# 27 Testing of the SIM/ME interface

The following sequence of tests confirms:

a) the correct interpretation of data read from the SIM (Subscriber Identification Module) by the ME;
b) the correct writing of data to the SIM by the ME;
c) the initiation of appropriate procedures by the ME;
d) low level protocols;
e) electrical characteristics;
f) physical characteristics.

All tests apply to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

A SIM simulator will be required as part of the SS. Alternatively, to perform the logical tests, SIMs programmed with specific data may be used. The SIM data is not defined within the initial conditions of the tests unless it differs from the default values defined below.

**Definition of default values for SIM/ME interface testing**

A SIM containing the following default values is used for all tests of this section unless otherwise stated.

For each data item, the logical default values and the coding within the elementary files (EF) of the SIM follow.

NOTE 1: Bx represents Byte x of the coding.

NOTE 2: Unless otherwise defined, the coding values are hexadecimal.

**$EF_{IMSI}$ (IMSI)**

Logically: 246813579

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
|---|---|---|---|---|---|---|---|---|---|
| | 05 | 29 | 64 | 18 | 53 | 97 | FF | FF | FF |

**$EF_{LOCI}$ (Location Information)**

Logically:
LAI-MCC: 246
LAI-MNC: 81
LAI-LAC: 0001
TMSI: "FF .. FF"

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FF | FF | FF | FF | 42 | F6 | 18 | 00 | 01 | FF | 00 |

**$EF_{Kc}$ (Ciphering Key Kc)**

Logically:
Key Kc: xx
Sequence No: 1

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
|---|---|---|---|---|---|---|---|---|---|
| | xx | xx | xx | xx | xx | xx | xx | xx | 01 |

**$EF_{ACC}$ (Access Control Class)**

Logically: One and only one access class from 0 - 9, e.g. class 7 for which the coding is "00 80".

**$EF_{FPLMN}$ (Forbidden PLMNs)**

Logically: PLMN1: 234 02 (MCC MNC)
PLMN2: 234 03
PLMN3: 234 04
PLMN4: 234 05

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 | F4 | 20 | 32 | F4 | 30 | 32 | F4 | 40 | 32 | F4 | 50 |

**$EF_{SST}$ (SIM Service Table)**

Logically: CHV1 disable function allocated and activated.
Abbreviated dialling numbers allocated and activated.
PLMN selector allocated and activated.
Fixed dialling numbers not activated.

| Coding: | B1 | B2 | B3 | B4 |
|---|---|---|---|---|
| | xx0x1111 | 0011xxxx | xxxxxxxx | 0000xxxx (binary) |

The coding of $EF_{SST}$ shall conform with the capabilities of the SIM used.

**$EF_{ADN}$ (Abbreviated Dialling Number)**

Logically:
At least 10 records.
Record 1:
Length of alpha identifier: 32 characters
Alpha identifier: "ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEF"
Length of BCD number: "03"
TON and NPI: Telephony and Unknown
Dialled number: 123
CCI: None
Ext1: None

| Coding: | B1 | B2 | B3 | ... | B32 | B33 | B34 | B35 | B36 | B37 | B38 | B39 | ... | B46 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Record 1: | 41 | 42 | 43 | ... | 46 | 03 | 81 | 21 | F3 | FF | FF | FF | ... | FF |

**$EF_{Phase}$**

Logically: Phase 2

Coding: "02"

**$EF_{PLMNsel}$ (PLMN Selector)**

Logically: 1st PLMN: 234 01 (MCC MNC)
2nd PLMN: 234 02
3rd PLMN: 234 03
4th PLMN: 234 04
5th PLMN: 234 05
6th PLMN: 234 06
7th PLMN: 246 81
8th PLMN: 246 82

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B0 | B10 | B11 | B12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 | F4 | 10 | 32 | F4 | 20 | 32 | F4 | 30 | 32 | F4 | 40 |
| | B13 | B14 | B15 | B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 | B24 |
| | 32 | F4 | 50 | 32 | F4 | 60 | 42 | F6 | 18 | 42 | F6 | 28 |

**CHV1 (PIN)**

Logically: 2468

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 |
|---|---|---|---|---|---|---|---|---|
| | 32 | 34 | 36 | 38 | FF | FF | FF | FF |

**CHV2 (PIN2)**

Logically: 3579

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 |
|---|---|---|---|---|---|---|---|---|
| | 33 | 35 | 37 | 39 | FF | FF | FF | FF |

**Unblock CHV1 (PUK)**

Logically: 13243546

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 |
|---|---|---|---|---|---|---|---|---|
| | 31 | 33 | 32 | 34 | 33 | 35 | 34 | 36 |

**Unblock CHV2 (PUK2)**

Logically: 08978675

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 |
|---|---|---|---|---|---|---|---|---|
| | 30 | 38 | 39 | 37 | 38 | 36 | 37 | 35 |

**Definition of FDN SIM**

Some test cases require a different configuration than the one described above. For that purpose a default FDN SIM is defined. In general the values of the FDN SIM are identical to the default SIM, with the following exceptions:

**$EF_{SST}$ (SIM Service Table)**

Logically: CHV1 disable function allocated and activated.
Abbreviated dialling numbers allocated and activated.
PLMN selector allocated and activated.
Fixed dialling numbers allocated and activated.
Advice of Charge allocated and activated.

| Coding: | B1 | B2 | B3 | B4 |
|---|---|---|---|---|
| | xx111111 | 0011xx11 | xxxxxxxx | 0000xxxx (binary) |

The coding of $EF_{SST}$ shall conform with the capabilities of the SIM used.

**$EF_{FDN}$ (Fixed Dialling Numbers)**

Logically:
Record 1:
Length of alpha identifier: 6 characters
Alpha identifier: "FDN111"
Length of BCD number: "06"
TON and NPI: Telephony and International
Dialled number: +1357924680
CCI: None
Ext1: None

Coding for record 1:

| B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | B13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 44 | 4E | 31 | 31 | 31 | 06 | 91 | 31 | 75 | 29 | 64 | 08 |

| B14 | B15 | B16 | B17 | B18 | B19 | B20 |
|---|---|---|---|---|---|---|
| FF | FF | FF | FF | FF | FF | FF |

Record 2:

Length of alpha identifier: 6 characters
Alpha identifier: "FDN222"
Length of BCD number: "04"
TON and NPI: Telephony and Unknown
Dialled number: +24680
CCI: None
Ext1: None

Coding for record 2:

| B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | B13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 44 | 4E | 32 | 32 | 32 | 04 | 81 | 42 | 86 | F0 | FF | FF |

| B14 | B15 | B16 | B17 | B18 | B19 | B20 |
|---|---|---|---|---|---|---|
| FF | FF | FF | FF | FF | FF | FF |

Record 3:

Length of alpha identifier: 6 characters
Alpha identifier: "FDN333"
Length of BCD number: "0B"
TON and NPI: Telephony and International
Dialled number: +12345678901234567890
CCI: None
Ext1: None

Coding for record 3:

| B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | B13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 44 | 4E | 33 | 33 | 33 | 0B | 91 | 21 | 43 | 65 | 87 | 09 |

| B14 | B15 | B16 | B17 | B18 | B19 | B20 |
|---|---|---|---|---|---|---|
| 21 | 43 | 65 | 87 | 09 | FF | FF |

## 27.1 MS identification by short IMSI

### 27.1.1 MS identification by short IMSI - Normal case

#### 27.1.1.1 Definition and applicability

The IMSI is used for unique identification of the MS by a GSM network. The IMSI is stored in the SIM and read during the SIM/ME initialization procedure.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.1.1.2 Conformance requirement

On the receipt of an IMMEDIATE ASSIGNMENT message the MS shall send PAGING RESPONSE containing the IMSI of the SIM.

GSM 11.11, clause 11.2.1 and 11.4.2, GSM 04.08, clause 10.5.1.4.

#### 27.1.1.3 Test purpose

1) To verify that the ME uses the IMSI of the SIM.

2) To verify that the ME can handle an IMSI of less than the maximum length.

#### 27.1.1.4 Method of test

##### 27.1.1.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters:

Attach/detach: disabled
LAI (MCC/MNC/LAC): 246/81/0001
Access control: unrestricted.

The default SIM is installed into the ME and the MS is powered on.

##### 27.1.1.4.2 Procedure

a) The SS sends PAGING REQUEST to the MS using the IMSI stored in the SIM.

b) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

c) After receipt of a PAGING RESPONSE from the MS, the SS sends CHANNEL RELEASE to the MS.

#### 27.1.1.5 Test requirement

After step b) the MS shall send PAGING RESPONSE to the SS containing the IMSI stored in the SIM.

### 27.1.2 MS identification by short IMSI, Phase 1 DCS SIM

#### 27.1.2.1 Definition and applicability

Different from Phase 2, the IMSI in a Phase 1 DCS SIM is stored in a directory $DF_{DCS1800}$ with the specific identifier "7F 21". To ensure backwards compatibility, if selection of the phase 2 identifier "7F 20" fails, the MS shall select "7F 21". Otherwise access to the IMSI and other data is impossible with a Phase 1 DCS SIM

This test applies to DCS 1 800 MEs.

#### 27.1.2.2 Conformance requirement

If selection of DFGSM by the identifier "7F 20" fails, the ME shall select $DF_{DCS1800}$ with "7F 21".

GSM 11.11, clause 10.4.

#### 27.1.2.3 Test purpose

To verify that the ME uses the identifier "7F 21" to select $DF_{DCS1800}$ in a Phase 1 DCS SIM.

#### 27.1.2.4 Method of test

##### 27.1.2.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters:

Attach/detach: disabled
LAI (MCC/MNC/LAC): 246/81/0001
Access control: unrestricted.

A phase 1 DCS SIM (identifier of $DF_{DCS1800}$ is "7F 21", $DF_{GSM}$ not existing) with default values is installed into the ME and the MS is powered on.

##### 27.1.2.4.2 Procedure

a) The SS sends PAGING REQUEST to the MS using the IMSI stored in the SIM.

b) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

c) After receipt of a PAGING RESPONSE from the MS, the SS sends CHANNEL RELEASE to the MS.

#### 27.1.2.5 Test requirement

After step b) the MS shall send PAGING RESPONSE to the SS containing the IMSI stored in the SIM.

### 27.2 MS identification by short TMSI

#### 27.2.1 Definition and applicability

The TMSI is temporarily used for identification of the MS by a GSM network. It will have been previously assigned by the network. The TMSI is stored in the SIM by the ME and read during the SIM/ME initialization procedure.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.2.2 Conformance requirement

On the receipt of an IMMEDIATE ASSIGNMENT message the MS shall send PAGING RESPONSE containing the TMSI stored in the SIM.

GSM 11.11, clause 11.2.1 and 11.4.5, GSM 04.08, clause 10.5.1.4.

#### 27.2.3 Test purpose

1) To verify that the ME uses the TMSI stored in the SIM.

2) To verify that the ME can handle a TMSI of less than maximum length.

#### 27.2.4 Method of test

##### 27.2.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters:

Attach/detach: disabled
LAI (MCC/MNC/LAC): 246/81/0001
Access control: unrestricted.

The default SIM is used with the following exception:

$EF_{LOCI}$ (Location Information)

| | | |
|---|---|---|
| Logically: | LAI-MCC: | 246 |
| | LAI-MNC: | 81 |
| | LAI-LAC: | 0001 |
| | TMSI: | "2143" |

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 00 | 00 | 21 | 43 | 42 | F6 | 18 | 00 | 01 | FF | 00 |

The SIM is installed into the ME and the MS is powered on.

#### 27.2.4.2 Procedure

a) The SS sends PAGING REQUEST to the MS using the TMSI stored in the SIM.

b) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

c) After receipt of a PAGING RESPONSE from the MS, the SS sends CHANNEL RELEASE to the MS.

### 27.2.5 Test requirement

After step b) the MS shall send PAGING RESPONSE to the SS containing the TMSI stored in the SIM.

## 27.3 MS identification by long TMSI

### 27.3.1 Definition and applicability

The TMSI is temporarily used for identification of the MS by a GSM network. It will have been previously assigned by the network. The TMSI is stored in the SIM by the ME and read during the SIM/ME initialization procedure.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

### 27.3.2 Conformance requirement

On the receipt of an IMMEDIATE ASSIGNMENT message the MS shall send PAGING RESPONSE containing the correct TMSI stored in the SIM.

GSM 11.11, clause 11.2.1 and 11.4.5, GSM 04.08, clause 10.5.1.4.

### 27.3.3 Test purpose

1) To verify that the ME uses the TMSI stored in the SIM.

2) To verify that the ME can handle a TMSI of maximum length.

3) To verify that the ME does not respond to page requests containing a previous TMSI.

### 27.3.4 Method of test

#### 27.3.4.1 Initial conditions

Prior to this test, the ME shall have been operated with a SIM containing TMSI "2143". This may be achieved by executing the previous test (27.2) prior to this test. Only under this condition will test purpose 3) be verified.

The SS transmits on the BCCH, with the following network parameters:

Attach/detach: disabled
LAI (MCC/MNC/LAC): 246/81/0001
Access control: unrestricted.

The default SIM is used with the following exception:

$EF_{LOCI}$ (Location Information)

Logically: LAI-MCC: 246
LAI-MNC: 81
LAI-LAC: 0001
TMSI: "21430000"

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 21 | 43 | 00 | 00 | 42 | F6 | 18 | 00 | 01 | FF | 00 |

The SIM is installed into the ME and the MS is powered on.

#### 27.3.4.2 Procedure

a) The SS sends PAGING REQUEST to the MS using the TMSI "2143".

b) The SS sends PAGING REQUEST to the MS using the TMSI stored in the SIM.

c) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

d) After receipt of a PAGING RESPONSE from the MS, the SS sends CHANNEL RELEASE to the MS.

### 27.3.5 Test requirement

1) After step a) the MS shall not respond to the PAGING REQUEST.

2) After step c) the MS shall send PAGING RESPONSE to the SS containing the TMSI stored in the SIM.

## 27.4 MS identification by long IMSI, TMSI updating and cipher key sequence number assignment

### 27.4.1 Definition and applicability

The IMSI and TMSI are used for identification of the MS by a GSM network. They are read from the SIM during the SIM/ME initialization procedure. Within the authentication procedure the network sends a cipher key sequence number to the MS. In addition the network may allocate a new TMSI to the MS. Cipher key sequence number and TMSI are stored in the SIM after call termination and/or at GSM session termination.

Test purpose 2) will only be verified if this test sequentially follows the previous test (27.3).

The test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

### 27.4.2 Conformance requirement

1. On the receipt of an IMMEDIATE ASSIGNMENT message the MS shall send PAGING RESPONSE containing the correct IMSI stored in the SIM.

   GSM 11.11, clauses 11.2.1 and 11.4.2, GSM 04.08, clause 10.5.1.4.

2. After call termination the SIM shall contain the cipher key sequence number and TMSI received by the MS during the authentication and TMSI reallocation procedures.

   GSM 11.11, clauses 11.2.2, 11.4.5 and 11.4.6, GSM 02.17, clause 6.1.

### 27.4.3 Test purpose

1) To verify that the ME uses the IMSI stored in the SIM.

2) To verify that the ME does not respond to page requests containing a previous IMSI.

3) To verify that the ME can handle an IMSI of maximum length.

4) To verify that the ME correctly updates the cipher key sequence number at call termination.

5) To verify that the ME correctly updates the TMSI at call termination.

### 27.4.4 Method of test

#### 27.4.4.1 Initial conditions

Prior to this test, the ME shall have been operated with a SIM containing IMSI "246813579". This may be achieved by executing the previous test (27.3) prior to this test. Only under this condition will test purpose 2) be verified.

The SS transmits on the BCCH, with the following network parameters:

| | |
|---|---|
| Attach/detach: | disabled |
| LAI (MCC/MNC/LAC): | 246/81/0001 |
| Access control: | unrestricted. |

The default SIM is used with the following exception:

$EF_{IMSI}$ (IMSI)

Logically: 246811111111111

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
|---|---|---|---|---|---|---|---|---|---|
| | 08 | 29 | 64 | 18 | 11 | 11 | 11 | 11 | 11 |

The SIM is installed into the ME and the MS is powered on.

#### 27.4.4.2 Procedure

a) The SS sends PAGING REQUEST to the MS using the IMSI "246813579".

b) The SS sends PAGING REQUEST to the MS using the IMSI stored in the SIM.

c) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

d) After receipt of a PAGING RESPONSE from the MS, the SS sends AUTHENTICATION REQUEST to the MS containing cipher key sequence number set to binary 010.

e) After receipt of AUTHENTICATION RESPONSE from the MS, the SS sends TMSI REALLOCATION to the MS containing TMSI "32547698".

f) Within 5 seconds after receipt of TMSI REALLOCATION COMPLETE from the MS, the SS sends CHANNEL RELEASE to the MS.

g) To allow examination of the values in the SIM after call termination the MS shall not be soft powered down. If the test is performed with a SIM simulator, the simulation is stopped. If the test is performed with a SIM, the SIM is removed without soft powering down the MS. If this is not possible, the power supply of the ME is removed and then the SIM removed.

### 27.4.5 Test requirement

1) After step a) the MS shall not respond to the PAGING REQUEST.

2) After step c) the MS shall send PAGING RESPONSE to the SS containing the IMSI stored in the SIM.

3) After step e) the MS shall send TMSI REALLOCATION COMPLETE to the SS.

4) After step g) the SIM shall contain the following values:

$EF_{LOCI}$ (Location Information)

Logically:
LAI-MCC: 246
LAI-MNC: 81
TMSI: "32547698"

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 | 54 | 76 | 98 | 42 | F6 | 18 | xx | xx | xx | xx |

$EF_{Kc}$ (Ciphering Key Kc)

Logically:
Key Kc: xx (result of the authentication algorithm)
Sequence No: 2

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
|---|---|---|---|---|---|---|---|---|---|
| | xx | xx | xx | xx | xx | xx | xx | xx | 02 |

## 27.5 Forbidden PLMNs, location updating and undefined cipher key

### 27.5.1 Definition and applicability

A list of forbidden PLMNs stored in the SIM and providing storage for up to 4 entries is managed by the MS. In automatic PLMN selection mode the MS controls location updating attempts to appropriate networks with respect to this list of forbidden PLMNs. As a result of a location update reject with the cause "PLMN not allowed" the MS stores the PLMN which rejected the update request in the SIM.

After a location update, which is not followed by an authentication procedure, the cipher key sequence number indicates that the cipher key is undefined.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

### 27.5.2 Conformance requirement

1. In automatic PLMN selection mode the MS shall only attempt a LOCATION UPDATE if it receives a BCCH containing a LAI that is not indicated in the $EF_{FPLMN}$ in the SIM.

   GSM 02.11, clause 2.3, GSM 11.11, clauses 11.2.1 and 11.4.8.

2. After receipt of a LOCATION UPDATE REJECT message with the cause "PLMN not allowed" the ME shall update the $EF_{FPLMN}$ in the SIM.

   GSM 02.11, clause 2.3, GSM 11.11, clauses 11.2.1 and 11.4.8.

3. After call termination the SIM shall contain the correct cipher key sequence number.

   GSM 11.11, clauses 11.2.2, 11.4.5 and 11.4.6, GSM 02.17, clause 6.1.

4. After call termination the SIM shall contain the correct TMSI and location information received by the MS.

   GSM 11.11, clauses 11.2.2, 11.4.5 and 11.4.6, GSM 02.17, clause 6.1.

### 27.5.3 Test purpose

1) To verify that in automatic PLMN selection mode the MS does not attempt to access PLMNs stored in $EF_{FPLMN}$ on the SIM.

2) To verify that the $EF_{FPLMN}$ is correctly updated by the ME after receipt of a LOCATION UPDATE REJECT message with cause "PLMN not allowed".

3) To verify that the $EF_{Kc}$ has been correctly updated by the ME.

4) To verify that the $EF_{LOCI}$ has been correctly updated by the ME.

### 27.5.4 Method of test

#### 27.5.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters:

| | |
|---|---|
| Attach/detach: | disabled |
| LAI (MCC/MNC/LAC): | 234/02/0001 |
| Access control: | unrestricted. |

The default SIM is used with the following exception:

$EF_{IMSI}$ (IMSI)

Logically: 246811111111111

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
|---|---|---|---|---|---|---|---|---|---|
| | 08 | 29 | 64 | 18 | 11 | 11 | 11 | 11 | 11 |

$EF_{LOCI}$ (Location Information)

| Logically: | | |
|---|---|---|
| | LAI-MCC: | 234 |
| | LAI-MNC: | 01 |
| | LAI-LAC: | 0000 |
| | TMSI: | "32547698" |

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 | 54 | 76 | 98 | 32 | F4 | 10 | 00 | 00 | FF | 00 |

The SIM is installed into the ME and the MS is set to automatic PLMN selection mode.

$EF_{Kc}$ (Ciphering Key Kc)

| Logically: | | |
|---|---|---|
| | Key Kc: | undefined |
| | Sequence No: | 2 |

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
|---|---|---|---|---|---|---|---|---|---|
| | xx | xx | xx | xx | xx | xx | xx | xx | 02 |

**27.5.4.2 Procedure**

a) The MS is powered on.

b) The SS stops all RF output on the BCCH for a long enough period of time to cause a cell reselection procedure in the MS. The BCCH is changed to contain:

LAI (MCC/MNC): 234/03

The SS then resumes RF output on the BCCH.

c) The SS stops all RF output on the BCCH for a long enough period of time to cause a cell reselection procedure in the MS. The BCCH is changed to contain:

LAI (MCC/MNC): 234/04

The SS then resumes RF output on the BCCH.

d) The SS stops all RF output on the BCCH for a long enough period of time to cause a cell reselection procedure in the MS. The BCCH is changed to contain:

LAI (MCC/MNC): 234/05

The SS then resumes RF output on the BCCH.

e) The SS stops all RF output on the BCCH for a long enough period of time to cause a cell reselection procedure in the MS. The BCCH is changed to contain:

LAI (MCC/MNC): 234/01

The SS then resumes RF output on the BCCH.

f) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

g) After receipt of a LOCATION UPDATE REQUEST from the MS, the SS sends LOCATION UPDATE REJECT to the MS with cause "PLMN Not Allowed", followed by CHANNEL RELEASE.

The SS stops all RF output on the BCCH for a long enough period of time to cause a cell reselection procedure in the MS. The BCCH is changed to contain:

LAI (MCC/MNC): 234/06

The SS then resumes RF output on the BCCH.

h) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

i) After receipt of a LOCATION UPDATE REQUEST from the MS, the SS sends LOCATION UPDATE ACCEPT with:

LAI (MCC/MNC): 234/06
TMSI: "43658709"

to the MS.

j) After receipt of a TMSI REALLOCATION COMPLETE from the MS, the SS sends CHANNEL RELEASE to the MS.

k) The MS is soft powered down.

### 27.5.5 Test requirement

1) After each of the steps a) to d) the MS shall not attempt a LOCATION UPDATE.

2) After step f) the MS shall send LOCATION UPDATE REQUEST to the SS.

3) After step h) the MS shall send LOCATION UPDATE REQUEST to the SS.

4) After step i) the MS shall respond with TMSI REALLOCATION COMPLETE.

5) After step k) the SIM shall contain the following values:

$EF_{LOCI}$ (Location Information)

| | | |
|---|---|---|
| Logically: | LAI-MCC: | 234 |
| | LAI-MNC: | 06 |
| | TMSI: | "43658709" |

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 43 | 65 | 87 | 09 | 32 | F4 | 60 | xx | xx | xx | 00 |

$EF_{Kc}$ (Ciphering Key Kc)

| | | |
|---|---|---|
| Logically: | Key Kc: | xx |
| | Sequence No: | 7 |

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
|---|---|---|---|---|---|---|---|---|---|
| | xx | xx | xx | xx | xx | xx | xx | xx | 07 |

$EF_{FPLMN}$ (Forbidden PLMNs)

| | | |
|---|---|---|
| Logically: | PLMN1: | 234 03 (MCC MNC) |
| | PLMN2: | 234 04 |
| | PLMN3: | 234 05 |
| | PLMN4: | 234 01 |

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 | F4 | 30 | 32 | F4 | 40 | 32 | F4 | 50 | 32 | F4 | 10 |

## 27.6 MS updating forbidden PLMNs

### 27.6.1 Definition and applicability

A list of forbidden PLMNs stored in the SIM provides storage for up to 4 entries, and is managed by the MS. In automatic PLMN selection mode the MS controls location updating attempts to appropriate networks with respect to this list of forbidden PLMNs. As a result of a location update reject with the cause "PLMN not allowed" the MS stores the PLMN which rejected the update request in the SIM.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

### 27.6.2 Conformance requirement

After the receipt of a LOCATION UPDATE REJECT message with the cause "PLMN not allowed" the MS shall update the $EF_{FPLMN}$ in the SIM.

GSM 02.11, clause 3.2.2.4.

### 27.6.3 Test purpose

To verify that the MS correctly updates the $EF_{FPLMN}$, i.e. fill up existing gaps in the elementary file before overwriting any existing entries.

### 27.6.4 Method of test

#### 27.6.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters:

Attach/detach: disabled
LAI (MCC/MNC/LAC): 234/03/0001
Access control: unrestricted.

The default SIM is used with the following exception:

$EF_{FPLMN}$ (Forbidden PLMNs)

Logically: PLMN1: 234 02 (MCC MNC)
PLMN2: empty
PLMN3: 234 04
PLMN4: 234 05

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 | F4 | 20 | FF | FF | FF | 32 | F4 | 40 | 32 | F4 | 50 |

The SIM is installed into the ME and the MS is set to automatic PLMN selection mode.

#### 27.6.4.2 Procedure

a) The MS is powered on.

b) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

c) After receipt of a LOCATION UPDATE REQUEST from the MS, the SS sends LOCATION UPDATE REJECT to the MS with the cause "PLMN not allowed", followed by CHANNEL RELEASE.

d) The MS is soft powered down.

### 27.6.5 Test requirement

1) After step b) the MS shall send LOCATION UPDATE REQUEST to the SS.

2) After step d) the SIM shall contain:

$EF_{FPLMN}$ (Forbidden PLMNs)

Logically: PLMN1: 234 02 (MCC MNC)
PLMN2: 234 03
PLMN3: 234 04
PLMN4: 234 05

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 | F4 | 20 | 32 | F4 | 30 | 32 | F4 | 40 | 32 | F4 | 50 |

or

$EF_{FPLMN}$ (Forbidden PLMNs)

Logically: PLMN1: 234 02 (MCC MNC)
PLMN2: 234 04
PLMN3: 234 05
PLMN4: 234 03

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 | F4 | 20 | 32 | F4 | 40 | 32 | F4 | 50 | 32 | F4 | 30 |

## 27.7 MS deleting forbidden PLMNs

### 27.7.1 Definition and applicability

In manual PLMN selection mode the MS allows location update attempts to all available PLMNs, including forbidden PLMNs (as indicated by the forbidden PLMN list on the SIM). As a result of a successful location update procedure onto a PLMN which is in the forbidden PLMN list, the forbidden PLMN list is automatically updated by the MS.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

### 27.7.2 Conformance requirement

1. In manual PLMN selection mode the MS shall be able to perform a LOCATION UPDATE attempt to a PLMN which is in the forbidden PLMN list.

   GSM 02.11, clause 3.2.2.2.

2. After receipt of LOCATION UPDATE ACCEPT the MS shall delete the forbidden PLMN from the forbidden PLMN list.

   GSM 02.11, clause 3.2.2.4.

### 27.7.3 Test purpose

1) To verify that in automatic PLMN selection mode the MS does not attempt to access PLMNs stored in $EF_{FPLMN}$ on the SIM.

2) To verify that the MS is able to perform a LOCATION UPDATE on a forbidden PLMN in manual PLMN selection mode.

3) To verify that the MS after a successful LOCATION UPDATE deletes the PLMN in the $EF_{FPLMN}$ on the SIM.

### 27.7.4 Method of test

#### 27.7.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters:

| | |
|---|---|
| Attach/detach: | disabled |
| LAI (MCC/MNC/LAC): | 234/01/0001 |
| Access control: | unrestricted. |

The default SIM is used with the following exception:

$EF_{FPLMN}$ (Forbidden PLMNs)

| Logically: | | |
|---|---|---|
| | PLMN1: | empty |
| | PLMN2: | empty |
| | PLMN3: | 234 01 (MCC MNC) |
| | PLMN4: | empty |

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FF | FF | FF | FF | FF | FF | 32 | F4 | 10 | FF | FF | FF |

The SIM is installed into the ME and the MS is set to automatic PLMN selection mode.

#### 27.7.4.2 Procedure

a) The MS is powered on.

b) PLMN with MCC/MNC of 234/01 is manually selected.

c) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

d) After receipt of a LOCATION UPDATE REQUEST from the MS, the SS sends LOCATION UPDATE ACCEPT with:

LAI (MCC/MNC): 234/01
TMSI: "12345678"

to the MS.

e) After receipt of TMSI REALLOCATION COMPLETE from the MS, the SS sends CHANNEL RELEASE.

f) The MS is soft powered down.

### 27.7.5 Test requirement

1) After step a) the MS shall not attempt a LOCATION UPDATE.

2) After step c) the MS shall send LOCATION UPDATE REQUEST to the SS.

3) After step d) the MS shall respond with TMSI REALLOCATION COMPLETE.

4) After step f) the SIM shall contain the following values:

$EF_{LOCI}$ (Location Information)

Logically:
LAI-MCC: 234
LAI-MNC: 01
TMSI: "12345678"

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 12 | 34 | 56 | 78 | 32 | F4 | 10 | xx | xx | xx | 00 |

$EF_{FPLMN}$ (Forbidden PLMNs)

Logically:
PLMN1: empty
PLMN2: empty
PLMN3: empty
PLMN4: empty

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |

## 27.8 MS updating the PLMN selector list

### 27.8.1 Definition and applicability

The PLMN selector list gives in priority order the preferred PLMNs on which the MS shall register. The list is stored on the SIM in the $EF_{PLMNsel}$. Update and deletion of PLMNs may be performed by the subscriber.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

### 27.8.2 Conformance requirement

The MS shall correctly replace the selected PLMN in the PLMN selector list.

GSM 11.11, clause 11.5.5.

### 27.8.3 Test purpose

To verify that the MS correctly updates the $EF_{PLMNsel}$.

### 27.8.4 Method of test

#### 27.8.4.1 Initial conditions

No SS is required for this test.

The default SIM is used.

The SIM is installed into the ME and the MS is powered on.

#### 27.8.4.2 Procedure

a) The user shall initiate an MMI dependent procedure to change the second PLMN in the PLMN selector list to MCC/MNC of 567/01.

b) The MS is soft powered down.

### 27.8.5 Test requirement

After step b) the SIM shall contain the following values:

$EF_{PLMNsel}$ (PLMN Selector)

Logically:
1st PLMN: 234 01 (MCC MNC)
2nd PLMN: 567 01
3rd PLMN: 234 03
4th PLMN: 234 04
5th PLMN: 234 05
6th PLMN: 234 06
7th PLMN: 246 81
8th PLMN: 246 82

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B0 | B10 | B11 | B12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32 | F4 | 10 | 65 | F7 | 10 | 32 | F4 | 30 | 32 | F4 | 40 |
| | B13 | B14 | B15 | B16 | B17 | B18 | B19 | B20 | B21 | B22 | B23 | B24 |
| | 32 | F4 | 50 | 32 | F4 | 60 | 42 | F6 | 18 | 42 | F6 | 28 |

## 27.9 MS recognizing the priority order of the PLMN selector list

### 27.9.1 Definition and applicability

The PLMN selector list gives in priority order the preferred PLMNs on which the MS shall register. The list is stored on the SIM in the $EF_{PLMNsel}$. Update and deletion of PLMNs may be performed by the subscriber by the use of the PIN.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

### 27.9.2 Conformance requirement

When registering onto a VPLMN the MS shall take into account the priority order of the PLMNs in the preferred list on the SIM.

GSM 02.11, clause 3.2.2.2.

### 27.9.3 Test purpose

To verify that the PLMN with the higher priority (defined by its position in $EF_{PLMNsel}$) takes precedence over the PLMN with the lower priority when the MS performs a network selection.

### 27.9.4 Method of test

#### 27.9.4.1 Initial conditions

The SS transmits on two BCCHs, with the following network parameters:

Attach/detach: disabled
LAI (MCC/MNC/LAC): 234/33/0001
Access control: unrestricted.

Attach/detach: disabled
LAI (MCC/MNC/LAC): 234/34/0001
Access control: unrestricted.

The default SIM is used with the following exception:

$EF_{PLMNsel}$ (PLMN Selector)

| | | |
|---|---|---|
| Logically: | 1st PLMN: | 234 01 (MCC MNC) |
| | 2nd PLMN: | 234 02 |
| | ..... | ..... |
| | ..... | ..... |
| | 32nd PLMN: | 234 32 |
| | 33rd PLMN: | 234 34 |
| | 34th PLMN: | 234 33 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | | | |
| | 32 | F4 | 10 | 32 | F4 | 20 | | | |
| | ..... | | | | | | | | |
| | ..... | | | | | | | | |
| | B94 | b95 | B96 | B97 | B98 | B99 | B100 | B101 | B102 |
| | 32 | F4 | 23 | 32 | F4 | 43 | 32 | F4 | 33 |

The SIM is installed into the ME and the MS is set to automatic PLMN selection mode.

#### 27.9.4.2 Procedure

a) The MS is powered on.

b) After receipt of a CHANNEL REQUEST from the MS, the SS sends IMMEDIATE ASSIGNMENT to the MS.

c) After receipt of a LOCATION UPDATE REQUEST from the MS, the SS sends LOCATION UPDATE ACCEPT with:

LAI (MCC/MNC): 234/34
TMSI: "34567890"

to the MS

d) After receipt of a TMSI REALLOCATION COMPLETE from the MS, the SS sends CHANNEL RELEASE to the MS.

e) The MS is soft powered down.

### 27.9.5 Test requirement

1) After step b) the MS shall send LOCATION UPDATE REQUEST containing an MCC/MNC of 234/34 to the SS.

2) After step c) the MS shall respond with TMSI REALLOCATION COMPLETE.

3) After step e) the SIM shall contain the following values:

$EF_{LOCI}$ (Location Information)

Logically: LAI-MCC: 234
LAI-MNC: 34
TMSI: "34567890"

| Coding: | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 34 | 56 | 78 | 90 | 32 | F4 | 43 | xx | xx | xx | 00 |

## 27.10 MS access control management

### 27.10.1 Definition and applicability

Access Control allows restriction of call access attempts. All mobile stations are assigned to a "low order class", and optionally (for priority uses) also to one or more "high order classes".

A "high order class" is only valid in the HPLMN or HPLMN country. Otherwise, the "low order class" is used.

The classes are programmed on the SIM. The network controls which classes at any time may be barred.

In addition, there is a separate mechanism for control of network access for emergency call attempts.

This test applies to GSM and DCS 1 800 MEs using ID-1 or Plug-in SIM.

### 27.10.2 Conformance requirement

1. The ME shall read the access control value as part of the SIM/ME initialization procedure, and subsequently adopt this value.

   GSM 11.11, clause 11.2.1.

2. If the MS is a member of at least one access class which corresponds to the permitted classes as signalled over the air interface, and the access class is applicable in the serving network, the MS may make call attempts. Otherwise call access attempts are not allowed.

   If access class 10 is barred, MS of classes 0 - 9 and ME without SIMs shall not make emergency call attempts.

   MS of classes 11 - 15 are not allowed to make emergency call attempts if access class 10 and the relevant access class(es) between 11 and 15 are barred. Otherwise, emergency call attempts are allowed irrespective of the conditions of access class 10.

   All options are shown in figure 27-1 and are referenced to the tests.

   GSM 02.11, clauses 4.3 and 4.4.

### 27.10.3 Test purpose

1) To verify that the ME reads the access control value as part of the SIM/ME initialization procedure, and subsequently adopts this value.

2) To verify that the MS controls its network access in accordance with its access control class and the conditions imposed by the serving network.

The tests verify ME performance for the following:

Tests (a) and (b) No SIM in ME.

Tests (c) to (e) MS with access class 0 to 9.

Test (f) MS with access class 11 and 15 not in HPLMN, and
MS with access class 12,13 and 14 not in HPLMN country.

Test (g) and (h) MS with access class 11 and 15 in HPLMN, and
MS with access class 12,13 and 14 in HPLMN country.

Each of the above are tested against all relevant combinations of access control and emergency call bits signalled by the network, as shown in table 27-1.

### 27.10.4 Method of test

#### 27.10.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters:

| | |
|---|---|
| Attach/detach: | disabled |
| LAI (MCC/MNC/LAC): | see table 27-1 |
| Access control: | see table 27-1 |
| RACH: | see table 27-1 |

A SIM is installed in the ME containing IMSI and access control values as given in table 27-1 and the MS is powered on.

NOTE: Depending on the initial value of the $EF_{LOCI}$, the MS may perform a location update. This will be accepted by the SS.

**Coding details**

SIM IMSI: Data Field 6F 07

| | Value 246813579 | Value 2468135x9 |
|---|---|---|
| byte 1 | 05H | 05H |
| byte 2 | 29H | 29H |
| byte 3 | 64H | 64H |
| byte 4 | 18H | 18H |
| byte 5 | 53H | 53H |
| byte 6 | 97H | 9xH |
| byte 7 | FFH | FFH |
| byte 8 | FFH | FFH |
| byte 9 | FFH | FFH |

Access class: Data field 6F 78

See GSM 11.11.

NETWORK (SS)

RACH: As defined in GSM 04.08 section 10.5.2.29.

octet 1 01111000
octet 2 00001000
octet 3 }
octet 4 } as table 27-1

#### 27.10.4.2 Procedure

a) Using the MMI or EMMI a normal call set-up is attempted.

b) Using the MMI or EMMI an emergency call set-up is attempted.

c) The test is repeated for each set of values in table 27-1.

### 27.10.5 Test requirement

After steps a) and b) the MS shall access the network, or shall make no access attempt, in accordance with table 27-1.

NOTE: For type approval, to limit testing, in tests (c, (d) and (e) it is only necessary that one of the access classes is tested.

**Table 27-1**

| SIM | | Network | | Test result | |
|---|---|---|---|---|---|
| IMSI | Access class | RACH octet 3<br>octet 4 | BCCH/LAI MCC<br>MNC | Normal calls | Emergency calls |
| TEST (a)<br>No SIM in ME | | 00000100<br>00000000 | 234<br>01 | No | No |
| TEST (b)<br>No SIM in ME | | 00000000<br>00000000 | 234<br>01 | No | Yes |
| TEST (c)<br>246813579 | 0 | 00000100<br>00000001 | 246<br>81 | No | No |
| " | 1 | 00000100<br>00000010 | " | No | No |
| " | 2 | 00000100<br>00000100 | " | No | No |
| " | 3 | 00000100<br>00001000 | " | No | No |
| " | 4 | 00000100<br>00010000 | " | No | No |
| " | 5 | 00000100<br>00100000 | " | No | No |
| " | 6 | 00000100<br>01000000 | " | No | No |
| " | 7 | 00000100<br>10000000 | " | No | No |
| " | 8 | 00000101<br>00000000 | " | No | No |
| " | 9 | 00000110<br>00000000 | " | No | No |

**Table 27-1 (continued)**

| SIM | | Network | | Test result | |
|---|---|---|---|---|---|
| IMSI | Access class | RACH octet 3 octet 4 | BCCH/LAI MNC MNC | Normal calls | Emergency calls |
| TEST (d) | | | | | |
| 246813579 | 0 | 00000000 00000001 | 246 81 | No | Yes |
| " | 1 | 00000000 00000010 | " | No | Yes |
| " | 2 | 00000000 00000100 | " | No | Yes |
| " | 3 | 00000000 00001000 | " | No | Yes |
| " | 4 | 00000000 00010000 | " | No | Yes |
| " | 5 | 00000000 00100000 | " | No | Yes |
| " | 6 | 00000000 01000000 | " | No | Yes |
| " | 7 | 00000000 10000000 | " | No | Yes |
| " | 8 | 00000001 00000000 | " | No | Yes |
| " | 9 | 00000010 00000000 | " | No | Yes |

**Table 27-1 (continued)**

| SIM | | Network | | Test result | |
|---|---|---|---|---|---|
| IMSI | Access class | RACH octet 3 octet 4 | BCCH/LAI MNC MNC | Normal calls | Emergency calls |
| TEST (e) | | | | | |
| 246813579 | 0 | 11111011 11111110 | 246 81 | Yes | Yes |
| " | 1 | 11111011 11111101 | " | Yes | Yes |
| " | 2 | 11111011 11111011 | " | Yes | Yes |
| " | 3 | 11111011 11110111 | " | Yes | Yes |
| " | 4 | 11111011 11101111 | " | Yes | Yes |
| " | 5 | 11111011 11011111 | " | Yes | Yes |
| " | 6 | 11111011 10111111 | " | Yes | Yes |
| " | 7 | 11111011 01111111 | " | Yes | Yes |
| " | 8 | 11111010 11111111 | " | Yes | Yes |
| " | 9 | 11111001 11111111 | " | Yes | Yes |

**Table 27-1 (continued)**

| SIM | | Network | | Test result | |
|---|---|---|---|---|---|
| IMSI | Access class | RACH octet 3 octet 4 | BCCH/LAI MNC MNC | Normal calls | Emergency calls |
| TEST (f) | | | | | |
| 2468135x9 | 11 & x | 00000111 11111111 | 246 82 | No | No |
| " | " | 00000011 11111111 | " | No | Yes |
| " | " | 00000000 00000000 | | Yes | Yes |
| Set "x" to an arbitrary value in the range 0 to 9 | | | | | |
| 2468135x9 | 12 & x | 00000111 11111111 | 234 01 | No | No |
| " | " | 00000011 11111111 | " | No | Yes |
| " | " | 00000000 00000000 | | Yes | Yes |
| Set "x" to an arbitrary value in the range0 to 9 | | | | | |
| 2468135x9 | 13 & x | 00000111 11111111 | 234 01 | No | No |
| " | " | 00000011 11111111 | " | No | Yes |
| " | " | 00000000 00000000 | | Yes | Yes |
| Set "x" to an arbitrary value in the range0 to 9 | | | | | |
| 2468135x9 | 14 & x | 00000111 11111111 | 234 01 | No | No |
| " | " | 00000011 11111111 | " | No | Yes |
| " | " | 00000000 00000000 | | Yes | Yes |
| Set "x" to an arbitrary value in the range0 to 9 | | | | | |
| 2468135x9 | 15 & x | 00000111 11111111 | 246 82 | No | No |
| " | " | 00000011 11111111 | " | No | Yes |
| " | " | 00000000 00000000 | | Yes | Yes |
| Set "x" to an arbitrary value in the range0 to 9 | | | | | |

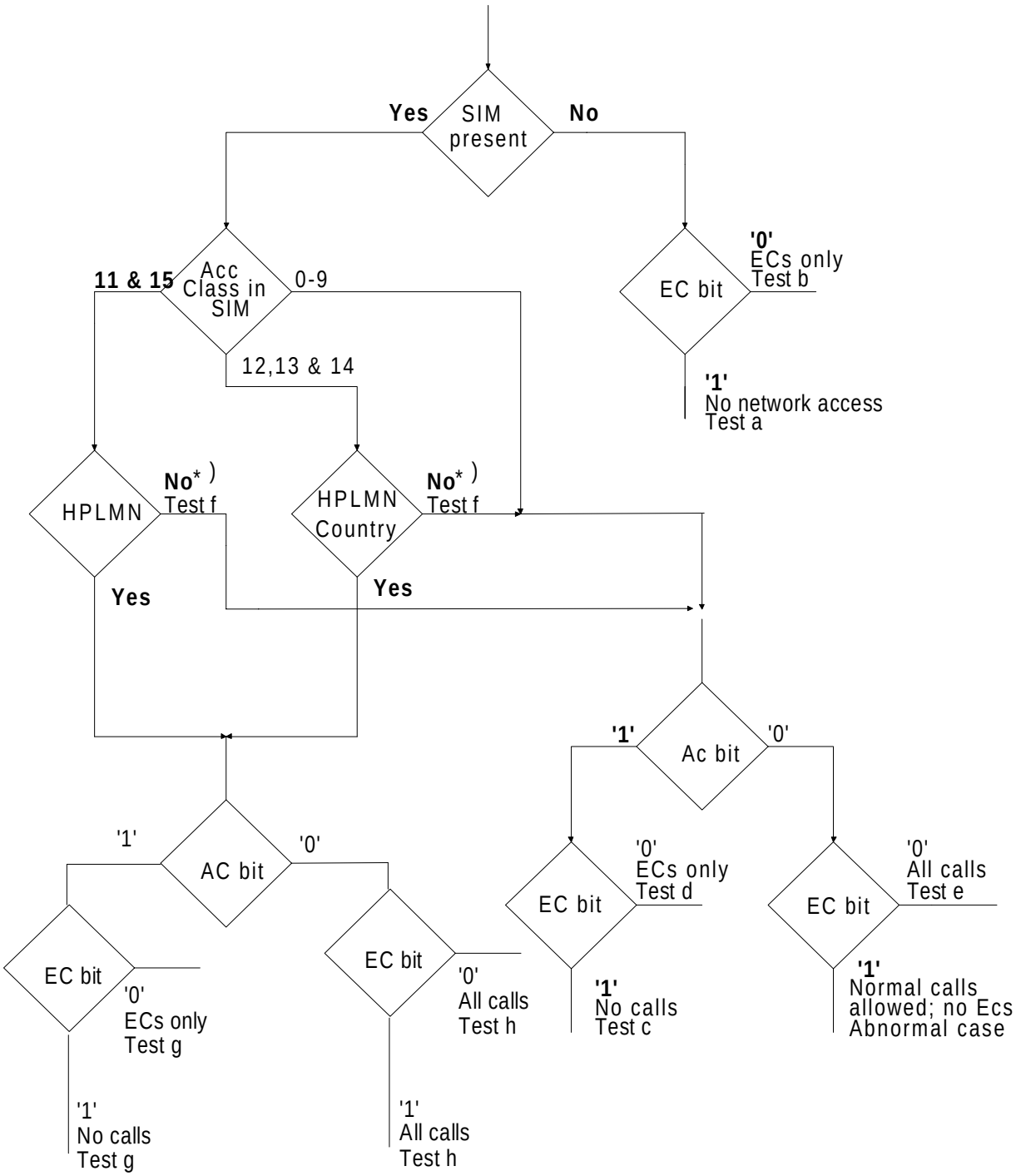
**Table 27-1 (continued)**

| SIM | | Network | | Test Result | |
|---|---|---|---|---|---|
| IMSI | Access Class | RACH octet 3 octet 4 | BCCH/LAI MNC MNC | Normal Calls | Emergency Calls |
| TEST (g) | | | | | |
| 246813579 | 11 & x | 00001111 11111111 | 246 81 | No | No |
| " | " | 00001011 11111111 | " | No | Yes |
| 246813579 | 12 & x | 00010111 11111111 | 246 82 | No | No |
| " | " | 00010011 11111111 | " | No | Yes |
| 246813579 | 13 & x | 00100111 11111111 | 246 82 | No | No |
| " | " | 00100011 11111111 | " | No | Yes |
| 246813579 | 14 & x | 01000111 11111111 | 246 82 | No | No |
| " | " | 01000011 11111111 | " | No | Yes |
| 246813579 | 15 & x | 10000111 11111111 | 246 81 | No | No |
| " | " | 10000011 11111111 | " | No | Yes |
| Set "x" to an arbitrary value in the range 0 to 9 | | | | | |

**Table 27-1 (continued)**

| SIM | | | Network | | Test Result | |
|---|---|---|---|---|---|---|
| | IMSI | Access Class | RACH<br>octet 3<br>octet 4 | BCCH/LAI<br>MNC<br>MNC | Normal Calls | Emergency Calls |
| TEST (h) | | | | | | |
| | 246813579 | 11 & x | 11110011<br>11111111 | 246<br>81 | Yes | Yes |
| | 246813579 | 12 & x | 11101011<br>11111111 | 246<br>82 | Yes | Yes |
| | 246813579 | 13 & x | 11011011<br>11111111 | 246<br>82 | Yes | Yes |
| | 246813579 | 14 & x | 10111011<br>11111111 | 246<br>82 | Yes | Yes |
| | 246813579 | 15 & x | 01111011<br>11111111 | 246<br>81 | Yes | Yes |
| | 246813579 | 11 & x | 11110111<br>11111111 | 246<br>81 | Yes | Yes |
| | 246813579 | 12 & x | 11101111<br>11111111 | 246<br>82 | Yes | Yes |
| | 246813579 | 13 & x | 11011111<br>11111111 | 246<br>82 | Yes | Yes |
| | 246813579 | 14 & x | 10111111<br>11111111 | 246<br>82 | Yes | Yes |
| | 246813579 | 15 & x | 01111111<br>11111111 | 246<br>81 | Yes | Yes |
| | Set "x" to an arbitrary value in the range 0 to 9 | | | | | |

**ACCESS CONTROL**

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ECs = Emergency Calls
Access Class in SIM - See GSM 11.11 Data Field 6F 78
EC bit = bit3 of octet 3 of RACH Control Parameters - See GSM 04.08 Para 10.5.2.29
AC bit = See bytes 3 & 4 of RACHControl Parameters
* ) Mobile adopts Access Class 0-9, based on IMSI. See GSM 02.11

## 27.11 Exchange protocol tests

### 27.11.1 Character transmission

#### 27.11.1.1 Bit/character duration during the transmission from the ME to the SIM

##### 27.11.1.1.1 Definition and applicability

Data is transmitted serially across the SIM/ME interface. A character comprises:

- the start bit;
- eight data bits;
- the parity bit.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

##### 27.11.1.1.2 Conformance requirement

The bit/character duration and the delay between two consecutive characters (between start leading edges) sent by the ME shall be in the range specified.

GSM 11.11, section 5.9.

##### 27.11.1.1.3 Test purpose

To verify the timing during the transmission from the ME to the SIM.

##### 27.11.1.1.4 Method of test

###### 27.11.1.1.4.1 Initial conditions

The ME is connected to the SIM simulator, and powered on.

###### 27.11.1.1.4.2 Procedure

A number of characters are transmitted from the ME to the SIM simulator. The SIM simulator shall measure the bit/character duration and the delay between two consecutive characters for all characters transmitted by the ME.

##### 27.11.1.1.5 Test requirement

The timing shall be in the range specified.

#### 27.11.1.2 Bit/character duration during the transmission from the SIM simulator to the ME

##### 27.11.1.2.1 Definition and applicability

Data is transmitted serially across the SIM/ME interface. A character comprises:

- the start bit;
- eight data bits;
- the parity bit.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

##### 27.11.1.2.2 Conformance requirement

Responses with maximum and minimum bit/character duration times shall be accepted by the ME.

GSM 11.11, clause 5.9.

#### 27.11.1.2.3 Test purpose

To verify the acceptance of maximum and minimum bit/character duration during the transmission from the SIM to the ME.

#### 27.11.1.2.4 Method of test

##### 27.11.1.2.4.1 Initial conditions

The ME is connected to the SIM simulator, and powered on.

##### 27.11.1.2.4.2 Procedure

The SIM simulator shall send responses with the maximum and minimum bit/character durations specified in GSM 11.11.

#### 27.11.1.2.5 Test requirement

The ME shall accept the response and act accordingly.

### 27.11.1.3 Inter-character delay

#### 27.11.1.3.1 Definition and applicability

The inter-character delay is defined as the time between the start edge of a character and the start edge of the previous character. It is given by:

- the length of a character plus an extra guard time of N etu during transmission from the ME to the SIM. N is indicated in ATR character TC1;
- the work waiting time during transmission from the SIM to the ME.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.11.1.3.2 Conformance requirement

1) If TC1 is 0 or 255 the ME shall work with the SIM.

2) If TC1 is not 0 or 255 the ME shall repeat the reset at least 2 times before it rejects the SIM.

3) The ME shall accept characters sent by the SIM with the work waiting time within the specified range.

GSM 11.11, clause 5.9.

#### 27.11.1.3.3 Test purpose

1) To verify the correct evaluation of the character TC1 indicated in the ATR.

2) To verify that the ME accepts the minimum and maximum work waiting time during the transmission from the SIM to the ME.

#### 27.11.1.3.4 Method of test

##### 27.11.1.3.4.1 Initial conditions

The ME is connected to the SIM simulator, and powered on.

##### 27.11.1.3.4.2 Procedure

a) Upon reception of a reset the SIM simulator transmits the ATR as follows:

a.1) N = 0;

| character name | content | meaning |
|---|---|---|
| TS | 3B | direct convention |
| T0 | 40 | TA1, TB1, TD1 not transmitted, TC1 transmitted, no historical characters |
| TA1 | 00 | N = 0 |

a.2) N = 255.

| character name | content | meaning |
|---|---|---|
| TS | 3B | direct convention |
| T0 | 40 | TA1, TB1, TD1 not transmitted, TC1 transmitted, no historical characters |
| TA1 | FF | N = 255 |

a.3) N = Value other than 0 and 255

| character name | content | meaning |
|---|---|---|
| TS | 3B | direct convention |
| T0 | 40 | TA1, TB1, TD1 not transmitted, TC1 transmitted, no historical characters |
| TA1 | 00 < XX < FF | 0 < N < 255 |

b) The SIM simulator transmits with a work-waiting-time of 12 etu.

c) The SIM simulator transmits with a work-waiting-time of 9 600 etu.

#### 27.11.1.3.5 Test requirement

In steps a.1) and a.2) the ME shall work with the SIM simulator.

In step a.3) the ME shall repeat the reset at least 2 times and then reject the SIM simulator.

In steps b) and c) the ME shall work with the SIM simulator.

### 27.11.1.4 Error handling during the transmission from the ME to the SIM

#### 27.11.1.4.1 Definition and applicability

Error checking is done for each character transmitted by making use of the parity bit. If the SIM detects a parity error, an error signal is sent to the ME, and the ME retransmits that character.

This test applies to GSM and DCS 1 800 MEs using either ID-1 of Plug-in SIM.

#### 27.11.1.4.2 Conformance requirement

Subsequent to Answer to Reset and the protocol type selection, the error detection and character repetition procedure specified in GSM 11.11 is mandatory for transmission on the basis of T = 0. On receipt of an error signal, the ME shall repeat the previously transmitted character.

GSM 11.11, clause 5.10.

#### 27.11.1.4.3 Test purpose

To verify the error handling during the transmission from the ME to the SIM.

#### 27.11.1.4.4 Method of test

##### 27.11.1.4.4.1 Initial conditions

The ME is connected to the SIM simulator, and powered on.

##### 27.11.1.4.4.2 Procedure

The SIM simulator shall transmit an error signal in response to a received character in accordance with ISO 7816-3, section 6.1.3.

#### 27.11.1.4.5 Test requirement

The ME shall repeat the character in accordance with ISO 7816-3, section 6.1.3.

### 27.11.1.5 Error handling during transmission from the SIM to the ME

#### 27.11.1.5.1 Definition and applicability

Error checking is done for each character transmitted by making use of the parity bit. If the ME detects a parity error, an error signal is sent to the SIM, and the SIM retransmits that character.

This test applies to GSM and DCS 1 800 MEs using either ID-1 of Plug-in SIM.

#### 27.11.1.5.2 Conformance requirement

Subsequent to Answer to Reset and the protocol type selection, the error detection and character repetition procedure specified in GSM 11.11 is mandatory for transmission on the basis of T = 0. On receipt of a response with a parity error, the ME shall send an error signal and expect the previously transmitted character to be repeated.

GSM 11.11, clause 5.10.

#### 27.11.1.5.3 Test purpose

To verify the error handling during the transmission from the SIM to the ME.

#### 27.11.1.5.4 Method of test

##### 27.11.1.5.4.1 Initial conditions

The ME is connected to the SIM simulator, and powered on.

##### 27.11.1.5.4.2 Procedure

The SIM simulator shall send a response with a parity error and check that the ME performs error handling in accordance with ISO 7816-3, section 6.1.3.

#### 27.11.1.5.5 Test requirement

The ME shall send an error signal in accordance with ISO 7816-3, section 6.1.3, and expect a repetition of the character. The ME shall correctly evaluate the character when repeated by the SIM simulator.

### 27.11.2 Answer to reset (RST)

#### 27.11.2.1 Acceptance of SIMs with internal RST

##### 27.11.2.1.1 Definition and applicability

Internal RST is one possible implementation of reset, and MEs must be able to accept SIMs with internal reset.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

##### 27.11.2.1.2 Conformance requirement

The ME shall accept a SIM with internal reset by recognizing the ATR within the specified time range.

GSM 11.11, clause 5.

ISO/IEC 7816-3: 1990, section 5.2.

##### 27.11.2.1.3 Test purpose

To verify that the ME accepts a SIM with internal reset.

##### 27.11.2.1.4 Method of test

###### 27.11.2.1.4.1 Initial conditions

The SIM simulator is configured for internal reset. The ME is connected to the SIM simulator and powered on.

###### 27.11.2.1.4.2 Procedure

The SIM simulator starts its ATR between (400/fi) s and (40 000/fi) s after the clock signal has been detected.

NOTE: fi is the initial frequency supplied by the ME.

##### 27.11.2.1.5 Test requirement

The ME accepts the SIM simulator with internal reset.

#### 27.11.2.2 Acceptance of SIMs with active low RST

##### 27.11.2.2.1 Definition and applicability

Active low RST is one possible implementation of reset, and MEs must be able to accept SIMs with active low reset.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

##### 27.11.2.2.2 Conformance requirement

The ME shall accept a SIM with active low reset by putting the RST contact to state H. The signal timing shall be in accordance with the specification.

GSM 11.11, clause 5.

ISO/IEC 7816-3: 1990, section 5.2.

#### 27.11.2.2.3 Test purpose

To verify that the ME accepts a SIM with active low reset. The timing of the RST signal shall be in accordance with the specification.

#### 27.11.2.2.4 Method of test

##### 27.11.2.2.4.1 Initial conditions

The SIM simulator is configured for active low reset. The ME is connected to the SIM simulator and powered on.

##### 27.11.2.2.4.2 Procedure

The SIM simulator measures the timing of the RST signal.

#### 27.11.2.2.5 Test requirement

The ME shall accept the SIM simulator with active low reset. The RST signal shall be put to state H after a minimum of (40 000/fi)s.

### 27.11.2.3 Characters of the answer to reset

#### 27.11.2.3.1 Definition and applicability

When the SIM is reset, it sends up to 33 characters to the ME, containing information which must be interpreted by the ME to ascertain the transmission protocol to be used.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.11.2.3.2 Conformance requirement

1. The ME shall adopt the data encoding convention and initial etu time defined in the initial character TS of the ATR.

   GSM 11.11, clause 5.8.

2. The ME shall be able to receive interface characters for other transmission protocols than T = 0, historical characters and a check byte, even if only T = 0 is used by the ME.

   GSM 11.11, clause 5.8.1.

#### 27.11.2.3.3 Test purpose

1. To verify that the ME adopts the appropriate data encoding convention and initial elementary time unit (etu) defined in the initial character TS of the Answer to Reset.

2. To verify that the ME accepts interface characters for transmission protocols other than T=0, historical characters and the check byte.

#### 27.11.2.3.4 Method of test

##### 27.11.2.3.4.1 Initial conditions

The ME is connected to the SIM (or SIM simulator).

##### 27.11.2.3.4.2 Procedure

a) The ME is powered on

b) The SIM (or SIM simulator) sends an ATR as follows:

| character name | content | meaning |
|---|---|---|
| TS | 3B | direct convention |
| T0 | 9F | TB1, TC1 not transmitted, TA1, TD1 transmitted, 15 historical characters |
| TA1 | 11 | default values F = 372, D = 1 |
| TD1 | 80 | TA2, TB2, TC2 not transmitted, TD2 transmitted, protocol T=0 offered |
| TD2 | 01 | TA2, TB2, TC2, TD2 not transmitted, protocol T=1 offered |
| Ti | 53 49 4D 20 53 55 42 47 52 4F 55 50 20 39 35 | historical characters |
| TCK | 4F | check byte |

c) The ME is made to send further commands to the SIM (or SIM simulator) (e.g. by entering the PIN).

d) The ME is switched off and on. This time the SIM (or SIM simulator) sends an ATR as follows:

| character name | content | meaning |
|---|---|---|
| TS | 3F | inverse convention |
| T0 | 9F | TB1, TC1 not transmitted, TA1, TD1 transmitted, 15 historical characters |
| TA1 | 11 | default values F = 372, D = 1 |
| TD1 | 80 | TA2, TB2, TC2 not transmitted, TD2 transmitted, protocol T=0 offered |
| TD2 | 01 | TA2, TB2, TC2, TD2 not transmitted, protocol T=1 offered |
| Ti | 53 49 4D 20 53 55 42 47 52 4F 55 50 20 39 35 | historical characters |
| TCK | 4F | check byte |

e) The ME is made to send further commands to the SIM (e.g. by entering the PIN).

#### 27.11.2.3.5 Test requirement

1. After step b), the ME shall work with the SIM (or SIM simulator).

2. After step d), the ME shall work with the SIM (or SIM simulator).

### 27.11.2.4 PTS procedure

#### 27.11.2.4.1 Definition and applicability

The PTS procedure is required to select the standard transmission protocol if the SIM does not use this as a default.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.11.2.4.2 Conformance requirement

If the ME receives an Answer to Reset where TA1 is not equal to "11", it shall initiate the PTS procedure as defined in GSM 11.11.

GSM 11.11, clause 5.8.2.

#### 27.11.2.4.3 Test purpose

To verify that ME uses the PTS procedure as specified in GSM 11.11.

#### 27.11.2.4.4 Method of test

##### 27.11.2.4.4.1 Initial conditions

The ME is connected to the SIM (or SIM simulator).

##### 27.11.2.4.4.2 Procedure

a) The ME is powered on.

b) The SIM (or the SIM simulator) sends an ATR as follows:

| character name | content | meaning |
|---|---|---|
| TS | 3B | direct convention |
| T0 | 10 | TB1, TC1, TD1 not transmitted, TA1 transmitted, no historical characters |
| TA1 | 77 | invalid values for F and D |

#### 27.11.2.4.5 Test requirement

After step b), the ME shall send to the SIM (or the SIM simulator) "FF00FF".

### 27.11.2.5 Reset repetition

#### 27.11.2.5.1 Definition and applicability

If transmission errors result in the ATR being unintelligible to the ME, the ME performs the reset again. The minimum number of reset attempts is three.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.11.2.5.2 Conformance requirement

Following receipt of a wrong ATR, the ME shall perform a reset. The ME shall not reject the SIM until at least three consecutive wrong ATRs are received.

GSM 11.11, clause 5.10.

#### 27.11.2.5.3 Test purpose

To verify that the ME repeats the reset procedure on receipt of a wrong ATR, and does not reject the SIM unless at least three consecutive wrong ATRs are received.

#### 27.11.2.5.4 Method of test

##### 27.11.2.5.4.1 Initial conditions

The ME is connected to the SIM simulator.

##### 27.11.2.5.4.2 Procedure

a) The ME is powered on.

b) The SIM simulator sends a non understandable answer to reset to the ME. (e.g. a wrong TS byte), at each reset initiated by the ME.

#### 27.11.2.5.5 Test requirement

After step b), the ME shall repeat the reset at least two times.

### 27.11.3 Command processing, procedure bytes

#### 27.11.3.1 Definition and applicability

The procedure bytes ACK, NULL, and SW1 are sent from the SIM to the ME, and give the ME an acknowledgement for the previous instruction, information concerning transfer of data and the card status at the end of the command.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.11.3.2 Conformance requirement

On the basis of protocol T = 0, the ME shall correctly use the different modes of data transmission defined in ISO 7816-3, section 8.2.2.

GSM 11.11, clause 5

ISO/IEC 7816: 1990, section 8.2.2.

#### 27.11.3.3 Test purpose

To verify that the ME uses correctly the different modes of data transmission.

#### 27.11.3.4 Method of test

#### 27.11.3.4.1 Initial conditions

The ME is connected to the SIM simulator and powered on.

#### 27.11.3.4.2 Procedure

a) The ME is made to initiate a VERIFY CHV command.

b) The SIM simulator answers the first 3 bytes with ACK=INS complemented.

c) The SIM simulator answers the next data byte with NULL (NULL="60").

d) The SIM simulator then sends ACK=INS. This byte is sent when the elapsed time since step b) is greater than the work waiting time.

e) The SIM simulator answers the transmission of the rest of the data with NULL.

f) The SIM simulator then sends SW1 and SW2, indicating correct execution of the command ("90" and "00" for SW1 and SW2 respectively). These bytes are sent when the elapsed time since step d) is greater than the work waiting time.

#### 27.11.3.5 Test requirement

The command shall be executed correctly.

### 27.12 Evaluation of directory characteristics

### 27.12.1 Operating speed in authentication procedure

#### 27.12.1.1 Definition and applicability

Authentication is performed by a GSM network on the SIM, by sending a random number to the SIM. The SIM then performs a calculation on the random number, and sends the result to the network for verification.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.12.1.2 Conformance requirement

If bit b2 of the file characteristics is set to 1, then the ME shall provide a clock frequency of at least 13/4 MHz to enable the SIM to run the authentication process in the required time.

GSM 11.11, clause 5.4.

#### 27.12.1.3 Test purpose

To verify that the authentication procedure is done with a frequency of at least 13/4 MHz if the bit b2 of the file characteristics (byte 1 of the directory characteristics) is set to 1.

#### 27.12.1.4 Method of test

##### 27.12.1.4.1 Initial conditions

System simulator:
1 cell, default parameters.

Mobile Equipment:
Connected to a SIM-simulator with bit b2 of the file characteristics set to 1.

ME is powered on.

##### 27.12.1.4.2 Procedure

An authentication is made in the same way as in test [26.7.2. Authentication]. The MS is paged. After the MS has responded with a PAGING RESPONSE message to the SS, the SS initiates an authentication procedure, sending the MS the value RAND. During authentication, the SIM simulator checks the frequency of the clock supplied by the ME. Following the AUTHENTICATION RESPONSE from the MS, the SS sends CHANNEL RELEASE.

#### 27.12.1.5 Test requirement

The frequency of the clock shall be at least 13/4 MHz during the authentication procedure.

### 27.12.2 Clock stop

#### 27.12.2.1 Definition and applicability

The ME may switch off the clock signal to the SIM, but only if the SIM indicates that it supports this feature.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.12.2.2 Conformance requirement

1. The ME shall not stop the clock, unless the requirements indicated in byte 1 of the file characteristics are met.

   GSM 11.11, clauses 5.6 and 9.2.1.

2. The ME shall wait at least 1 860 clock cycles after having received the last character including the minimum guard time (2 etu) of the response before switching off the clock. The ME shall wait at least 744 clock cycles before it sends the first command after having restarted the clock.

   GSM 11.11, clause 5.6.

#### 27.12.2.3 Test purpose

1. To verify that the clock is only switched off if requirements are met as indicated in the file characteristics (byte 1 of the directory characteristics).

2. To verify that the timing of the clock switching is as specified.

#### 27.12.2.4 Method of test

##### 27.12.2.4.1 Initial conditions

The ME is connected to a SIM simulator. CHV 1 is enabled.

##### 27.12.2.4.2 Procedure

a) A SIM simulator is used with bits set as follows:

| Bit b1 | Bit b3 | Bit b4 |
|---|---|---|
| 0 | 0 | 0 |

b) The ME is powered on. When the ME is in mode PIN check, 10 seconds shall elapse before the PIN is entered.

c) The ME is powered off, and a SIM simulator is used with bits set as follows:

| Bit b1 | Bit b3 | Bit b4 |
|---|---|---|
| 0 | 1 | 0 |

d) The ME is powered on. When the ME is in mode PIN check, 10 seconds shall elapse before the PIN is entered.

e) The ME is powered off, and a SIM simulator is used with bits set as follows:

| Bit b1 | Bit b3 | Bit b4 |
|---|---|---|
| 0 | 0 | 1 |

f) The ME is powered on. When the ME is in mode PIN check, 10 seconds shall elapse before the PIN is entered.

g) The ME is powered off, and a SIM simulator is used with bits set as follows:

| Bit b1 | Bit b3 | Bit b4 |
|---|---|---|
| 1 | 0 | 0 |

h) The ME is powered on. When the ME is in mode PIN check, 10 seconds shall elapse before the PIN is entered.

#### 27.12.2.5 Test requirement

1. During step b), the ME shall not switch off the clock.

2. During step d), the ME shall not switch off the clock, unless at high level.

3. During step f), the ME shall not switch off the clock, unless at low level.

4. During steps d), f) and h), the ME shall not switch off the clock until at least 1 860 clock cycles after having received the last character of the response including the minimum guard time (2 etu).

5. During steps d), f) and h), the ME shall wait at least 744 clock cycles before it sends the first command after having restarted the clock.

## 27.13 Mechanical tests

### 27.13.1 Contact pressure

#### 27.13.1.1 Definition and applicability

The contacts of the card reader must exert a force to maintain a good electrical contact, but the force must not be excessive and damage the SIM.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.13.1.2 Conformance requirement

A contact force may not be greater than 0,5 N per contact.

GSM 11.11, clause 4.3.4.

#### 27.13.1.3 Test purpose

To verify that the contact pressure of each contacting element is not greater than 0,5 N when each of the following types of card is used:

i) Unembossed.
ii) Embossed on the contact side.
iii) Embossed on the opposite side to the contacts.

NOTE: Only type i) applies to the plug-in SIM.

#### 27.13.1.4 Method of test

##### 27.13.1.4.1 Initial conditions

The ME manufacturers shall provide a separate card reader (mechanical components) to make the measurement possible.

##### 27.13.1.4.2 Procedure

The pressure of each contacting element is measured.

#### 27.13.1.5 Test requirement

The contact pressure of each contacting element shall be not greater than 0,5 N.

### 27.13.2 Shape of contacts for IC card SIM card reader

#### 27.13.2.1 Definition and applicability

The shape of the contacts is important to maintain a good electrical contact, but must not damage the SIM.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.13.2.2 Conformance requirement

The radius of curvature of the contacting elements shall be greater than or equal to 0,8 mm in the contact area of both axes.

GSM 11.11, clause 4.3.4.

#### 27.13.2.3 Test purpose

To verify that the radius of curvature of the contacting elements is greater than or equal to 0,8 mm in the contact area on both axes.

#### 27.13.2.4 Method of test

##### 27.13.2.4.1 Initial conditions

The ME manufacturers shall provide a separate card reader (mechanical components) to make the measurement possible.

##### 27.13.2.4.2 Procedure

The radius of curvature of the contacting elements is measured on both axes.

#### 27.13.2.5 Test requirement

The radius of curvature of the contacting elements shall be greater than or equal to 0,8 mm in the contact area on both axes.

## 27.14 Secret code usage

### 27.14.1 Entry of PIN

#### 27.14.1.1 Definition and applicability

The PIN is a number used to authenticate the user to the SIM for security. Entry of the correct PIN allows PIN-protected data to be accessed over the SIM-ME interface.

This test applies to all ME.

#### 27.14.1.2 Conformance requirement

Following insertion of the SIM and switching on the MS, the ME shall check the state of the PIN. If the PIN is enabled, the ME asks the user for PIN verification.

The VERIFY CHV function verifies the PIN presented by the ME to the SIM.

**Reference:**

GSM 02.30, section 4.6.1; GSM 11.11, sections 8.9, 9.2.9 and 11.3.1.

#### 27.14.1.3 Test purpose

1. To verify that the PIN verification procedure is performed by the ME correctly.

2. To verify that the GSM basic public MMI string is supported.

#### 27.14.1.4 Method of test

##### 27.14.1.4.1 Initial conditions

The ME is connected to a SIM or SIM-simulator with the PIN enabled, and powered off.

The default SIM is used.

##### 27.14.1.4.2 Procedure

a) The ME is powered on.

b) When the MS is in mode "PIN check" enter "2468#".

#### 27.14.1.5 Test requirement

1) The ME shall send a VERIFY CHV command to the SIM, with CHV number = "01".

2) The MS shall give an indication "OK", following a successful execution of the command.

### 27.14.2 Change of PIN

#### 27.14.2.1 Definition and applicability

The PIN may be changed by the user, by entering the old and new PINs. The length of the PIN is between 4 and 8 digits.

This test applies to all MEs.

#### 27.14.2.2 Conformance requirement

The ME shall support the change of PIN procedure as defined in GSM 02.30 and GSM 11.11.

**Reference:**

GSM 02.30, section 4.6.2; GSM 11.11, sections 8.10, 9.2.10 and 11.3.2.

#### 27.14.2.3 Test purpose

1. To verify that the PIN substitution procedure is performed correctly by the ME.

2. To verify that the GSM basic public MMI string is supported.

#### 27.14.2.4 Method of test

##### 27.14.2.4.1 Initial conditions

The ME is connected to a SIM or SIM-simulator with the PIN enabled.

The default SIM is used.

The ME is powered-on, with the correct PIN entered.

##### 27.14.2.4.2 Procedure

a) Enter "**04*2468*01234567*01234567#".

b) The MS is switched off and on.

c) When the MS is in mode "PIN-check", the sequence "01234567#" is entered.

d) The MS is switched off and on.

e) When the MS is in mode "PIN check" enter "2468#".

#### 27.14.2.5 Test requirement

1) After step a), the ME shall send a CHANGE CHV command to the SIM, with CHV number set to "01".

2) Following the successful execution of the command, the MS shall give an indication that the new PIN is accepted.

3) After step c), the MS shall give an indication "OK".

4) After step e), the MS shall give an indication that the entered PIN is not accepted.

### 27.14.3 Disabling the PIN

#### 27.14.3.1 Definition and applicability

Entry of the PIN may be disabled by the user, depending on the service table of the SIM. It is the responsibility of the ME to check the SIM service table.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM that support a feature to disable the PIN.

#### 27.14.3.2 Conformance requirement

Disabling PIN is achieved through the DISABLE CHV command. If the PIN disable function in the SIM service table is not allocated or activated, then the ME shall not attempt to disable the PIN.

**Reference:**

GSM 11.11, sections 8.11, 9.2.11, 10.2.7, 11 and 11.3.3.

#### 27.14.3.3 Test purpose

To verify that the ME does not attempt to disable the PIN.

#### 27.14.3.4 Method of test

#### 27.14.3.4.1 Initial conditions

The ME is connected to the SIM simulator.

Elementary files in the SIM simulator shall be default, with the exception of:

**$EF_{SST}$ (SIM Service Table)**

Logically: CHV1 disable function not activated.
Abbreviated dialling numbers allocated and activated.
PLMN selector allocated and activated.
Fixed dialling numbers not activated.

| Coding: | B1 | B2 | B3 | B4 |
|---|---|---|---|---|
| | xx0x110x | 0011xxxx | xxxxxxxx | 0000xxxx (binary) |

The coding of $EF_{SST}$ shall conform with the capabilities of the SIM simulator.

The ME is powered on and a correct PIN entered.

#### 27.14.3.4.2 Procedure

Using the ME's MMI procedure, an attempt is made to disable the PIN.

#### 27.14.3.5 Test requirement

The ME shall not send a DISABLE CHV command across the SIM/ME interface.

### 27.14.4 PUK entry

#### 27.14.4.1 Definition and applicability

After three consecutive wrong entries of the PIN, the PIN becomes blocked. The PUK is used to unblock the PIN. This function may be performed whether or not the PIN is blocked.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM.

#### 27.14.4.2 Conformance requirement

The ME shall support the procedure to unblock PIN using PUK, as defined in GSM 02.30 and GSM 11.11.

**Reference:**

GSM 02.30, section 4.6.3; GSM 11.11, sections 8.13, 9.2.13 and 11.3.5.

#### 27.14.4.3 Test purpose

1. To verify that the CHV unblocking procedure is performed correctly.

2. To verify that the GSM basic public MMI string is supported.

#### 27.14.4.4 Method of test

##### 27.14.4.4.1 Initial conditions

The ME is connected to the SIM simulator.

The default SIM is used.

##### 27.14.4.4.2 Procedure

a) The ME is powered on.

b) Enter "**05*13243546*1234*1234#"

c) The ME is powered off and on.

d) Enter the new PIN: "1234".

e) The ME is powered off and on.

f) Enter a wrong PIN three times.

g) Enter "**05*13243546*2468*2468#".

h) The ME is powered off and on.

i) Enter the new PIN: "2468".

#### 27.14.4.5 Test requirements

1. After step b), the ME shall send an UNBLOCK CHV command to the SIM, with CHV number = "00".

2. After step d), the ME shall indicate that the PIN has been accepted.

3. After step f), the ME shall indicate that the PIN has been blocked.

4. After step g), the ME shall send an UNBLOCK CHV command to the SIM, with CHV number = "00".

5. After step j), the ME shall indicate that the PIN has been accepted.

### 27.14.5 Entry of PIN2

#### 27.14.5.1 Definition and applicability

PIN2 is a number used to authenticate the user to the SIM for security. Entry of the correct PIN2 allows PIN2-protected data to be accessed over the SIM-ME interface.

This test applies to all ME that support a feature requiring entry of PIN2, such as AoC or FDN.

#### 27.14.5.2 Conformance requirement

Where entry of PIN2 is necessary for security access, the ME shall indicate that PIN2 is to be entered.

The VERIFY CHV function verifies the PIN presented by the ME to the SIM.

**Reference:**

GSM 02.30, section 4.6.1; GSM 11.11, sections 8.9, 9.2.9, and 11.3.1.

#### 27.14.5.3 Test purpose

To verify that entry of PIN2 is processed by the ME correctly.

#### 27.14.5.4 Method of test

#### 27.14.5.4.1 Initial conditions

The ME is connected to a SIM or SIM-simulator and powered on, with the correct PIN entered.

A default FDN SIM is used.

#### 27.14.5.4.2 Procedure

a) A feature is accessed which requires the entry of PIN2, e.g. resetting ACM for Advice of Charge, or changing a Fixed Dialling Number.

b) The MMI is used to enter PIN2: "3579".

#### 27.14.5.5 Test requirement

1) After step b), the ME shall send a VERIFY CHV command to the SIM, with CHV number = "02".

2) Following the successful execution of the command, the MS shall give an indication that PIN2 was accepted.

### 27.14.6 Change of PIN2

#### 27.14.6.1 Definition and applicability

The PIN2 may be changed by the user, by entering the old and new PIN2s. The length of the PIN is between 4 and 8 digits.

This test applies to all MEs that support PIN2.

#### 27.14.6.2 Conformance requirement

The ME shall support the change of PIN2 procedure as defined in GSM 02.30 and GSM 11.11.

**Reference:**

GSM 02.30, section 4.6.2; GSM 11.11, sections 8.10, 9.2.10 and 11.3.2.

#### 27.14.6.3 Test purpose

1. To verify that PIN2 substitution procedure is performed correctly by the ME.

2. To verify that the GSM basic public MMI string is supported.

#### 27.14.6.4 Method of test

##### 27.14.6.4.1 Initial conditions

The ME is connected to a SIM or SIM-simulator.

The default FDN SIM is used, with PIN enabled.

The ME is powered on, with the correct PIN entered.

##### 27.14.6.4.2 Procedure

a) Enter "**042*3579*12345678*12345678#".

b) The MS is switched off and on, and PIN entered: "2468".

c) Enter "**042*3579*12345678*12345678#".

d) Enter "**042*12345678*3579*3579#".

#### 27.14.6.5 Test requirement

1) After step a), the ME shall send a CHANGE CHV command to the SIM, with CHV number set to "02".

2) Following the successful execution of the command, the MS shall give an indication that the new PIN2 is accepted.

3) After step c), the MS shall give an indication that the new PIN2 is not accepted.

4) After step d), the MS shall give an indication that the new PIN2 is accepted.

### 27.14.7 PUK2 entry

#### 27.14.7.1 Definition and applicability

After three consecutive wrong entries of PIN2, it becomes blocked. PUK2 is used to unblock PIN2. This function may be performed whether or not PIN2 is blocked.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM, that support PIN2.

#### 27.14.7.2 Conformance requirement

The ME shall support the procedure to unblock PIN2 using PUK2, as defined in GSM 02.30 and GSM 11.11.

**Reference:**

GSM 02.30, section 4.6.3; GSM 11.11, sections 8.13, 9.2.13 and 11.3.5.

#### 27.14.7.3 Test purpose

1. To verify that the PUK2 unblock procedure is performed correctly by the ME.

2. To verify that the GSM basic public MMI string is supported.

#### 27.14.7.4 Method of test

##### 27.14.7.4.1 Initial conditions

The ME is connected to the SIM simulator.

The default FDN SIM is used, with PIN enabled.

##### 27.14.7.4.2 Procedure

a) The ME is powered on and a correct PIN entered.

b) Enter "**052*08978675*1234*1234#"

c) The MS is powered off and on, and PIN entered: "2468".

d) A feature is selected requiring the entry of PIN2, and the new PIN2 "1234" is entered.

e) A wrong PIN2 is entered three times.

f) Enter "**052*08978675*3579*3579#".

g) A feature is selected requiring the entry of PIN2, and the new PIN2 "3579" is entered.

#### 27.14.7.5 Test requirements

1. After step b), the ME shall send an UNBLOCK CHV command to the SIM, with CHV number = "02"

2. After step d), the ME shall send a VERIFY CHV command, with CHV number = "02". Following the successful execution of the command, the ME shall indicate that the PIN2 has been accepted.

3. After step e), the ME shall indicate that PIN2 has been blocked.

4. After step f), the ME shall send an UNBLOCK CHV command to the SIM, with CHV number = "02"

5. After step g), the ME shall indicate that PIN2 has been accepted.

### 27.15 Abbreviated Dialling Numbers (ADN)

#### 27.15.1 Definition and applicability

Abbreviated Dialling Numbers contain subscriber number and supplementary service control strings. They may also contain alpha identifiers.

This test applies to both GSM and DCS 1 800 MEs using either ID-1 or plug-in SIMs, that support ADN.

#### 27.15.2 Conformance requirement

The ME shall be able to manage the storage and retrieval of ADNs from the SIM, and set up calls to these numbers.

**Reference:**

GSM 02.07, annex B.3.1; GSM 02.30 section 4.6.4; GSM 11.11, section 11.5.1.

### 27.15.3 Test purpose

To verify that the ME manages the storage and retrieval of ADNs from the SIM.

### 27.15.4 Method of Test

#### 27.15.4.1 Initial conditions

Coding of elementary files in the SIM shall be as default, with the addition of:

**$EF_{ADN}$ (Abbreviated Dialling Number)**

Logically:

At least 101 records.

Record 1:

| | |
|---|---|
| Length of alpha identifier: | 32 characters |
| Alpha identifier: | "ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEF" |
| Length of BCD number: | "03" |
| TON and NPI: | Telephony and Unknown |
| Dialled number: | 123 |
| CCI: | None |
| Ext1: | None |

Coding for record 1:

| B1 | B2 | B3 | ... | B32 | B33 | B34 | B35 | B36 | B37 | B38 | B39 | ... | B46 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 42 | 43 | ... | 46 | 03 | 81 | 21 | F3 | FF | FF | FF | ... | FF |

The ME is installed with the default SIM or SIM simulator, and switched on.

#### 27.15.4.2 Procedure

a) The code "+123456789012345" is stored (entered) in the MS as abbreviated dialling entry number 7 on the SIM.

b) The code "00112233" is stored (entered) in the MS as abbreviated dialling entry number 6 on the SIM.

c) The code "**21*44556677#" is stored (entered) in the MS as abbreviated dialling entry number 101 on the SIM.

d) Retrieve data from SIM entry number 7 using the procedure N(N)(N)#.

e) Retrieve data from SIM entry number 6 using the procedure N(N)(N)#.

f) Retrieve data from SIM entry number 101 using the procedure N(N)(N)#.

g) Retrieve data from SIM entry number 1 using the procedure N(N)(N)#, and display the alpha identifier.

### 27.15.5 Test requirements

1) After step d), the number "+123456789012345" shall be displayed.

2) After step e), the number "00112233" shall be displayed.

3) After step f), the number "**21*44556677#" (or an equivalent representation) shall be displayed.

4) After step g), the ME shall display at least part of the alpha identifier, and shall sustain normal operation.

## 27.16 MMI reaction to SIM status encoding

### 27.16.1 Definition and applicability

The SIM gives status information in response to instructions, as two-byte codes. Some of these codes give valuable information to the user, and appropriate indication by the ME is mandatory.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or plug-in SIMs.

### 27.16.2 Conformance requirement

It is mandatory to give the user an appropriate indication when any of the codes given below appear.

**Reference:**

GSM 02.30, section 4.6.5.

### 27.16.3 Test purpose

To verify that the ME gives an appropriate indication to the user in response to status information return codes from the SIM.

### 27.16.4 Method of test

#### 27.16.4.1 Initial conditions

The ME is connected to the SIM simulator. All elementary files are coded as default.

The ME is powered on.

#### 27.16.4.2 Procedure.

The SIM simulator is used to send the following error codes as reaction on an instruction from the ME:

- 9240 Memory Problem
- 9804 Access security policy not fulfilled or secret code rejected
- 9840 Secret code locked
- 6FXX Technical problem with no diagnostic given as reaction on an instruction from the ME.

### 27.16.5 Test requirement

For each error code, the ME shall give an appropriate MMI indication.

## 27.17 Electrical tests

**General test purpose**

Testing of electrical characteristics of the SIM/ME interface.

Whilst non-conformance in this area would be unlikely to cause difficulties to other users or the network (type approval criteria), significant deviations from the specifications (GSM 11.11 and ISO 7816) may damage the SIM. If an attempt is then made to use the SIM in a different ME, then its failure may reflect badly on both that ME and the network.

This section lists the electrical tests to be performed.

They include:

i) tests during activation and deactivation phases; and

ii) tests to be performed on each contact in both static and dynamic states: e.g. voltages, currents and signal characteristics.

However, due to the likely difficulty of accessing the terminals of the SIM/ME interface for the purposes of measurements, the ME manufacturer shall provide a test interface in accordance with section 36.5 for the purpose of conformance testing.

These tests apply to GSM and DCS 1 800 MEs using either ID-1 or plug-in SIMs with any one of the following types of SIM/ME interface:

a) 5V SIM interface: The interface only supports the 5V operation mode as specified in GSM 11.11 and ISO 7816-3. The following conformance requirements apply:

| | |
|---|---|
| 27.17.1.1.2 | |
| 27.17.1.2.2 | a) |
| 27.17.1.3.2 | a) |
| 27.17.1.4.2 | a) |
| 27.17.2.1.1.2 | a) |
| 27.17.2.1.2.2 | a) |
| 27.17.2.2.2 | a) |
| 27.17.2.3.2 | a-1,2,3,4) |
| 27.17.2.5.2 | a-1,2,3,4) |

b) 3V SIM interface: The interface only supports the 3V operation mode as specified in GSM 11.12. The following conformance requirements apply:

| | |
|---|---|
| 27.17.1.1.2 | |
| 27.17.1.2.2 | b) |
| 27.17.1.4.2 | b) |
| 27.17.1.5.1.2 | |
| 27.17.1.5.2.2 | |
| 27.17.2.1.1.2 | b) |
| 27.17.2.1.2.2 | b) |
| 27.17.2.2.2 | b) |
| 27.17.2.3.2 | b-1,2,3,4) |
| 27.17.2.5.2 | b-1,2,3,4) |

c) 5V/3V SIM interface: The interface supports both the 5V operation mode as specified in GSM 11.11 and ISO 7816-3 and the 3V operation mode as specified in GSM 11.12. It recognizes the type of SIM and switches the interface accordingly. The following conformance requirements apply:

| | |
|---|---|
| 27.17.1.1.2 | |
| 27.17.1.2.2 | c-1,2) |
| 27.17.1.3.2 | c) |
| 27.17.1.4.2 | c-1,2) |
| 27.17.1.5.3.2 | |
| 27.17.1.5.4.2 | |
| 27.17.2.1.1.2 | c-1,2) |
| 27.17.2.1.2.2 | c-1,2) |
| 27.17.2.2.2 | c-1,2) |
| 27.17.2.3.2 | c-1,2,3,4,5,6,7,8) |
| 27.17.2.5.2 | c-1,2,3,4,5,6,7,8) |

**General measurement conventions**

For the 5V interface operation mode, the measurement conventions are specified in ISO/IEC 7816-3 section 4.2.1.

For the 3V interface operation mode these conditions apply in an analogous way.

### 27.17.1 Test of the power transition phases

#### 27.17.1.1 Phase preceding ME power on

##### 27.17.1.1.1 Definition and applicability

When the mobile equipment is switched off, the contacts of the SIM/ME interface remain in an inactive state in order to prevent any damage to the SIM.

This test applies to GSM and DCS 1 800 MEs.

##### 27.17.1.1.2 Conformance requirement

The residual voltage across the contacts of the SIM/ME interface (C1, C2, C3, C6, C7) shall not exceed +/- 0,4 Volts referenced to GND.

**Reference:**

GSM 11.11, section 4.3.3

##### 27.17.1.1.3 Test purpose

To verify that the residual voltage across the contacts of the SIM/ME interface (C1, C2, C3, C6, C7) is not greater than +/- 0,4 Volts referenced to GND.

##### 27.17.1.1.4 Method of test

###### 27.17.1.1.4.1 Initial condition

The ME is connected to a SIM Simulator.

The contact C1 (Vcc) of the SIM/ME interface is loaded with an impedance of 10 kOhm.

The other contacts (C2, C3, C6, C7) are loaded with an impedance of 50 kOhm.

###### 27.17.1.1.4.2 Procedure

The residual voltage on each contact is measured.

##### 27.17.1.1.5 Test requirement

The residual voltage on each contact shall not exceed +/- 0,4 Volts referenced to GND.

#### 27.17.1.2 Phase during SIM power on

##### 27.17.1.2.1 Definition and applicability

When the mobile station is switched on or when the SIM/ME interface is being activated after 3V/5V switching, the contacts shall be activated in a defined sequence in order to prevent any damage to the SIM.

The timing of this sequence is not defined, a measurement resolution better than or equivalent to 100 ns is assumed.

An ME supporting both 5V and 3V interface operation mode may switch from 3V to 5V after it has read the SIM type identification in the SIM status information by deactivating the SIM and activating it at the new supply voltage.

This test applies to GSM and DCS 1 800 MEs with:

a) 5V SIM interface

b) 3V SIM interface

c) 5V/3V SIM interface

#### 27.17.1.2.2 Conformance requirement

a) When the MS is soft powered on, the contacts of the SIM/ME interface shall be activated in the following order:

   1 - RST in state L,

   2 - Vcc powered,

   3 - I/O (ME) in reception mode,

   4 - Clock signal provided with a suitable and stable clock.

   When Vpp is connected to Vcc, as allowed by GSM 11.11 (clause 4.3.2 and 5.3), then Vpp is activated together with Vcc, at the time of Vcc (step 2 in the sequence above).

b) When the MS is soft powered on, the contacts of the SIM/ME interface shall be activated in the following order:

   1 - RST in state L,

   2 - Vcc powered,

   3 - I/O (ME) in reception mode,

   4 - Clock signal provided with a suitable and stable clock.

c-1) When the MS is soft powered on, the contacts of the SIM/ME interface shall be activated to 3V mode in the following order:

   1 - RST in state L,

   2 - Vcc powered,

   3 - I/O (ME) in reception mode,

   4 - Clock signal provided with a suitable and stable clock.

c-2) When the SIM/ME interface is being activated after the 3V/5V switching the contacts shall be activated to 5V mode in the order given in c-1).

**Reference:**

a): GSM 11.11, section 4.3.2

b), c-1), c-2) GSM 11.12, section 4.4 and section 4.5

#### 27.17.1.2.3 Test purpose

To verify that the contacts of the SIM/ME interface are activated in the correct order, as described in the conformance requirement.

#### 27.17.1.2.4 Method of test

##### 27.17.1.2.4.1 Initial condition

The ME is connected to a SIM Simulator.

##### 27.17.1.2.4.2 Procedure

To test the requirements a), b) and c-1), the MS is soft powered on.

To test the requirement c-2), the ME is caused to switch the voltage on the SIM/ME interface.

The verification of each activation procedure starts with the first contact leaving the inactive state. The SIM/ME interface is monitored until it is fully activated.

#### 27.17.1.2.5 Test requirement

The contacts of the SIM/ME interface shall be activated in the correct order, as described in the conformance requirement.

### 27.17.1.3 Phase during ME power off with clock stop forbidden

#### 27.17.1.3.1 Definition and applicability

When the mobile station is soft powered off, the contacts shall be deactivated in a defined sequence in order to prevent any damage to the SIM.

The timing of this sequence is not defined, a measurement resolution better than or equivalent to 100 ns is assumed.

NOTE 1: If during MS operation the SIM is physically removed it is impractical to ensure correct sequencing of deactivation and the possible damage to the SIM cannot be safeguarded by a type approval test. Furthermore, in this situation the integrity of SIM data is not guaranteed (see GSM 02.17).

NOTE 2: Since 3V technology SIMs shall not indicate that clock stop is forbidden, this test applies only to MEs with a 5V interface and MEs with a 5V/3V interface when powered down from 5V mode.

This test applies to GSM and DCS 1 800 MEs with:

a) 5V SIM interface

b) [not applicable for 3V SIM interface]

c) 5V/3V SIM interface

#### 27.17.1.3.2 Conformance requirement

a) When the ME is soft powered down, the contacts of the SIM/ME interface shall be deactivated in the following order:

   1 - RST at low state,

   2 - Clock stopped at low state,

   3 - Vpp inactive (only if Vpp is provided independent of Vcc, see GSM 11.11 clause 5.3),

   4 - I/O at state A,

   5 - Vcc inactive.

When Vpp is connected to Vcc, as allowed by GSM 11.11 (clause 5.3), then Vpp is deactivated together with Vcc, at the time of Vcc (step 5 in the sequence above).

c) When the ME is soft powered down from 5V mode, the contacts of the SIM/ME interface shall be deactivated in the following order:

1 - RST at low state,

2 - Clock stopped at low state,

3 - I/O at status A,

4 - Vcc inactive.

**Reference:**

a): GSM 11.11, section 4.3.2

c): GSM 11.12, section 4.5

#### 27.17.1.3.3 Test purpose

To verify that the contacts of the SIM/ME interface become deactivated in the correct order, as given in the conformance requirement.

#### 27.17.1.3.4 Method of test

#### 27.17.1.3.4.1 Initial condition

The ME is connected to a SIM Simulator.

The file characteristics of the directories (byte 14 of STATUS information) shall indicate a 5V SIM with clock stop forbidden.

#### 27.17.1.3.4.2 Procedure

The MS is soft powered off.

The SIM/ME interface is monitored until it is fully deactivated.

#### 27.17.1.3.5 Test requirement

The contacts of the SIM/ME interface shall be deactivated in the correct order, as given in the conformance requirement.

### 27.17.1.4 Phase during ME power off with clock stop allowed

#### 27.17.1.4.1 Definition and applicability

When the mobile station is soft powered off or when the SIM/ME interface is being deactivated for 3V/5V switching, the contacts shall be deactivated in a defined sequence in order to prevent any damage to the SIM.

The timing of this sequence is not defined, a measurement resolution better than or equivalent to 100 ns is assumed.

NOTE: If during MS operation the SIM is physically removed it is impractical to ensure correct sequencing of deactivation and the possible damage to the SIM cannot be safeguarded by a type approval test. Furthermore, in this situation the integrity of the SIM data is not guaranteed (see GSM 02.17).

This test applies to GSM and DCS 1 800 MEs with:

a) 5V SIM interface

b) 3V SIM interface

c) 5V/3V SIM interface

#### 27.17.1.4.2 Conformance requirement

a) Depending on the state of the clock at the time of deactivation, the contacts of the SIM/ME shall be deactivated in one of two ways.

If the clock is running, the contacts of the SIM/ME interface shall be deactivated in the following order:

1 - RST at low level,

2 - Clock stopped at low level,

3 - Vpp inactive (only if Vpp is provided independent of Vcc, see GSM 11.11 clause 5.3),

4 - I/O at status A,

5 - Vcc inactive.

When Vpp is connected to Vcc, as allowed by GSM 11.11 (clause 5.3), then Vpp is deactivated together with Vcc, at the time of Vcc (step 5 in the sequence above).

If the clock is stopped and is not restarted, the ME is allowed to deactivate all the contacts in any order, provided that all signals reach low level before Vcc leaves high level.

b) Depending on the state of the clock at the time of deactivation, the contacts of the SIM/ME shall be deactivated in one of two ways.

If the clock is running, the contacts of the SIM/ME interface shall be deactivated in the following order:

1 - RST at low level,

2 - Clock stopped at low level,

3. I/O at status A,

4.- Vcc inactive.

If the clock is stopped and is not restarted, the ME is allowed to deactivate all the contacts in any order, provided that all signals reach low level before Vcc leaves high level.

c-1) Depending on the state of the clock at the time of deactivation, the contacts of the SIM/ME interface shall be deactivated in one of two ways.

If the clock is running, the contacts of the SIM/ME interface shall be deactivated in the following order:

1 - RST at low level,

2 - Clock stopped at low level,

3. I/O at status A,

4.- Vcc inactive.

If the clock is stopped and is not restarted, the ME is allowed to deactivate all the contacts in any order, provided that all signals reach low level before Vcc leaves high level.

c-2) When the SIM/ME interface is deactivated for 3V/5V switching, the contacts shall be deactivated as given in c-1).

**Reference:**

a): GSM 11.11, section 4.3.2

b), c-1), c-2): GSM 11.12, section 4.5

#### 27.17.1.4.3 Test purpose

To verify that, depending on the state of the clock (running or stopped), the contacts of the SIM/ME interface become deactivated in the correct order, as given in the conformance requirement.

#### 27.17.1.4.4 Method of test

##### 27.17.1.4.4.1 Initial condition

The ME is connected to a SIM Simulator.

The file characteristics of the directories (byte 14 of STATUS information) shall indicate that clock stop is allowed.

##### 27.17.1.4.4.2 Procedure

To test the requirements a), b) and c-1), the MS is soft powered off.

To test the requirement c-2), the ME is caused to switch the voltage on the SIM/ME interface.

The SIM/ME interface is monitored until it is fully deactivated.

#### 27.17.1.4.5 Test requirement

The contacts of the SIM/ME interface shall be deactivated in the correct order, as given in the conformance requirements.

### 27.17.1.5 SIM Type Recognition and Voltage Switching

#### 27.17.1.5.1 Reaction of 3V only MEs on SIM type recognition failure

##### 27.17.1.5.1.1 Definition and applicability

When a 3V only ME detects a failure during the SIM type recognition procedure, the ME shall reject the SIM in order to prevent any damage to the SIM.

This test applies to GSM and DCS 1 800 MEs with a 3V SIM interface.

##### 27.17.1.5.1.2 Conformance requirement

1) The procedure for deriving the identification bit (SIM type recognition procedure) shall be performed by the ME immediately after the ATR and before issuing any other command. The procedure shall consist of the two commands “SELECT GSM” and “STATUS/GET RESPONSE”.

2) If a 3V only ME cannot complete the SIM type recognition procedure the ME shall deactivate the SIM/ME interface and reject the SIM immediately without issuing any further command.

   This procedure shall be finished within 5 seconds after the “STATUS/GET RESPONSE” command.

**Reference:**

GSM 11.12 section 4.3 and 4.5

#### 27.17.1.5.1.3 Test purpose

1) To verify that a 3V only ME correctly performs the SIM type recognition procedure.

2) To verify that a 3V only ME deactivates the SIM/ME interface and rejects the SIM in case that the SIM does not respond to the “STATUS/GET RESPONSE” command.

#### 27.17.1.5.1.4 Method of test

##### 27.17.1.5.1.4.1 Initial condition

The ME is connected to a SIM Simulator simulating a 3V technology SIM with nominal test conditions according to table 27.2-2. All elementary files are coded as default.

The ME is powered on.

##### 27.17.1.5.1.4.2 Procedure

After sending the ATR the SIM simulator checks the presence of the commands “SELECT GSM” and “STATUS/GET RESPONSE” as the first and only commands of the GSM card session.

The SIM simulator does not respond to the “STATUS/GET RESPONSE” command.

The SIM/ME interface is monitored for at least 1 minute until the MS is switched off.

#### 27.17.1.5.1.5 Test requirement

1) Immediately after the ATR only the two commands “SELECT GSM” and “STATUS/GET RESPONSE” shall be sent by the ME.

2) The 3V only ME shall deactivate the SIM/ME interface within 5 seconds and reject the SIM (i.e. not activate the SIM/ME interface within the test procedure).

### 27.17.1.5.2 Reaction of 3V only MEs on type recognition of 5V only SIMs

#### 27.17.1.5.2.1 Definition and applicability

When a 3V only ME detects a 5V only SIM during the SIM type recognition procedure, the ME shall reject the SIM in order to prevent any damage to the SIM.

This test applies to GSM and DCS 1 800 MEs with 3V SIM interface.

#### 27.17.1.5.2.2 Conformance requirement

1) The procedure for deriving the identification bit (SIM type recognition procedure) shall be performed by the ME immediately after the ATR and before issuing any other command. The procedure shall consist of the two commands “SELECT GSM” and “STATUS/GET RESPONSE”

2) If a 3V only ME identifies a 5V only SIM during the SIM type recognition procedure the ME shall deactivate the SIM/ME interface and reject the SIM immediately without issuing any further command.

**Reference:**

GSM 11.12 section 4.3 and 4.5.

#### 27.17.1.5.2.3 Test purpose

1) To verify that a 3V only ME correctly performs the SIM type recognition procedure.

2) To verify that a 3V only ME deactivates the SIM/ME interface and rejects the SIM if a 5V only SIM is applied.

#### 27.17.1.5.2.4 Method of test

##### 27.17.1.5.2.4.1 Initial condition

The ME is connected to a SIM Simulator simulating a 3V technology SIM (to ensure that the ME can perform the SIM type recognition procedure) with nominal test conditions according to table 27.2-2. All elementary files are coded as default. Bit 5 in byte 14 of the status information is set to “0” (i.e. 5V only SIM).

The ME is powered on.

##### 27.17.1.5.2.4.2 Procedure

After sending the ATR the SIM simulator checks the presence of the commands “SELECT GSM” and “STATUS/GET RESPONSE” as the first and only commands of the GSM card session.

The SIM simulator responds to the “STATUS/GET RESPONSE” command with a status information indicating a 5V only SIM.

The SIM/ME interface is monitored for at least 1 minute until the MS is switched off.

#### 27.17.1.5.2.5 Test requirement

1) Immediately after the ATR only the two command “SELECT GSM” and “STATUS/GET RESPONSE” shall be sent by the ME.

2) The 3V only ME shall deactivate the SIM/ME interface immediately after receipt of the status information from the SIM (but not later than 5 seconds after the “STATUS/GET RESPONSE command) and reject the SIM (i.e. not activate the SIM/ME interface again within the test procedure).

### 27.17.1.5.3 Reaction of 3V technology MEs on type recognition of 5V only SIMs

#### 27.17.1.5.3.1 Definition and applicability

When a 3V technology ME detects a 5V only SIM during the SIM type recognition procedure, the ME shall switch to 5V operation.

This test applies to GSM and DCS 1 800 MEs with the 5V/3V SIM interface.

#### 27.17.1.5.3.2 Conformance requirement

1) A 3V technology ME shall initially activate the SIM at 3V (i.e. the first activation of a GSM card session.

2) The procedure for deriving the identification bit (SIM type recognition procedure) shall be performed by the ME immediately after the ATR procedure and before issuing any other command. The procedure shall consist of the two commands “SELECT GSM” and “STATUS/GET RESPONSE”.

3) If a 3V technology ME identifies a 5V only SIM during the SIM type recognition procedure, the ME shall switch to 5V operation mode. Switching from 3V to 5V shall only be performed by deactivating the SIM and activating it with 5V supply voltage immediately after the SIM type recognition procedure without issuing any further command.

**Reference:**

GSM 11.12 section 4.3 and 4.4.

#### 27.17.1.5.3.3 Test purpose

1) To verify that a 3V technology ME initially activates the SIM with 3V.

2) To verify that a 3V technology ME correctly performs the SIM type recognition procedure.

3) To verify that a 3V technology ME deactivates the SIM/ME interface immediately after the SIM type recognition procedure (in order to switch the supply voltage) without issuing any further command.

#### 27.17.1.5.3.4 Method of test

##### 27.17.1.5.3.4.1 Initial condition

The ME is connected to a SIM Simulator simulating a 5V only SIM with nominal test conditions according to table 27.2-1. All elementary files are coded as default. Bit 5 in byte 14 of the status information is set to “0” (i.e. 5V only SIM).

The ME is powered on.

##### 27.17.1.5.3.4.2 Procedure

After sending the ATR the SIM simulator checks the presence of the commands “SELECT GSM” and “STATUS/GET RESPONSE” as the first and only commands of the GSM card session.

The SIM simulator responds to the “STATUS/GET RESPONSE” command with a status information indicating a 5V only SIM.

The SIM/ME interface is monitored for at least 1 minute until the MS is switched off.

#### 27.17.1.5.3.5 Test requirement

1) The initial activation of the SIM/ME interface shall be performed with 3V supply voltage.

2) Immediately after the ATR the two commands “SELECT GSM” and “STATUS/GET RESPONSE” shall be sent by the ME before issuing further commands.

3) The 3V technology ME shall deactivate the SIM/ME interface immediately after receipt of the status information from the SIM.

### 27.17.1.5.4 Reaction of 3V technology MEs on type recognition of 3V technology SIMs

#### 27.17.1.5.4.1 Definition and applicability

When a 3V technology ME detects a 3V technology SIM during the SIM type recognition procedure the ME may either switch to 5V operation or stay in 3V operation.

This test applies to GSM and DCS 1 800 MEs with 5V/3V SIM interface.

#### 27.17.1.5.4.2 Conformance requirement

1) A 3V technology ME shall initially activate the SIM with a 3V (i.e. the first activation of a GSM card session).

2) The procedure for deriving the identification bit (SIM type recognition procedure) shall be performed by the ME immediately after the ATR and before issuing any other command. the procedure shall consist of the two commands “SELECT GSM” and “STATUS/GET RESPONSE”.

3) If a 3V technology ME identifies a 3V technology SIM during the SIM type recognition the ME may switch to 5V operation. Switching from 3V to 5V shall only be performed by deactivating the SIM and activating it with 5V supply voltage immediately after the SIM type recognition procedure without issuing any further commands.

**Reference:**

GSM 11.12, section 4.3, 4.4 and 4.7.

#### 27.17.1.5.4.3 Test purpose

1) To verify that a 3V technology ME initially activates the SIM with 3V.

2) To verify that a 3V technology ME correctly performs the SIM type recognition procedure.

3) To verify that a 3V technology ME deactivates the SIM/ME interface immediately after the recognition of a 3V technology SIM (in order to switch the supply voltage) or proceeds with the 3V operation during the whole GSM card session without switching to 5V supply voltage.

#### 27.17.1.5.4.4 Method of test

##### 27.17.1.5.4.4.1 Initial condition

The ME is connected to a SIM Simulator simulating a 3V technology SIM with nominal test conditions according to table 27.2-2. All elementary files are coded as default. Bit 5 in byte 14 of the status information is set to “1” (i.e. 3V technology SIM.)

The ME is powered on.

##### 27.17.1.5.4.4.2 Procedure

After sending the ATR the SIM simulator checks the presence of commands “SELECT GSM” and “STATUS/GET RESPONSE” as the first and only commands of the GSM card session.

The SIM simulator responds to the "STATUS/GET RESPONSE" command with a status information indicating a 3V technology SIM.

The SIM/ME interface is monitored for at least 1 minute until the MS is switched off.

#### 27.27.1.5.4.5 Test requirement

1) The initial activation of the SIM/ME interface shall be performed with 3V supply voltage.

2) Immediately after the ATR the two commands “SELECT GSM” and “STATUS/GET RESPONSE: shall be sent by the ME.

3) The ME shall react in one of the following ways:

   a) The ME deactivates the SIM/ME interface immediately after the receipt of the status information from the SIM.

   b) the ME proceeds with the GSM card session without switching to another supply voltage.

### 27.17.2 Electrical tests on each ME contact

The following tables give the electrical conditions that must be applied by the SIM simulator to all contacts during a test if not stated otherwise.

**Table 27.2-1: Nominal test conditions on 5V SIM/ME interface**

| Contacts | Low level | High level | Max. capacitive load |
|---|---|---|---|
| C1 (Vcc) | --- | I = 10 mA | |
| C2 (RST) | I = -200 µA | I = +20 µA | 30 pF |
| C3 (CLK) | I = -200 µA | I = +20 µA | 30 pF |
| C5 (GND) | --- | --- | |
| C6 ((Vpp) | --- | I = 0 mA | |
| C7 (I/O)<br>ME input<br>ME output | <br>V = 0 V<br>I = -1 mA | <br>I = +20 µA<br>I = +20 µA | 30 pF |

**Table 27.2-2: Nominal test conditions on 3V SIM/ME interface**

| Contacts | Low level | High level | Max. capacitive load |
|---|---|---|---|
| C1 (Vcc) | --- | I = 6 mA | |
| C2 (RST) | I = -200 µA | I = +200 µA | 30 pF |
| C3 (CLK) | I = -20 µA | I = +20 µA | 30 pF |
| C5 (GND) | --- | --- | |
| C6 ((Vpp) | --- | --- | |
| C7 (I/O)<br>ME input<br>ME output | <br>V = 0 V<br>I = -1 mA | <br>I = +20 µA<br>I = +20 µA | 30 pF |

NOTE 1: Measurements of contacts voltage levels can be done at any time since the beginning of activation of the SIM and the end of deactivation of the SIM (ISO/IEC 7816-3 section 5.1).

NOTE 2: The reference point of all measurements is the contact C5 (Ground).

NOTE 3: Currents flowing into the SIM are considered positive.

#### 27.17.2.1 Electrical tests on contact C1

C1 = Card power supply (Vcc)

##### 27.17.2.1.1 Test 1

###### 27.17.2.1.1.1 Definition and applicability

When the mobile station is activated, the supply voltage on the SIM/ME interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the SIM.

This test applies to GSM and DCS 1 800 MEs with:

a) 5V SIM interface

b) 3V SIM interface

c) 5V/3V SIM interface

###### 27.17.2.1.1.2 Conformance requirement

a) The voltage on contact C1 of the SIM/ME interface shall be 5V +/- 10 % for Icc up to 10 mA.

b) The voltage on contact C1 of the SIM/ME interface shall be 3V +/- 10 % for Icc up to 6 mA.

c-1) The voltage on contact C1 of the SIM/ME interface shall be 5V +/- 10 % for Icc up to 10 mA when the interface is in 5V operation mode.

c-2) The voltage on contact C1 of the SIM/ME interface shall be 3V +/- 10 % for Icc up to 6 mA when the interface is in 3V operation mode.

**Reference:**

a), c-1): GSM 11.11, section 5.1.

b):, c-2): GSM 11.12, section 5.

#### 27.17.2.1.1.3 Test purpose

To verify that the ME keeps the voltage on contact C1 of the SIM/ME interface within the ranges specified in the conformance requirements.

#### 27.17.2.1.1.4 Method of test

**Initial condition**

The ME is connected to a SIM Simulator.

The MS is activated.

The remaining contacts of the SIM/ME interface are in nominal test conditions (See GSM 11.10 section 27.17.2).

**Test Procedure**

The voltage of contact C1 (Vcc) of the SIM/ME interface is measured.

#### 27.17.2.1.1.5 Test requirement

The voltage on contact C1 of the SIM/ME interface shall be within the ranges specified in the conformance requirements.

### 27.17.2.1.2 Test 2

#### 27.17.2.1.2.1 Definition and applicability

When the mobile station is activated, the supply voltage on the SIM/ME interface shall be able to counteract spikes in the current consumption of the SIM up to the limits given in the conformance requirement, ensuring that the supply voltage stays in the specified range.

This test applies to GSM and DCS 1 800 MEs with:

a) 5V SIM interface

b) 3V SIM interface

c) 5V/3V SIM interface

#### 27.17.2.1.2.2 Conformance requirement

a) The voltage on contact C1 of the SIM/ME interface shall be 5V +/- 10 % for spikes in the current consumption with a maximum charge of 40 nAs with no more than 400 ns duration and an amplitude of at most 200 mA.

b) The voltage on contact C1 of the SIM/ME interface shall be 3V +/- 10 % for spikes in the current consumption with a maximum charge of 12 nAs with no more than 400 ns duration and an amplitude of at most 60 mA.

c-1) The voltage on contact C1 of the SIM/ME interface shall be 5V +/- 10 % for spikes in the current consumption with a maximum charge of 40 nAs with no more than 400 ns duration and an amplitude of at most 200 mA when the interface is in 5V operation mode.

c-2) The voltage on contact C1 of the SIM/ME interface shall be 3V +/- 10 % for spikes in the current consumption with a maximum charge of 12 nAs with no more than 400 ns duration and an amplitude of at most 60 mA when the interface is in 3V operation mode.

**Reference:**

a), c-1): GSM 11.11, section 5.2.

b), c-2): GSM 11.12, section 5

#### 27.17.2.1.2.3 Test purpose

To verify that the ME keeps the voltage on contact C1 of the SIM/ME interface within the specified range for the conditions given in the conformance requirement.

#### 27.17.2.1.2.4 Method of test

**Initial condition**

The ME is connected to a SIM Simulator.

The MS is activated.

The remaining contacts of the SIM/ME interface are held in nominal test condition (See GSM 11.10 section 27.17.2).

**Procedure**

To test the requirements a) and c-1), the voltage on contact C1 of the SIM/ME interface is monitored and the following current spikes are applied:

1) continuous spikes:
current amplitude 20 mA
current offset 0 mA
Duration 100 ns
Pause 100 ns

2) continuous spikes:
current 20 mA
current offset 0 mA
Duration 400 ns
Pause 400 ns

3) continuous spikes:
current amplitude 15 mA
current offset 5 mA
(i.e. maximum amplitude = 5 mA + 15 mA = 20 mA
Duration 150 ns
Pause 300 ns

4) random spikes:
current amplitude 200 mA
current offset 0 mA
Duration 200 ns
Pause between 0,1 ms and 500 ms, randomly varied

5) random spikes:
current amplitude 100 mA
current offset 0 mA
Duration 400 ns
Pause between 0,1 ms and 500 ms, randomly varied

6) random spikes
current amplitude 195 mA
current offset 5mA
(i.e. maximum amplitude = 5 mA + 195 mA = 200 mA
Duration 200 ns
Pause between 0,1 ms and 500 ms, randomly varied

To test the requirements b) and c-2), the voltage on contact C1 of the SIM/ME interface is monitored and the following current spikes are applied:

1) continuous spikes:
current amplitude 12 mA
current offset 0 mA
Duration 100 ns
Pause 100 ns

2) continuous spikes:
current 12 mA
current offset 0 mA
Duration 400 ns
Pause 400 ns

3) continuous spikes:
current amplitude 9 mA
current offset 3 mA
(i.e. maximum amplitude = 3 mA + 9 mA = 12 mA
Duration 150 ns
Pause 300 ns

4) random spikes:
current amplitude 60 mA
current offset 0 mA
Duration 200 ns
Pause between 0,1 ms and 500 ms, randomly varied

5) random spikes:
current amplitude 30 mA
current offset 0 mA
Duration 400 ns
Pause between 0,1 ms and 500 ms, randomly varied

6) random spikes
current amplitude 57 mA
current offset 3 mA
(i.e. maximum amplitude = 3 mA + 57 mA = 60 mA
Duration 200 ns
Pause between 0,1 ms and 500 ms, randomly varied

NOTE: The specified spike durations are measured at 50 % of the spike amplitude.

#### 27.17.2.1.2.5 Test requirement

The voltage on contact C1 of the SIM/ME interface shall be within the ranges specified in the conformance requirements.

#### 27.17.2.2 Electrical tests on contact C2

C2 = Reset (RST)

##### 27.17.2.2.1 Definition and applicability

When the mobile station is activated, the voltage on contact C2 of the SIM/ME interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the SIM.

This test applies to GSM and DCS 1 800 MEs with:

a) 5V SIM interface

b) 3V SIM interface

c) 5V/3V SIM interface

##### 27.17.2.2.2 Conformance requirement

a) The voltage on contact C2 (RST) of the SIM/ME interface shall be between -0,3V and +0,6V for a current of -200 μA in low state and between 3,8V and Vcc + 0,3V for a current of +20 μA in high state.

b) The voltage on contact C2 (RST) of the SIM/ME interface shall be between -0,3V and +0,7V for a current of -200 μA in low state and between 2,15 V and Vcc + 0,3V for a current of +200 μA in high state.

c-1) The voltage on contact C2 (RST) of the SIM/ME interface shall be between -0,3V and +0,6V for a current of -200 μA in low state and between 3,8V and Vcc + 0,3V for a current of +20 μA in high state when the interface is in 5V operation mode.

c-2) The voltage on contact C2 (RST) of the SIM/ME interface shall be between -0,3V and +0,7V for a current of -200 μA in low state and between 2,15 V and Vcc + 0,3V for a current of +200 μA in high state when the interface is in 3V operation mode.

**Reference:**

a), c-1): GSM 11.11, section 5.

b), c-2): GSM 11.12, section 5.

##### 27.17.2.2.3 Test purpose

To verify that the ME keeps the voltage on contact C2 (RST) of the SIM/ME interface within the specified range, as given in the conformance requirement.

##### 27.17.2.2.4 Method of test

###### 27.17.2.2.4.1 Initial condition

The ME is connected to a SIM Simulator.

The MS is activated.

The remaining contacts of the SIM/ME interface are held in nominal test conditions (See GSM 11.10 section 27.17.2).

###### 27.17.2.2.4.2 Procedure

The voltage on contact C2 (RST) of the SIM/ME interface is measured.

#### 27.17.2.2.5 Test requirement

The voltage on contact C2 (RST) of the SIM/ME interface shall be within the range specified in the conformance requirement.

### 27.17.2.3 Electrical tests on contact C3

C3 = Clock (CLK)

#### 27.17.2.3.1 Definition and applicability

When the mobile station is activated, the voltage, the rise/fall time of the signal, the clock cycle ratio and the frequency on contact C3 of the SIM/ME interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the SIM.

This test applies to GSM and DCS 1 800 MEs with:

a) 5V SIM interface

b) 3V SIM interface

c) 5V/3V SIM interface

#### 27.17.2.3.2 Conformance requirement

a-1) The voltage on contact C3 (CLK) of the SIM/ME interface shall be between -0,3V and +0,5V for a current of -200 μA in low state and between 3,15V and Vcc +0,3V for a current of +20 μA in high state.

a-2) The rise and the fall time of the clock signal shall not exceed 9 % of the clock period .

a-3) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state.

a-4) The frequency of the clock signal shall be between 1 MHz and 5 MHz.

b-1) The voltage on contact C3 (CLK) of the SIM/ME interface shall be between -0,3V and +0,7V for a current of -20 μA in low state and between 1,85V and Vcc +0,3V for a current of +20 μA in high state.

b-2) The rise and the fall time of the clock signal shall not exceed 50 ns.

b-3) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state.

b-4) The frequency of the clock signal shall be between 1 MHz and 4 MHz.

c-1) The voltage on contact C3 (CLK) of the SIM/ME interface shall be between -0,3V and +0,5V for a current of -200 μA in low state and between 3,15V and Vcc +0,3V for a current of +20 μA in high state when the interface is in 5V operation mode.

c-2) The rise and the fall time of the clock signal shall not exceed 9 % of the clock period when the interface is in 5V operation mode.

c-3) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the interface is in 5V operation mode.

c-4) The frequency of the clock signal shall be between 1 MHz and 5 MHz when the interface is in 5V operation mode.

c-5) The voltage on contact C3 (CLK) of the SIM/ME interface shall be between -0,3V and +0,7V for a current of -20 μA in low state and between 1,85V and Vcc +0,3V for a current of +20 μA in high state when the interface is in 3V operation mode.

c-6) The rise and the fall time of the clock signal shall not exceed 50 ns when the interface is in 3V operation mode.

c-7) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the interface is in 3V operation mode.

c-8) The frequency of the clock signal shall be between 1 MHz and 4 MHz when the interface is in 3V operation mode.

**Reference:**

a), c-1,2,3,4) GSM 11.11, section 5 and section 5.4.

b), c-3,5,6,7) GSM 11.12, section 4.2 and section 5.

#### 27.17.2.3.3 Test purpose

To verify that the ME keeps the voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the SIM/ME interface within the ranges specified in the conformance requirements.

#### 27.17.2.3.4 Method of test

##### 27.17.2.3.4.1 Initial condition

The ME is connected to a SIM Simulator.

The MS is activated.

The remaining contacts of the SIM/ME interface are held in nominal test conditions (See GSM 11.10 section 27.17.2).

##### 27.17.2.3.4.2 Procedure

The voltage, the rise/fall time, the clock cycle ratio and the frequency on contact C3 (CLK) of the SIM/ME interface are measured.

#### 27.17.2.3.5 Test requirement

The voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the SIM/ME interface shall be within the ranges specified in the conformance requirements.

### 27.17.2.4 [Not used]

### 27.17.2.5 Electrical tests on contact C7

C7 = Input - output (I/O)

#### 27.17.2.5.1 Definition and applicability

When the mobile station is activated, the ME shall keep the voltage, the current and the rise/fall time of the signal on contact C7 of the SIM/ME interface within the specified range in order to ensure correct operation and to prevent any damage to the SIM.

This test applies to GSM and DCS 1 800 MEs with:

a) 5V SIM interface

b) 3V SIM interface

c) 5V/3V SIM interface

**27.17.2.5.2 Conformance requirement**

a-1) ME receiving state A (low state):
With an imposed voltage of 0V the current flowing out of the ME shall not exceed 1 mA.

a-2) ME transmitting state A (low state):
The voltage shall be between -0,3V and 0,4V when a current of 1 mA flowing into the ME is applied.

a-3) ME transmitting or receiving state Z (high state):
The voltage shall be between +3,8V and Vcc + 0,3V when a current of 20 μA flowing out of the ME is applied.

a-4) The rise time and the fall time of the I/O signal shall not exceed 1 μs.

b-1) ME receiving state A (low state):
With an imposed voltage of 0V the current flowing out of the ME shall not exceed 1 mA.

b-2) ME transmitting state A (low state):
The voltage shall be between -0,3V and 0,4V when a current of 1 mA flowing into the ME is applied.

b-3) ME transmitting or receiving state Z (high state):
The voltage shall be between 0,7*Vcc and Vcc + 0,3V when a current of 20 μA flowing out of the ME is applied.

b-4) The rise time and the fall time of the I/O signal shall not exceed 1 μs.

c-1) ME receiving state A (low state):
With an imposed voltage of 0V the current flowing out of the ME shall not exceed 1 mA when the ME is in 5V operation mode.

c-2) ME transmitting state A (low state):
The voltage shall be between -0,3V and 0,4V when a current of 1 mA flowing into the ME is applied when the ME is in 5V operation mode.

c-3) ME transmitting or receiving state Z (high state):
The voltage shall be between +3,8V and Vcc + 0,3V when a current of 20 μA flowing out of the ME is applied when the ME is in 5V operation mode.

c-4) The rise time and the fall time of the I/O signal shall not exceed 1 μs when the ME is in 5V operation mode.

c-5) ME receiving state A (low state):
With an imposed voltage of 0V the current flowing out of the ME shall not exceed 1 mA when the ME is in 3V operation mode.

c-6) ME transmitting state A (low state):
The voltage shall be between -0,3V and 0,4V when a current of 1 mA flowing into the ME is applied when the ME is in 3V operation mode.

c-7) ME transmitting or receiving state Z (high state):
The voltage shall be between 0,7*Vcc and Vcc + 0,3V when a current of 20 μA flowing out of the ME is applied when the ME is in 3V operation mode.

c-8) The rise time and the fall time of the I/O signal shall not exceed 1 μs when the ME is in 3V operation mode.

**Reference:**

a), c-1,2,3,5) GSM 11.11, section 5.

a), c-1,2,4,5) GSM 11.12, section 5.

#### 27.17.2.5.3 Test purpose

To verify that the ME keeps the voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the SIM/ME interface within the ranges specified in the conformance requirements.

#### 27.17.2.5.4 Method of test

#### 27.17.2.5.4.1 Initial condition

The ME is connected to a SIM Simulator.

The MS is activated.

The remaining contacts of the SIM/ME interface are held in nominal test conditions (See GSM 11.10 section 27.17.2).

#### 27.17.2.5.4.2 Procedure

The voltage, the current and the rise/fall time on contact C7 (I/O) of the SIM/ME interface are measured.

#### 27.17.2.5.5 Test requirement

The voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the SIM/ME interface shall be within the ranges specified in the conformance requirements.

### 27.18 Fixed Number Dialling (FND)

### 27.18.1 ME and SIM with FND activated

#### 27.18.1.1 Definition and applicability

Fixed Number Dialling (FDN) is a service defined for the SIM. An activated FDN service results in call restrictions for the MS. The call restrictions are controlled by the ME. To ascertain the type of SIM and state of FDN the MS runs the FDN capability request procedure during SIM/ME initialization.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM and supporting the FDN service.

#### 27.18.1.2 Conformance requirement

1. Recognizing the state of the SIM (FDN enabled) the MS shall perform the SIM initialization procedure as specified.
2. The MS allows call set-up to a directory number as stored in $EF_{FDN}$.
3. The MS allows call set-up to a directory number as stored in $EF_{FDN}$ and extended by digits in the end.
4. The MS does not allow call set-up to a directory number stored in $EF_{FDN}$ but with missing digits at the end.
5. The MS does not allow call set-up to a directory number having no reference in $EF_{FDN}$.
6. The MS allows call set-up of an emergency call.

**Reference:**

GSM 11.11, clauses 10.2.7, 10.3.2, 11.2.1 and 11.5.1, GSM 02.07, clause 3.2.

#### 27.18.1.3 Test purpose

1. To verify that the ME as a result of the state of the SIM rehabilitates $EF_{IMSI}$ and $EF_{LOCI}$ during SIM/ME initialization procedure.
2. To verify that the ME allows call set-up to a FDN number.
3. To verify that the ME allows call set-up to a FDN number extended by some digits in the end.

4. To verify that the ME rejects call set-up to a FDN number not completely corresponding to an entry in $EF_{FDN}$ .
5. To verify that the ME rejects call set-up to number having no reference in $EF_{FDN}$.
6. To verify that the ME allows emergency call set-up.

#### 27.18.1.4 Method of test

##### 27.18.1.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters

| | |
|---|---|
| Attach/detach: | disabled |
| LAI (MCC/MNC/LAC): | 246/81/0001 |
| Access control: | unrestricted |

The default FDN-SIM with FDN service enabled is installed into the ME and the MS is powered on.

##### 27.18.1.4.2 Procedure

a) The MS is powered on and PIN1 is entered.

b) Using the MMI a call set-up to the fixed dialling number 1 is attempted.

c) Using the MMI a call set-up to the fixed dialling number 2 extended by "123" in the end is attempted.

d) Using the MMI a call set-up to a number which is equal to the fixed dialling number 3 without the last digit is attempted, e.g. by recalling the fixed dialling number 3 and deleting the last digit (only in display).

e) Using the MMI a call set-up to the number "1234567" is attempted.

f) Using the MMI an emergency call set-up is attempted.

#### 27.18.1.5 Test requirement

1) After step a) the MS is registered and in idle state.

2) After steps b) and c) the MS shall allow call set-up and send the requested number across the air interface.

3) After steps d) and e) the MS shall prevent call set-up.

4) After step f) the MS shall allow emergency call set-up and send the requested number across the air interface.

### 27.18.2 ME and SIM with FND deactivated

#### 27.18.2.1 Definition and applicability

Fixed Number Dialling (FDN) is a service defined for the SIM. An activated FDN service results in call restrictions for the MS. Only directory numbers which are stored in the $EF_{FDN}$ may be dialled by the MS. The call restrictions are controlled by the ME. To ascertain the type of SIM and state of FDN the MS runs the FDN capability request procedure during SIM/ME initialization. Deactivation of the service by the subscriber is possible under the control of PIN2 and switches the SIM into a "normal", non restrictive SIM.

This test apply to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM and supporting the FDN service.

#### 27.18.2.2 Conformance requirement

1. Recognizing the state of the SIM (FDN disabled) the MS correctly performs the SIM initialization procedure.
2. The MS allows call set-up to a directory number as stored in $EF_{FDN}$.
3. The MS allows call set-up to a directory number as stored in $EF_{ADN}$.
4. The MS allows call set-up to a directory number given in manually.

**Reference:**

GSM 11.11, clauses 10.2.7, 10.3.2, 11.2.1 and 11.5.1, GSM 02.07, clause 3.2.

#### 27.18.2.3 Test purpose

1. To verify that the ME as a result of the state of the SIM correctly performs the SIM/ME initialization procedure.
2. To verify that the ME allows call set-up to a FDN number.
3. To verify that the ME allows call set-up to a ADN number.
4. To verify that the ME allows call set-up to manually given number.

#### 27.18.2.4 Method of test

##### 27.18.2.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters

| | |
|---|---|
| Attach/detach: | disabled |
| LAI (MCC/MNC/LAC): | 246/81/0001 |
| Access control: | unrestricted |

The default FDN SIM with FDN service disabled is installed into the ME and the MS is powered on.

##### 27.18.2.4.2 Procedure

a) Using the MMI a call set-up to the fixed dialling number 1 is attempted.

b) Using the MMI a call set-up to the abbreviated dialling number 1 is attempted.

c) Using the MMI a call set-up to the number "1234567" is attempted.

#### 27.18.2.5 Test requirement

After steps a), b) and c) the MS shall allow call set-up and send the requested number across the air interface.

### 27.18.3 Enabling, disabling and updating of FND

#### 27.18.3.1 Definition and applicability

FDN may be enabled and disabled by the subscriber under control of PIN2. Fixed dialling numbers are read with PIN and updated under control of PIN2.

This test apply to GSM and DCS 1 800 MEs using either ID-1 or Plug-in SIM and supporting the FDN service.

#### 27.18.3.2 Conformance requirement

1. Recognizing the state of the SIM (FDN enabled) the MS shall perform the SIM initialization procedure as specified.

2. The MS shall allow updating of $EF_{FDN}$ by the use of PIN2.
3. The MS provides means to disable the FDN service by the use of PIN2.
4. The MS shall allow the use of $EF_{ADN}$ after disabling of FDN.

**Reference:**

GSM 11.11, clauses 10.2.7, 10.3.2, 11.2.1 and 11.5.1, GSM 02.07, clause 3.2.

### 27.18.3.3 Test purpose

1. To verify that the ME as a result of the state of the SIM rehabilitates $EF_{IMSI}$ and $EF_{LOCI}$ during SIM/ME initialization procedure.
2. To verify that the ME correctly performs the update of a number in $EF_{FDN}$.
3. To verify that the ME correctly disables FDN service.
4. To verify that the ME recognizes disabling of FDN and allows access to $EF_{ADN}$.

### 27.18.3.4 Method of test

#### 27.18.3.4.1 Initial conditions

The SS transmits on the BCCH, with the following network parameters

| | |
|---|---|
| Attach/detach: | disabled |
| LAI (MCC/MNC/LAC): | 246/81/0001 |
| Access control: | unrestricted |

The default FDN SIM with FDN service enabled is installed into the ME and the MS is powered on.

#### 27.18.3.4.2 Procedure

a) The MS is powered on and PIN 1 is entered.

b) Using the MMI the directory number "+876543210" is stored in $EF_{FDN}$ as fixed dialling number 1 (The alpha identifier is not changed).

c) Using the MMI the FDN disabling procedure is performed. On request of the MS PIN2 is entered.

d) Using the MMI a call set-up to the abbreviated dialling number 1 is attempted.

e) The MS is soft-powered down.

### 27.18.3.5 Test requirement

1) After step a) the MS is registered and in idle state.

2) After step c) the MS shall indicate that the FDN disabling procedure has been successful.

3) After step d) the MS shall allow call set-up and send the requested number across the air interface.

4) After step e) the value of bit 1 of byte 12 in the response data of $EF_{ADN}$ in the SIM shall be "1" and record 1 in $EF_{FDN}$ , shall contain the following values:

| B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | B13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46 | 44 | 4E | 31 | 31 | 31 | 06 | 91 | 78 | 56 | 34 | 12 | F0 |

| B14 | B15 | B16 | B17 | B18 | B19 | B20 |
|---|---|---|---|---|---|---|
| FF | FF | FF | FF | FF | FF | FF |

## 27.19 Phase identification

### 27.19.1 Definition and applicability

The phase of the SIM is indicated in the Elementary File $EF_{PHASE}$. This allows the ME to identify the phase of the SIM and adapt its functionality accordingly.

This test applies to GSM and DCS 1 800 MEs using either ID-1 or plug-in SIMs.

### 27.19.2 Conformance requirement

The phase of the card shall be determined as part of the initialization procedure.

**Reference:**

GSM 11.11, sections 10.2.16 and 11.2.1.

### 27.19.3 Test purpose

To verify that the ME requests the SIM phase as part of the initialization procedure.

### 27.19.4 Method of test

#### 27.19.4.1 Initial conditions

The ME is connected to the SIM simulator, and powered off.

The default values are used.

#### 27.19.4.2 Procedure

a) The mobile is powered on.

b) The SIM simulator monitors the SIM initialization procedure.

### 27.19.5 Test requirement

The ME shall request the phase of the SIM as part of the initialization procedure.

## 27.20 SIM presence detection

### 27.20.1 Definition and applicability

The presence of the SIM is an essential requirement for setting up and maintaining a call. The ME detects the presence of the SIM electronically.

### 27.20.2 Conformance requirement

To ensure that the SIM has not been removed during a card session, the ME shall send STATUS commands at frequent intervals of no longer than 30 seconds during a call. If the ME detects that the SIM has been removed, a possibly ongoing call shall be terminated by the ME within 5 seconds at the latest after having detected the SIM removal.

**Reference:**

GSM 11.11, section 11.2.7.

#### 27.20.3 Test purpose

1. To verify that the ME sends STATUS messages at frequent intervals of no longer than 30 seconds during a call.
2. To verify that the ME terminates a call within 5 seconds at the latest after having received a wrong response to the STATUS command.

#### 27.20.4 Method of test

##### 27.20.4.1 Initial conditions

The ME is connected to the SIM-simulator.

All elementary files are coded as default.

##### 27.20.4.2 Procedure

a) A call is set up using the generic call setup.

b) The SIM simulator monitors the time interval between STATUS commands sent by the ME.

c) After 3 minutes, the call is cleared.

d) A call is set up using the generic call setup.

e) After one minute after the call was successfully set up, the SIM simulator responds to a STATUS command with the response data of the MF.

#### 27.20.5 Test requirements

1. During step b), the time interval between STATUS commands shall not be longer than 30 seconds.

2. After step e), the ME shall terminate the call within 5 seconds at the latest after having received the wrong response to the STATUS command.

### 27.21 Advice of Charge (AoC)

#### 27.21.1 AoC not supported by SIM

##### 27.21.1.1 Definition and applicability

If the ME under test supports Advice of Charge Charging, it shall still look at the capability of the SIM, before responding to any AoCC information from the network.

This test is applicable to all MEs supporting AoCC.

##### 27.21.1.2 Conformance requirement

1. An MS not supporting AoCC and in the outgoing call / U4 call delivered state, on receipt of a CONNECT message containing AoCC information shall acknowledge the CONNECT message but ignore and not acknowledge the AoCC information sent within the CONNECT.

2. An MS not supporting AoCC and in the outgoing call / U4 call delivered state, on receipt of a FACILITY message containing AoCC information shall ignore and not acknowledge the AoCC information sent within the FACILITY.

3. An MS not supporting AoCC and in the incoming call / U9 call confirmed state, on receipt of a FACILITY message containing AoCC information shall ignore and not acknowledge the AoCC information sent within the FACILITY.

4. An MS not supporting AoCC and in the U10 call active state, on receipt of a FACILITY message containing AoCC information, shall ignore and not acknowledge the AoCC information sent within the FACILITY.

**References:**

GSM 03.86, sections 1.2, 1.3, 2.2, 2.3; GSM 04.86, section 2.

### 27.21.1.3 Test purpose

1. To verify that an MS not supporting AoCC (where the ME does support AoCC but the SIM does not) and in the outgoing call / U4 call delivered state, on receipt of a CONNECT message containing AoCC information shall acknowledge the CONNECT message but ignore and not acknowledge the AoCC information sent within the CONNECT.

2. To verify that an MS not supporting AoCC (where the ME does support AoCC but the SIM does not) and in the outgoing call / U4 call delivered state, on receipt of a FACILITY message containing AoCC information shall ignore and not acknowledge the AoCC information sent within the FACILITY.

3. To verify that an MS not supporting AoCC (where the ME does support AoCC but the SIM does not) and in the incoming call / U9 call confirmed state, on receipt of a FACILITY message containing AoCC information shall ignore and not acknowledge the AoCC information sent within the FACILITY.

4. To verify that an MS not supporting AoCC (where the ME does support AoCC but the SIM does not) and in the U10 call active state, on receipt of a FACILITY message containing AoCC information, shall ignore and not acknowledge the AoCC information sent within the FACILITY.

### 27.21.1.4 Method of test

#### 27.21.1.4.1 Initial conditions

The ME shall be installed with a SIM or SIM simulator, with all elementary files coded as for the default SIM, with the exception of:

**$EF_{SST}$ (SIM Service Table)**

Logically: CHV1 disable function allocated and activated.
Abbreviated dialling numbers allocated and activated.
PLMN selector allocated and activated.
Fixed dialling numbers not activated.
AoC not activated.

| Coding: | B1 | B2 | B3 | B4 |
|---|---|---|---|---|
| | xx0x1111 | 0011xx0x | xxxxxxxx | 0000xxxx (binary) |

The coding of $EF_{SST}$ shall conform with the capabilities of the SIM used.

The generic call set up procedures are followed up to and including the reception, or transmission of the ALERTING message by the MS.

#### 27.21.1.4.2 Procedure

a) For an MO call in the U4 state the SS transmits CONNECT containing AoCC information.

b) For an MO call in the U4 state the SS transmits FACILITY containing AoCC information.

c) For an MTcall in the U9 state the SS transmits FACILITY containing AoCC information.

d) For an MO call in the U10 state the SS transmits FACILITY containing AoCC information.

#### 27.21.1.5 Test requirement

In all cases, the MS shall ignore the AoCC information sent to it in the Facility information elements as part of the CONNECT/FACILITY messages and not send any AoCC information acknowledgement. It shall be checked for 15 seconds that the MS does not transmit any AoCC information acknowledgement after the receipt of AoCC information.

### 27.21.2 Maximum frequency of ACM updating

#### 27.21.2.1 Definition and applicability

The ACM shall be updated at the end of every interval, where the interval length is given by parameter e2. The ME shall update the ACM not more frequently than once every 5 seconds, even if the interval is less than 5 seconds. More frequent updating may affect the SIM's read/write cycles.

This test applies to all ME supporting AoC.

#### 27.21.2.2 Conformance requirement

The ACM shall be incremented when the CCM is incremented or once every 5 seconds, whichever is the longer period.

**Reference:**

GSM 02.24, section 4.3, part h.

#### 27.21.2.3 Test purpose

To verify that the interval between increments is 5 seconds.

#### 27.21.2.4 Method of test

#### 27.21.2.4.1 Initial conditions

The ME shall be connected to the SIM simulator, with all elementary files coded as default with the exception of:

**$EF_{SST}$ (SIM Service Table)**

Logically:
CHV1 disable function allocated and activated.
Abbreviated dialling numbers allocated and activated.
PLMN selector allocated and activated.
Fixed dialling numbers not activated.
AoC allocated and activated.

| Coding: | B1 | B2 | B3 | B4 |
|---|---|---|---|---|
| | xx0x1111 | 0011xx11 | xxxxxxxx | 0000xxxx (binary) |

The coding of $EF_{SST}$ shall conform with the capabilities of the SIM used.

**$EF_{ACM}$ (Accumulated call meter)**

Logically: 50 units

**$EF_{ACMmax}$ (Accumulated call meter maximum)**

Logically: 150 units

**System Simulator:**

1 cell, default parameters, IMSI attach/detach disabled.

**Mobile Station:**

The MS is in MM-state "idle, updated".

**27.21.2.4.2 Procedure**

a) The MS is made to initiate a call. The call is established with AoCC e-parameters sent in a Facility IE in the CONNECT message, as given below. The MS returns the AoCC acknowledgement within 1 second of the CONNECT message. It is an implementation option whether the AoCC acknowledge is sent by the MS before or after the CONNECT ACKNOWLEDGE.

b) The call is maintained for 90 seconds, then terminated by the SS. During the call, the SIM-simulator monitors the time intervals between successive INCREMENT commands.

**Maximum Duration of Test:**

2 minutes.

**Expected Sequence:**

| Step | Direction | Message | Comments |
|---|---|---|---|
| 1 | MS | | The MS is made to initiate a call |
| 2 | MS -> SS | CHANNEL REQUEST | |
| 3 | SS -> MS | IMMEDIATE ASSIGNMENT | |
| 4 | MS -> SS | CM SERVICE REQUEST | |
| 5 | SS -> MS | CM SERVICE ACCEPT | |
| 6 | MS -> SS | SETUP | |
| 7 | SS -> MS | CALL PROCEEDING | |
| 8 | SS -> MS | ASSIGNMENT COMMAND | to a supported channel type |
| 9 | MS -> SS | ASSIGNMENT COMPLETE | |
| 10 | SS -> MS | ALERTING | |
| 11 | SS -> MS | CONNECT | As default message except contains Facility IE with contents as indicated in i below |
| | | | Either A or B branch is taken |
| A12 | MS -> SS | CONNECT ACKNOWLEDGE | |
| A13 | MS -> SS | FACILITY | As default message except contains Facility IE with contents as indicated in ii below |
| B12 | MS -> SS | FACILITY | As default message except contains Facility IE with contents as indicated in ii below |
| B13 | MS -> SS | CONNECT ACKNOWLEDGE | |
| 14 | | | call duration 90 seconds after CAI information sent by SS, |
| 15 | SS -> MS | DISCONNECT | |
| 16 | MS -> SS | RELEASE | |
| 17 | SS -> MS | RELEASE COMPLETE | |
| 18 | SS -> MS | CHANNEL RELEASE | The main signalling link is released. |

**Specific Message Contents:**

**i) FACILITY Information Element** with **Invoke = ForwardChargeInformation** component type as defined in GSM 04.80 section 3.6.1 table 3.3.

For ASN.1 description see default message contents in section 31.6.1.3.

The values of the e-parameters within the parameter part of the Facility Information Element shall be set as below:

| | e-parameters | | | | | | |
|---|---|---|---|---|---|---|---|
| parameter | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| value | 1 | 1 | 1 | 0 | 0 | 0 | 0 |

Values shown in table are in the format and have units as in GSM 02.24 section 3.

**ii) FACILITY Information Element** with **Return Result** component type as defined in GSM 04.80 section 3.6.1 table 3.4.

For ASN.1 description see default message contents in section 31.6.1.3.

#### 27.21.2.5 Test requirement

The MS shall send INCREMENT commands to the SIM every 5 seconds.

### 27.21.3 Call terminated when ACM greater than ACMmax

#### 27.21.3.1 Definition and applicability

ACMmax gives the maximum value of ACM, at which the current calls shall be terminated and no further charged calls may be made (except emergency calls).

This test applies to all ME supporting AoCC.

#### 27.21.3.2 Conformance requirement

ACM shall be incremented by the value of CCM.

If the ACMmax is valid, and the ACM becomes equal to or exceeds the value of the ACMmax, then all calls in progress, chargeable to the user, shall be terminated by the MS, once the chargeable interval determined by the CAI has elapsed, (except emergency calls).

**Reference:**

GSM 02.24, section 4.3 part h and section 4.2.2.

#### 27.21.3.3 Test purpose

1. To verify that the ME increments the ACM by the correct number of units, even though this may take ACM above ACMmax.

2. To verify that the ME terminates the call.

#### 27.21.3.4 Method of test

#### 27.21.3.4.1 Initial conditions

The ME shall be connected to a SIM or the SIM simulator, with all elementary files coded as default with the exception of:

**$EF_{SST}$ (SIM Service Table)**

Logically: CHV1 disable function allocated and activated.
Abbreviated dialling numbers allocated and activated.
PLMN selector allocated and activated.
Fixed dialling numbers not activated.
AoC allocated and activated.

| Coding: | B1 | B2 | B3 | B4 |
|---|---|---|---|---|

xx0x1111 0011xx11 xxxxxxxx 0000xxxx (binary)

The coding of $EF_{SST}$ shall conform with the capabilities of the SIM used.

**$EF_{ACM}$ (Accumulated call meter)**

Logically: 80 units

**$EF_{ACMmax}$ (Accumulated call meter maximum)**

Logically: 94 units

**System Simulator:**

1 cell, default parameters, IMSI attach/detach disabled.

**Mobile Station:**

The MS is in MM-state "idle, updated".

#### 27.21.3.4.2 Procedure

a) The MS is made to initiate a call. The call is established with AoCC e-parameters sent in a Facility IE in the CONNECT message, as given below. The MS returns the AoCC acknowledgement within 1 second of the CONNECT message. It is an implementation option whether the AoCC acknowledge is sent by the MS before or after the CONNECT ACKNOWLEDGE.

b) The call is maintained until cleared by the MS (after 30 seconds).

c) The contents of ACM are checked.

**Maximum Duration of Test:**

2 minutes.

**Expected Sequence:**

| Step | Direction | Message | Comments |
|---|---|---|---|
| 1 | MS | | The MS is made to initiate a call |
| 2 | MS -> SS | CHANNEL REQUEST | |
| 3 | SS -> MS | IMMEDIATE ASSIGNMENT | |
| 4 | MS -> SS | CM SERVICE REQUEST | |
| 5 | SS -> MS | CM SERVICE ACCEPT | |
| 6 | MS -> SS | SETUP | |
| 7 | SS -> MS | CALL PROCEEDING | |
| 8 | SS -> MS | ASSIGNMENT COMMAND to a supported channel type | |
| 9 | MS -> SS | ASSIGNMENT COMPLETE | |
| 10 | SS -> MS | ALERTING | |
| 11 | SS -> MS | CONNECT | As default message except contains Facility IE with contents as indicated in i below |
| | | | Either A or B branch is taken |
| A12 | MS -> SS | CONNECT ACKNOWLEDGE | |
| A13 | MS -> SS | FACILITY | As default message except contains Facility IE with contents as indicated in ii below |
| B12 | MS -> SS | FACILITY | As default message except contains Facility IE with contents as indicated in ii below |
| B13 | MS -> SS | CONNECT ACKNOWLEDGE | |
| 14 | | | call duration 30 seconds after CAI information sent by SS |
| 15 | MS -> SS | DISCONNECT | |
| 16 | SS -> MS | RELEASE | |
| 17 | MS -> SS | RELEASE COMPLETE | |
| 18 | MS -> SS | CHANNEL RELEASE | The main signalling link is released. |

**Specific Message Contents:**

**i) FACILITY Information Element** with **Invoke = ForwardChargeInformation** component type as defined in GSM 04.80 section 3.6.1 table 3.3.

For ASN.1 description see default message contents in section 31.6.1.3.

The values of the e-parameters within the parameter part of the Facility Information Element shall be set as below:

| | e-parameters | | | | | | |
|---|---|---|---|---|---|---|---|
| parameter | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| value | 10 | 10 | 1 | 0 | 0 | 0 | 0 |

Values shown in table are in the format and have units as in GSM 02.24 section 3.

**ii) FACILITY Information Element** with **Return Result** component type as defined in GSM 04.80 section 3.6.1 table 3.4.

For ASN.1 description see default message contents in section 31.6.1.3.

**27.21.3.5 Test requirement**

1) The MS shall terminate the call correctly 30 seconds after CAI was sent.

2) The value of ACM shall be 100 units.

### 27.21.4 Response codes of increase command

#### 27.21.4.1 Definition and applicability

ACM has a maximum value in terms of coding, and an attempt by the ME to exceed that value by sending an INCREASE command shall result in an error message from the SIM.

This test applies to all MEs supporting AoCC.

#### 27.21.4.2 Conformance requirement

The ME shall perform the increasing procedure, sending the amount to be increased.

The running accumulated charge shall be stored in the ACM of the SIM.

Where this charge cannot be stored in the MS, use of the telecommunications service shall be prevented.

**References:**

GSM 11.11, section 11.5.3; GSM 02.86, sections 2.2.1 and 2.1.

#### 27.21.4.3 Test purpose

To verify that the ME clears a charged call if the SIM indicates that the ACM cannot be increased.

#### 27.21.4.4 Method of test

##### 27.21.4.4.1 Initial conditions

The ME shall be connected to the SIM simulator, with all elementary files coded as default with the exception of:

**$EF_{SST}$ (SIM Service Table)**

Logically: CHV1 disable function allocated and activated.
Abbreviated dialling numbers allocated and activated.
PLMN selector allocated and activated.
Fixed dialling numbers not activated.
AoC allocated and activated.

| Coding: | B1 | B2 | B3 | B4 |
|---|---|---|---|---|
| | xx0x1111 | 0011xx11 | xxxxxxxx | 0000xxxx (binary) |

The coding of $EF_{SST}$ shall conform with the capabilities of the SIM used.

**$EF_{ACM}$ (Accumulated call meter)**

Logically: (Maximum-10) units

**$EF_{ACMmax}$ (Accumulated call meter maximum)**

Logically: (Maximum-2) units

System Simulator:
1 cell, default parameters, IMSI attach/detach disabled.

Mobile Station:
The MS is in MM-state "idle, updated".

**27.21.4.4.2 Procedure**

a) The MS is made to initiate a call. The call is established with AoCC e-parameters sent in a Facility IE in the CONNECT message, as given below. The MS returns the AoCC acknowledgement within 1 second of the CONNECT message. It is an implementation option whether the AoCC acknowledge is sent by the MS before or after the CONNECT ACKNOWLEDGE.

b) After an interval has elapsed, the ME increments the ACM. When an INCREASE command is received, the SIM-sim sends back the error "98 50".

c) Conditions are reset to those described in the initial conditions. Steps a) and b) of the test are repeated, except that the error code sent by the SIM simulator at step b) is now "6F xx".

d) Conditions are reset to those described in the initial conditions. Steps a) and b) of the test are repeated, except that the error code sent by the SIM simulator at step b) is now "92 40".

**Maximum Duration of Test:**

3 minutes.

**Expected Sequence:**

| Step | Direction | Message | Comments |
|---|---|---|---|
| 1 | MS | | The MS is made to initiate a call |
| 2 | MS -> SS | CHANNEL REQUEST | |
| 3 | SS -> MS | IMMEDIATE ASSIGNMENT | |
| 4 | MS -> SS | CM SERVICE REQUEST | |
| 5 | SS -> MS | CM SERVICE ACCEPT | |
| 6 | MS -> SS | SETUP | |
| 7 | SS -> MS | CALL PROCEEDING | |
| 8 | SS -> MS | ASSIGNMENT COMMAND to a supported channel type | |
| 9 | MS -> SS | ASSIGNMENT COMPLETE | |
| 10 | SS -> MS | ALERTING | |
| 11 | SS -> MS | CONNECT | As default message except contains Facility IE with contents as indicated in i below |
| | | | Either A or B branch is taken |
| A12 | MS -> SS | CONNECT ACKNOWLEDGE | |
| A13 | MS -> SS | FACILITY | As default message except contains Facility IE with contents as indicated in ii below |
| B12 | MS -> SS | FACILITY | As default message except contains Facility IE with contents as indicated in ii below |
| B13 | MS -> SS | CONNECT ACKNOWLEDGE | |
| 14 | | | call duration approx 10s after CAI information sent by SS |
| 15 | MS -> SS | DISCONNECT | |
| 16 | SS -> MS | RELEASE | |
| 17 | MS -> SS | RELEASE COMPLETE | |
| 18 | MS -> SS | CHANNEL RELEASE | The main signalling link is released. |

**Specific Message Contents:**

**i) FACILITY Information Element** with **Invoke = ForwardChargeInformation** component type as defined in GSM 04.80 section 3.6.1 table 3.3.

The values of the e-parameters within the parameter part of the Facility Information Element shall be set as below:

| | e-parameters | | | | | | |
|---|---|---|---|---|---|---|---|
| parameter | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| value | 20 | 10 | 1 | 0 | 0 | 0 | 0 |

Values shown in table are in the format and have units as in GSM 02.24 section 3.

**ii) FACILITY Information Element** with **Return Result** component type as defined in GSM 04.80 section 3.6.1 table 3.4.

#### 27.21.4.5 Test requirement

In each of the three cases, as described in steps b), c) and d) of the procedure, the MS shall terminate the call correctly when it receives an indication from the SIM that the ACM cannot be incremented.