 5s = 2s for BCCH decoding + 2s for PBCCH decoding + 1s fo re-selection + tolerance)

3) After step d) there should be no response on carriers 1, 2, 3.

4) After step e) there should be a response on carrier 3 within 3 seconds of the SS sending the RESET command. (The 3s = 2s for BCCH decoding + 1s for re-selection + tolerance).

20.22.6 Cell reselection timings

20.22.6.1 Definition and applicability

This test is applicable for all types of GPRS mobiles

20.22.6.2 Conformance requirement

At least for every sample or every second, whichever is greatest, the MS shall calculate the value of C1, C31 and C32 for the serving cell and recalculate C1, C31 and C32 values for non serving cells (if necessary). The MS shall make a cell re-selection if:

i) The path loss criterion parameter (C1) for the serving cells falls below zero.

20.22.6.3 Test purpose

1. To verify that the MS meets conformance requirement 6.2 (i) within time allowed.

20.22.6.4 Method of Test

20.22.6.4.1 Initial Conditions

Parameters changed from the default values in table 20.22.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4
RF Signal Level (dBm)	-60	-60	-70	-70
GPRS_RXLEV_ACCESS_MIN (dBm)	-90	-90	-100	-100
GRO			-28	
SPLIT_PG_CYCLE	4	4	4	4
C1	30		30	
C32	30		2	

Note 1: The HCS structure is omitted from the system information messages on all the cells. Therefore C31 is not used.

Note 2: The RLA_P should be updated every 3.84 seconds with SPLIT_PG_CYCLE=4

Note 3: Carriers 1 and 3 are the BCCH carriers which broadcast the position of the PBCCH channel in the cell (Carriers 2 and 4)

20.22.6.4.2 Procedure

a) The SS activates all carriers and pages the MS on carrier 4. The SS starts to monitor carriers 3 and 4 for responses from the MS.

b) The MS is switched on.

c) The SS waits 30s before the RF level of carriers 1 & 2 are reduced to –100 dBm for 8 seconds. (During this period C1 becomes –10). Then the SS raises the level back to –60 dBm.The SS waits 20 seconds.

d) The SS reduces the RF level on carriers 1 & 2 to –100dBm.

20.22.6.5 Test Requirements

1) After step c) there shall be no access on carrier 3 or carrier 4.

2) After step d) there shall be access on carrier 4 within 25 seconds (allow 20s for c1 average to reach –10 + 2s to decode BCCH + 2s to decode PBCCH)

20.22.7 Downlink signalling failure

20.22.7.1 Definition and applicability

This test is applicable for all types of GPRS MSs.

20.22.7.2 Conformance requirement

The downlink signalling failure criterion is based on the downlink signalling failure counter DSC.

1. If DRX period split is supported , DSC shall be initialised to a value equal to the nearest integer to max(10,90/64*SPLIT_PG_CYCLE) where SPLIT_PG_CYCLE is an parameter defined at GPRS attach (see 05.02)

2. Thereafter, whenever the MS attempts to decode a message in its paging subchannel; if a message is successfully decoded DSC is increased by 1, however never beyond the max value defined in 1.

3. Whenever the MS can not successfully decode a message in its paging subchannel the DSC is decreased by 4.

4. When DSC reaches 0, a downlink signalling failure shall be declared. A downlink signalling failure shall result in cell reselection, GSM 03.22, 4.5 (ii) and GSM 05.08, 6.5

NOTE: The network sends the paging subchannel for a given MS every 64/SPLIT_PG_CYCLE multiframes . The requirement for network transmission on the paging subchannel is specified in GSM 04.08. The MS is required to attempt to decode a message every time its paging subchannel is sent.

20.22.7.3 Test purpose

1. To verify that the MS initialises the DSC counter in accordance with the conformance requirement. This is verified indirectly.

2. To verify that whenever the MS successfully decodes a message on paging subchannel, the DSC is increased by 1, (however never beyond the nearest integer to max defined in 16.2.1). This is verified indirectly.

3 To verify that whenever the MS can not successfully decode a message on paging subchannel, the DSC decreased by 4. This is verified indirectly.

4. To verify that when the DSC reaches 0, a downlink signalling failure shall be declared and the MS will perform cell reselection.

20.22.7.4 Method of Test

20.22.7.4.1 Initial Conditions

Parameters changed from the default values in table 20.22.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4
RF Signal Level (dBμV emf() / dBm)	-65	-65	-60	-60
GPRS_RXLEV_ACCESS_MIN (dBm)	-95	-95	-100	-100
SPLIT_PG_CYCLE	4	4	4	4
C1	30		40	
C32	30		40	

Note 1: The HCS structure is omitted from the system information messages on all the cells. Therefore C31 is not used.

Note 2: With SPLIT_PG_CYCLE=4 DSC should be set to 10, Paging blocks occur every 832 frames or 3.84 seconds.

Note 3: Carrier 1 and 3 are BCCH carriers which broadcast the position of the PBCCH channel in the cell (Carrier 2 and 4.)

20.22.7.4.2 Procedure

a) The MS is switched on. On carrier 4 valid layer 3 messages shall be sent in the paging blocks, but not paging the MS. On carrier 2 the MS is paged continuously in all paging blocks.

b) After 40s the SS sends corrupted data (using random data, wrong parity bits see GSM 05.03, 4.3 & 4.1.2 or other lower layer error) in 2 successive paging blocks on carrier 4 and then reverts to sending normal data.

NOTE 1: Sending corrupted, i.e. non-decodable data on 2 successive paging blocks should decrease the DSC to 2.

c) The SS monitors all accesses on both carriers for 40 s. (Allows the DSC counter to go back to maximum of 10, paging block every 3.84 secs)

d) The SS sends corrupted data in 3 successive paging blocks on carrier 4 and then reverts to sending normal data..

NOTE 2: Sending corrupted, data on 3 successive paging blocks should decrease the DSC to < 0 (-2) and cause a cell reselection.

e) The SS monitors all accesses on both carriers for 30s

20.22.7.5 Test requirements

1) There shall be no access on carriers 1 or 2 after step b).

2) The MS shall access on carrier 2 at test step e) within 5 seconds. (The time should be measured from the transmission of the complete 3rd successive paging block with errors and allows 4 secs for decoding BCCH and PBCCH).

20.22.8 Cell selection when the best cell does not support GPRS

20.22.8.1 Definition and applicability

Cell selection is a process in which an MS, whenever a new PLMN is selected, attempts to find a suitable cell of that PLMN to camp on. Two methods of searching for a suitable cell are possible, normal cell selection and stored list cell selection. The process ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink. The support of GPRS is not a condition to select a cell. Once the MS is camped on a cell, access to the network is allowed.

This test is applicable for all types of GPRS MSs.

20.22.8.2 Conformance requirement

1. The MS shall be able to select the strongest cell within 30 seconds of switch on. This assumes a valid SIM, with PIN disabled and ideal radio conditions, GSM 05.08, 6.1.

2. There are various requirements that a cell must satisfy before an MS can perform normal camping on it:

   2.1 (i) It should be a cell of the selected PLMN

   2.2 (ii) It should not be "barred" (see section 3.5.1)

   2.3 (iii) It should not be in an LA which is in the list of "forbidden LAs for roaming";

   2.4 (iv) The radio path loss between MS and BTS must be below a threshold set by the PLMN operator. This is estimated as shown in section 3.6. GSM 03.22, 3.2.1.

   NOTE: Criteria 2.3 (iii) is not applicable for Cell Selection.

3. Initially the MS looks for a cell which satisfies these 4 constraints ("suitable cell") by checking cells in descending order of received signal strength. If a suitable cell is found, the MS camps on it, GSM 03.22, 3.2.1.

4. The MS shall be able to calculate correctly the path loss criterion parameter C1, used for cell selection and reselection, GSM 05.08, 6.4.

20.22.8.3 Test purpose

1. To verify that the MS meets conformance requirement 1. even when one of the other cells supports GPRS.

2. To verify that:

   2.1 The MS does not select a cell of a PLMN, which is not the selected PLMN.

   2.2 The MS does not select a cell which is "barred".

   2.4 The MS does not select a cell with C1<0.

3. To verify that the MS selects suitable cells in descending order of received signal strength.

4. To verify that the MS does not select a cell with C1<0.

20.22.8.4 Method of test

20.22.8.4.1 Initial conditions

Parameters changed from the default values in table 20.22.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5
RF Signal Level (dBm)	-75	-80	-70	-60	-70
CBA	0	0	0	1	0
RXLEV_ACCESS_MIN (dBm)	-90	-90	-90	-90	-60
GPRS_RXLEV_ACCESS_MIN					
MNC			01		
MCC			002		
C1	15	10	20	30	-10

Note 1: For an E-GSM MS carrier 1 and carrier 5 ARFCNs are chosen in the E-GSM band, carrier 3 and carrier 4 ARFCNs in the P-GSM band.

Note 2: Carrier 2 supports GPRS without PBCCH channel in the cell.

Note 3: Carriers 1, 3, 4 and 5 do not support GPRS.

20.22.8.4.2 Procedure

a) The SS activates and pages on the MS on all carriers. All Carriers are monitored for RA requests from the MS.

b) The MS is switched on.

20.22.8.5 Test requirements

1) After step b), the first response from the MS shall be on carrier 1 within 33 seconds. There shall be no response from the MS on any other carrier

20.22.9 Cell reselection when the best cell does not support GPRS

20.22.9.1 Definition and applicability

While camped on a cell of the selected PLMN the MS may need to select a different cell in order to fulfil the normal service state. This ensures that the MS is camped on a cell from which it can reliably decode downlink data and with which it has a high probability of communications on the uplink. The target cell should be reselected despite it does not support GPRS.

This test is applicable for all types of GPRS MSs.

20.22.9.2 Conformance requirement

1. While camped on a cell of the selected PLMN ("camped normally"), the MS may need to select a different cell ("normal cell reselection" state). The following events trigger a cell reselection:

   1.1 (iii) The cell camped on (current serving cell) has become barred.

   1.2 (iv) There is a better cell (in terms of the path loss criterion C2) in the same LA, or a much better cell in another LA of the selected PLMN (using the CRH parameter).

   The MS will then reselect a new cell in order to fulfil the process goal.; GSM 03.22, 4.5.

NOTE 1: Criterion (i) is tested in section 20.8 (Cell reselection when C1(serving cell) < 0 for 5 seconds).

NOTE 2: Criterion (ii) is tested section 20.16 (Downlink signalling failure).

NOTE 3: Criterion (v) is tested in section 20.6 (Cell reselection timings).

2. There are various requirements that a cell must satisfy before an MS can perform normal camping on it:

   2.1 (ii) It should not be "barred".

   2.2 (iv) The radio path loss between MS and BTS must be below a threshold set by the PLMN operator. GSM 03.22, 3.2.1.

NOTE 4: Criterion (i) is not relevant for cell reselection and for cell selection it is tested in section 20.1.

NOTE 5: Criterion (iv) refers to the C1 parameter.

3. The MS shall be able to calculate correctly the path loss criterion parameter C2 used for cell reselection; GSM 05.08, 6.4.

4. At least every 5 s the MS shall calculate the value of C1 and C2 for the serving cell and recalculate C1 and C2 values for non serving cells (if necessary). The MS shall then check whether:

   i) The path loss criterion (C1) for current serving cell falls below zero for a period of 5 seconds. This indicates that the path loss to the cell has become too high.

   ii) The calculated value of C2 for a non-serving suitable cell exceeds the value of C2 for the serving cell for a period of 5 seconds, except in the case of the new cell being in a different location area in which case the C2 value for the new cell shall exceed the C2 value of the serving cell by at least CELL_RESELECT_HYSTERESIS dB as defined by the BCCH data from the current serving cell, for a period of 5 seconds. This indicates that it is a better cell. GSM 05.08, 6.6.2.

5. The MS shall attempt to decode the full BCCH data of the serving cell at least every 30 seconds; GSM 05.08, 6.6.1.

20.22.9.3 Test purpose

1. To verify that:

   1.1 The MS meets conformance requirement 1.1.

   1.2 The MS meets conformance requirement 1.2.

   1.3 The MS meets conformance requirement 1.3.

2. To verify that:

   2.1 The MS does not reselect a cell which is barred.

   2.2 The MS does not reselect a cell which has a C1<0.

   2.3 The MS does reselect a cell even if does not support GPRS.

2.4 The MS keeps camping on the serving cell despite it does not support GPRS and there is a non-serving suitable cell with a lower C2 that supports GPRS.

2.5 The MS does not attempt to attach to GPRS when camping on a cell that does not support GPRS despite there is a non-serving suitable cell with a lower C2 that supports GPRS.

3. To verify that the MS calculates the C2 parameter correctly when the CELL_RESELECT_OFFSET, TEMPORARY_OFFSET and PENALTY_TIME parameters are not used.

4. To verify that the MS takes into account the CELL_RESELECT_HYSTERESIS parameter when reselecting a cell in a different location area, whether the this cell supports GPRS or not.

5. To verify that the MS decodes the CELL_BAR_ACCESS and CELL_BAR_QUALIFY parameters from the BCCH every 30 seconds.

20.22.9.4 Method of test

20.22.9.4.1 Initial conditions

Parameters changed from the default values in table 20.1.

Parameter	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5
RF Signal Level (dBµV emf() / dBm)	43 / -70	33 / -80	43 / -70	38 / -75	38 / -75
RXLEV_ACCESS_MIN (dBm)	-85	-90	-90	-85	-67
CRH	10 dB				
LAC			different from other carriers		
CBA				1	
CBQ				0	
C1	15	10	20	10	-8
C2	15	10	20	10	-8

Note 1: Carrier 1 and 3 support GPRS without PBCCH channel in the cell.

Note 2: Carriers 2, 4 and 5 do not support GPRS.

The BA(BCCH) list only contains the ARFCNs of the carriers used during the test.

20.22.9.4.2 Procedure

a) The SS activates carriers 1, 2, 4 and 5. The MS is paged on carriers 1, 2, 4 and 5. The SS monitors carriers 2, 4 and 5 for RA requests from the MS.

b) The MS is switched on.

c) When the SS receives a response on carrier 1, it stops paging the MS on this carrier and waits for 25 seconds. (The MS should reselect and camp onto carrier 1).

d) The SS disables GPRS on carrier 1 and enables GPRS on carrier 2.

e) The SS enables GPRS on carrier 1 and disables GPRS on carrier 2.

f) The SS stops paging on all carriers except carrier 2. The level of carrier 2 is increased to 43 dBµVemf (C2 becomes 20 dB), and the SS monitors carrier 2 for RA requests from the MS.

g) When the SS receives a response from the MS on carrier 2, it stops paging the MS on this carrier.

h) The MS is switched off then on and the MS is paged on carriers 1, 4 and 5. The SS monitors carrier 1, 4 and 5 for RA requests from the MS.

i) The MS is switched off.

j) The SS is reconfigured and sets CBA = 1 on carriers 1 and 5, enables GPRS on carrier 2 and disables GPRS on carrier 1.

k) The MS is switched on.

l) After 33 seconds, the SS starts paging continuously on carrier 1 and sets CBA=1 on carrier 2 and CBA=0 on carriers 1, 4 and 5.

m) When the SS receives a response on carrier 1, it stops paging the MS and waits for 25 seconds. (The MS should reselect and camp onto carrier 1).

n) The SS activates carrier 3, pages the MS continuously on this carrier and monitors carrier 3 for RA requests from the MS.

o) The SS increases the level of carrier 3 to 53 dBµVemf (C2 increases to 30 dB.).

p) The SS is reconfigured and sets CBA = 1 on carriers 1 and 5, disables GPRS on carrier 3 and enables GPRS on carrier 1.

q) The MS is switched on.

r) After 33 seconds, the SS starts paging continuously on carrier 1 and sets CBA=1 on carrier 2 and CBA=0 on carriers 1, 4 and 5.

s) When the SS receives a response on carrier 1, it stops paging the MS and waits for 25 seconds. (The MS should reselect and camp onto carrier 1).

t) The SS activates carrier 3, pages the MS continuously on this carrier and monitors carrier 3 for RA requests from the MS.

u) The SS increases the level of carrier 3 to 53 dBµVemf (C2 increases to 30 dB.).

20.22.9.5 Test requirements

1) After step c), there shall be no response from the MS on carriers 2, 4, or 5 within 50 seconds.

NOTE 1: 33 seconds for the MS to read the BCCH of carrier 2 (30 seconds + 10 %), 15 seconds for the MS to reselect cell 1, since the MS already has a running average on carrier 1, allow 50 seconds.

2) After step d), there shall be no response from the MS on carriers 2, 4, or 5 within 50 seconds.

3) After step e), there shall be no response from the MS on carriers 2, 4, or 5 within 50 seconds.

4) In step f), the MS shall respond on carrier 2 within 20 seconds of increasing the level of carrier 2.

NOTE 2: 5 seconds to perform running average, 10 seconds to detect C2 differences, 2,4 seconds to read BCCH of carrier 2, 1 second to perform RA. Total 18,4 seconds, allow 20 seconds.

5) After step h), there shall be no response from the MS on carriers 1, 4, or 5 within 50 seconds.

6) In step l), the MS shall respond on carrier 1 within 50 seconds of setting CBA=1 on carrier 2.

7) After step n), there shall be no response from the MS within 50 seconds.

8) After step o), the MS shall respond on carrier 3 within 20 seconds.

9) In step r), the MS shall respond on carrier 1 within 50 seconds of setting CBA=1 on carrier 2.

NOTE 2: 33 seconds for the MS to read the BCCH of carrier 2 (30 seconds + 10 %), 15 seconds for the MS to reselect cell 1, since the MS already has a running average on carrier 1, allow 50 seconds.

10) After step t), there shall be no response from the MS within 50 seconds.

11) After step u), the MS shall respond on carrier 3 within 20 seconds.