32 Testing of speech transcoding functions

The test sequences for speech transcoding and DTX tests, both for input and required output, are defined in 3GPP TS 06.10, clause 5, and 3GPP TS 06.32, clause 4 for the full rate speech codec. For the half rate speech codec the test sequences are defined in 3GPP TS 06.20, clause 5 and 3GPP TS 06.42 clause 7. They are available on floppy disks in IBM/AT MS-DOS format from ETSI publications department.

The Digital Audio Interface (DAI) is described in subclause 36.4.

NOTE: For a definition of the term "traffic frame" used in this clause, refer to 3GPP TS 06.32 and 3GPP TS 06.42.

32.1 Full Rate Downlink speech transcoding

32.1.1 Definition

Downlink speech transcoding transforms the 13 kbit/s net bit stream obtained by channel decoding the incoming bit stream from the air interface to 13 bit linear PCM.

32.1.2 Conformance requirement

The output bit stream from the speech transcoder shall be continuous and bit by bit exactly the same as the predefined output sequence (SEQ01.OUT, SEQ03.OUT, SEQ04.OUT and SEQ05.OUT).

3GPP TS 06.01, clause2.

3GPP TS 06.10, subclauses 5.2 and 5.2.2.

32.1.3 Test purpose

To verify that the speech transcoding of the MS can transform all predefined sequences (SEQ01.OUT, SEQ03.OUT, SEQ04.OUT and SEQ05.OUT) at 13 kbits/s level to 104 kbit/s (13 bit linear PCM at 8 kHz) level correctly.

32.1.4 Method of test

32.1.4.1 Initial conditions

DTX is off.

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech decoder/DTX functions (downlink)".

32.1.4.2 Procedure

a) The SS resets the speech decoder of the MS via the DAI.

b) The SS sends test sequence SEQ01.COD at 13 kbit/s to the MS via the air interface after passing it through the SS channel encoder.

NOTE: These test sequence files contain 16 bit words for all speech encoded parameters and are justified as described in 3GPP TS 06.10 table 5.1. 76 words are used as input in a period of 20 ms.

c) The SS records the 104 kbit/s output bit stream from the MS on the digital audio interface.

d) The test is repeated using the test sequences SEQ03.COD, SEQ04.COD and SEQ05.COD.

32.1.5 Test requirements

The bit stream output shall be continuous and bit by bit exactly the same as the sequence given in the files SEQ01.OUT, SEQ03.OUT, SEQ04.OUT and SEQ05.OUT.

NOTE: These files contain 16 bit words of 13 bit linear PCM left justified.

32.2 Full Rate Downlink receiver DTX functions

32.2.1 Definition

The DTX receiver functions consist of a SID frame detector, comfort noise generator functions and lost frame substitution and muting functions.

32.2.2 Conformance requirement

1) The output level of the decoder has to be constant for an input signal consisting of identical speech frames.

   3GPP TS 06.10.

2/3) When, after the first lost speech frame subsequent speech frames are lost, a muting technique shall be used that will gradually decrease the output level, resulting in the silencing of the output after a maximum of 320 ms. Speech frames with the FACCH flag set provoke a Bad Frame Indication (BFI = 1) and are hence regarded as lost speech frames.

   3GPP TS 06.01, clause 6; 3GPP TS 06.11, subclauses 2.1 and 2.2, clause 3 for requirement 2 (first part).

   3GPP TS 06.01, clause 6; 3GPP TS 06.11, subclauses 2.1 and 2.2, clause 3; 3GPP TS 06.31, subclauses 1.2.2 and 3.1.1 for requirement 3 (second part).

4/5) A valid SID-frame followed by a sequence of lost speech frames shall result in comfort noise generation with constant block amplitude parameters. Speech frames with the FACCH flag set provoke a Bad Frame Indication (BFI = 1) and are hence regarded as lost speech frames.

   3GPP TS 06.01, clauses 3 and 5; 3GPP TS 06.12, clause 3 and subclause 3.1.

   3GPP TS 06.31, subclauses 1.2.2, 3.1, 3.1.1 and 3.1.2 for requirement 4 (first part).

   3GPP TS 06.01, clauses 3, 5 and 6; 3GPP TS 06.11, subclauses 2.1 and 2.2; 3GPP TS 06.12, clause 3 and subclause 3.1.

   3GPP TS 06.31, subclauses 1.2.2, 3.1, 3.1.1 and 3.1.2 for requirement 5 (second part).

6/7) An invalid SID-frame followed by a sequence of lost speech frames shall result in comfort noise generation, using the set of parameters from the last valid SID-frame. Speech frames with the FACCH flag set provoke a Bad Frame Indication (BFI = 1) and are hence regarded as lost speech frames.

   3GPP TS 06.01, clauses 3 and 5; 3GPP TS 06.12, clause 3 and subclause 3.1.

   3GPP TS 06.31, subclauses 1.2.2, 3.1, 3.1.1 and 3.1.2 for requirement 6 (first part).

   3GPP TS 06.01, clauses 3, 5 and 6; 3GPP TS 06.11, subclauses 2.1 and 2.2; 3GPP TS 06.12, clause 3 and subclause 3.1.

   3GPP TS 06.31, subclauses 1.2.2, 3.1, 3.1.1 and 3.1.2 for requirement 7 (second part).

8) The energy of the output signal is controlled by the block amplitude parameter, xmaxc.

   3GPP TS 06.10, subclauses 3.1.20, 3.1.21 and 3.2.1.

9/10) The first SID-frame that is expected and not received shall be substituted by the last valid SID-frame and the procedure for valid SID-frames shall be applied. For the second lost SID-frame, a muting technique shall be used that will gradually decrease the output level, resulting in silencing the output after a maximum of 320 ms. Speech frames with the FACCH flag set provoke a Bad Frame Indication (BFI = 1) and are hence regarded as lost speech frames.

   3GPP TS 05.08, subclause 8.3; 3GPP TS 06.01, clause 6; 3GPP TS 06.11, subclauses 2.3 and 2.4.

   3GPP TS 06.31, subclauses 1.2.2, 3.1.1 and 3.1.2.

32.2.3 Test purpose

1) To verify that the signal energy at the output of the decoder is constant with a tolerance of ±3 dB if a sequence of identical speech frames is applied at the receiver input.

2) To verify that the muting function of the receiver is within the required limits if a sequence of lost speech frames is applied at the receiver input.

3) To verify that the muting function of the receiver is within the required limits if a sequence of speech frames with the FACCH flag set is applied at the receiver input.

4) To verify the function of comfort noise generation when a valid SID-frame is received followed by a sequence of lost speech frames. The signal energy at the output of the decoder shall be constant with a tolerance of ±3 dB.

5) To verify the function of comfort noise generation when a valid SID-frame is received followed by a sequence of speech frames with the FACCH flag set. The signal energy at the output of the decoder shall be constant with a tolerance of ±3 dB.

6) To verify the function of comfort noise generation when an invalid SID-frame is received followed by a sequence of lost speech frames. The signal energy at the output of the decoder shall be constant with a tolerance of ±3 dB.

7) To verify the function of comfort noise generation when an invalid SID-frame is received followed by a sequence of speech frames with the FACCH flag set. The signal energy at the output of the decoder shall be constant with a tolerance of ±3 dB.

8) To verify that the signal energy at the output of the decoder depends on the block amplitude xmaxc of the input frames if a sequence of speech frames is applied to the decoder. The signal energy at the output of the decoder shall be constant with a tolerance of ±3 dB.

9) To verify the SID-frame substitution and muting functions on the comfort noise, if two consecutive expected SID-frames are lost with the other frames being lost speech frames.

10) To verify the SID-frame substitution and muting functions on the comfort noise, if two consecutive expected SID-frames are lost with the other frames being speech frames with the FACCH flag set.

32.2.4 Method of test

32.2.4.1 Initial conditions

Uplink DTX is off.

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech decoder/DTX functions (downlink)".

32.2.4.2 Procedure

a) The SS transmits coded "speech" traffic frames on the air interface after passing them trough the SS channel encoder. They contain a special test signal at 13 kbit/s as defined below. All traffic frames are identical with the exception of some frames which are SID frames as defined in 3GPP TS 06.32.

b) The energy of the PCM signal is evaluated (as a mean square average) at the digital audio interface of the MS at 104 kbit/s level (13 bit, 8 kHz linear PCM) and recorded for each block of 20 ms synchronized to the 20 ms speech frame structure.

c) The SS transmission of the TDMA frames of the TCH/FS on the air interface is ramped "on" and "off" on a traffic frame by traffic frame basis, taking into account the block diagonal interleaving scheme defined in 3GPP TS 05.03. The first traffic frame in step 1 occurs one frame after the window of the SACCH multiframe (TDMA frame 60 modulo 104), allocated for the SID frame (see 3GPP TS 05.02 and 3GPP TS 05.08). The SACCH will also be transmitted.

NOTE 1: 8 timeslots in 8 consecutive TCH/FS TDMA frames are seen as one traffic frame, and the next traffic frame starts in the middle of the previous one (i.e. after 4 TDMA frames of the previous one) due to the block diagonal interleaving scheme defined in 3GPP TS 05.03.

d) The special test frame is an encoded "speech" traffic frame of 260 bits obtained from white Gaussian noise band limited to 300 Hz to 3 400 Hz. When repeated, the special test frame results in a humming sound with a fairly constant level when decoded, and is defined in table 32-1.

Table 32-1: Table of special test traffic frame for receiver DTX tests

Encoded parameter	Value			
LARc(1)	38			
LARc(2)	42			
LARc(3)	24			
LARc(4)	20			
LARc(5)	10			
LARc(6)	9			
LARc(7)	5			
LARc(8)	3			
	Sub-block no:			
	0	**1**	**2**	**3**
Grid position (Mc)	1	3	2	0
Block amplitude (xmaxc)	40	40	40	40
LTP gain (Bc)	0	0	0	0
LTP lag (Nc)	40	120	40	120
RPE pulses (xmc)				
- pulse no 1	4	6	6	6
- pulse no 2	4	5	4	3
- pulse no 3	2	1	3	4
- pulse no 4	6	2	1	3
- pulse no 5	3	6	4	1
- pulse no 6	5	1	6	3
- pulse no 7	5	2	5	5
- pulse no 8	5	6	2	1
- pulse no 9	1	3	4	4
- pulse no 10	3	2	4	3
- pulse no 11	5	5	4	5
- pulse no 12	6	1	2	2
- pulse no 13	1	3	4	3

NOTE 2: The signal energy of the decoded special test frame is controlled with the block amplitude parameter (xmaxc). Reducing xmaxc from 40 to 32 reduces the signal energy by 6 dB, and reducing xmaxc from 40 to 24 reduces the signal energy by 12 dB.

e) The sequence of traffic frames on the air interface is as follows:

e.1) 23 test frames "on".

e.2) 20 frames "off".

e.3) 20 test frames "on".

e.4) 1 SID frame followed by 6 frames "off", another identical SID frame and 23 frames "off". Except for the SID codeword, the SID frames are identical to the test frame.

e.5) 1 different SID frame, however with 2 to 15 errors inserted in the SID codeword, followed by 23 frames "off".

e.6) 20 test frames "on", but with the block amplitude parameter xmaxc = 24.

e.7) 1 SID frame followed by 50 frames "off". Except for the SID codeword, the SID frames are identical to the test frame.

e.8) The whole test is repeated, but the frames "off" are replaced by frames "on" with the FACCH flag set.

32.2.5 Test requirements

1) In step e.1), the signal energy shall be fairly constant within ±3 dB.

2) In step e.2), the signal energy shall decrease to less than -60 dBm within 17 frames.

3) In step e.4), comfort noise shall be generated. The same requirements as in step e.1) apply.

4) In step e.5), the same requirements as in step e.4) apply.

5) In step e.6), the same requirements as in step e.1) apply. However, the signal energy shall be 12 dB lower.

6) In step e.7), the signal energy shall be fairly constant within ±3 dB for 28 frames. Then the signal energy shall decrease to less than -60 dBm within 16 frames.

7) In step e.8), the same requirements as in all previous steps apply.

32.3 Full Rate Uplink speech transcoding

32.3.1 Definition

Uplink speech transcoding transforms 13 bit linear PCM to the 13 kbit/s net bit stream. This net bit stream is to be channel encoded for transmission on the air interface.

32.3.2 Conformance requirement

The output bit stream from the speech transcoder shall be bit by bit exactly the same as the predefined output sequence (SEQ01.OUT, SEQ02.OUT, SEQ03.OUT and SEQ04.OUT).

3GPP TS 06.01, clause 2.

3GPP TS 06.10, subclauses 5.2 and 5.2.1.

32.3.3 Test purpose

To verify that the speech transcoder on the MS can transform all predefined sequences (SEQ01.INP, SEQ02.INP, SEQ03.INP and SEQ04.INP) at 104 kbit/s (13 bit linear PCM at 8 kHz) level to 13 kbit/s level correctly.

32.3.4 Method of test

32.3.4.1 Initial conditions

Uplink DTX is off.

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech encoder/DTX functions (uplink)".

32.3.4.2 Procedure

a) The SS resets the speech decoder on the MS (see subclause 36.4).

b) The SS sends a test sequence SEQ01.INP to the MS at 104 kbit/s level via the digital audio interface.

NOTE: These files contain 16 bit words for 13 bit linear PCM left justified. See also 3GPP TS 06.10 table 5.1.

c) The SS records the 13 kbit/s output bit stream obtained by channel decoding the incoming bit stream from the air interface.

d) The test is repeated using the test sequences SEQ02.INP, SEQ03.INP and SEQ04.INP.

32.3.5 Test requirements

The bit stream output shall be bit by bit exactly the same as the sequence given in the files SEQ01.COD, SEQ02.COD, SEQ03.COD and SEQ04.COD.

NOTE: These files contain 16 bit words of all the 76 parameters in a speech frame justified as in 3GPP TS 06.10 table 5.1. 76 codewords shall occur in a frame of 20 ms.

32.4 Full Rate Uplink transmitter DTX functions

32.4.1 Definition

The VAD/DTX transmitter functions consist of a Voice Activity Detector (VAD) and a surrounding Discontinuous Transmission (DTX) system introducing additional "speech" traffic frames on the air interface compared to those the VAD itself would classify as speech frames containing real speech. The additional traffic frames on the air are introduced due to:

1) A "hangover" period at the end of speech bursts in order to be certain that the traffic frames contain only noise and to evaluate the background acoustic noise characteristics when no real speech is present.

2) Special traffic frames (SID frames) added on the air at regular intervals containing only the evaluated background acoustic noise characteristics. These frames are used for generation of comfort noise in speaker silence periods on the receiving side.

32.4.2 Conformance requirement

The MS VAD and DTX function allows only those frames to be transmitted that are either marked with SP = 1 or that are properly positioned SID-frames.

3GPP TS 05.08, subclause 8.3; 3GPP TS 06.01, clauses 3 and 4; 3GPP TS 06.31, subclauses 2.1, 2.1.1 and 2.1.2; 3GPP TS 06.32, clauses 1 and 2, subclauses 2.1 and 2.2.8.

32.4.3 Test purpose

To verify that the combination of VAD and DTX operates correctly.

32.4.4 Method of test

32.4.4.1 Initial conditions

A call is set up on a TCH/FS according to the generic call set-up procedure.

Uplink DTX is on.

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech encoder/DTX functions (uplink)".

32.4.4.2 Procedure.

a) The SS sends a test sequence SPEC_A1.INP of PCM samples, which are grouped into frames of 20 ms synchronized to the TDMA and traffic frame structure on the air interface, on the digital audio interface in the MS at 104 kbits/s (13 bit, 8 kHz linear PCM).

The start of the test sequences is synchronized with the radio transmission on the air interface so that the first traffic frame on the air occurs just after the traffic frame allocated for the SID frame (TDMA frame 56 modulo 104, see 3GPP TS 05.02 and 3GPP TS 05.08).

NOTE: 8 timeslots in 8 consecutive TCH/FS TDMA frames are seen as one traffic frame and the next traffic frame starts in the middle of the previous one (i.e. after 4 TDMA frames of the previous one) due to the block diagonal interleaving scheme defined in 3GPP TS 05.03.

b) The SS detects whether or not there is any power transmitted over the radio path on a timeslot basis excluding SACCH frames. The speech frame by speech frame on/off transmission (on = 1) is recorded.

c) The test is repeated for all test sequences *.INP described in 3GPP TS 06.32 clause 4.

32.4.5 Test requirements

1) In step b), the traffic frame on/off sequence recorded shall be bit exact like the sequence of SP flags stored as bit 15 of LAR(2) on the respective reference files *.COD described in 3GPP TS 06.32, with the following exceptions:

1.1) The occurrence of a SID frame in its allowed window within the SACCH multiframe as defined in 3GPP TS 05.08.

1.2) The occurrence of a SID frame after 1 or more real speech frames consecutively transmitted on the air.

32.5 Full Rate Speech channel transmission delay

32.5.1 Definition

The total transmission delay within the various elements of a GSM system are specified as round trip delays. For the MS this would be equivalent to applying an RF equivalent of a speech signal to the MS receiver, closing an acoustic path from the ERP to the MRP, detecting the corresponding RF signal at the MS transmitter output and measuring the time interval between the signal originally fed to the MS receiver and that transmitted by the MS transmitter.

This simple approach cannot be demonstrated to be accurate due to the inherent non linear characteristic of the speech transcoder. The overall delay therefore is split into four identifiable and measurable delays. The delays are respectively:

- the downlink delay from RF input to DAI output;
- DAI output to ERP;
- MRP to DAI output; and
- DAI to uplink RF output.

Each delay is defined and its method of test described in the following subclauses.

32.5.2 Conformance requirement

The overall speech channel transmission delay shall be less than 143,9 ms.

3GPP TS 03.50, subclause 3.3.6.1.

32.5.3 Test purpose

To verify that the round trip delay, of a speech channel for a MS, which consists of the sum of:

- the downlink delay from RF input to DAI output;
- DAI output to ERP;
- MRP to DAI output; and
- DAI to uplink RF output;

meets the requirements when using the predefined test sequences SEQ01.COD, SEQ03.COD, SEQ04.COD and SEQ05.COD.

32.5.4 Downlink processing delay

32.5.4.1 Definition

The downlink processing delay is the delay from the first bit of a speech block transmitted from the RF output of the SS up to the last bit of the corresponding speech block received at the DAI on the output of the speech transcoder.

32.5.4.2 Method of test

32.5.4.2.1 Initial conditions

DTX is off.

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech decoder/DTX functions (downlink)".

32.5.4.2.2 Procedure

a) The test set up is that described in subclause 32.1 for downlink speech transcoding.

b) The SS transmits one of the test patterns SEQ01.COD, SEQ03.COD, SEQ04.COD or SEQ05.COD to the MS.

c) The SS measures for each speech block it transmits the time between the first bit at the air interface and the last bit of that speech block on the DAI. This difference is the delay measured.

d) Step c) is repeated 20 times and the maximum delay measured in ms is the downlink processing delay TDP.

NOTE: This is to account for the fact that the processing time may not be constant.

32.5.5 Downlink coding delay

32.5.5.1 Definition

The downlink coding delay is defined as the delay between the digital representation of an acoustic signal on the DAI and the corresponding acoustic signal at the ERP.

32.5.5.2 Method of test

32.5.5.2.1 Initial conditions

The DAI of the MS is connected to the SS and is set to the operating mode "Test of acoustic devices and A/D & D/A".

The handset is mounted in the LRGP (see annex 1 of ITU-T Recommendation P.76) and the earpiece is sealed to the knife edge of the artificial ear conforming to ITU-T Recommendation P.51.

32.5.5.2.2 Procedure

a) The SS generates on the DAI a digital representation of a sine wave with a frequency of 1 000 Hz.

b) The SS measures the "phase shift" $\varnothing_1$, in the range of 0 to 360 degrees, between the equivalent sine wave generated at the DAI and the sine wave at the input to the artificial ear.

c) The frequency is increased to 1100 Hz and the resulting phase shift $\varnothing_2$ noted.

d) The downlink coding delay TDC is calculated from either:

$TDC = (\varnothing_2 - \varnothing_1)/36$ ms for $\varnothing_2 > \varnothing_1$; or

$TDC = (\varnothing_2 + 360 - \varnothing_1)/36$ ms for $\varnothing_2 < \varnothing_1$

32.5.6 Uplink processing delay

32.5.6.1 Definition

The uplink processing delay is the delay from the first bit of a speech block on the DAI to the last bit of that speech block being transmitted on the air interface of the MS.

32.5.6.2 Method of test

32.5.6.2.1 Initial conditions

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech encoder/DTX functions (uplink)".

32.5.6.2.2 Procedure

a) The test set up is that described in subclause 32.3 for uplink speech transcoding.

b) The SS sends one of the test patterns SEQ01.INP, SEQ03.INP, SEQ04.INP or SEQ05.INP to the DAI of the MS.

c) The SS measures the time between the first bit on the DAI, and the last transmitted bit of the block at the air interface for each speech block the SS sends on the DAI. This time difference is the delay measured.

d) Step c) is repeated 20 times. The maximum delay measured in ms is the uplink coding delay TUP.

NOTE: This is to account for the fact that the processing time may not be constant.

32.5.7 Uplink coding delay

32.5.7.1 Definition

The uplink coding delay is defined as the delay between an acoustic signal at the MRP and the digital representation of that signal on the DAI.

32.5.7.2 Method of test

32.5.7.2.1 Initial conditions

The DAI of the MS is connected to the SS and is set to the operating mode "Test of acoustic devices and A/D & D/A".

The handset is mounted in the LRGP (see annex 1 of ITU-T recommendation P.76) and the earpiece is sealed to the knife edge of the artificial ear conforming to ITU-T recommendation P.51.

32.5.7.2.2 Procedure

a) The SS generates an acoustic signal at the artificial mouth of the LRGP, being a pure sine wave with a frequency of 1 000 Hz.

b) The SS measures the "phase shift" $\varnothing_1$, in the range of 0 to 360 degrees, between the signal at the MRP and its digital representation on the DAI.

c) The SS set the generated frequency to 1 100 Hz and measures the resulting phase shift $\varnothing_2$.

d) The uplink coding delay TUC is calculated from either:

$TUC = (\varnothing_2 - \varnothing_1)/36$ ms for $\varnothing_2 > \varnothing_1$; or

$TUC = (\varnothing_2 + 360 - \varnothing_1)/36$ ms for $\varnothing_2 < \varnothing_1$

32.5.8 Test requirement

The sum of the delays {TDP + TDC + TUP + TUC} shall be less than 144,9 ms.

NOTE 1: This limit includes an allowance of 4*0,25 ms delay from the DAI to the MS transmission path.

NOTE 2: No allowances have been made for any delays within the measurement system. These must either be calibrated out or subtracted from the individual delays before performing the sum above.

32.6 Half Rate Downlink speech transcoding

32.6.1 Definition

Downlink speech transcoding transforms the 5,6 kbit/s net bit stream obtained by channel decoding the incoming bit stream from the air interface to 104 kbit/s (13 bit linear PCM at 8 kHz) level.

32.6.2 Conformance requirement:

The output bit stream from the speech transcoder shall be continuous and bit by bit exactly the same as the predefined output sequences contained in SEQ01.OUT, SEQ02.OUT, SEQ03.OUT and SEQ04.OUT.

3GPP TS 06.02, clause 5; 3GPP TS 06.20.

32.6.3 Test purpose:

To verify that the speech transcoder of the MS can transform all the predefined sequences (SEQ01.DEC, SEQ02.DEC, SEQ03.DEC and SEQ04.DEC) at 5,6 kbit/s level to 104 kbit/s (13 bit linear PCM at 8 kHz) level correctly.

32.6.4 Method of test

32.6.4.1 Initial conditions

Uplink DTX is off.

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech decoder/DTX functions (downlink)".

Frequency hopping is on, where the BCCH carrier is part of the hopping sequence. Frequency hopping shall be performed over four carriers using random frequency hopping. Downlink power control shall be activated and a difference of 30 dB between the level of the BCCH carrier and the other carriers adjusted.

NOTE: Frequency hopping is used to ensure that the MS can cope with the reception of bursts (on the BCCH carrier) that have a power level that is different from the rest of the bursts.

32.6.4.2 Procedure

a) The SS sends a reset pulse to the MS on the digital audio interface. This reset pulse will start the clock output of the MS at 104 kHz (pin 24 of the DAI).

b) The SS sends test sequence SEQ01.DEC at 5,6 kbit/s to the MS via the air interface after passing it through the SS channel encoder. The speech decoder of the MS is reset by the special reset sequence which is at the beginning of the test sequence.

c) The SS records the 104 kbit/s output bit stream from the MS on the digital audio interface. The recording shall be triggered by the reception of the encoder homing frame. The encoder homing frame itself shall not be recorded.

d) The test is repeated using test sequences SEQ02.DEC, SEQ03.DEC and SEQ04.DEC.

32.6.5 Test requirement

The bit stream output shall be continuous and bit by bit exactly the same as the sequence describing the speech data contained in the files SEQ01.OUT, SEQ02.OUT, SEQ03.OUT and SEQ04.OUT. The two encoder homing frames at the beginning of each test sequence *.OUT shall be disregarded for this comparison.

32.7 Half Rate Downlink receiver DTX functions

32.7.1 Definition

The DTX receiver functions consist of a SID frame detector, comfort noise generator functions and lost frame substitution and muting functions.

32.7.2 Conformance requirement

The output bit stream from the speech transcoder shall be continuous and bit by bit exactly the same as the predefined output sequences contained in DTX*.OUT described in 3GPP TS 06.07 subclause 7.

3GPP TS 06.02, clauses 6 and 8; 3GPP TS 06.22; 3GPP TS 06.41.

32.7.3 Test purpose

To verify that the MS generates comfort noise correctly.

32.7.4 Method of test

32.7.4.1 Initial conditions

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech decoder/DTX functions (downlink)".

Frequency Hopping is on, where the BCCH carrier is part of the hopping sequence. Frequency Hopping shall be done over four carriers using random Frequency Hopping.

NOTE: Frequency Hopping is used to ensure that the MS can cope with the reception of dummy bursts (on the BCCH frequency) during DTX.

32.7.4.2 Procedure

a) The SS sends a reset pulse to the MS on the digital audio interface. This reset pulse will start the clock output of the MS at 104 kHz (pin 24 of the DAI).

b) The SS sends test sequence DTX01.DEC at 5,6 kbit/s to the MS via the air interface after passing it through the SS channel encoder. The speech decoder of the MS will be reset by the special reset sequence which is at the beginning of the test sequence.

c) The SS transmission of the TDMA frames of the TCH/HS on the air interface is ramped "on" and "off" on a traffic frame by traffic frame basis, taking into account the block diagonal interleaving scheme defined in 3GPP TS 05.03. The first traffic frame in step b occurs one frame after the window of the SACCH multiframe (TDMA frame 0 or 52 modulo 104 for subchannel 0 and TDMA frame 1 or 53 modulo 104 for subchannel 1), allocated for the SID frame (see 3GPP TS 05.02 and 3GPP TS 05.08). The SACCH will also be transmitted.

d) The information whether to ramp the transmitter of the SS "on" or "off" is derived from the sequence of SP-flags contained in the file DTX01.COD (see file format description in 3GPP TS 06.07 clause 5 for the position of the SP-flag).

e) The SS records the 104 kbit/s output bit stream from the MS on the digital audio interface. The recording shall be triggered by the reception of the encoder homing frame. The encoder homing frame itself is not recorded.

f) The test is repeated using test sequences *.DEC described in 3GPP TS 06.07 clause 7.

32.7.5 Test requirement

The bit stream output shall be continuous and bit by bit exactly the same as the sequence describing the speech data contained in the files DTX*.OUT described in 3GPP TS 06.07 subclause 7. The two encoder homing frames at the beginning of each test sequence *.OUT shall be disregarded for this comparison.

32.8 Half Rate Uplink speech transcoding

32.8.1 Definition

Uplink speech transcoding transforms 104 kbit/s (13 bit linear PCM at 8 kHz) level to the 5,6 kbit/s net bit stream. This net bit stream is to be channel encoded for transmission on the air interface.

32.8.2 Conformance requirement

The output bit stream from the speech transcoder shall be bit by bit exactly the same as the predefined sequences contained in SEQ01.COD, SEQ02.COD and SEQ03.COD described in 3GPP TS 06.07 clause 6.

3GPP TS 06.02, clause 5; 3GPP TS 06.20.

32.8.3 Test purpose

To verify that the speech transcoder of the MS can transform all the predefined sequences SEQ01.INP, SEQ02.INP and SEQ03.INP at 104 kbit/s (13 bit linear PCM at 8 kHz) level to 5,6 kbit/s level correctly.

32.8.4 Method of test

32.8.4.1 Initial conditions

Uplink DTX is off.

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech encoder/DTX functions (uplink)".

Frequency hopping is on.

32.8.4.2 Procedure

a) The SS sends a reset pulse to the MS on the digital audio interface. This reset pulse will start the clock output of the MS at 104 kHz (pin 24 of the DAI).

b) The SS synchronizes the input of the test sequences via the digital audio interface to the framing of the MS in the uplink. This can be done in two steps as follows:

b.1) The SS sends to the MS at 104 kbit/s level via the digital audio interface 13 triplets of input frames, each triplet consisting of 480 samples. The 480 samples of one triplet shall all be identical. The 13 bits of one sample shall all be set to "zero" except for one which is set to "one". The position of the bit within the 13 bits of a sample that is set to "one" shall vary in such a way, that all possible 13 positions are exercised within the 13 triplets of input frames. An example for such a sequence is given in test sequence BITSYNC.INP described in 3GPP TS 06.07 subclause 8. The SS records the 5,6 kbit/s output bit stream obtained by channel decoding the incoming bit stream from the air interface. As soon as the decoder homing frame is detected at the output, the framing of the MS with respect to the 13 bit long input words is known by looking at the corresponding input frame that has caused the decoder homing frame at the output.

NOTE: The encoder homing frame consists of 160 identical samples, each 13 bit long left justified, with the least significant bit set to "one" and all other bits set to "zero" (0008 hex). The speech encoder will go to its predefined home state at the end of the first received encoder homing frame. Consecutive encoder homing frames will produce the decoder homing frame at the output of the speech encoder.

b.2) Synchronized to the 13 bit framing of the MS, the SS now sends test sequence SEQSYNC.INP described in 3GPP TS 06.07 subclause 8 to the MS at 104 kbit/s level via the digital audio interface. The SS records the 5,6 kbit/s output bit stream obtained by channel decoding the incoming bit stream from the air interface. The recording shall be triggered by the reception of the decoder homing frame. By comparing the first recorded frame that is not a decoder homing frame with the 160 possible output frames contained in sequences SYNC*.COD, the offset of the input to the 20 ms framing of the MS is known.

c) Synchronized to the 20 ms framing of the MS, the SS sends a test sequence SEQ01.INP to the MS at 104 kbit/s level via the digital audio interface. The speech encoder of the MS is reset by the special homing sequence which is at the beginning of the test sequence.

d) The SS records the 5,6 kbit/s output bit stream obtained by channel decoding the incoming bit stream from the air interface. The recording shall be triggered by the reception of the decoder homing frame. The decoder homing frame itself is not recorded.

e) The test is repeated using test sequences SEQ02.INP and SEQ03.INP.

32.8.5 Test requirements

The bit stream output shall be bit by bit exactly the same as the sequences describing the speech parameters contained in the files SEQ01.COD, SEQ02.COD and SEQ03.COD. The two decoder homing frames at the beginning of each test sequence *.COD shall be disregarded for this comparison.

32.9 Half Rate Uplink transmitter DTX functions

32.9.1 Definition

The VAD/DTX transmitter functions consist of a Voice Activity Detector (VAD) that inhibits the transmitter during speech pauses, and a surrounding Discontinuous Transmission (DTX) system introducing Silence Descriptor (SID) frames on the air interface.

32.9.2 Conformance requirement

The MS VAD and DTX function allow only those frames to be transmitted that are either properly positioned SID-frames, SACCH-frames or frames marked with SP-flag = 1.

For the transmitted frames, the output bit stream from the speech transcoder shall be bit by bit exactly the same as the predefined sequences contained in DTX*.COD described in 3GPP TS 06.07 subclause 6.

3GPP TS 05.08, subclause 8.3; 3GPP TS 06.02, clauses 6 and 7; 3GPP TS 06.41; 3GPP TS 06.42.

32.9.3 Test purpose

To verify that the combination of VAD and DTX operates correctly.

32.9.4 Method of test

32.9.4.1 Initial conditions

Uplink DTX is on.

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech encoder/DTX functions (uplink)".

Frequency Hopping is on.

32.9.4.2 Procedure

a) The SS sends a reset pulse to the MS on the digital audio interface. This reset pulse will start the clock output of the MS at 104 kHz (pin 24 of the DAI).

b) The SS synchronizes the input of the test sequences via the digital audio interface to the framing of the MS in the uplink. This can be done in two steps as follows:

b.1) The SS sends to the MS at 104 kbit/s level via the digital audio interface 13 triplets of input frames, each triplet consisting of 480 samples. The 480 samples of one triplet shall all be identical. The 13 bits of one sample shall all be set to "zero" except for one which is set to "one". The position of the bit within the 13 bits of a sample that is set to "one" shall vary in such a way, that all possible 13 positions are exercised within the 13 triplets of input frames. An example for such a sequence is given in test sequence BITSYNC.INP described in 3GPP TS 06.07 subclause 8. The SS records the 5,6 kbit/s output bit stream obtained by channel decoding the incoming bit stream from the air interface. As soon as the decoder homing frame is detected at the output, the framing of the MS with respect to the 13 bit long input words is known by looking at the corresponding input frame that has caused the decoder homing frame at the output.

NOTE: The encoder homing frame consists of 160 identical samples, each 13 bit long left justified, with the least significant bit set to "one" and all other bits set to "zero" (0008 hex). The speech encoder will go to its predefined home state at the end of the first received encoder homing frame. Consecutive encoder homing frames will produce the decoder homing frame at the output of the speech encoder.

b.2) Synchronized to the 13 bit framing of the MS, the SS now sends test sequence SEQSYNC.INP described in 3GPP TS 06.07 subclause 8 to the MS at 104 kbit/s level via the digital audio interface. The SS records the 5,6 kbit/s output bit stream obtained by channel decoding the incoming bit stream from the air interface. The recording shall be triggered by the reception of the decoder homing frame. By comparing the first recorded frame that is not a decoder homing frame with the 160 possible output frames contained in sequences SYNC*.COD, the offset of the input to the 20 ms framing of the MS is known.

c) The SS sends test sequence DTX01.INP of PCM samples described in 3GPP TS 06.07 clause 7 on the digital audio interface in the MS at 104 kbit/s (13 bit linear PCM at 8 kHz). The speech encoder of the MS will be reset by the special homing sequence which is at the beginning of the test sequence.

d) The start of the test sequence is synchronized with the radio transmission on the air interface so that the first traffic frame on the air caused by the first encoder homing frame in the test sequence occurs just after the traffic frame allocated for the SID frame (TDMA frame 0 or 52 modulo 104 for subchannel 0 and TDMA frame 1 or 53 modulo 104 for subchannel 1), allocated for the SID frame (see 3GPP TS 05.02 and 3GPP TS 05.08).

e) The SS detects whether or not there is any power transmitted over the radio path on a time slot basis excluding SACCH frames. The speech frame by speech frame on/off transmission (on = 1) is calculated and recorded. The recording shall be triggered by the reception of the decoder homing frame. The flag marking the decoder homing frame itself is not recorded.

f) The SS records the 5,6 kbit/s output bit stream obtained by channel decoding the incoming bit stream from the air interface. The recording shall be triggered by the reception of the decoder homing frame. The decoder homing frame itself is not recorded.

g) The test is repeated for all test sequences DTX*.INP described in 3GPP TS 06.07 clause 7.

32.9.5 Test requirements

1) The bit stream recorded in step e) shall be continuous and bit by bit exactly the same as the sequence of SP-flags contained in the files DTX*.COD (see file format description in 3GPP TS 06.07 subclause 5 for the position of the SP-flag), except for the bits marking those frames that are SID frames scheduled for transmission according to 3GPP TS 06.41. The first two frames in the reference files *.COD shall be disregarded for this comparison.

2) The bit stream recorded in step f) shall be continuous and bit by bit exactly the same as the sequence describing the speech parameters contained in the files *.COD described in 3GPP TS 06.07 subclause 7, except for the bits of the speech frames marked with SP-flag=0. The two decoder homing frames at the beginning of each test sequence *.COD shall be disregarded for this comparison.

32.10 Half Rate Speech channel transmission delay

32.10.1 Definition

The total transmission delay within the various elements of a GSM system are specified as round trip delays. For the MS this would be equivalent to applying an RF equivalent of a speech signal to the MS receiver, closing an acoustic path from the ERP to the MRP, detecting the corresponding RF signal at the MS transmitter output and measuring the time interval between the signal originally fed to the MS receiver and that transmitted by the MS transmitter.

This simple approach cannot be demonstrated to be accurate due to the inherent non linear characteristic of the speech transcoder. The overall delay therefore is split into four identifiable and measurable delays. The delays are respectively:

- the downlink delay from RF input to DAI output;
- DAI output to ERP;
- MRP to DAI output; and
- DAI to uplink RF output.

Each delay is defined and its method of test described in the following subclauses.

32.10.2 Conformance requirement

The overall speech channel transmission delay shall be less than 143,9 ms.

3GPP TS 03.50 subclause 3.3.6.2.

32.10.3 Test purpose

To verify that the round trip delay of a speech channel for a MS which consists of the sum of:

- the downlink delay from RF input to DAI output;
- DAI output to ERP;
- MRP to DAI output; and
- DAI to uplink RF output;

meets the requirements when using the predefined test sequences SEQ01.INP and SEQ01.DEC.

32.10.4 Downlink processing delay

32.10.4.1 Definition

The downlink processing delay is the delay from the first bit of a speech block transmitted from the RF output of the SS up to the last bit of the corresponding speech block received at the DAI on the output of the speech transcoder.

32.10.4.2 Method of test

32.10.4.2.1 Initial conditions

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech decoder/DTX functions (downlink)".

32.10.4.2.2 Procedure

a) The test set up is that described in subclause 32.6.4.2 for downlink speech transcoding.

b) The SS transmits the test pattern SEQ01.DEC described in 3GPP TS 06.07 subclause 6 to the MS.

c) The SS measures for each speech block it transmits the time between the first bit at the air interface and the last bit of that speech block on the DAI. This time difference is the delay measured.

d) Step c) is repeated 20 times and the maximum delay measured in ms is the downlink processing delay TDP.

NOTE: This is to account for the fact that the processing time may not be constant.

32.10.5 Downlink coding delay

32.10.5.1 Definition

The downlink coding delay is defined as the delay between the digital representation of an acoustic signal on the DAI and the corresponding acoustic signal at the ERP.

32.10.5.2 Method of test

32.10.5.2.1 Initial conditions

The DAI of the MS is connected to the SS and is set to the operating mode "Test of acoustic devices and A/D & D/A".

The handset is mounted in the LRGP (see annex 1 of ITU-T recommendation P.76) and the earpiece is sealed to the knife edge of the artificial ear conforming to ITU-T recommendation P.51.

32.10.5.2.2 Procedure

a) The SS generates on the DAI a digital representation of a sine wave with a frequency of 1 000 Hz.

b) The SS measures the "phase shift" $\varnothing_1$, in the range of 0 to 360 degrees, between the equivalent sine wave generated at the DAI and the sine wave at the input to the artificial ear.

c) The frequency is increased to 1 100 Hz and the resulting phase shift $\varnothing_2$ noted.

d) The downlink coding delay TDC is calculated from either:

$TDC = (\varnothing_2 - \varnothing_1)$ ms/36 for $\varnothing_2 > \varnothing_1$; or

$TDC = (\varnothing_2 + 360 - \varnothing_1)$ ms/36 for $\varnothing_2 < \varnothing_1$

32.10.6 Uplink processing delay

32.10.6.1 Definition

The uplink processing delay is the delay from the first bit of a speech block on the DAI to the last bit of that speech block being transmitted on the air interface of the MS.

32.10.6.2 Method of test

32.10.6.2.1 Initial conditions

The DAI of the MS is connected to the SS and is set to the operating mode "Test of speech encoder/DTX functions (uplink)".

32.10.6.2.2 Procedure

a) The test set up is that described in subclause 32.8.4.2 for uplink speech transcoding.

b) The SS sends one of the test patterns SEQ01.INP described in 3GPP TS 06.07 subclause 6 to the DAI of the MS.

c) The SS measures the time between the first bit on the DAI, and the last transmitted bit of the block at the air interface for each speech block the SS sends on the DAI. This time difference is the delay measured.

d) Step c) is repeated 20 times. The maximum delay measured in ms is the uplink coding delay TUP.

NOTE: This is to account for the fact that the processing time may not be constant.

32.10.7 Uplink coding delay

32.10.7.1 Definition

The uplink coding delay is defined as the delay between an acoustic signal at the MRP and the digital representation of that signal on the DAI.

32.10.7.2 Method of test

32.10.7.2.1 Initial conditions

The handset is mounted in the LRGP (see annex 1 of ITU-T recommendation P.76) and the earpiece is sealed to the knife edge of the artificial ear conforming to ITU-T recommendation P.51.

32.10.7.2.2 Procedure

a) The SS generates an acoustic signal at the artificial mouth of the LRGP, being a pure sine wave with a frequency of 1 000 Hz.

b) The SS measures the "phase shift" $\varnothing_1$, in the range of 0 to 360 degrees, between the signal at the MRP and its digital representation on the DAI.

c) The SS sets the generated frequency to 1 100 Hz, and measures the resulting phase shift $\varnothing_2$.

d) The uplink coding delay TUC is calculated from either:

TDC = $(\varnothing_2 - \varnothing_1)$ ms/36 for $\varnothing_2 > \varnothing_1$; or

TDC = $(\varnothing_2 + 360 - \varnothing_1)$ ms/36 for $\varnothing_2 < \varnothing_1$

32.10.8 Test requirement

The sum of the delays TDP, TDC, TUP, and TUC shall be less than 144,9 ms.

NOTE: This limit includes an allowance of 4*0,25 ms delay from the DAI to the MS transmission path.

32.11 Intra cell channel change from a TCH/HS to a TCH/FS

32.11.1 Definition

Dual rate MSs support an intra cell channel change from a TCH/HS to a TCH/FS by switching the Speech and channel codec used from HR to FR.

32.11.2 Conformance requirement:

1) When commanded to perform an intra cell channel change from a TCH/HS to a TCH/FS, the MS shall switch channels from HR to FR. The maximum time allowed for the MS to perform this switch in rates is 20 ms.

3GPP TS 05.10, subclause 6.8.

2) For an intra cell channel change, the time between the end of the last complete speech or data frame or message block sent on the old channel and the time the MS is ready to transmit on the new channel shall be less than 20 ms.

3GPP TS 05.10, subclause 6.8.

32.11.3 Test purpose:

1) To verify that the MS encodes speech correctly after performing an intra cell channel change from a TCH/HS to a TCH/FS.

2) To verify that the MS, when commanded to perform an intracell channel change to a new ARFCN and/or timeslot number within the same cell, if the starting time is not used in the ASSIGNMENT COMMAND, is ready to transmit on the new channel within 20 ms of the last complete speech frame or message block sent on the old channel.

32.11.4 Method of test

32.11.4.1 Initial conditions

Uplink DTX is off.

The SS sets up a call according to the generic call set up procedure on a HR channel in the low ARFCN range on timeslot 1.

32.11.4.2 Procedure

a) The SS records the sequence of BFI flags obtained by channel decoding the incoming bit stream from the uplink air interface using the HR channel decoder on the old channel and at the same time records the sequence of BFI flags obtained by channel decoding the incoming bit stream from the uplink air interface using the FR channel decoder on the channel to which the channel change will take place.

b) The SS sends an ASSIGNMENT COMMAND to the MS allocating a FR channel in the high ARFCN range on timeslot 2, and with a power command of 7. These old and new carriers have a relative frequency tolerance of 0, and a relative timing tolerance of 1/4 bit.

c) The time at which the sequence of BFI flags at the output of the HR channel decoder performs the first transition from 0 to 1 is registered (t_1). In case of occurrence of speech frames after an RR frame, the next transition of the BFI flag from 0 to 1 after the reception of the RR frame is defined as t_1.

d) The time values at which the sequence of BFI flags at the output of the FR channel decoder performs transitions from 1 to 0 are registered. The time t_2 is defined as the time where the BFI flag at the output of the FR channel decoder toggles from 1 to 0 due to a correctly received speech traffic frame received at the channel decoder. Transitions due to the occurrence of an ASSIGNMENT COMPLETE frame or an SABM frame after the reception of good speech frames shall not be considered. If the first frame sent on the new traffic channel was an SABM frame, t_2 is defined as the time the BFI flag toggles from 1 to 0 due to a correctly received speech traffic frame after the reception of the SABM frame.

NOTE: There shall be an allowance of at maximum two transitions for this BFI flag from 0 to 1 and back to zero again after t_2. These transitions are caused by the SABM frame if it was not the first frame to be sent on the new TCH, or the ASSIGNMENT COMPLETE frame, or both. Since both frames are FACCH frames, each would cause exactly one BFI=1 indications.

e) The time difference $Dt = t_2 - t_1$ shall be calculated.

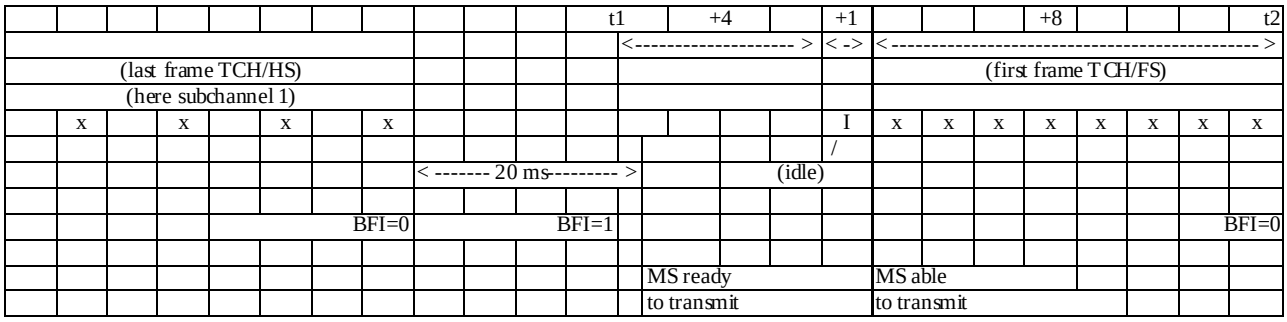
32.11.5 Test requirement

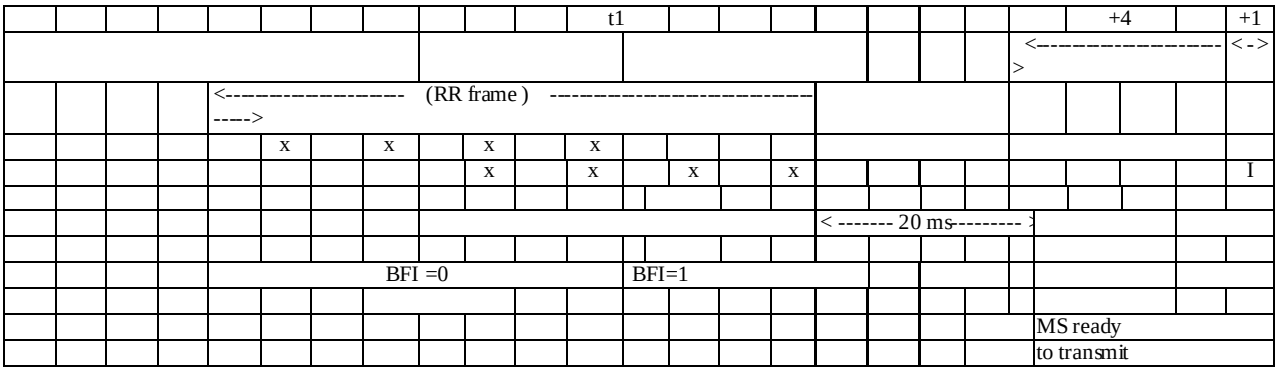
1) The last transition of the BFI flag at the output of the FR channel decoder from 1 to 0 shall be followed by a sequence of at least 50 zeroes, interrupted by at maximum two transitions to 1, each interruption containing exactly one BFI=1 flag, caused by the SABM or the ASSIGNMENT COMPLETE frames.

2) The calculated time difference Dt shall not exceed 13 TDMA frames. If the first frame sent on the new channel was an SABM frame, an additional time difference of 4 frames is allowed. If the last frame sent on the old channel was an RR frame, an additional time difference of 9 frames is allowed.

NOTE: The BFI of the old channel will toggle from 0 to 1 only four frames after the reception of the last bit of the speech frame sent on the old channel. The time between the last bit of the last complete speech or data frame or message block sent on the old channel and the time the MS is ready to transmit on the new channel shall be less than 20 ms (3GPP TS 05.10, subclause 6.8). This time will expire 4 frames and 3 timeslots after the sending of the last bit of the last complete speech frame on the old channel, i.e. the MS may not be able to transmit in the corresponding timeslot in the current frame, but must wait approx. 4 frames until the next allowed frame (FN mod 13 = 0, 4 or 8) is reached.
The next frame could be an idle frame, so the MS must wait for another frame. This equates to 5 frames, after which the MS is able to start transmission on the new channel.
Additionally, 8 frames will be needed due to interleaving until the last bit of the first speech frame on the new channel is received and the BFI flag toggles from 1 to 0.
This makes a total of 13 frames or 60 ms between the frame number when the BFI toggles from 0 to 1 on the old channel and the frame number when the BFI toggles from 1 to 0 on the new channel. See diagram below.
If SABM is the first frame received on the new channel, 4 more frames are allowed.

If RR is the last frame sent on the old channel, additionally 9 more frames are allowed (RR frames plus an idle frame).





32.12 Intra cell channel change from a TCH/FS to a TCH/HS

32.12.1 Definition

Dual rate MSs support an intra cell channel change from a TCH/FS to a TCH/HS by switching the Speech and channel codec used from FR to HR.

32.12.2 Conformance requirement:

1) When commanded to perform an intra cell channel change from a TCH/FS to a TCH/HS, the MS shall switch channels from FR to HR.

   3GPP TS 05.10 subclause 6.8.

2) For an intra cell channel change, the time between the end of the last complete speech or data frame or message block sent on the old channel and the time the MS is ready to transmit on the new channel shall be less than 20 ms.

3GPP TS 05.10, subclause 6.8.

32.12.3 Test purpose:

1) To verify that the MS encodes speech correctly after performing an intra cell channel change from a TCH/FS to a TCH/HS.

2) To verify that the MS, when commanded to perform an intra cell channel change to a new ARFCN and/or new timeslot number within the same cell, if the starting time is not used in the ASSIGNMENT COMMAND, is ready to transmit on the new channel within 20 ms of the last complete speech frame or message block sent on an old channel.

32.12.4 Method of test

32.12.4.1 Initial conditions

Uplink DTX is off.

The SS sets up a call according to the generic call set up procedure on a FR channel in the low ARFCN range on timeslot 1.

32.12.4.2 Procedure

a) The SS records the sequence of BFI flags obtained by channel decoding the incoming bit stream from the uplink air interface using the FR channel decoder on the old channel and at the same time the sequence of BFI flags obtained by channel decoding the incoming bit stream from the uplink air interface using the HR channel decoder on the channel to which the channel change will take place.

b) The SS sends an ASSIGNMENT COMMAND to the MS allocating a HR channel on sub-channel 0 in the high ARFCN range on timeslot 2, and with a power command of 7. These old and new carriers have a relative frequency tolerance of 0, and a relative timing tolerance of 1/4 bit.

c) The time at which the sequence of BFI flags at the output of the FR channel decoder performs the first transition from 0 to 1 is registered (t_1). In case of occurrence of speech frames after an RR frame, the next transition of the BFI flag from 0 to 1 after the reception of the RR frame is defined as t_1.

d) The time values at which the sequence of BFI flags at the output of the HR channel decoder performs transitions from 1 to 0 are registered. The time t_2 is defined as the time where the BFI flag at the output of the HR channel decoder toggles from 1 to 0 due to a correctly encoded speech traffic frame received at the channel decoder. Transitions due to the occurrence of an ASSIGNMENT COMPLETE frame or and SABM frame after the reception of good speech frames shall not be considered. If the first frame sent on the new traffic channel was an SABM frame, t_2 is defined as the time the BFI flag toggles from 1 to 0 due to a correctly received speech traffic frame after the reception of the SABM frame.

NOTE: There shall be an allowance of at maximum two transitions for this BFI flag from 0 to 1 and back to zero again after t_2. These transitions are caused by the SABM frame if it was not the first frame to be sent on the new TCH, or the ASSIGNMENT COMPLETE frame, or both. Since both frames are FACCH frames, each would cause exactly two BFI=1 indications.

e) The time difference $Dt = t_2 - t_1$ shall be calculated.

32.12.5 Test requirement

1) The last transition of the BFI flag at the output of the HR channel decoder from 1 to 0 shall be followed by a sequence of at least 50 zeroes, interrupted by at maximum two transitions to 1, each interruption containing exactly two BFI=1 flags, caused by the SABM or the ASSIGNMENT COMPLETE frames.

2) The calculated time difference Dt shall not exceed 12 TDMA frames. if the first frame sent on the new channel was an SABM frame,an additional time difference of 9 frames is allowed. If the last frame sent on the old channel was an RR frame, an additional time difference of 5 frames is allowed.

NOTE: The BFI of the old channel will toggle from 0 to 1 only 4 frames after the reception of the last bit of the last speech frame sent on the old channel. The BFI on the old channel will toggle from 0 to 1 only four frames after the reception of the last bit of the last complete speech or data frame or message block sent on the old channel.

The time between the last bit of the last complete speech frame sent on the old channel and the time the MS is ready to transmit on the new channel shall be less than 20 ms (3GPP TS 05.10, subclause 6.8). This time will expire 4 frames and 3 timeslots after the sending of the last bit of the last complete speech frame on the old channel, i.e. the MS may not be able to transmit in the corresponding new timeslot in its current frame, but must wait approx. 4 frames until the next allowed frame (FN mod 13 = 0, 4 or 8) is reached.

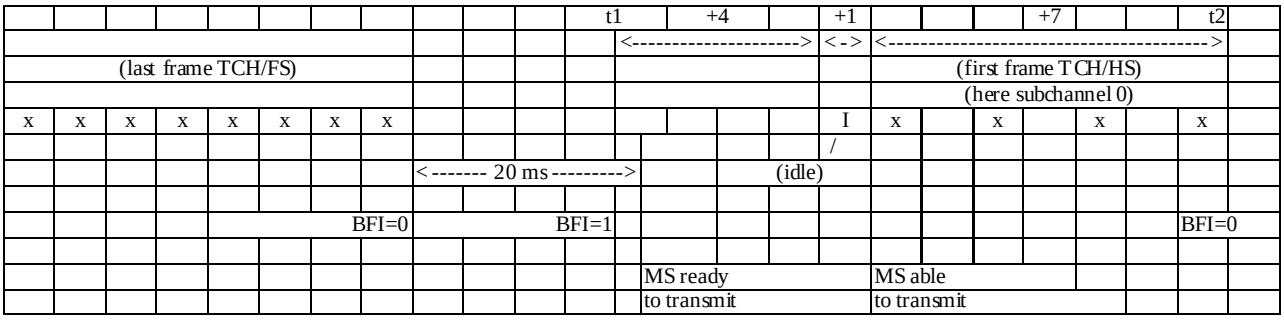
The next frame could be an idle frame, so the MS must wait for another frame. This equates to 5 frames, after which the MS is able to start transmission on the new channel.

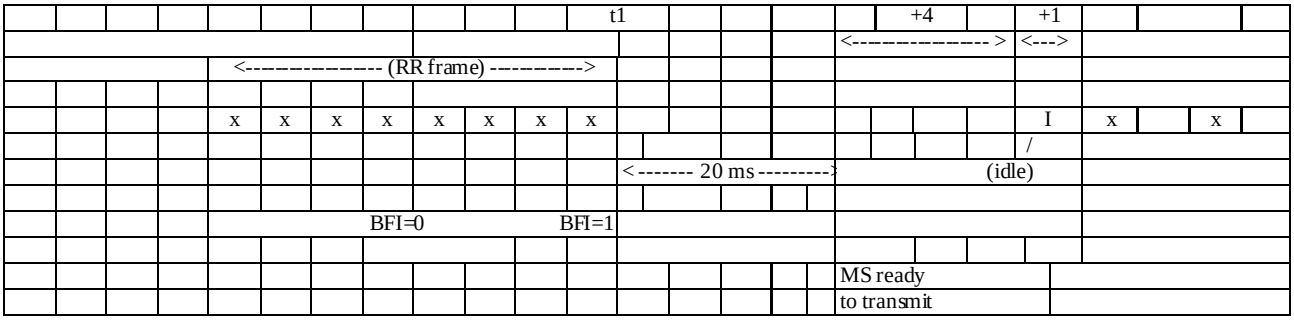
Additionally, 7 frames will be needed due to interleaving until the last bit of the first speech frame on the new channel is received and the BFI flag toggles from 1 to 0.

This makes a total of 12 frames or 55,4 ms between the frame number when the BFI toggles from 0 to 1 on the old channel and the frame number when the BFI toggles from 1 to 0 on the new channel. See diagram below.

If SABM is the first frame received on the new channel, 9 more frames are allowed.

If RR is the last frame sent on the old channel, 5 more frames are allowed.





33 Mobile station features

3GPP TS 02.07 defines mandatory and optional MS features. Their presence and appropriate functioning are verified by the following tests.

33.1 Entry and display of called number

33.1.1 Definition

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

33.1.2 Conformance requirement

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

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

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

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

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

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

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

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

33.1.3 Test purpose

1) To verify that an MS with human interface, in a SETUP message sent to originate a call, includes the same "Number digits" in the "Called party BCD number" of the SETUP message as displayed.

2) To verify that an MS with MMI, when made to establish a call sends a SETUP message, which includes the "Numbering plan identification" in the "Called party BCD number" of the SETUP message for an outgoing call with the value "ISDN/telephony numbering plan (E.164/E.163)".

3) To verify that an MS with MMI, when made to establish a call without use of the "+-key" function, sends a SETUP message, which includes the "Type of number" in the "Called party BCD number" of the SETUP message for an outgoing call with the value "unknown".

4) To verify that an MS with MMI, implementing the "+-key" function, when made to establish a call with use of the "+-key" function, sends a SETUP message, which includes the "Type of number" in the "Called party BCD number" of the SETUP message for an outgoing call with the value "international number.

33.1.4 Method of test

33.1.4.1 Initial conditions

The MS is registered in a cell of the SS.

33.1.4.2 Procedure

a) A number (not including "+ function") is entered and then a call is set up.

b) After the SS has accepted the call the number displayed on the MS and the number received in the SS are compared.

c) The NPI and TON are examined in the SS.

d) Steps a) to c) are repeated, but in a), the number entered starts with the "+ function".

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

33.1.5 Test requirements

1) In step b), both numbers shall be identical.

2) In step c), the NPI shall be "E164" and the TON shall be "unknown".

3) In step d), the NPI shall be "E164" and the TON shall be "international".

33.2 Indication of call progress signals

33.2.1 Definition

Void.

33.2.2 Conformance requirement

Void.

33.2.3 Test purpose

Void.

33.2.4 Ringing tone

33.2.4.1 Method of test

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

33.2.4.2 Requirements

1) According to subclause "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 7).

2) The ringing tone characteristics shall be as follows:

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

33.2.5 Busy tone

33.2.5.1 Method of test

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

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

Message: DISCONNECT (3GPP TS 04.08 / 3GPP TS 24.008, subclause 9.3.7) to the MS:	
Information element	**Comment**
Protocol discriminator	CM
Transaction identifier	MS orig.
Message type	
Cause	
- Coding standard	GSM
- Location	User
- Cause value	#17 "user busy"

33.2.5.2 Requirements

1) According to subclause "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 5).

2) After the reception of DISCONNECT a busy tone shall be generated. The busy tone characteristics shall be as follows:

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

33.2.6 Congestion tone

33.2.6.1 Method of test

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

b) The SS then sends message DISCONNECT with cause number 42.

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

33.2.6.2 Requirements

1) According to subclause "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 5).

2) After the reception of DISCONNECT a congestion tone shall be generated.

3) The congestion tone characteristics shall be as follows:

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

33.2.7 Authentication failure tone

33.2.7.1 Method of test

a) According to subclause "Structured procedures, Mobile originating call, early assignment, Method of test", paragraphs a) to e).

b) After reception of message AUTHENTICATION RESPONSE the SS sends message AUTHENTICATION REJECT.

Message: AUTHENTICATION REJECT (3GPP TS 04.08 / 3GPP TS 24.008, 9.2.1) to the MS:	
Information element	**Comment**
Protocol discriminator Transaction identifier Message type	MM not relevant

33.2.7.2 Requirements

1) According to subclause "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 4).

2) After reception of AUTHENTICATION REJECT a tone shall be generated indicating authentication failure.

3) The authentication failure tone is the error/special information tone with characteristics as follows:

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

33.2.8 Number unobtainable tone

33.2.8.1 Method of test

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

b) The SS then sends message DISCONNECT with cause number 1.

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

33.2.8.2 Requirements

1) According to subclause "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 5).

2) After reception of DISCONNECT a tone shall be generated indicating that the called number is unobtainable.

The number unobtainable tone is the error/special information tone with characteristics as in subclause 33.2.7.2.

33.2.9 Call dropped tone

33.2.9.1 Method of test

a) According to subclause "Structured procedures, Mobile originating call, early assignment, Method of test", paragraphs a) to l). However, it shall be indicated in the system information messages that call re-establishment shall not be attempted (RACH control parameters).

b) When the call has been established the SS stops transmitting on the TCH/SACCH.

33.2.9.2 Requirements

1) According to subclause "Structured procedures, Mobile originating call, early assignment, Requirements", paragraphs 1) to 8).

2) After the radio link time-out period has expired a tone shall be generated indicating that the call has been dropped.

The call dropped tone characteristics shall be as follows:

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

33.3 Network selection / indication

33.3.1 Definition

Network selection and indication is the ability of the MS to correctly select a network and display to the user in accordance with 3GPP TS 02.11 and 3GPP TS 03.22.

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

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

33.3.2 Conformance requirement

1) Upon switching on, when an IMSI is available and there is no registered PLMN on the SIM, the MS shall select its Home PLMN and perform the cell selection procedure.

2) If the MS loses radio coverage for its registered PLMN, and the MS is in automatic PLMN selection mode, it shall attempt to select its Home PLMN.

3) If the Registered PLMN is unavailable due to the loss of radio coverage and the MS is in automatic PLMN selection mode and the HPLMN is also unavailable, it shall attempt to select a suitable cell and access the PLMNs in turn, in the order of priority as stored in the SIM.

4) If there is no registered PLMN in the SIM or the registered PLMN is unavailable and If the Home PLMN is unavailable and the MS is in automatic PLMN selection mode, it shall attempt to select a suitable cell and

accesses the PLMNs in turn, in the order of priority as stored in the SIM, upon switching on and when the IMSI is available.

5) An MS, roaming in a VPLMN whose MCC is the same as the MCC of the IMSI, shall periodically attempt to obtain service on its Home PLMN in automatic mode. For this purpose, a value T minutes, which is the HPLMN search period, may be stored in the SIM; T is either in the range 6 minutes to 8 hours in 6 minutes step or it indicates that no periodic attempt shall be made. If no HPLMN search value is available on the SIM the mobile equipment shall use a default value of 30 minutes.

6) At switch on, the MS selects and attempts to perform a Location Update on the Registered PLMN if it exists. If the registered PLMN is a VPLMN of the SIM's home country, the MS shall wait at least 2 minutes before attempting to obtain service on its home PLMN.

33.3.3 Test purpose

1) To verify that the MS with SIM containing in the PLMN selector field at least one PLMN different from the Home PLMN and containing no registered PLMN, when in automatic PLMN selection mode, selects its Home PLMN, if available, upon switching on and when the IMSI is available. (This is verified by observation of the location updating procedure).(Steps 1.1 through 1.5).

2) To verify that if the MS loses radio coverage for its registered PLMN, and the MS is in automatic PLMN selection mode, it shall attempt to select its Home PLMN. (Steps 1.14C through 1.16C).

3) To verify that the MS, when it looses radio coverage for its selected PLMN (i.e. Registered PLMN) and in automatic PLMN selection mode, selects the PLMN with the highest priority among the PLMNs stored on the SIM, if the Home PLMN is unavailable. (Steps 1.10 through 1.12).

4) If there is no registered PLMN in the SIM or the registered PLMN is unavailable and If the Home PLMN is unavailable and the MS is in automatic PLMN selection mode, it shall attempt to select a suitable cell and accesses the PLMNs in turn, in the order of priority as stored in the SIM, upon switching on and when the IMSI is available. (Steps 1.22 through 1.25).

5) To verify that an MS, roaming in a VPLMN whose MCC is the same as the MCC of the IMSI, shall attempt to obtain service on its Home PLMN in automatic mode with a period of T. To verify that the MS shall not attempt to obtain service on its home PLMN in automatic mode when T is set to "no periodic attempts shall be made". To verify that a default value of 30 min is used when no HPLMN search timer value is available on the SIM. (Steps 1.13 A through 1.15A, 1.13B through 1.15B and 1.13C.)

6) To verify that, at switch on, the MS selects and attempts to perform a Location Update on the registered PLMN if it exists. If the registered PLMN is a VPLMN of the SIM's home country, the MS shall wait at least 2 minutes before attempting to obtain service on its home PLMN. (Steps 1.25 through 1.28).

Reference

Requirements 1, 2, 3: see 3GPP TS 03.22 subclause 4.4.3.1.

Requirements 4: see 3GPP TS 03.22 subclause 3.1.

Requirement 5, 6: see 3GPP TS 03.22 subclause 4.4.3.3.

33.3.4 Method of Test

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

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

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

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

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

Specific PICS Statements

- Country PLMN/Indication (TSPC_Feat_PLMNind)

PIXIT Statements

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33.3.4.1 Procedure 1

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

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

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

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

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

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

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

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

1.3) The MS is brought into the "on" condition with automatic selection mode active.

1.4) The SS checks that the MS sends a "location updating request" on carrier 1.

1.5) The SS sends a "location updating accept" message to the MS on carrier 1. After 5 s, the MS "selected PLMN indicator" is checked.

1.6) The SS switches off carriers 1.

1.7) The SS checks that the MS sends a "location updating request" on carrier2.

1.8) The SS sends a "location updating accept" message to the MS on carrier 2. After 5 s, the MS "selected PLMN indicator" is checked.

1.9) Carrier 2 is turned off.

1.10) The SS checks that the MS sends a "location updating request" on carrier 3.

1.11) The SS sends a "location updating accept" message on carrier 3. After 5 s, the MS "selected PLMN indicator" is checked.

1.12) Carriers 1 and 2 are turned on with the same parameters as in step 1.2) above.

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

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

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

Branch A

1.13A) The SS checks that the MS does not send a "location updating request" on either carrier 1 or 2during 6 minutes after step 1.11 is completed.

1.14A) The SS checks that the MS sends a "location updating request" on channel 1 between 6 and 12 min after step 1.11 is completed.

1.15A) The SS sends a "location updating accept" message on carrier 1. After 5 s, the MS "selected PLMN indicator" is checked.

Branch B

1.13B) The SS checks that the MS does not send a "location updating request" on either carrier 1 or 2 during 30 minutes after step 1.11 is completed.

1.14B) The SS checks that the MS sends a "location updating request" on channel 1 between 30 and 60 min after step 1.11 is completed.

1.15B) The SS sends a "location updating accept" message on carrier 1. After 5 s, the MS "selected PLMN indicator" is checked.

Branch C

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

1.14C) The SS switches off carrier 3.

1.15C) The SS checks that the MS sends a "location updating request" on channel 1.

1.16C) The SS sends a "location updating accept" message on carrier 1. After 5 s, the MS "selected PLMN indicator " is checked.

1.17) The SS switches off carrier 1 and switches on carrier 3.

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

1.19) The SS sends a "location updating accept" message on carrier 2. After 5 s, the MS "selected PLMN indicator" is checked.

1.20) The mobile station is switched off.

1.21) The SS switches off carrier 2.

1.22) The mobile station is switched on.

1.23) The SS checks that the MS sends a "location updating request" on carrier 3.

1.24) The SS sends a "location updating accept" message on carrier 3. After 5 s, the MS "selected PLMN indicator" is checked.

1.25) The MS is switched off.

1.26) The SS switches on carrier 1.

1.27) The mobile station is switched on.

1.28) The SS checks that the MS does not send a "location updating request" on carrier 1. After 2 minutes, the MS "selected PLMN indicator" is checked.

33.3.4.2 Requirements 1

Requirement 1.1) is mandatory for all MS. Requirements 1.2) only apply to MS capable of indicating PLMN.

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

1.2) The selected PLMN shall be indicated:

End of Step	1.5	1.8	1.11	1.15A/B	1.16C
PLMN indicated:	PLMN1	PLMN2	PLMN3	PLMN1	PLMN1
End of Step	119	124	128		
PLMN indicated:	PLMN2	PLMN3	PLMN3		

33.3.4.3 Procedure 2

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

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

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

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

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

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

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

33.3.4.4 Requirements 2

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

Table 33-1: Normal system information fields

Parameter	Reference in 3GPP TS 04.08 / 3GPP TS 24.008 / 3GPP TS 44.018	Abbreviation	Normal setting
Cell Channel Description	10.5.2.1	-	Any values
Max retrans	10.5.2.17	-	1
Tx-integer	10.5.2.17	-	Any value
CELL_BAR_ACCESS	10.5.2.17	CBA	0 (i.e. no barred)
AC CN	10.5.2.17	AC	All 0
RE	10.5.2.17	RE	0 (i.e. re-establishment allowed)
BA ARFCN	10.5.2.13	BA	One entry equal to the ARFCN of the carrier
NCC	10.5.2.15	NCC	Any value
Cell Identity	10.5.1.1	-	Any value
MCC, MNC	10.5.1.3	PLMN	Ref. 33.3.2, 1b) and 33.3.2, 2b)
LAC	10.5.1.3	LAC	1111 (Hex)
ATT, B_AG_BLKS_RES,T3212,	10.5.2.8	-	ATT = "1"
CCCH_CONF			Other parameters any values.
BS_PA_MFRMS	10.5.2.8	BPM	5 frames
Cell Options	10.5.2.3	-	Any values
CELL_RESELECT_HYSTERESIS	10.5.2.4	CRH	10 dB
MS_TXPWR_MAX_CCH	10.5.2.4	MTMC	Maximum RF output power of MS.
RXLEV_ACCESS_MIN	10.5.2.4	RAM	-95 dBm

33.4 Invalid and blocked PIN indicators

33.4.1 Definition

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33.4.2 Conformance requirement

Void.

33.4.3 Test purpose

Void.

33.4.4 Method of test

33.4.4.1 Initial conditions

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

33.4.4.2 Procedure

a) The MS is switched on.

b) Three wrong PIN are entered.

Activation may be either manual or via the EMMI.

33.4.5 Test requirements

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

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

33.5 Service indicator

33.5.1 Definition

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33.5.2 Conformance requirement

Void.

33.5.3 Test purpose

Void.

33.5.4 Method of test

33.5.4.1 Initial conditions

a) The MS is in idle mode, unregistered.

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

33.5.4.2 Procedure

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

33.5.5 Test requirements

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

33.6 Subscription identity management

33.6.1 Definition

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

33.6.2 Conformance requirement

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

33.6.3 Test purpose

1) To verify that during an established call: either

   1.1) on removal of the SIM from an MS, the MS will perform an IMSI detach; or

   1.2) after removing the power source from the MS, removing the SIM, and restoring the power source to the MS, the MS may perform an IMSI detach.

2) To verify that an MS without SIM card will not establish a MO call which is not an emergency call.

3) To verify that an MS without SIM card will not accept an incoming call.

33.6.4 Method of test

33.6.4.1 Initial conditions

Void.

33.6.4.2 Procedure

a) A call is set up.

b) (Reserved).

c) Either:

   (i) the SIM is removed; or

   (ii) where this is not possible, the power source is removed from the MS, the SIM is removed and the power source is restored to the MS.

   The SS observes whether or not the MS performs IMSI detach.

d) An attempt to establish a MO call is made (not an emergency call).

e) An attempt to establish a MT call is made.

33.6.5 Test requirements

1) Either:

   1.1) in step c(i), the MS shall perform an IMSI detach; or

   1.2) in step c(ii), the MS may perform an IMSI detach.

2) In step d) the MS shall not attempt to set up a new call via the Um interface.

3) In step e), the MS shall not respond to the attempt to set up a new call via the Um interface.

33.7 Barring of outgoing calls

33.7.1 Definition

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

33.7.2 Conformance requirement

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

33.7.3 Test purpose

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

33.7.4 Method of test

33.7.4.1 Initial conditions

Void.

33.7.4.2 Procedure

a) The local facility to bar outgoing calls is activated.

b) Via MMI, the MS is actioned to establish an emergency call.

33.7.5 Test requirements

1) The MS shall establish an emergency call.

33.8 Prevention of unauthorized calls

33.8.1 Definition

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

33.8.2 Conformance requirement

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

33.8.3 Test purpose

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

33.8.4 Method of test

33.8.4.1 Initial conditions

33.8.4.2 Procedure

a) The local facility to restrict operation such that the MS can only be operated by using a key or a keyword is activated. The most restrictive situation is created.

b) Via MMI, the MS is actioned to establish an emergency call.

33.8.5 Test requirements

1) The MS shall establish an emergency call.

34 Short message service (SMS)

Ref.: 3GPP TS 03.40, 3GPP TS 04.11 (point to point)
3GPP TS 03.41, 3GPP TS 04.12 (cell broadcast)

34.1 General

The purpose of these tests is to verify that the MS can handle GSM functions when submitting or receiving Short Messages (SM) between MS and a short message service centre as described in 3GPP TS 03.40.

The procedures are based upon services provided by the Mobility Management (MM) sublayer which is not tested in this case.

The SMS comprises three basic services. The SMS point to point services shall work in an active MS at any time independent of whether or not there is a speech or data call in progress. The SMS cell broadcast service only works when the MS is in idle mode.

The manufacturer shall declare whether SMS messages are stored in the SIM and/or the ME. This shall be referred to as the SMS message store in the following tests.

A timeout of 60s is applied throughout the tests with respect to the retransmission of CP-Data messages. This timeout is based on the maximum TR1M + 15s. The 15s is sufficient time to verify that the MS does not initiate more than the maximum number of retransmissions.

Unless otherwise stated default message contents from subclause 26.6.14 applies for GSM 900 and default message contents from subclause 26.6.15 applies for DCS 1 800 and default message contents from subclause 26.6.16 applies for GSM 450 and default message contents from subclause 26.6.17 applies for GSM 480 and default message contents from subclause 26.6.18 applies for PCS 1 900 and default message contents from subclause 26.6.19 applies for GSM 750 and default message contents from subclause 26.6.20 applies for GSM 850 and default message contents from subclause 26.6.21 applies for GSM 710 and default message contents from subclause 26.6.22 applies for T-GSM 810.

For the test cases in section 34.4 the default message contents shall be set as in "GPRS default conditions" clause 40.

34.2 Short message service point to point

34.2.1 SMS mobile terminated

34.2.1.1 Conformance requirements

An active MS shall be able to receive short message TPDU (SMS-DELIVER) at any time, independently of whether or not there is a speech or data call in progress. A report will always be returned to the SC, confirming that the MS has received the short message.

Reference

3GPP TS 03.40; 3.1.

34.2.1.2 Test purpose

To verify the ability of a MS to receive and decode the SMS where provided for the point to point service.

34.2.1.3 Method of test

Initial Conditions

System simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in "Idle, updated" state.

The SMS message storage shall be empty.

Specific PICS Statements:

- SMS messages are stored in the SIM (TSPC_AddInfo_StoreRcvSMSSIM).
- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements:

- Description of the basic procedures to display a mobile terminated short message.
- Support for call control state U10.

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) The SS initiates the transmission of a short message using a paging request. Upon response of the MS to the paging the SS assigns an SDCCH, authenticates the MS and activates ciphering. Then the SS establishes SAPI 3 by sending a SABM frame with SAPI 3 on the SDCCH.

When a UA frame (SAPI 3) is received in response, the SS sends a CP-DATA message. The information element of the CP-DATA message will be RP-DATA RPDU (SMS DELIVER TPDU).

b) The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

c) The SS sends a CP-ACK to the MS with no further CP-DATA messages and the SS initiates channel release.

d) Steps a), b) and c) are repeated but the first CP-DATA message from the MS is not acknowledged. The second CP-DATA message from the MS is acknowledged by a CP-ACK.

e) Steps a) and b) are repeated. The SS is configured not to send CP-ACK. Then maximum 3 CP-DATA retransmissions may occur. The SS ensures that the MS disconnects the link within 60 s after the first CP-DATA not acknowledged by the SS. The 60 s is sufficient time to wait to verify that the MS does not send more than the maximum allowed (3) CP-DATA retransmissions.

f) The SMS message store shall be cleared manually by the operator.

g) A data or speech call is established on a TCH with the SS and the state U10 of call control is entered. The SS sends a SABM frame with SAPI-3 on the SACCH associated to the TCH.

When a UA frame (SAPI-3) is received in response, the SS sends a CP-DATA message. The information element of the CP-DATA message will be RP-DATA RPDU (SMS DELIVER TPDU). The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

h) The SS sends a CP-ACK to the MS with no further CP-DATA messages and the SS initiates channel release. The SMS message store shall be cleared manually by the operator.

i) Steps g) and h) are repeated but the first CP-DATA message from the MS is not acknowledged. The second CP-DATA message from the MS is acknowledged by a CP-ACK.

j) Step g) is repeated. The SS is configured not to send CP-ACK. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 60 s after the first CP-DATA not acknowledged the SS initiates the channel release. The 60 s is sufficient time to wait to verify that the MS does not send more than the maximum allowed (3) CP-DATA retransmissions (during a call in progress).

k) A data or speech call is established on a TCH with the SS and the state U10 of call control shall be entered. The SS sends a SABM frame with SAPI-3 on the SACCH associated to the TCH. After the UA response on SAPI-3, the speech call is cleared by the SS with a disconnect message. (The call clearing is continued on the FACCH in parallel to the following exchange of messages related to SMS).

The SS sends a CP-DATA RPDU (SMS DELIVER TPDU) message. The information element of the CP-DATA message is RP-DATA.

The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

The SS sends a CP-ACK to the MS with no further CP-DATA messages and the SS initiates channel release.

The SMS message store shall be cleared manually by the operator.

l) A data or speech call is established on a TCH with the SS and the state U10 of call control is entered. The SS sends a SABM frame with SAPI-3 on the SACCH associated to the TCH. After the UA response on SAPI-3, the speech call shall be cleared from the MS. (The call clearing is continued on the FACCH in parallel to the following exchange of messages related to SMS).

The SS sends a CP-DATA message. The information element of the CP-DATA message is RP-DATA RPDU (SMS DELIVER TPDU).

The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

The SS sends a CP-ACK to the MS with no further CP-DATA messages and the SS initiates channel release.

The SMS message store shall be cleared manually by the operator.

Maximum Duration of Test

20 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST	
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
3	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
11	MS -> SS	UA (SAPI=3)	MS shall respond to SABM in step 10
12	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
13	SS		Waits max 25 s for CP-ACK
14	MS -> SS	CP-ACK	
15	SS		Waits max 60 s for RP-ACK RPDU
16	MS -> SS	CP-DATA	Contains RP-ACK RPDU
17	SS -> MS	CP-ACK	
18	MS		There should be no further CP-DATA messages until the MS aborts the RR connection (disconnection of layer 2).
19	MS		The MS shall indicate that an SM has arrived. If the MS provides the functionality to display MT messages, it is checked that the correct message is displayed
20	SS -> MS	PAGING REQUEST	
21	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
22	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
23	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
24	SS -> MS	AUTHENTICATION REQUEST	
25	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
26	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.

Step	Direction	Message	Comments
27	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
28	SS		SS starts ciphering.
29	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
30	MS -> SS	UA (SAPI=3)	The MS shall respond to the SABM
31	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
32	SS		Waits max 25 s for CP-ACK
33	MS -> SS	CP-ACK	
34	SS		Waits max 60 s for RP-ACK RPDU
35	MS -> SS	CP-DATA	First CP-DATA from MS, contains RP-ACK RPDU
36	SS		First CP-DATA message not acknowledged by SS
37	MS -> SS	CP-DATA	Retransmitted CP-DATA from MS contains RP-ACK RPDU
38	SS -> MS	CP-ACK	Second CP_DATA message is acknowledged
39	MS		There should be no further CP-DATA messages until the MS aborts the RR connection (disconnection of layer 2).
40	MS		The MS shall indicate that an SM has arrived. If the MS provides the functionality to display MT messages, it is checked that the correct message is displayed
41	SS -> MS	PAGING REQUEST	
42	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
43	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
44	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
45	SS -> MS	AUTHENTICATION REQUEST	
46	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
47	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
48	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
49	SS		SS starts ciphering.
50	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
51	MS -> SS	UA (SAPI=3)	The MS shall respond to the SABM
52	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
53	SS		Waits max 25 s for CP-ACK
54	MS -> SS	CP-ACK	
55	SS		Waits max 60 s for RP-ACK RPDU
56	MS -> SS	CP-DATA	Contains RP-ACK RPDU
57	SS		First CP-DATA message not acknowledged by SS
58	MS -> SS	CP-DATA	Retransmitted CP-DATA from MS contains RP-ACK RPDU
59	SS		Retransmitted CP-DATA message not acknowledged by SS
60	MS		Depending upon the maximum number of CP-DATA retransmissions implemented, step 58 and 59 may be repeated.
61	MS -> SS	DISC	The main signalling link is released within 60 s after the first CP-DATA message not acknowledged by SS.
62	MS		The MS shall indicate that an SM has arrived. If the MS provides the functionality to display MT messages, it is checked that the correct message is displayed
63	SS		A data or speech call is established on a TCH and the state U10 of call control is entered.
64	SS -> MS	SABM (SAPI=3)	Sent on SACCH associated with the TCH
65	MS -> SS	UA (SAPI=3)	The MS shall respond to the SABM
66	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
67	SS		Waits max 25 s for CP-ACK
68	MS -> SS	CP-ACK	
69	SS		Waits max 60 s for RP-ACK RPDU
70	MS -> SS	CP-DATA	Contains RP-ACK RPDU

Step	Direction	Message	Comments
71	SS -> MS	CP-ACK	
72-1	SS -> MS	DISCONNECT	Disconnect the active call
72-2	MS -> SS	RELEASE	
72-3	SS -> MS	RELEASE COMPLETE	
72-4	MS		There should be no further CP-DATA messages until the MS aborts the RR connection (disconnection of layer 2)
73	MS		The MS shall indicate that an SM has arrived. If the MS provides the functionality to display MT messages, it is checked that the correct message is displayed
74	MS		Clear the SMS message store
75	SS		A data or speech call is established on a TCH and the state U10 of call control is entered.
76	SS -> MS	SABM (SAPI=3)	Sent on SACCH associated with the TCH
77	MS -> SS	UA (SAPI=3)	The MS shall respond to the SABM
78	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
79	SS		Waits max 25 s for CP-ACK
80	MS -> SS	CP-ACK	
81	SS		Waits max 60 s for RP-ACK RPDU
82	MS -> SS	CP-DATA	First CP-DATA from MS, contains RP-ACK RPDU
83	SS		First CP-DATA message not acknowledged by SS
84	MS -> SS	CP-DATA	Retransmitted CP-DATA message contains RP-ACK RPDU
85	SS -> MS	CP-ACK	Second CP-DATA message is acknowledged
86-1	SS -> MS	DISCONNECT	Disconnect the active call
86-2	MS -> SS	RELEASE	
86-3	SS -> MS	RELEASE COMPLETE	
86-4	MS		There should be no further CP-DATA messages until the MS aborts the RR connection (disconnection of layer 2)
87	MS		The MS shall indicate that an SM has arrived. If the MS provides the functionality to display MT messages, it is checked that the correct message is displayed
88	MS		Clear the SMS message store
89	SS		A data or speech call is established on a TCH and the state U10 of call control is entered.
90	SS -> MS	SABM (SAPI=3)	Sent on SACCH associated with the TCH
91	MS -> SS	UA (SAPI=3)	The MS shall respond to the SABM
92	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
93	SS		Waits max 25 s for CP-ACK
94	MS -> SS	CP-ACK	
95	SS		Waits max 60 s for RP-ACK RPDU
96	MS -> SS	CP-DATA	First CP-DATA from MS, contains RP-ACK RPDU
97	SS		First CP-DATA message not acknowledged by SS
98	MS -> SS	CP-DATA	Transmitted CP-DATA message contains RP-ACK RPDU
99	SS		Retransmitted CP-DATA message not acknowledged by SS
100	MS		Depending on the maximum number of CP-DATA retransmissions implemented, step 98-99 may be repeated. The maximum number of retransmissions may however not exceed three.
101	SS -> MS	CHANNEL RELEASE	The main signalling link is released after a duration of 60 s after the first CP-DATA message not acknowledged by SS.
102	MS		The MS shall indicate that an SM has arrived. If the MS provides the functionality to display MT messages, it is checked that the correct message is displayed
103	MS		Clear the SMS message store
104	SS		A data or speech call is established on a TCH and the state U10 of call control is entered.
105	SS -> MS	SABM (SAPI=3)	Sent on SACCH associated with the TCH
106	MS -> SS	UA (SAPI=3)	The MS shall respond to the SABM
107	SS -> MS	DISCONNECT	The speech call is cleared by the SS. The call clearing is continued on the FACCH in parallel to the following exchange of messages related to SMS.
108	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)

Step	Direction	Message	Comments
109	SS		Waits max 25 s for CP-ACK
110	MS -> SS	CP-ACK	
111	SS		Waits max 60 s for RP-ACK RPDU
112	MS -> SS	CP-DATA	Contains RP-ACK RPDU
113	SS -> MS	CP-ACK	
114	MS		There should be no further CP-DATA messages until the MS aborts the RR connection (disconnection of layer 2).
115	MS		The MS shall indicate that an SM has arrived. If the MS provides the functionality to display MT messages, it is checked that the correct message is displayed
116	MS		Clear the SMS message store
117	SS		A data or speech call is established on a TCH and the state U10 of call control is entered.
118	SS -> MS	SABM (SAPI=3)	Sent on SACCH associated with the TCH
119	MS -> SS	UA (SAPI=3)	The MS shall respond to the SABM
120	MS -> SS	DISCONNECT	The speech call is cleared from the MS.
121	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
122	SS -> MS	RELEASE	This message is likely to be sent on the FACCH before all of the CP-DATA message has been sent on the SACCH.
123	MS -> SS	RELEASE COMPLETE	
124	MS -> SS	CP-ACK	shall be sent before 25 s after the start of step 121
125	SS		Waits max 60 s for RP-ACK RPDU
126	MS -> SS	CP-DATA	Contains RP-ACK RPDU
127	SS -> MS	CP-ACK	
128	MS		There should be no further CP-DATA messages until the MS aborts the RR connection (disconnection of layer 2).
129	MS		The MS shall indicate that an SM has arrived. If the MS provides the functionality to display MT messages, it is checked that the correct message is displayed
130	MS		Clear the SMS message store

NOTE: Time values for SS wait time are chosen sufficiently high to be sure that the MS has enough time to respond to the different messages.

Specific Message Contents:

SMS DELIVER TPDU

Information element	Comment Value	
TP-MTI	SMS DELIVER	"00"B
TP-MMS	more messages are waiting in SC	"0"B
TP-RP	no reply path	"0"B
TP-UDHI	TP-UD contains only the SM	"0"B
TP-SRI	no status report returned	"0"B
TP-OA	an international number coded E.164	
TP-PID	default	"00000000"B
TP-DCS	default alphabet	"00000000"B
TP-SCTS	any legal value (cf. 3GPP TS 03.40)	
TP-UDL	160	
TP-UD (140 octets)	text of message (160 characters)	

NOTE: The 160 characters shall include at least one occurrence of each character in the default alphabet (see 3GPP TS 03.40 annex 2).

34.2.2 SMS mobile originated

34.2.2.1 Conformance requirements

An active MS shall be able to submit short message TPDU (SMS-SUBMIT) at any time, independently of whether or not there is a speech or data call in progress.

Reference

3GPP TS 03.40; subclause 3.1.

34.2.2.2 Test purpose

To verify that the MS is able to correctly send a short message where the SMS is provided for the point to point service. The test also verifies that the MS is capable of simultaneously receive a network originated SM whilst sending a mobile originated SM.

34.2.2.3 Method of test

Initial Conditions

System simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in "Idle, updated" state.

The SMS message storage shall be empty.

Specific PICS Statements

- SMS messages are stored in the SIM (TSPC_AddInfo_StoreRcvSMSSIM).
- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements

- Description of the basic procedures to display a mobile originated short message.
- Support for call control state U10.
- Maximum length (characters) of a mobile originated short message.

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) The MS shall be set up to send a SM to the SS. The SS responds to the channel request message by allocating an SDCCH. The SS answers correctly to the SABM on SAPI 0 and then performs the authentication and ciphering procedures.

b) The SS responds with a UA frame SAPI-3 to the MS.

c) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for the CP-ACK message.

d) The SS sends a channel release message to the MS.

e) Steps a) and b) are repeated. The SS is configured not to send the CP-ACK message. Then maximum 3 CP-DATA retransmissions may occur. The SS ensures that the MS disconnects the link within 60 s after the first CP-DATA not acknowledged by the SS. The 60 s is sufficient time to wait to verify that the MS does not send more than the maximum CP-DATA retransmissions and that TR1M has expired.
Any remaining message in the outbox should be removed prior to the next step. All requests from the MS during this time shall be ignored.

f) Steps a) and b) are repeated. On receipt of the CP-DATA from the MS the SS sends a CP-ERROR message containing a "Network Failure" cause. Then the SS initiates channel release.
Any remaining message in the outbox should be removed prior to the next step. All requests from the MS during this time shall be ignored.

g) A data or speech call is established on a TCH with the SS and the state U10 of call control is entered. The MS is setup to send an SM to the SS. After the reception of the CM SERVICE REQUEST, the SS sends a CM SERVICE ACCEPT message. The SS responds with a UA frame SAPI-3 to the SABM with SAPI-3 received from the MS.

h) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for the CP-ACK message. Then the SS sends a channel release message to the MS.

i) Step g) is repeated. The SS is configured not to send the CP-ACK message or to respond to any other CM requests. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 60 s after the first CP-DATA not acknowledged the SS initiates channel release. The 60 s is sufficient time to wait to verify that the MS does not send more than the maximum CP-DATA retransmissions (during a call in progress).
Any remaining message in the outbox should be removed prior to the next step. All requests from the MS during this time shall be ignored.

j) The SS is configured to receive a mobile originated SM. Steps a) and b) are repeated and, using the end of the CP-DATA message from the MS as a trigger, the SS sends a SM to the MS. In this case a new transaction identifier shall be used in the CP messages of SMS mobile terminated.
Any remaining message in the outbox should be removed prior to the next step. All requests from the MS during this time shall be ignored.

k) The MS is set up to send an SM to the SS. On receipt of the CM SERVICE REQUEST the SS sends a CM SERVICE REJECT message with the reject cause set to "Service Option not supported" or "Service Option temporarily out of order". After 5 s the SS initiates channel release.
Any remaining message in the outbox should be removed. All requests from the MS during this time shall be ignored.

Maximum Duration of Test

20 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS -> SS	CHANNEL REQUEST	Establishment cause is “Other procedures which can be completed with an SDDCH” NECI = 0
2	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
3	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM on SAPI 0. CM service type set to "Short message transfer"
4	SS -> MS	AUTHENTICATION REQUEST	
5	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
6	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
7	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
8	SS		SS starts ciphering.
9	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3
10	SS -> MS	UA (SAPI=3)	
11	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
12	SS -> MS	CP-ACK	
13	SS -> MS	CP-DATA	Contains RP-ACK RPDU
14	SS		Waits max 25 s for CP-ACK
15	MS -> SS	CP-ACK	
16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.
17	MS -> SS	DISC (SAPI=0)	MS shall respond to channel release with a layer 2 DISC frame with SAPI 0
18	MS -> SS	CHANNEL REQUEST	Establishment cause is “Other procedures which can be completed with an SDDCH” (NECI=0)
19	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
20	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM on SAPI 0.
21	SS -> MS	AUTHENTICATION REQUEST	
22	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
23	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
24	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
25	SS		SS starts ciphering.
26	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3

Step	Direction	Message	Comments
27	SS -> MS	UA (SAPI=3)	
28	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
29	SS		SS configured not to send CP-ACK
30	MS -> SS	CP-DATA	Retransmitted CP-DATA message
31	MS		Depending on the maximum number of CP-DATA retransmissions implemented, step 30 may be repeated. The maximum number of retransmissions may however not exceed three.
31a (Optio-nal)	MS -> SS	CP-ERROR	The MS may send CP-ERROR if TR1M expires
32a	MS -> SS	DISC (SAPI = 0)	The main signalling link is released within 60 s after the first CP-DATA message not acknowledged by SS.
32b	MS		Any remaining message in the outbox should be removed prior to the next step. All requests from the MS during this time shall be ignored.
33	MS -> SS	CHANNEL REQUEST	Establishment cause is “Other procedures which can be completed with an SDDCH” (NECI=0)
34	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
35	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. CM service type set to "short message transfer"
36	SS -> MS	AUTHENTICATION REQUEST	
37	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
38	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
39	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
40	SS		SS starts ciphering.
41	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3
42	SS -> MS	UA (SAPI=3)	
43	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
44	SS -> MS	CP-ERROR	Sent containing "Network Failure" cause.
45	SS -> MS	CHANNEL RELEASE	The main signalling link is released.
45a	MS -> SS	DISC (SAPI = 0)	MS shall respond to channel release with a layer 2 DISC frame with SAPI 0.
45b	MS		Any remaining message in the outbox should be removed prior to the next step. All requests from the MS during this time shall be ignored.
46	SS		A data or speech call is established on a TCH and the state U10 of call control is entered.
47	MS		The MS is set up to send an SM
48	MS -> SS	CM SERVICE REQUEST	Sent in a layer 2 frame on the FACCH. CM service type set to "short message transfer"
49	SS -> MS	CM SERVICE ACCEPT	
50	MS -> SS	SABM (SAPI=3)	Sent on SACCH associated with the TCH
51	SS -> MS	UA (SAPI=3)	
52	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
53	SS -> MS	CP-ACK	
54	SS -> MS	CP-DATA	Contains RP-ACK RPDU
55	SS		Waits max 25 s for CP-ACK
56	MS -> SS	CP-ACK	
57	SS -> MS	CHANNEL RELEASE	The main signalling link is released.
58	MS -> SS	DISC (SAPI =0)	The MS shall respond to channel release with a layer 2 DISC frame with SAPI 0.
59	SS		A data or speech call is established on a TCH and the state U10 of call control is entered.
60	MS -> SS	CM SERVICE REQUEST	Sent in a layer 2 frame on the FACCH. CM service type set to "short message transfer"
61	SS -> MS	CM SERVICE ACCEPT	
62	MS -> SS	SABM (SAPI=3)	Sent on SACCH associated with the TCH
63	SS -> MS	UA (SAPI=3)	
64	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
65	SS		SS configured not to send CP-ACK
66	MS -> SS	CP-DATA	Transmitted CP-DATA message

Step	Direction	Message	Comments
67	MS		Depending on the maximum number of CP-DATA retransmissions implemented, step 66 may be repeated. The maximum number of retransmissions may however not exceed three. Any other CM requests from the MS shall be ignored.
67a (Optio-nal)	MS->SS	CP-ERROR	The MS may send CP-ERROR if TR1M expires
68	SS -> MS	CHANNEL RELEASE	The main signalling link is released after a duration of 60 s after the first CP-DATA message not acknowledged by SS.
69	MS -> SS	DISC (SAPI =0)	The MS shall respond to channel release
69a	MS		Any remaining message in the outbox should be removed prior to the next step. All requests from the MS during this time shall be ignored.
70	MS -> SS	CHANNEL REQUEST	Establishment cause is “Other procedures which can be completed with an SDDCH” (NECI=0)
71	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
72	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. CM service type set to "short message transfer"
73	SS -> MS	AUTHENTICATION REQUEST	
74	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
75	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
76	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
77	SS		SS starts ciphering.
78	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3
79	SS -> MS	UA (SAPI=3)	
80	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
81	SS		The SS sends an SM to the MS triggered by the end of the CP-DATA message from the MS
82	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
83	MS		The MS shall correctly receive the SM and indicate that a message has arrived. If the MS provides the functionality to display MT messages, it is checked that the correct message is displayed. In the MO case the MS shall send the CP-ACK message with transaction identifier assigned to this transfer. In the MT case the MS shall send a CP-ACK message and a CP-DATA message containing the RP-ACK RPDU. The transaction identifier shall be the same as chosen by the SS for the MT transfer.
83a	MS		Any remaining message in the outbox should be removed prior to the next step. All requests from the MS during this time shall be ignored.
84	MS -> SS	CHANNEL REQUEST	Establishment cause is “Other procedures which can be completed with an SDDCH” (NECI=0)
85	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
86	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. CM service type set to "short message transfer"
87	SS -> MS	CM SERVICE REJ	Reject cause set to "Service Option not supported" or "Service Option temporarily out of order"
88	MS		The MS shall not establish SAPI-3
89	SS -> MS	CHANNEL RELEASE	Sent 5 s after CM SERVICE REJ
90	MS		Any remaining message in the outbox should be removed. All requests from the MS during this time shall be ignored.

NOTE: Time values for SS wait times are chosen sufficiently high to be sure that the MS has enough time to respond to the different messages.

Specific Message Contents:

SMS SUBMIT TPDU

Information element	Comment Value	
TP-MTI	SMS SUBMIT	"01"B
TP-VPF	not checked	
TP-RP	no reply path	"0"B
TP-UDHI	not checked	
TP-SRR	not checked	
TP-MR	not checked	
TP-RD	not checked	
TP-DA	not checked (an E164 number)	
TP-PID	default	"00000000"B
TP-DCS	default alphabet	"00000000"B
TP-VP	not checked	
TP-UDL	as applicable	
TP-UD (140 octets max)	maximum number of characters (text of message) as defined by the manufacturer (see PICS/PIXIT)	

34.2.3 Test of memory full condition and memory available notification:

The Memory Available Notification provides a means for the MS to notify the network that it has memory available to receive one or more short messages. The SMS status field in the SIM contains status information on the "memory available" notification flag.

34.2.3.1 Conformance requirement

1. When a mobile terminated message is Class 2, the MS shall ensure that the message has been transferred to the SMS data field in the SIM before sending an acknowledgement to the SC. The MS shall return a protocol error message if the short message cannot be stored in the SIM and there is other short message storage available in the MS. If all the short message storage in the MS is already in use, the MS shall return "memory capability exceeded".

2. When the MS rejects a short message due to lack of available memory capability the need to transfer notification shall be stored in the SIM.

3. If the memory capability becomes available because memory is cleared, the value of the memory capability exceeded notification flag in the SIM is read. If the flag is set, the MS notifies the network that memory capability is now available. After a positive acknowledgement from the network, the ME unsets the memory capability exceeded notification flag in the SIM.

References

3GPP TS 03.40, subclause 9.2.3.10, 3GPP TS 03.38, clause 4.

3GPP TS 03.40, subclause 10.3 (operation 14).

3GPP TS 03.40, subclause 10.3 (operation 14).

34.2.3.2 Test purpose

1. To verify that the MS sends the correct acknowledgement when its memory in the SIM becomes full.

2. To verify that the MS sends the correct acknowledgement when its memory in the ME and the SIM becomes full, and sets the "memory exceeded" notification flag in the SIM.

3. To verify that the MS performs the "memory available" procedure when its message store becomes available for receiving short messages, and only at this moment.

34.2.3.3 Method of test

Initial conditions

System Simulator:

1 cell, default parameters

Mobile Station:

The MS shall be in the idle updated state.

The SMS message storage shall not be full

The MS shall be connected to the SIM simulator. The following shall be present in the SIM simulator:

- EF_{SMS} with at least one record;
- $EF_{SMSstatus}$, with SMS "Memory Cap. Exceed" notification flag set to "memory available";
- Service no. 4 (SMS) in EF_{SST} set to allocated and activated.

For storing of Class 1 Short Messages the MS shall be set up to store Short Messages in the ME memory (by way of MMI, as described in PICS/PIXIT statement).

Specific PICS Statements

- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements

- Description of the basic procedures to display a mobile originated short message.
- Description of the procedure to fill up MS memory (internal/external) to leave only memory for a limited number of SMS.

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) step a) of subclause 34.2.5.3 (test of Class 2 Short Messages) is repeated until the MS sends a negative acknowledgement (RP-ERROR). The SIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the SIM.

b) a Class 1 Short Message is sent to the MS.

c) step b) is repeated until the MS sends a negative acknowledgement (RP-ERROR). The SIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the SIM.

d) a Short Message is sent to the MS with the DCS field of the SMS-DELIVER TPDU set to 0.

e) the SS prompts the operator to read a short message and to remove one or more messages from the message store of the MS.

f) the SS waits for a CHANNEL REQUEST from the MS, and sends an IMMEDIATE ASSIGNMENT allocating an SDCCH.

g) the SS answers correctly to the SABM on SAPI 0.

h) the SS answers correctly to the SABM on SAPI 3.

i) the SS answers to the RP-SMMA from the MS with a CP-DATA containing a RP-ACK RPDU.

j) after the MS has acknowledged the CP-DATA with a CP-ACK, the SS releases the channel with a CHANNEL RELEASE message. The SIM simulator shall indicate if the "memory capability exceeded" notification flag has been unset on the SIM.

k) step e) is repeated.

Maximum Duration of Test

-

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST	
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
3	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
11	MS -> SS	UA (SAPI=3)	
12	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 2 Short Message
13	SS		Waits max 25 s for CP-ACK
14	MS -> SS	CP-ACK	
15	SS		Waits max 60 s for RP-ACK RPDU
16	MS -> SS	CP-DATA	Contains RP-ACK RPDU
17	SS -> MS	CP-ACK	
18	SS -> MS	CHANNEL RELEASE	The main signalling link is released. Step 1-18 is repeated until MS sends a negative acknowledgement (RP-ERROR) in step 16. The RP-ERROR RPDU cause field shall be "Protocol error, unspecified" if there is message capability in the ME, or "Memory capability exceeded" if there is no message capability in the ME. If the total memory store of the MS is full, the ME shall set the "memory capability exceeded" notification flag on the SIM.
19	SS -> MS	PAGING REQUEST	
20	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
21	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
22	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
23	SS -> MS	AUTHENTICATION REQUEST	
24	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
25	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
26	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
27	SS		SS starts ciphering.
28	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
29	MS -> SS	UA (SAPI=3)	
30	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 1 Short Message
31	SS		Waits max 25 s for CP-ACK
32	MS -> SS	CP-ACK	
33	SS		Waits max 60 s for RP-ACK RPDU
34	MS -> SS	CP-DATA	Shall contain RP-ACK RPDU if there is memory capability in the ME. If not it shall contain RP-ERROR RPDU which cause field shall be "memory capability exceeded". If the total memory store of the MS now becomes full at this step, the ME shall set the "memory cap. exceed" notification flag on the SIM.
35	SS -> MS	CP-ACK	
36	SS -> MS	CHANNEL RELEASE	The main signalling link is released. Step 19-36 is repeated until the MS sends an RP-ERROR. The SIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the SIM.
37	SS -> MS	PAGING REQUEST	
38	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
39	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
40	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
41	SS -> MS	AUTHENTICATION REQUEST	
42	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
43	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
44	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.

Step	Direction	Message	Comments
45	SS		SS starts ciphering.
46	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
47	MS -> SS	UA (SAPI=3)	
48	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) with TP-DCS set to 0
49	SS		Waits max 25 s for CP-ACK
50	MS -> SS	CP-ACK	
51	SS		Waits max 60 s for RP-ACK RPDU
52	MS -> SS	CP-DATA	Shall contain RP-ERROR RPDU with error cause "memory capability exceeded".
53	SS -> MS	CP-ACK	
54	SS -> MS	CHANNEL RELEASE	The main signalling link is released.
55	SS		Prompts the operator to remove one or more messages from the short message store of the MS.
57	MS -> SS	CHANNEL REQUEST	Establishment cause "Other services which can be completed with an SDCCH" (NECI=0).
58	SS -> MS	IMMEDIATE ASSIGNMENT	SS allocates an SDCCH
59	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. CM service type information element is set to "Short message transfer".
60	SS -> MS	CM SERVICE ACCEPT (UA)	SAPI 0
61	MS -> SS	SABM (SAPI=3)	MS shall establish SAPI 3
62	SS -> MS	UA (SAPI=3)	
63	MS -> SS	CP-DATA	Contains RP-SMMA RPDU
64	SS -> MS	CP-ACK	
65	SS -> MS	CP-DATA	Contains RP-ACK RPDU
66	MS -> SS	CP-ACK	Acknowledge of CP-DATA containing the RP-ACK RPDU. The ME shall unset the "memory capability exceeded" notification flag on the SIM.
67	SS -> MS	CHANNEL RELEASE	The main signalling link is released. The SIM simulator shall indicate if the "memory capability exceeded" notification flag has been unset on the SIM.
68	SS		Prompts the operator to remove one or more messages from the message store of the MS.
69	MS		Shall not attempt to send a RP-SMMA RPDU. This is verified by checking that the MS does not send a CHANNEL REQUEST message with the establishment cause "Other services which can be completed with an SDCCH"

NOTE: Time values for SS wait time are chosen sufficiently high to be sure that the MS has enough time to respond to the different messages.

Specific Message Contents:

SMS-DELIVER TPDU in step 12

Information element	Comment Value	
TP-MTI	SMS DELIVER	"00"B
TP-MMS	more messages are waiting in SC	"0"B
TP-RP	no reply path	"0"B
TP-UDHI	TP-UD contains only the SM	"0"B
TP-SRI	no status report returned	"0"B
TP-OA	an international number coded E.164	
TP-PID	default	"00000000"B
TP-DCS	default alphabet, class 2	"11110010"B
TP-SCTS	always set to the current time of the system simulator (cf. 3GPP TS 03.40)	
TP-UDL	160	
TP-UD (140 octets)	text of message (160 characters)	

SMS-DELIVER TPDU in step 30

same as in step 12 except:

TP-DCS	default alphabet, class 1	"11110001"B

SMS-DELIVER TPDU in step 48

same as in step 12 except:

TP-DCS	default alphabet	"00000000"B

34.2.4 Test of the status report capabilities and of SMS-COMMAND:

This test applies to MSs which support the status report capabilities.

34.2.4.1 Conformance requirement

The SMS offers the SC the capabilities of informing the MS of the status of a previously sent mobile originated short message. This is achieved by the SC returning a status report TPDU (SMS-STATUS-REPORT) to the originating MS.

SMS-COMMAND enables an MS to invoke an operation at the SC.

The MS shall increment TP-MR by 1 for each SMS-SUBMIT or SMS-COMMAND being submitted.

References

3GPP TS 03.40; subclause 3.2.9.

3GPP TS 03.40; subclause 9.2.3.6.

34.2.4.2 Test purpose

1) To verify that the MS is able to accept a SMS-STATUS-REPORT TPDU.

2) To verify that the MS is able to use the SMS-COMMAND functionality correctly and sends an SMS-COMMAND TPDU with the correct TP-Message-Reference.

34.2.4.3 Method of test

Initial conditions

System Simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in the idle updated state.

Specific PICS Statements

-

PIXIT Statements

-

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) The MS is made to send a Mobile Originated short message as in steps a) to d) of test 34.2.2 (SMS Mobile originated).

b) The SS establishes a data link on SAPI-3 with the MS, then sends a CP-DATA message containing a RP-DATA RPDU itself containing an SMS-STATUS-REPORT TPDU.

c) The SS sends a CHANNEL RELEASE message.

d) The MS is made to send an SMS-COMMAND message enquiring about the previously submitted short message.

e) The SS responds to the MS so as to enable it to establish a data link on SAPI-3 on an SDCCH.

f) The SS acknowledges the CP-DATA message from the MS with a CP-ACK followed by a CP-DATA message containing an RP-ACK RPDU.

g) After receiving the CP-ACK from the MS, the SS releases the channel by using a CHANNEL RELEASE message.

h) The MS is made to send an SMS-COMMAND message requiring to delete the previously submitted short message.

i) steps e) to g) are repeated.

Maximum Duration of Test

-

Expected Sequence

Step	Direction	Message	Comments
1	MS -> SS	CHANNEL REQUEST	Establishment cause is "Other procedures which can be completed with an SDCCH " (NECI=0)
2	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
3	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM.
4	SS -> MS	AUTHENTICATION REQUEST	
5	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
6	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
7	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
8	SS		SS starts ciphering.
9	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3
10	SS -> MS	UA (SAPI=3)	
11	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
12	SS -> MS	CP-ACK	
13	SS -> MS	CP-DATA	Contains RP-ACK RPDU
14	SS		Waits max 25 s for CP-ACK
15	MS -> SS	CP-ACK	
16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.
17	SS -> MS	PAGING REQUEST	
18	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
19	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
20	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
22	SS -> MS	AUTHENTICATION REQUEST	
23	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
24	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
25	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
26	SS		SS starts ciphering.
27	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
28	MS -> SS	UA (SAPI=3)	
29	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS-STATUS-REPORT TPDU)
30	MS -> SS	CP-ACK	
31	MS -> SS	CP-DATA	Contains RP-ACK RPDU
32	SS ->MS	CP-ACK	
33	SS -> MS	CHANNEL RELEASE	
34	MS		The MS is made to send an SMS-COMMAND message enquiring about the previously submitted SM
35	MS -> SS	CHANNEL REQUEST	Establishment cause "Other services which can be completed with an SDCCH".
36	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
37	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM.
38	SS -> MS	AUTHENTICATION REQUEST	
39	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.

Step	Direction	Message	Comments
40	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
41	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
42	SS		SS starts ciphering.
43	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3
44	SS -> MS	UA (SAPI=3)	
45	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS-COMMAND TPDU) which shall contain the correct TP-MR
46	SS -> MS	CP-ACK	
47	SS -> MS	CP-DATA	Contains RP-ACK RPDU
48	MS -> SS	CP-ACK	
49	SS -> MS	CHANNEL RELEASE	
50	MS	The MS is made to send an SMS-COMMAND	message requiring to delete the previously submitted SM.
51	MS -> SS	CHANNEL REQUEST	Establishment cause "Other services which can be completed with an SDCCH".
52	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
53	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM.
54	SS -> MS	AUTHENTICATION REQUEST	
55	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
56	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
57	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
58	SS		SS starts ciphering.
59	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3
60	SS -> MS	UA (SAPI=3)	
61	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS-COMMAND TPDU) which shall contain the correct TP-MR
62	SS -> MS	CP-ACK	
63	SS -> MS	CP-DATA	Contains RP-ACK RPDU
64	MS -> SS	CP-ACK	
65	SS -> MS	CHANNEL RELEASE	

Specific Message Contents:

SMS SUBMIT TPDU

Information element	Comment Value	
TP-MTI	SMS SUBMIT	"01"B
TP-VPF	not checked	
TP-RP	no reply path	"0"B
TP-UDHI	not checked	
TP-SRR	status report is requested	"1"B
TP-MR	not checked	
TP-RD	not checked	
TP-DA	not checked (an E164 number)	
TP-PID	default	"00000000"B
TP-DCS	default alphabet	"00000000"B
TP-VP	not checked	
TP-UDL	as applicable	
TP-UD (140 octets max)	maximum number of characters	

SMS-STATUS-REPORT TPDU (SS to MS in step 29):

Information element	Comment Value	
TP-MTI	SMS-STATUS-REPORT	"10"B
TP-MR	same as previous SMS-SUBMIT	
TP-MMS	no more messages	"1"B
TP-SRQ	result of SMS-SUBMIT	"0"B
TP-RA	same as the Destination address of the SMS-SUBMIT	
TP-SCTS	any legal value (cf. 3GPP TS 03.40)	
TP-DT	any legal value (cf. 3GPP TS 03.40)	
TP-ST	SM received	"00000000"B

first SMS-COMMAND TPDU (MS to SS in step 44)

Information element	Comment Value	
TP-MTI	SMS-COMMAND	"10"B
TP-MR	TP-MR in previous SMS-SUBMIT plus "1"	
TP-SRR	status report requested (3GPP TS 03.40 9.2.3.19)	"1"B
TP-PID	default	"00000000"B
TP-CT	Enquiry relating to previously submitted short message	"00000000"B
TP-MN	not checked (TP-MR in previous SMS-SUBMIT)	
TP-DA	not checked (an E164 number)	
TP-CDL	not checked	
TP-CD	not checked	

second SMS-COMMAND TPDU (MS to SS in step 60)

Information element	Comment Value	
TP-MTI	SMS-COMMAND	"10"B
TP-MR	TP-MR in previous SMS-COMMAND plus "1"	
TP-SRR	status report not requested	"0"B
TP-PID	default	"00000000"B
TP-CT	Delete previously submitted short message	"00000010"B
TP-MN	not checked (TP-MR in previous SMS-SUBMIT)	
TP-DA	not checked (an E164 number)	
TP-CDL	not checked	
TP-CD	not checked	

34.2.5 Test of message class 0 to 3

34.2.5.1 Short message class 0

34.2.5.1.1 Conformance requirement

When a mobile terminated message is class 0 and the MS has the capability of displaying short messages, the MS shall display the message immediately and send an acknowledgement to the SC when the message has successfully reached the MS irrespective of whether there is memory available in the SIM or ME. The message shall not be automatically stored in the SIM or ME.

References

3GPP TS 03.38, clause 4.

34.2.5.1.2 Test purpose

To verify that the MS will accept and display but not store a class 0 message, and that it will accept and display a class 0 message if its message store is full.

NOTE: failure of this test in a mobile could cause it to reject a class 0 message when its SMS memory becomes full. This could lead to unwanted repetitions between the MS and the service centre.

34.2.5.1.3 Method of test

Initial conditions

System Simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in the idle updated state.

The MS message store shall be empty.

Specific PICS Statements

- SMS messages are stored in the SIM (TSPC_AddInfo_StoreRcvSMSSIM).
- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements

- Description of the basic procedures to display a mobile terminated short message.
- Description of the procedure to fill up all MS memory (internal/external) to leave only memory for a limited number of SMS.

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) The SS sends a class 0 message by using the method described in step a) of subclause 34.2.1 but with the TPDU described in this subclause.

b) The MS message store shall be filled (for example by using the method of 34.2.3 test of the memory available notification) with the same SMS-DELIVER TPDU except that TP-DCS is set to class 1.

c) The SS sends a class 0 message as in step a).

Maximum Duration of Test

-

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST	
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
3	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
11	MS -> SS	UA (SAPI=3)	
12	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 0 Short Message
13	MS -> SS	CP-ACK	
14	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
15	SS -> MS	CP-ACK	
16	SS -> MS	CHANNEL RELEASE	
17	MS		The content of the short message shall be displayed by the ME. The MS shall not store the message. This can be checked by verifying that it is impossible to retrieve any short messages from the MS message store.
18	SS		The MS message store shall be filled (for example by using the method of 34.2.3) with Class 1 SMS-DELIVER TPDU.
19	SS -> MS	PAGING REQUEST	
20	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
21	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
22	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
23	SS -> MS	AUTHENTICATION REQUEST	
24	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
25	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
26	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.

Step	Direction	Message	Comments
27	SS		SS starts ciphering.
28	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
29	MS -> SS	UA (SAPI=3)	
30	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 0 Short Message
31	MS -> SS	CP-ACK	
32	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
33	SS -> MS	CP-ACK	
34	SS -> MS	CHANNEL RELEASE	
35	MS		The content of the short message shall be displayed by the ME.

Specific Message Contents:

SMS-DELIVER TPDU (containing a class 0 message) (SS to MS):

Information element	Comment Value	
TP-MTI	SMS-DELIVER	"00"B
TP-MMS	more messages are waiting in SC	"0"B
TP-RP	no reply path	"0"B
TP-UDHI	TP-UD contains only the SM	"0"B
TP-SRI	no status report returned	0
TP-OA	an international number coded E.164	
TP-PID	default	"00000000"B
TP-DCS	default alphabet, class 0	“1111 0000"B
TP-SCTS	any legal value (cf. 3GPP TS 03.40)	
TP-UDL	160	
TP-UD (140 octets)	text of message (160 characters)	

SMS-DELIVER TPDU (containing a class 1 message to fill the MS message store) (SS to MS):

Information element	Comment Value	
TP-MTI	SMS-DELIVER	"00"B
TP-MMS	more messages are waiting in SC	"0"B
TP-RP	no reply path	"0"B
TP-UDHI	TP-UD contains only the SM	"0"B
TP-SRI	no status report returned	0
TP-OA	an international number coded E.164	
TP-PID	default	"00000000"B
TP-DCS	default alphabet, class 1	"1111 0001"B
TP-SCTS	any legal value (cf. 3GPP TS 03.40)	
TP-UDL	160	
TP-UD (140 octets)	text of message (160 characters)	

34.2.5.2 Test of class 1 short messages

34.2.5.2.1 Conformance requirement

When a mobile terminated message is class 1, the MS shall send an acknowledgement to the SC when the message has successfully reached the MS and can be stored, either in the ME or in the SIM.

References

3GPP TS 03.38, clause 4.

34.2.5.2.2 Test purpose

This procedure verifies that the MS acts correctly on receiving a class 1 message, i.e. that it stores the message in the ME or SIM and sends an acknowledgement (at RP and CP-Layer).

34.2.5.2.3 Method of test

Initial conditions

System Simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in the idle updated state.

The MS message store shall not be full.

For storing of class 1 Short Messages, the MS shall be set up to store Short Messages in the ME memory if supported, otherwise the message may be stored in the SIM (by way of MMI, as described in PICS/PIXIT statement).

Specific PICS Statements

- Support for Short message MT/PP (TSPC_Serv_TS21).
- SMS messages are stored in the SIM (TSPC_AddInfo_StoreRcvSMSSIM).
- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements

- Description of the basic procedures to display a mobile terminated short message.
-

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) the SS delivers a Short Message of class 1 to the MS as specified in subclause 34.2.1, step a).

b) the Short Message is recalled (e.g. by means of the MMI).

Maximum Duration of Test

-

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST	
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
3	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
11	MS -> SS	UA (SAPI=3)	
12	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 1 Short Message
13	MS -> SS	CP-ACK	
14	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
15	SS -> MS	CP-ACK	
16	SS -> MS	CHANNEL RELEASE	
17	MS		The short message shall be recalled and displayed at the MS.

Specific Message Contents:

SMS-DELIVER TPDU (containing a class 1 message) (SS to MS):

Information element	Comment Value
TP-MTI	SMS-DELIVER "00"B
TP-MMS	more messages are waiting in SC "0"B
TP-RP	no reply path "0"B
TP-UDHI	TP-UD contains only the SM"0"B
TP-SRI	no status report returned 0
TP-OA	an international number coded E.164
TP-PID	default"00000000"B
TP-DCS	default alphabet, class 1 "1111 0001"B
TP-SCTS	any legal value (cf. 3GPP TS 03.40)
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters)

34.2.5.3 Test of class 2 short messages

34.2.5.3.1 Definition

Class 2 Short Messages are defined as SIM specific, and the MS shall ensure that a message of this class is stored on the SIM.

34.2.5.3.2 Conformance requirement

When a mobile terminated message is Class 2, the MS shall ensure that the message has been correctly transferred to the SMS data field in the SIM before sending an acknowledgement to the SC. The MS shall return a "protocol error, unspecified" error message if the short message cannot be stored in the SIM and there is other short message storage available at the MS. If all the short message storage at the MS is already in use, the MS shall return "memory capacity exceeded".

Reference(s)

3GPP TS 03.40, subclause 9.2.3.10; 3GPP TS 03.38, clause 4; 3GPP TS 11.11, subclause 10.3.3.

34.2.5.3.3 Test purpose

This procedure verifies that the MS acts correctly on receiving a class 2 message, i.e. that it stores the message correctly in the SIM, and if this is not possible, returns a protocol error message, with the correct error cause, to the network.

There are 2 cases:

1) If the MS supports storing of short messages in the SIM and in the ME, and storage in the ME is not full, and the short message cannot be stored in the SIM, the error cause shall be "protocol error, unspecified".

2) If the MS supports storing of short messages in the SIM and not in the ME, and storage in the ME is not full, and the short message cannot be stored in the SIM, the error cause shall be "memory capacity exceeded".

NOTE: If the MS supports storing of short messages in the SIM and the ME, and storage in the ME is full, and the short message cannot be stored in the SIM, the error cause shall be "memory capacity exceeded". This case is not tested in this test.

34.2.5.3.4 Test method

Initial conditions

System Simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in the idle updated state.

The ME message store shall be empty.

The ME shall be connected to the SIM simulator. The following shall be present in the SIM simulator:

- EF_{SMS} with at least two free records and one full record;
- $EF_{SMSstatus}$, with SMS "Memory Cap. Exceed" notification flag set to "memory available";
- Service no. 4 (SMS) in EF_{SST} set to allocated and activated;

For storing of Class 1 Short Messages the MS shall be set up to store Short Messages in the ME memory (by way of MMI, as described in PICS/PIXIT statement).

Specific PICS Statements

- Support for Short message MT/PP (TSPC_Serv_TS21).
- SMS messages are stored in the SIM (TSPC_AddInfo_StoreRcvSMSSIM).
- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) the SS delivers a Short Message of class 2 to the MS as specified in subclause 34.2.1, step b).

b) following an attempt by the ME to store the short message in a free record of EF_{SMS} in the SIM, the SIM simulator returns the status response "OK" ("90 00").

c) step a) is repeated.

d) following an attempt by the ME to store the short message in a free record of EF_{SMS} in the SIM, the SIM simulator returns the status response "memory problem" ("92 40").

Note: the ME may retry to store the short message several times to recover the memory problem. The SIM simulator shall return the status response "memory problem" ("92 40") for each attempt, even for a different record.

e) the SIM simulator indicates if an attempt was made in steps a) and c) to store the messages and if the messages are stored according to the requirement.

Maximum Duration of Test

-

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST	
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
3	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
11	MS -> SS	UA (SAPI=3)	
12	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 2 Short Message
13	MS -> SS	CP-ACK	
14	ME		The ME shall correctly store the short message in a free record of EFSMS in the SIM, i.e. - the ME shall use a free record - the first byte of the record shall indicate "message received by MS from network" - the TS-Service-Centre-Address shall be correctly stored - the TPDU shall be identical to that sent by the SS - bytes following the TPDU shall be set to "FF"
15	SIM		The SIM simulator returns the status response "OK" ("90 00"). The SIM simulator shall indicate if an attempt was made by the ME to store the short message in the SIM.
16	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
16A	SS -> MS	CP-ACK	
17	SS -> MS	CHANNEL RELEASE	
18	SS -> MS	PAGING REQUEST	
19	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
20	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
21	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
22	SS -> MS	AUTHENTICATION REQUEST	
23	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
24	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
25	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
26	SS		SS starts ciphering.
27	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
28	MS -> SS	UA (SAPI=3)	
29	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 2 Short Message
30	MS -> SS	CP-ACK	
31	ME		The ME shall attempt to store the short message in a free record of EFSMS in the SIM.
32	SIM		The SIM simulator returns the status response "memory problem" ("92 40"). The SIM simulator shall indicate if an attempt was made by the ME to store the short message in the SIM. Note: the ME may retry to store the short message several times to recover the memory problem. The SIM simulator shall return the status response "memory problem" ("92 40") for each attempt, even for a different record.

Step	Direction	Message	Comments
33	MS -> SS	CP-DATA	Contains RP-ERROR RPDU with error cause "protocol error, unspecified" if the MS supports storing of short messages in the ME, or error cause "memory capacity exceeded" if not.
33A	SS -> MS	CP-ACK	
34	SS -> MS	CHANNEL RELEASE	

Specific Message Contents:

SMS-DELIVER TPDU (containing a class 2 message) (SS to MS):

Information element	Comment Value
TP-MTI	SMS-DELIVER "00"B
TP-MMS	more messages are waiting in SC "0"B
TP-RP	no reply path "0"B
TP-UDHI	TP-UD contains only the SM"0"B
TP-SRI	no status report returned 0
TP-OA	an international number coded E.164
TP-PID	default"00000000"B
TP-DCS	default alphabet, class 2 "1111 0010"B
TP-SCTS	any legal value (cf. 3GPP TS 03.40)
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters)

34.2.5.4 Test of class 3 short messages

For further study.

34.2.6 Test of short message type 0 (Ph2, R96…R99 and REL-4)

34.2.6.1 Conformance requirement

When a mobile terminated message is type 0, the MS shall acknowledge receipt of the short message to the SC but may discard its contents.

Note: Ideally the MS is able to receive the type 0 message irrespective of whether there is memory available in the SIM or ME and does not indicate the receipt of the type 0 short message to the user. The message should not be automatically stored in the SIM or ME.

This test shall apply to all MSs that have a Ph2, R96…R99 or REL-4 short message type 0 implementation.

References

3GPP TS 03.40 / 3GPP TS 23.040, subclause 9.2.3.9.

34.2.6.2 Test purpose

To verify that the MS will acknowledge receipt of the short message to the SC. The MS should discard its contents.

NOTE: failure of this test in a mobile could cause it to reject a type 0 message when the network is trying to reach the MS. This could lead to unwanted repetitions between the MS and the service centre.

34.2.6.3 Method of test

Initial conditions

System Simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in the idle updated state.

Specific PICS Statements

-

PIXIT Statements

-

Foreseen Final State of MS

Idle, updated.

Test Procedure

The SS sends a type 0 message by using the method described in step a) of section 34.2.1 but with the TPDU described in this section.

Maximum Duration of Test

1 minute

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST	
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
3	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
11	MS -> SS	UA (SAPI=3)	
12	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), type 0 Short Message
13	MS -> SS	CP-ACK	
14	MS -> SS	CP-DATA	Contains RP-ACK TP-Protocol-Identifier (TP-PID).
15	SS -> MS	CP-ACK	
16	SS -> MS	CHANNEL RELEASE	
17	MS		Ideally the MS is able to receive the type 0 message irrespective of whether there is memory available in the SIM or ME and does not indicate the receipt of the type 0 short message to the user. The message should not be automatically stored in the SIM or ME.

Specific Message Contents:

SMS-DELIVER TPDU (containing a type 0 message) (SS to MS):

Information element	Comment Value
TP-MIT	SMS-DELIVER "00"B
TP-MMS	more messages are waiting in SC "0"B
TP-RP	no reply path "0"B
TP-UDHI	TP-UD contains only the SM"0"B
TP-SRI	no status report returned 0
TP-OA	an international number coded E.164
TP-PID	Type 0: "01000000"B
TP-DCS	default alphabet "0000 0000"B
TP-SCTS	any legal value (cf. 3GPP TS 03.40 / 3GPP TS 23.040)
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters)

34.2.6a Test of short message type 0 (≥ REL 5)

34.2.6a.1 Conformance requirement

When a mobile terminated message is type 0, the MS shall acknowledge receipt of the short message to the SC but shall discard its contents. This means that

- the MS shall be able to receive the type 0 short message irrespective of whether there is memory available in the SIM or ME or not,
- the MS shall not indicate the receipt of the type 0 short message to the user,
- the short message shall neither be stored in the SIM nor ME.

This test shall apply to all MSs that have a ≥ REL-5 short message type 0 implementation.

References

3GPP TS 23.040, subclause 9.2.3.9.

34.2.6a.2 Test purpose

To verify that the MS will acknowledge receipt of the short message to the SC. The MS shall discard its contents. This means that

- the MS shall be able to receive the type 0 short message irrespective of whether there is memory available in the SIM or ME or not,
- the MS shall not indicate the receipt of the type 0 short message to the user,
- the short message shall neither be stored in the SIM nor ME.

NOTE: failure of this test in a MS could cause it to reject a type 0 message when the network is trying to reach the MS. This could lead to unwanted repetitions between the MS and the service centre. In addition service affecting restrictions could happen to the customer.

34.2.6a.3 Method of test

Initial conditions

System Simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in the idle updated state.

the ME- and SIM message store shall be empty.

Specific PICS Statements

-

PIXIT Statements

-

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) The SS sends a type 0 short message by using the method described in step a) of clause 34.2.1 but with the TPDU described in this section.

b) The ME- and SIM short message store shall be filled (for example by using the method of clause 34.2.3 test of the memory available notification).

c) The SS sends a type 0 short message as in step a).

Maximum Duration of Test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST	
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
3	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
11	MS -> SS	UA (SAPI=3)	
12	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), type 0 Short Message
13	MS -> SS	CP-ACK	
14	MS -> SS	CP-DATA	Contains RP-ACK TP-Protocol-Identifier (TP-PID).
15	SS -> MS	CP-ACK	
16	SS -> MS	CHANNEL RELEASE	
17	MS		The MS shall discard the type 0 short message. This means that the MS does not indicate the receipt of the type 0 short message to the user. The MS shall not store the message in the SIM or ME. This can be checked by verifying that it is impossible to retrieve any short messages from the ME- and SIM message store.
18	SS		The ME- and SIM message store shall be filled (for example by using the method of clause 34.2.3).
19	SS -> MS	PAGING REQUEST	
20	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
21	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
22	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
23	SS -> MS	AUTHENTICATION REQUEST	
24	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
25	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
26	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
27	SS		SS starts ciphering.
28	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
29	MS -> SS	UA (SAPI=3)	
30	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), type 0 Short Message
31	MS -> SS	CP-ACK	
32	MS -> SS	CP-DATA	Contains RP-ACK TP-Protocol-Identifier (TP-PID).
33	SS -> MS	CP-ACK	
34	SS -> MS	CHANNEL RELEASE	
35	MS		The MS shall discard the type 0 short message. This means that the MS does not indicate the receipt of the type 0 short message to the user. The MS shall not store the message in the SIM or ME. This can be checked by verifying that it is impossible to retrieve any short messages from the ME- and SIM message store.

Specific Message Contents:

SMS-DELIVER TPDU (containing a type 0 message) (SS to MS):

Information element	Comment Value
TP-MIT	SMS-DELIVER "00"B
TP-MMS	more messages are waiting in SC "0"B
TP-RP	no reply path "0"B
TP-UDHI	TP-UD contains only the SM"0"B
TP-SRI	no status report returned 0
TP-OA	an international number coded E.164
TP-PID	Type 0: "01000000"B
TP-DCS	default alphabet "0000 0000"B
TP-SCTS	any legal value (cf. 3GPP TS 03.40 / 3GPP TS 23.040)
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters)

34.2.7 Test of the replace mechanism for SM type 1-7

34.2.7.1 Definition

This test shall apply to MSs which support:

- Replace Short Messages; and
- display of received Short Messages.

34.2.7.2a Conformance requirement for MS with implementation up to and including Rel. 97

On receipt of a short message, the MS shall check to see if the associated Protocol Identifier contains a Replace Short Message Type code. If such a code is present, then the MS will check the associated SC address (RP-OA) and originating address (TP-OA) and replace any existing stored message having the same Protocol Identifier code, SC address and originating address with the new short message.

Reference(s)

3GPP TS 03.40; subclause 9.2.3.9.

34.2.7.2b Conformance requirement for MS with implementation after Rel.98 and later

On receipt of a short message, the MS shall check to see if the associated Protocol Identifier contains a Replace Short Message Type code. If such a code is present, then the MS will check the originating address and replace any existing stored message having the same Protocol Identifier code and originating address with the new short message and other parameter values. If there is no message to be replaced, the MS shall store the message in the normal way. The MS may also check the SC address as well as the Originating Address. However, in a network which has multiple SCs, it is possible for a Replace Message type for a SM to be sent via different SCs and so it is recommended that the SC address should not be checked by the MS unless the application specifically requires such a check.

Reference(s)

3GPP TS 03.40 / 3GPP TS 23.040, subclause 9.2.3.9.

34.2.7.3 Test purpose

This procedure verifies the correct implementation of the replace mechanism for Replace Short Messages.

NOTE: The test will not check the correct SC address for any releases.

34.2.7.4 Test method

Initial conditions

System Simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in the idle updated state.

The MS message store shall be empty.

Specific PICS Statements

-

PIXIT Statements

- Description of the basic procedures to display a mobile terminated short message.

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) two different numbers n and m are drawn randomly between 1 and 7. Two different addresses for TP-Originating-Address (TPOA1 and TPOA2) are drawn.

b) the SS delivers a short message to the MS as specified in subclause 34.2.1 step a). In the SMS-DELIVER TPDU, the TP-Protocol-Identifier parameter is "Replace Short Message Type n", the TP-Originating-Address is TPOA1, and the RP-Originating-Address is RPOA.

c) step b) is repeated but with a different TP-Originating-Address (TPOA2), and different contents of TP-User-Data in the SMS-DELIVER TPDU. The other parameters are the same as in step b).

d) step c) is repeated but with the TP-Protocol-Identifier equal to "Replace Short Message Type m", and contents of TP-User-Data different from the former two messages. The other parameters are the same as in step c).

e) step d) is repeated but the contents of TP-User-Data are different from that used in step d).

f) the SS prompts the operator to display the Short Messages stored in the MS.

Maximum Duration of Test

-

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST	
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
3	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
11	MS -> SS	UA (SAPI=3)	
12	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type n", TP-OA is TPOA1 and RP-OA is RPOA
13	MS -> SS	CP-ACK	
14	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
14A	SS -> MS	CP-ACK	
15	SS -> MS	CHANNEL RELEASE	
16	SS -> MS	PAGING REQUEST	
17	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
18	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
19	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
20	SS -> MS	AUTHENTICATION REQUEST	

Step	Direction	Message	Comments
21	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
22	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
23	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
24	SS		SS starts ciphering.
25	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
26	MS -> SS	UA (SAPI=3)	
27	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type n", TP-OA is TPOA2 and RP-OA is RPOA, TP-UD different from step 12
28	MS -> SS	CP-ACK	
29	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
29A	SS -> MS	CP-ACK	
30	SS -> MS	CHANNEL RELEASE	
31	SS -> MS	PAGING REQUEST	
32	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
33	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
34	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
35	SS -> MS	AUTHENTICATION REQUEST	
36	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
37	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
38	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
39	SS		SS starts ciphering.
40	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
41	MS -> SS	UA (SAPI=3)	
42	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type m", TP-OA is TPOA2 and RP-OA is RPOA, TP-UD different from step 12 and 27
43	MS -> SS	CP-ACK	
44	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
45	SS -> MS	CP-ACK	
46	SS -> MS	CHANNEL RELEASE	
47	SS -> MS	PAGING REQUEST	
48	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
49	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
50	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
51	SS -> MS	AUTHENTICATION REQUEST	
52	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
53	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
54	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
55	SS		SS starts ciphering.
56	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
57	MS -> SS	UA (SAPI=3)	
58	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type m", TP-OA is TPOA2 and RP-OA is RPOA, TP-UD different from step 42
59	MS -> SS	CP-ACK	
60	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
61	SS -> MS	CP-ACK	
62	SS -> MS	CHANNEL RELEASE	
63	SS		Prompts the operator to display the Short Messages stored in the MS. Only the Short Messages delivered in step 12, 27 and 58 shall be retrievable and displayed

Specific Message Contents:

SMS-DELIVER TPDU

Information element	Comment Value	
TP-MTI	SMS-DELIVER	"00"B
TP-MMS	no more messages are waiting in SC	"1"B
TP-RP	no Reply Path	"0"B
TP-UDHI	TP-UD contains only the SM	"0"B
TP-SRI	no Status Report returned	"0"B
TP-OA	an international number coded E.164 (see test method description)	
TP-PID	binary 01000xxx, xxx represents n resp. m (see test method description)	
TP-DCS	default alphabet	"00000000"B
TP-SCTS	the time when the message was submitted according to 3GPP TS 03.40	
TP-UDL	160	
TP-UD (140 octets)	text of message (160 characters) (see test method description)	

34.2.8 Test of the reply path scheme

34.2.8.1 Definition

This test applies to MSs which support:

- reply procedures (the class of MSs for which this is mandatory is described in 3GPP TS 03.40, annex 4):
- displaying of received Short Messages: and
- submitting Short Messages.

Steps b) and d) are only executed for MSs which support storing of Short messages.

34.2.8.2 Conformance requirement

When a replying MS receives an original mobile terminated short message it has:

- originating SME = TP-Originating Address in the SMS-DELIVER TPDU;
- original SC = RP-Originating Address in the RP-MT-DATA.

When submitting the reply mobile originated short message, the replying MS should use parameters as follows:

- TP-Destination Address in SMS-SUBMIT TPDU = originating SME;
- RP-Destination Address in RP-MO-DATA = original SC.

Reference(s)

3GPP TS 03.40 annex 4, clauses 5 and 6.

34.2.8.3 Test purpose

This procedure verifies that the MS is able to send a Reply Short Message back to the correct originating SME even if in the meantime it receives another Short Message.

34.2.8.4 Test method

Initial conditions

System Simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in the idle updated state.

The MS message store shall be empty.

Specific PICS Statements

-

PIXIT Statements

- Description of the basic procedures to display a mobile terminated short message.
- Description of the basic procedures to send a mobile originated short message.

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) the SS delivers a Short Message as specified in subclause 34.2.1, step b) with TP-Reply-Path set to 1.

b) step a) is repeated but with:

- different TP-Originating-Address for the originating SME;
- different RP-Originating-Address for the original SC; and
- different message contents TP-User-Data.

c) one of the two Short Messages is displayed (e.g. by means of the MMI) and the Reply Short Message is submitted (e.g. by means of the MMI).

d) step c) is repeated for the other Short Message.

Maximum Duration of Test

-

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST	
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
3	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
11	MS -> SS	UA (SAPI=3)	
12	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-RP set to 1
13	MS -> SS	CP-ACK	
14	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
14A	SS -> MS	CP-ACK	
15	SS -> MS	CHANNEL RELEASE	
16	SS -> MS	PAGING REQUEST	
17	MS -> SS	CHANNEL REQUEST	Establishment cause is "Answer to paging"
18	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
19	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
20	SS -> MS	AUTHENTICATION REQUEST	
21	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
22	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
23	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
24	SS		SS starts ciphering.
25	SS -> MS	SABM (SAPI=3)	SS establishes SAPI 3
26	MS -> SS	UA (SAPI=3)	

Step	Direction	Message	Comments
27	SS -> MS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-OA, RP-OA and TP-UD different from step 12
28	MS -> SS	CP-ACK	
29	MS -> SS	CP-DATA	Contains RP-ACK RPDU.
29A	SS -> MS	CP-ACK	
30	SS -> MS	CHANNEL RELEASE	
31	MS		One of the two Short Messages is displayed and the Reply Short Message is submitted.
32	MS -> SS	CHANNEL REQUEST	
33	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
34	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM.
35	SS -> MS	AUTHENTICATION REQUEST	
36	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
37	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
38	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
39	SS		SS starts ciphering.
40	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3
41	SS -> MS	UA (SAPI=3)	
42	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU) RP-DA = RP-OA corresponding to the message displayed TP-DA = TP-OA corresponding to the message displayed
43	SS -> MS	CP-ACK	
44	SS -> MS	CP-DATA	Contains RP-ACK RPDU
45	SS		Waits max 25 s for CP-ACK
46	MS -> SS	CP-ACK	
47	SS -> MS	CHANNEL RELEASE	The main signalling link is released.
48	MS		The other Short Message is displayed and the Reply Short Message is submitted.
49	MS -> SS	CHANNEL REQUEST	
50	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
51	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM.
52	SS -> MS	AUTHENTICATION REQUEST	
53	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
54	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
55	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
56	SS		SS starts ciphering.
57	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3
58	SS -> MS	UA (SAPI=3)	
59	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU) RP-DA = RP-OA corresponding to the Message displayed TP-DA = TP-OA corresponding to the message displayed
60	SS -> MS	CP-ACK	
61	SS -> MS	CP-DATA	Contains RP-ACK RPDU
62	SS		Waits max 25 s for CP-ACK
63	MS -> SS	CP-ACK	
64	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents:

SMS-DELIVER TPDU

Information element	Comment Value
TP-MTI	SMS-DELIVER "00"B
TP-MMS	no more messages are waiting in SC "1"B
TP-RP	Reply Path exists "1"B
TP-UDHI	TP-UD contains only the SM"0"B
TP-SRI	no Status Report returned "0"B
TP-OA	an international number coded E.164 (see test method description)
TP-PID	default"00000000"B
TP-DCS	default alphabet "00000000"B
TP-SCTS	the time when the message was submitted according to 3GPP TS 03.40
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters) (see test method description)

34.2.9 Multiple SMS mobile originated

34.2.9.1 MS in idle mode

This test applies to MS supporting the ability of sending multiple short messages on the same RR connection when there is no call in progress.

34.2.9.1.1 Conformance requirements

For a R99 or earlier MS only:

If another short message or a memory available notification is to be sent, an originating SMR entity in the UE may choose to continue to use the same RRC connection. When the MS chooses to use the same RR connection, then:

- the MS shall transmit a CM SERVICE REQUEST for the new CM connection before the final CP-ACK (e.g. the one that acknowledges the CP-DATA that carried the RP-ACK) for the old MM connection is transmitted;
- before transmission of the first CP-DATA on the new MM connection, the MS shall transmit the CP-ACK for the old MM connection;
- the Transaction Identifier used on the new MM connection shall be different to that used on the old MM connection; and
- the MS shall not initiate establishment of the new MM connection before the final CP-DATA (e.g. the one carrying the RP-ACK) has been received.

For a Rel-4 or later MS only:

In the case of a SMS transfer via the CS domain, when the UE chooses to use the same RR or CS signalling connection, then:

- the UE shall transmit a CM SERVICE REQUEST for the new CM connection before the final CP-ACK (i.e. the one that acknowledges the CP-DATA that carried the RP-ACK) for the old MM connection is transmitted;
- before transmission of the first CP-DATA on the new MM connection, the UE may transmit the CP-ACK for the old MM connection; the UE shall not transmit the final CP-ACK after the new CP-DATA;
- the Transaction Identifier used on the new MM connection shall be different to that used on the old MM connection; and
- the UE shall not initiate establishment of the new MM connection before the final CP-DATA (e.g. the one carrying the RP-ACK) has been received.

References

3GPP TS 03.40; subclause 3.1

3GPP TS 04.11; subclause 5.4

3GPP TS 04.13; subclause 5.6

34.2.9.1.2 Test purpose

To verify that the MS is able to correctly send multiple short messages on the same RR connection when using an SDCCH.

34.2.9.1.3 Method of test

Initial conditions

System simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in "Idle, updated" state.

The SMS message storage shall be empty.

Specific PICS Statements

- SMS messages are stored in the SIM (TSPC_AddInfo_StoreRcvSMSSIM).
- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements

- Description of how to enter multiple SMS.
- Description of the basic procedures to display a mobile originated short message.

Foreseen final state of MS

Idle, updated.

Test procedure

a) The MS shall be set up to send 3 short messages as multiple SM to the SS. The SS responds to the channel request message by allocating an SDCCH. The SS answers correctly to the SABM on SAPI 0 and then performs the authentication and ciphering procedures.

b) The SS responds with a UA frame SAPI-3 to the MS.

c) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU. The Transaction Identifier used on this MM connection is 'x'.

d) the MS shall transmit a CM SERVICE REQUEST for the new CM connection (for the second short message) before the final CP-ACK (the one that acknowledges the CP-DATA that carried the RP-ACK before) for the old MM connection is transmitted. The MS shall not initiate establishment of the new MM connection before the final CP-DATA (i.e. the one carrying the RP-ACK for the first short message) has been received. Before transmission of the first CP-DATA on the new MM connection:

The MS may transmit the CP-ACK for the old MM connection. The Transaction Identifier used on the new MM connection shall be y, where y <> x (see step c)). Thereby, the UE can transmit the final CP-ACK after either the sending of the CM SERVICE REQUEST for the new CM connection or the reception of the CM SERVICE ACCEPT for the new CM connection or not to send a CP-ACK at all, thus three cases are possible. These cases are specified using two branches for the transmission of the final CP-ACK where the transmission of the final CP-ACK for the old MM connection is optional. The two branches are specified in

the expected sequence table like A and B respectively. The SS waits for the UE to transmit the final CP-ACK. If received within 5 s then the SS transmits the CM SERVICE ACCEPT and waits for the UE to transmit the first CP-DATA on the new MM connection (branch A). If the final CP-ACK is not received within 5 s then the SS transmits the CM SERVICE ACCEPT and then waits for the UE to send the final CP-ACK (optional) and/or the first CP-DATA on the new MM connection (branch B).

e) Void.

f) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU.

g) The MS shall transmit a CM SERVICE REQUEST for the new CM connection (for the third short message) before the final CP-ACK (the one that acknowledges the CP-DATA that carried the RP-ACK before) for the old MM connection is transmitted. Before transmission of the first CP-DATA on the new MM connection:

The MS may transmit the CP-ACK for the old MM connection. The Transaction Identifier used on the new MM connection shall be z, where z <> y (see step c)). Thereby, the UE can transmit the final CP-ACK after either the sending of the CM SERVICE REQUEST for the new CM connection or the reception of the CM SERVICE ACCEPT for the new CM connection or not to send a CP-ACK at all, thus three cases are possible. These cases are specified using two branches for the transmission of the final CP-ACK where the transmission of the final CP-ACK for the old MM connection is optional. The two branches are specified in the expected sequence table like A and B respectively. The SS waits for the UE to transmit the final CP-ACK. If received within 5 s then the SS transmits the CM SERVICE ACCEPT and waits for the UE to transmit the first CP-DATA on the new MM connection (branch A). If the final CP-ACK is not received within 5 s then the SS transmits the CM SERVICE ACCEPT and then waits for the UE to send the final CP-ACK (optional) and/or the first CP-DATA on the new MM connection (branch B).

h) Void

i) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU.

j) The SS waits a maximum of 5 s after sending CP-DATA for the CP-ACK message from the MS.

k) The SS sends a Channel Release message to the MS.

Maximum duration of test

5 minutes.

Expected sequence

Step	Direction	Message	Comments
1	MS -> SS	CHANNEL REQUEST	Establishment cause is “Other procedures which can be completed with an SDCCH” NECI = 0
2	SS -> MS	IMMEDIATE ASSIGNMENT	SS assigns an SDCCH
3	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM on SAPI 0. CM service type set to "Short message transfer"
4	SS -> MS	AUTHENTICATION REQUEST	
5	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
6	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
7	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
8	SS		SS starts ciphering.
9	MS -> SS	SABM (SAPI=3)	MS establishes SAPI 3 on DCCH
10	SS -> MS	UA (SAPI=3)	
11	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 11, 12, 13 and 15 shall be x.
12	SS -> MS	CP-ACK	
13	SS -> MS	CP-DATA	Contains RP-ACK RPDU
14	MS -> SS	CM SERVICE REQUEST	CM service type set to "Short message transfer".

Step	Direction	Message	Comments
15	MS -> SS	CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. If CP-ACK received then continue at A16. If CP-ACK is not received within 5 s from the CM SERVICE REQUEST was sent in step 14 then goto step B16-1.
Branch A			
A16	SS -> MS	CM SERVICE ACCEPT	After having sent the CM SERVICE ACCEPT then goto step 17.
Branch B			
B16-1	SS->MS	CM SERVICE ACCEPT	This branch is chosen if the MS does not send a CP-ACK within 5 s of step 14.
B16-2 (optional)	MS->SS	CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU.
17	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 17, 18, 19 and 21 shall be y where y <> x (see step 11).
18	SS -> MS	CP-ACK	
19	SS -> MS	CP-DATA	Contains RP-ACK RPDU
20	MS -> SS	CM SERVICE REQUEST	CM service type set to "Short message transfer".
21	MS -> SS	CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. If CP-ACK received then continue at A22 If CP-ACK is not received within 5 s from the CM SERVICE REQUEST was sent in step 20 then goto step B22-1.
Branch A			
A22	SS -> MS	CM SERVICE ACCEPT	After having sent the CM SERVICE ACCEPT then goto step 23.
Branch B			
B22-1	SS->MS	CM SERVICE ACCEPT	This branch is chosen if the MS does not send a CP-ACK within 5 s of step 20.
B22-2 (optional)	MS->SS	CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU
23	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 23, 24, 25 and 26 shall be z, where z <> y (see step 17).
24	SS -> MS	CP-ACK	
25	SS -> MS	CP-DATA	Contains RP-ACK RPDU
26	MS -> SS	CP-ACK	Shall be sent within 5 s of step 25
27	SS -> MS	CHANNEL RELEASE	The main signalling link is released.
28	MS -> SS	DISC (SAPI=0)	MS shall respond to channel release with a layer 2 DISC frame with SAPI 0

Specific message contents:

SMS SUBMIT TPDU

Information element	Comment Value
TP-MTI	SMS SUBMIT '01'B
TP-VPF	not checked
TP-RP	no reply path '0'B
TP-UDHI	not checked
TP-SRR	not checked
TP-MR	not checked
TP-RD	not checked
TP-DA	not checked (an E164 number)
TP-PID	not checked
TP-DCS	not checked
TP-VP	not checked
TP-UDL	as applicable
TP-UD (140 octets max.)	the user data consist of an arbitrarily chosen amount of octets

34.2.9.2 MS in active mode

This test applies to MS supporting the ability of sending multiple short messages when there is a call in progress.

34.2.9.2.1 Conformance requirements

For a R99 or earlier MS only:

If another short message or a memory available notification is to be sent, an originating SMR entity in the UE may choose to continue to use the same RRC connection. When the MS chooses to use the same RR connection, then:

- the MS shall transmit a CM SERVICE REQUEST for the new CM connection before the final CP-ACK (e.g. the one that acknowledges the CP-DATA that carried the RP-ACK) for the old MM connection is transmitted;
- before transmission of the first CP-DATA on the new MM connection, the MS shall transmit the CP-ACK for the old MM connection;
- the Transaction Identifier used on the new MM connection shall be different to that used on the old MM connection; and
- the MS shall not initiate establishment of the new MM connection before the final CP-DATA (e.g. the one carrying the RP-ACK) has been received.

For a Rel-4 or later MS only:

In the case of a SMS transfer via the CS domain, when the UE chooses to use the same RR or CS signalling connection, then:

- the UE shall transmit a CM SERVICE REQUEST for the new CM connection before the final CP-ACK (i.e. the one that acknowledges the CP-DATA that carried the RP-ACK) for the old MM connection is transmitted;
- before transmission of the first CP-DATA on the new MM connection, the UE may transmit the CP-ACK for the old MM connection; the UE shall not transmit the final CP-ACK after the new CP-DATA;
- the Transaction Identifier used on the new MM connection shall be different to that used on the old MM connection; and
- the UE shall not initiate establishment of the new MM connection before the final CP-DATA (e.g. the one carrying the RP-ACK) has been received.

References

3GPP TS 03.40; subclause 3.1.

3GPP TS 04.11; subclause 5.4.

3GPP TS 04.13; subclause 5.6.

34.2.9.2.2 Test purpose

To verify that the MS is able to correctly send multiple short messages on the same RR connection when sent parallel to a call.

34.2.9.2.3 Method of test

Initial conditions

System simulator:

1 cell, default parameters.

Mobile Station:

The MS shall be in "Idle, updated" state.

The SMS message storage shall be empty.

Specific PICS Statements

- SMS messages are stored in the SIM (TSPC_AddInfo_StoreRcvSMSSIM).
- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements

- Description of how to enter multiple SMS.
- Description of the basic procedures to display a mobile originated short message.
- Support for state U10 of call control.

Foreseen final state of MS

Idle, updated.

Test procedure

a) A data or speech call is established on a TCH with the SS and the state U10 of call control is entered. The MS is set up to send 3 short messages as multiple SM to the SS. After the reception of the CM SERVICE REQUEST, the SS sends a CM SERVICE ACCEPT message. The SS responds with a UA frame SAPI-3 to the SABM with SAPI-3 received from the MS.

b) Steps c) to k) of the test procedure in subclause 34.2.9.1.3 are repeated.

Maximum duration of test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS		A data or speech call is established on a TCH and the state U10 of call control is entered.
2	MS		The MS is set up to send 3 short messages as multiple SM
3	MS -> SS	CM SERVICE REQUEST	Sent in a layer 2 frame on the FACCH. CM service type set to "short message transfer"
4	SS -> MS	CM SERVICE ACCEPT	
5	MS -> SS	SABM (SAPI=3)	Sent on SACCH associated with the TCH
6	SS -> MS	UA (SAPI=3)	
7	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 7, 8, 9 and 11 shall be x.
8	SS -> MS	CP-ACK	
9	SS -> MS	CP-DATA	Contains RP-ACK RPDU
10	MS -> SS	CM SERVICE REQUEST	Sent in a layer 2 frame on the FACCH. CM service type set to "short message transfer"
11	MS -> SS	CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. If CP-ACK received then continue at A12. If CP-ACK is not received within 5 s from the CM SERVICE REQUEST was sent in step 10 then goto step B12-1.
Branch A			
A12	SS -> MS	CM SERVICE ACCEPT	After having sent the CM SERVICE ACCEPT then goto step 13.
Branch B			
B12-1	SS->MS	CM SERVICE ACCEPT	This branch is chosen if the MS does not send a CP-ACK within 5 s of step 10.
B12-2 (optional)	MS->SS	CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU.
13	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 13, 14, 15 and 17 shall be y where y <> x (see step 7).
14	SS -> MS	CP-ACK	

Step	Direction	Message	Comments
15	SS -> MS	CP-DATA	Contains RP-ACK RPDU
16	MS -> SS	CM SERVICE REQUEST	Sent in a layer 2 frame on the FACCH. CM service type set to "short message transfer"
17	MS -> SS	CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. If CP-ACK received then continue at A18 If CP-ACK is not received within 5 s from the CM SERVICE REQUEST was sent in step 16 then goto step B18-1.
Branch A			
A18	SS -> MS	CM SERVICE ACCEPT	After having sent the CM SERVICE ACCEPT then goto step 19.
Branch B			
B18-1	SS->MS	CM SERVICE ACCEPT	This branch is chosen if the MS does not send a CP-ACK within 5 s of step 16.
B18-2 (optional)	MS->SS	CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU.
19	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 19, 20, 21 and 22 shall be z, where z <> y (see step 13).
20	SS -> MS	CP-ACK	
21	SS -> MS	CP-DATA	Contains RP-ACK RPDU
22	MS -> SS	CP-ACK	Shall be sent within 5.5 s (5 sec + 10% tolerance) of step 21
23	SS -> MS	CHANNEL RELEASE	The main signalling link is released.
24	MS -> SS	DISC (SAPI = 0)	MS shall respond to channel release with a layer 2 DISC frame with SAPI 0.

Specific Message Contents:

SMS SUBMIT TPDU

Information element	Comment Value	
TP-MTI	SMS SUBMIT	'01'B
TP-VPF	not checked	
TP-RP	no reply path	'0'B
TP-UDHI	not checked	
TP-SRR	not checked	
TP-MR	not checked	
TP-RD	not checked	
TP-DA	not checked (an E164 number)	
TP-PID	not checked	
TP-DCS	not checked	
TP-VP	not checked	
TP-UDL	as applicable	
TP-UD (140 octets max.)	the user data consist of an arbitrarily chosen amount of octets	

34.3 Short message service cell broadcast

This test applies to all MSs.

34.3.1 Conformance requirements

If the MS supports SMS-CB, it is responsible for recombination of the four blocks received via the radio path into a single block which constitutes the cell broadcast short message.

In idle mode, the MS listens to the BCCH and to the paging sub-channel for the paging group it belongs to. The MS is required to receive and analyse the paging messages and immediate assignment messages sent on the paging subchannel corresponding to its paging subgroup.

Reference

3GPP TS 03.41; clause 8.

3GPP TS 04.08 / 3GPP TS 44.018, subclauses 3.2.1 and 3.3.2.1.

34.3.2 Test purpose

This test verifies that an MS supporting SMS-CB is able to receive SMS-CB messages.

This test verifies that an MS is able to respond to a paging requested during the transmission of a cell broadcast short message.

34.3.3 Test method

Initial conditions

System Simulator:

1 cell, default parameters, except BS_PA_MFRMS = 2.

The SS provides a BCCH/CCCH to support the MS in idle mode.

Periodic location updating is disabled.

Mobile Station:

The MS shall be in the idle updated state.

Specific PICS Statements

-

PIXIT Statements

- Description of the basic procedures to display a cell broadcasted short message.

Foreseen Final State of MS

Idle, updated.

Test Procedure

a) Three Cell Broadcast (CB) messages are sent by the SS on the CBCH with serial numbers 0,1,1.

b) Step a) is repeated, but the SS pages the MS during the transmission of the second CB message. This shall be achieved by paging the MS immediately after the first block of the CB message has been sent. The SS shall ensure that the page is transmitted on the radio interface prior to the transmission of the 4th block of the CB message.

NOTE: The use of BS_PA_MFRMS = 2 ensures that this can be achieved irrespective of the IMSI.

The MS shall respond to the page.

Maximum Duration of Test

-

Expected Sequence

Since the SMS-CB messages are sent continuously, a table is not applicable in this test.

Specific Message Contents:

Cell broadcast test message content

Information element	Comment Value
Serial Number	
- Geographical scope	"00"B
- Message code	see test procedure "0000000000"B or "0000000001"B
- Update number	as applicable
Message identifier	"0"B
Data Coding Scheme	Default alphabet, English "00000001"B
Page parameter	"0001 0001"B
Contents of message	93 user characters using 93 different characters of default 7 bit coded alphabet

SYSTEM INFORMATION TYPE 4

As default except:

Information element	Value/remark
CBCH Channel Description	
- Channel type and TDMA offset	SDDCH/4 + SACCH/C4 or CBCH (SDDCH/4)
- Timeslot number	time slot zero
- Training sequence code	5 (same as BCC)
- Hopping channel	Single RF channel
-Channel selector	Channel number 263 (for GSM 450 MS) Channel number 310 (for GSM 480 MS) Channel number 20 (for GSM 900 MS) Channel number 590 (for DCS 1 800 and PCS 1 900 MS) Channel number 457 (for GSM 710, GSM 750 and T-GSM 810 MS) Channel number 147 (for GSM 850 MS)
CBCH Mobile Allocation	Not included

34.4 Short message service point to point over GPRS

34.4.1 SMS mobile terminated

34.4.1.1 Definition

34.4.1.2 Conformance requirements

An active MS shall be able to receive a short message TPDU (SMS-DELIVER) at any time, independently of whether or not there is a speech or data call in progress. A report shall always be returned to the SC; either confirming that the MS has received the short message, or informing the SC that it was impossible to deliver the short message TPDU to the MS, including the reason why.

References

3GPP TS 23.040 clauses 3.1, 9.2.3.16.

34.4.1.3 Test purpose

To verify the ability of a MS to receive and decode the SM where provided for the point to point service.

34.4.1.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- Mobile Station:
  - the MS shall be in GMM-state "GMM-REGISTERED";

- the SMS message storage shall be empty.

Specific PICS Statements

- SMS messages are stored in the SIM (TSPC_AddInfo_StoreRcvSMSSIM).
- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements

- Support for session management state "PDP-ACTIVE".
- Maximum number of retransmissions of an unacknowledged CP-DATA message.

Test procedure

a) The SS sends a CP-DATA message. The information element of the CP-DATA message will be RP-DATA RPDU (SMS DELIVER TPDU).

b) The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

c) The SS sends a CP-ACK to the MS with no further CP-DATA messages.

d) Steps a), b) and c) are repeated but the first CP-DATA message from the MS is not acknowledged. The second CP-DATA message from the MS is acknowledged by a CP-ACK.

e) Steps a) and b) are repeated. The SS is configured not to send CP-ACK. Then maximum 3 CP-DATA retransmissions may occur. The SS check during 60 s that the MS does not send more than the maximum allowed (3) CP-DATA retransmissions.

f) The SMS message store shall be cleared manually by the operator.

g) A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.

The SS sends a CP-DATA message. The information element of the CP-DATA message will be RP-DATA RPDU (SMS DELIVER TPDU). The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

h) The SS sends a CP-ACK to the MS with no further CP-DATA. The SMS message store shall be cleared manually by the operator.

i) Steps g) and h) are repeated but the first CP-DATA message from the MS is not acknowledged. The second CP-DATA message from the MS is acknowledged by a CP-ACK.

j) Step g) is repeated. The SS is configured not to send CP-ACK. Then maximum 3 CP-DATA retransmissions may occur. The SS check during 60 s that the MS does not send more than the maximum allowed (3) CP-DATA retransmissions. (60 s the sufficient wait time while PDP context in progress).

k) The SS initiates a PDP context deactivation (The PDP context deactivation is continued in parallel to the following exchange of messages related to SMS).

The SS sends a CP-DATA RPDU (SMS DELIVER TPDU) message. The information element of the CP-DATA message is RP-DATA.

The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

The SS sends a CP-ACK to the MS with no further CP-DATA.

The SMS message store shall be cleared manually by the operator.

l) A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered. The PDP context shall be cleared from the MS. (The PDP context deactivating is continued in parallel to the following exchange of messages related to SMS).

The SS sends a CP-DATA message. The information element of the CP-DATA message is RP-DATA RPDU (SMS DELIVER TPDU).

The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

The SS sends a CP-ACK to the MS with no further CP-DATA messages.

The SMS message store shall be cleared manually by the operator.

Expected sequence

Step	Direction	Message	Comments
1	MS <- SS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
2	SS		Waits max 25 s for CP-ACK
3	MS -> SS	CP-ACK	
4	SS		Waits max 60 s for RP-ACK RPDU
5	MS -> SS	CP-DATA	Contains RP-ACK RPDU
6	MS <- SS	CP-ACK	
7	MS		There should be no further CP-DATA message.
8	MS		The MS shall indicate that an SM has arrived.
9	MS <- SS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
10	SS		Waits max 25 s for CP-ACK
11	MS -> SS	CP-ACK	
12	SS		Waits max 60 s for RP-ACK RPDU
13	MS -> SS	CP-DATA	First CP-DATA from MS, contains RP-ACK RPDU
14	SS		First CP-DATA message not acknowledged by SS
15	MS -> SS	CP-DATA	Retransmitted CP-DATA from MS, contains RP-ACK RPDU
16	MS <- SS	CP-ACK	Second CP_DATA message is acknowledged
17	MS		There should be no further CP-DATA messages
18	MS		The MS shall indicate that an SM has arrived.
19	MS <- SS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
20	SS		Waits max 25 s for CP-ACK
21	MS -> SS	CP-ACK	
22	SS		Waits max 60 s for RP-ACK RPDU
23	MS -> SS	CP-DATA	Contains RP-ACK RPDU
24	SS		First CP-DATA message not acknowledged by SS
25		CP-DATA	Retransmitted CP-DATA from MS, contains RP-ACK RPDU
26	SS		Retransmitted CP-DATA message not acknowledged by SS
27	MS		Depending upon the maximum number of CP-DATA retransmissions implemented, step 25 and 26 may be repeated.
28	MS		The SS verifies within 60 s after the first CP-DATA message not acknowledged by SS that the MS does not retransmit more than the maximum allowed.
29	MS		The MS shall indicate that an SM has arrived.
30	MS, SS	{PDP Context Activation}	Macro. PDP context activation from the MS.
31	MS <- SS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
32	SS		Waits max 25 s for CP-ACK
33	MS -> SS	CP-ACK	
34	SS		Waits max 60 s for RP-ACK RPDU
35	MS -> SS	CP-DATA	Contains RP-ACK RPDU
36	MS <- SS	CP-ACK	
37	MS <- SS	DEACTIVATE PDP CONTEXT REQUEST	Deactivates the existing PDP context.
38	MS -> SS	DEACTIVATE PDP CONTEXT ACCEPT	
39	MS		The MS shall indicate that an SM has arrived.
40	MS		Clear the SMS message store
41	MS	{PDP Context Activation}	Macro. PDP context activation from the MS.
42	MS <- SS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)

Step	Direction	Message	Comments
43	SS		Waits max 25 s for CP-ACK
44	MS -> SS	CP-ACK	
45	SS		Waits max 60 s for RP-ACK RPDU
46	MS -> SS	CP-DATA	First CP-DATA from MS, contains RP-ACK RPDU
47	SS		First CP-DATA message not acknowledged by SS
48	MS -> SS	CP-DATA	Retransmitted CP-DATA message, contains RP-ACK RPDU
49	MS <- SS	CP-ACK	Second CP-DATA message is acknowledged
50	MS <- SS	DEACTIVATE PDP CONTEXT REQUEST	Deactivates an existing PDP context.
51	MS -> SS	DEACTIVATE PDP CONTEXT ACCEPT	
52	MS		The MS shall indicate that an SM has arrived.
53	MS		Clear the SMS message store
54	MS	{PDP Context Activation}	Macro. PDP context activation from the MS.
55	MS <- SS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
56	SS		Waits max 25 s for CP-ACK
57	MS -> SS	CP-ACK	
58	SS		Waits max 60 s for RP-ACK RPDU
59	MS -> SS	CP-DATA	First CP-DATA from MS, contains RP-ACK RPDU
60	SS		First CP-DATA message not acknowledged by SS
61	MS -> SS	CP-DATA	Transmitted CP-DATA message, contains RP-ACK RPDU
62	SS		Retransmitted CP-DATA message not acknowledged by SS
63	MS		Depending on the maximum number of CP-DATA retransmissions implemented, step 61 and 62 may be repeated. The maximum number of retransmissions may however not exceed three.
64	MS		The SS verifies within 60 s after the last CP-DATA retransmission that the MS does not retransmit more than the maximum allowed.
65	MS		The MS shall indicate that an SM has arrived.
66	MS		Clear the SMS message store
67	MS <- SS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
68	MS <- SS	DEACTIVATE PDP CONTEXT REQUEST	The PDP context is deactivated by the SS. The PDP context deactivating is continued in parallel to the following exchange of messages related to SMS.
69	MS -> SS	DEACTIVATE PDP CONTEXT ACCEPT	This message may be transmitted after this step timing.
70	SS		Waits max 25 s for CP-ACK
71	MS -> SS	CP-ACK	
72	SS		Waits max 60 s for RP-ACK RPDU
73	MS -> SS	CP-DATA	Contains RP-ACK RPDU
74	MS <- SS	CP-ACK	
75	MS		The MS shall indicate that an SM has arrived.
76	MS		Clear the SMS message store
77	MS	{PDP Context Activation}	Macro. PDP context activation from the MS.
78	MS -> SS	DEACTIVATE PDP CONTEXT REQUEST	The PDP context is deactivated by the MS. The PDP context deactivation is continued in parallel to the following
79	MS <- SS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
80	MS <- SS	DEACTIVATE PDP CONTEXT ACCEPT	
81	SS		Waits max 25 s for CP-ACK
82	MS -> SS	CP-ACK	
83	SS		Waits max 60 s for RP-ACK RPDU
84	MS -> SS	CP-DATA	Contains RP-ACK RPDU
85	MS <- SS	CP-ACK	
86	MS		The MS shall indicate that an SM has arrived.
87	MS		Clear the SMS message store

NOTE: Time values for SS wait time are chosen sufficiently high to be sure that the MS has enough time to respond to the different messages.

Specific Message Contents

SMS DELIVER TPDU (not containing a type 0 message)

Information element	Comment Value
TP-PID	Different from Type 0: “01000000”B
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters)
NOTE: The 160 characters in TP-UD shall include at least one occurrence of each character in the default alphabet (see 3GPP TS 23.038, clause 6.2.1).	

34.4.2 SMS mobile originated

34.4.2.1 Definition

34.4.2.2 Conformance requirements

A GPRS MS shall be able to submit short message TPDU (SMS-SUBMIT) at any time, independently of whether or not there is a PDP context in progress.

References

3GPP TS 24.011 clause 5.3.2.2.

3GPP TS 23.040 clause 3.1, 9.2.3.16.

34.4.2.3 Test purpose

To verify that a GPRS MS is able to correctly send a short message where the SMS is provided for the point to point service.

34.4.2.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- Mobile Station:
  - the MS shall be in GMM-state "GMM-REGISTERED";
  - the SMS message storage shall be empty.

Specific PICS Statements

- SMS messages are stored in the SIM (TSPC_AddInfo_StoreRcvSMSSIM).
- SMS messages are stored in the ME (TSPC_AddInfo_StoreRcvSMSME).

PIXIT Statements

- Support for state PDP-ACTIVE of session management.
- Maximum number of retransmissions of an unacknowledged CP-DATA message.

Test procedure

a) The MS shall be set up to send a short message to the SS. The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for CP-ACK message.

b) The MS shall be set up to send a short message to the SS. This time the SS will not acknowledge the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS. The MS retransmits the CP-DATA message.

Now, the CP-DATA message will be acknowledged by a CP-ACK from the SS, followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for CP-ACK message.

c) The MS shall be set up to send a short message to the SS. The SS is configured not to send any CP-ACK to acknowledge the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS. Then maximum 3 CP-DATA retransmissions may occur. Following the last CP-DATA retransmission from the MS, the SS checks that the MS does not retransmit more than the maximum allowed.

d) The MS shall be set up to send a short message to the SS. On receipt of the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS, the SS sends a CP-ERROR message containing a "Network Failure" cause. The SS verifies within 60 seconds that the MS does not re-send any CP-DATA messages.

e) A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered. The MS shall be set up to send a short message to the SS. The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for CP-ACK message.

f) The MS shall be set up to send a short message to the SS. The SS is configured not to send CP-ACK to acknowledge the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS. The MS retransmits the CP-DATA message. Now, the CP-DATA message will be acknowledged by a CP-ACK from the SS, followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for CP-ACK message.

g) The MS shall be set up to send a short message to the SS. The SS is configured not to send any CP-ACK to acknowledge the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS. Then maximum 3 CP-DATA retransmissions may occur. Following the last CP-DATA retransmission from the MS, the SS checks that the MS does not retransmit more than the maximum allowed.

h) The MS shall be set up to send a short message to the SS. On receipt of the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS, the SS sends a CP-ERROR message containing a "Network Failure" cause. The SS verifies that within 60 seconds the MS does not re-send any CP-DATA messages.

i) The MS shall be set up to send a short message to the SS. On receipt of the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS, the SS requests the deactivation of the previously active PDP context by sending DEACTIVATE PDP CONTEXT REQUEST, the MS responds with DEACTIVATE PDP CONTEXT ACCEPT. The SS responds with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for CP-ACK message.

j) A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered. The MS shall be set up to send a short message to the SS. On receipt of the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS, the SS requests the deactivation of the previously active PDP context by sending DEACTIVATE PDP CONTEXT REQUEST, the MS responds with DEACTIVATE PDP CONTEXT ACCEPT. This time the SS will not acknowledge the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS. The MS retransmits the CP-DATA message. Now, the CP-DATA message will be acknowledged by a CP-ACK from the SS, followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for CP-ACK message.

k) A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered. The MS shall be set up to send a short message to the SS. On receipt of the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS, the SS requests the deactivation of the previously active PDP context by sending DEACTIVATE PDP CONTEXT REQUEST, the MS responds with DEACTIVATE PDP CONTEXT ACCEPT. The SS is configured not to send any CP-ACK to acknowledge the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the MS. Then maximum 3 CP-DATA retransmissions may occur. Depending on the maximum number of automatic repeat, MO SMS sending may be repeated. Following the last CP-DATA retransmission from the MS, the SS checks that the MS does not retransmit more than the maximum allowed.

Expected sequence

Step	Direction	Message	Comments
1	MS		The MS is set up to send an SM.
2	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
3	SS → MS	CP-ACK	
4	SS → MS	CP-DATA	Contains RP-ACK RPDU.
5	SS		Wait max 25 s for CP-ACK.
6	MS → SS	CP-ACK	
7	MS		The MS is set up to send an SM.
8	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
9	SS		SS configured not to send CP-ACK.
10	MS → SS	CP-DATA	Retransmitted CP-DATA from MS.
11	SS → MS	CP-ACK	
12	SS → MS	CP-DATA	Contains RP-ACK RPDU.
13	SS		Wait max 25 s for CP-ACK.
14	MS → SS	CP-ACK	
15	MS		The MS is set up to send an SM.
16	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
17	SS		SS configured not to send any CP-ACK.
18	MS → SS	CP-DATA	Retransmitted CP-DATA from MS.
19	MS		Depending upon the maximum number of CP-DATA retransmissions implemented, step 18 may be repeated. The maximum number of retransmissions shall however not exceed three.
20	SS		The SS verifies within 60 s after the first CP-DATA message not acknowledged by SS that the MS does not retransmit more than the maximum allowed.
21	MS		The MS is set up to send an SM.
22	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
23	SS → MS	CP-ERROR	Containing “Network Failure” cause.
24			The SS verifies within 60 s after step 22 that the MS does not re-send any CP-DATA messages.
25	MS		A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
26	MS		The MS is set up to send an SM.
27	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
28	SS → MS	CP-ACK	
29	SS → MS	CP-DATA	Contains RP-ACK RPDU.
30	SS		Wait max 25 s for CP-ACK.
31	MS → SS	CP-ACK	
32	MS		The MS is set up to send an SM.
33	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
34	SS		SS configured not to send CP-ACK.
35	MS → SS	CP-DATA	Retransmitted CP-DATA from MS.
36	SS → MS	CP-ACK	
37	SS → MS	CP-DATA	Contains RP-ACK RPDU.
38	SS		Wait max 25 s for CP-ACK.
39	MS → SS	CP-ACK	
40	MS		The MS is set up to send an SM.
41	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
42	SS		SS configured not to send any CP-ACK.
Step	**Direction**	**Message**	**Comments**
43	MS → SS	CP-DATA	Retransmitted CP-DATA from MS.

44	MS		Depending upon the maximum number of CP-DATA retransmissions implemented, step 43 may be repeated. The maximum number of retransmissions shall however not exceed three.
45	SS		The SS verifies within 60 s after the first CP-DATA message not acknowledged by SS that the MS does not retransmit more than the maximum allowed.
46	MS		The MS is set up to send an SM.
47	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
48	SS → MS	CP-ERROR	Containing "Network Failure" cause.
49			The SS verifies within 60 s after step 47 that the MS does not re-send any CP-DATA messages.
50	MS		The MS is set up to send an SM.
51	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
52	SS → MS	DEACTIVATE PDP CONTEXT REQUEST	The PDP context is deactivated by the SS. The PDP context deactivation is continued in parallel to the following exchange of messages related to SMS.
53	MS → SS	DEACTIVATE PDP CONTEXT ACCEPT	
54	SS → MS	CP-ACK	
55	SS → MS	CP-DATA	Contains RP-ACK RPDU.
56	SS		Wait max 25 s for CP-ACK.
57	MS → SS	CP-ACK	
58	MS		A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
59	MS		The MS is set up to send an SM.
60	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
61	SS → MS	DEACTIVATE PDP CONTEXT REQUEST	The PDP context is deactivated by the SS. The PDP context deactivation is continued in parallel to the following exchange of messages related to SMS.
62	MS → SS	DEACTIVATE PDP CONTEXT ACCEPT	
63	SS		SS configured not to send CP-ACK.
64	MS → SS	CP-DATA	Retransmitted CP-DATA from MS.
65	SS → MS	CP-ACK	
66	SS → MS	CP-DATA	Contains RP-ACK RPDU.
67	SS		Wait max 25 s for CP-ACK.
68	MS → SS	CP-ACK	
69	MS		A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
70	MS		The MS is set up to send an SM.
71	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU).
72	SS → MS	DEACTIVATE PDP CONTEXT REQUEST	The PDP context is deactivated by the SS. The PDP context deactivation is continued in parallel to the following exchange of messages related to SMS.
73	MS → SS	DEACTIVATE PDP CONTEXT ACCEPT	
74	SS		SS configured not to send any CP-ACK.
Step	**Direction**	**Message**	**Comments**
75	MS → SS	CP-DATA	Retransmitted CP-DATA from MS.

76	MS		Depending upon the maximum number of CP-DATA retransmissions implemented, step 75 may be repeated. The maximum number of retransmissions shall however not exceed three.
77	SS		The SS verifies within 60 s after the first CP-DATA message not acknowledged by SS that the MS does not retransmit more than the maximum allowed.
NOTE:	Time values for SS wait times are chosen sufficiently high to be sure that the MS has enough time to respond to the different messages.		

Specific Message Contents

None.

34.4.3 Test of the status report capabilities and of SMS-COMMAND over GPRS:

This test applies to MSs which support the status report capabilities.

34.4.3.1 Definition

34.4.3.2 Conformance requirement

The SMS offers the SC the capabilities of informing the MS of the status of a previously sent mobile originated short message. This is achieved by the SC returning a status report TPDU (SMS-STATUS-REPORT) to the originating MS.

SMS-COMMAND enables an MS to invoke an operation at the SC.

The MS shall increment TP-MR by 1 for each SMS-SUBMIT or SMS-COMMAND being submitted.

References

- 3GPP TS 23.040 clauses 3.2.9 and 9.2.3.6.

34.4.3.3 Test purpose

1) To verify that the MS is able to accept a SMS-STATUS-REPORT TPDU.

2) To verify that the MS is able to use the SMS-COMMAND functionality correctly and sends an SMS-COMMAND TPDU with the correct TP-Message-Reference.

34.4.3.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- Mobile Station:
  - the MS shall be in GMM-state "GMM-REGISTERED".

Specific PICS Statements

-

PIXIT Statements

-

Test procedure

a) The MS is made to send a Mobile Originated short message.

b) The SS sends a CP-DATA message containing a RP-DATA RPDU itself containing an SMS-STATUS-REPORT TPDU.

c) The MS is made to send an SMS-COMMAND message enquiring about the previously submitted short message.

d) The SS acknowledges the CP-DATA message from the MS with a CP-ACK followed by a CP-DATA message containing an RP-ACK RPDU.

e) The MS is made to send an SMS-COMMAND message requiring to delete the previously submitted short message.

Expected sequence

Step	Direction	Message	Comments
1	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
2	SS → MS	CP-ACK	
3	SS → MS	CP-DATA	Contains RP-ACK RPDU
4	SS		Waits max 25 s for CP-ACK
5	MS → SS	CP-ACK	
6	SS → MS	CP-DATA	Contains RP-DATA RPDU (SMS-STATUS-REPORT TPDU)
7	MS → SS	CP-ACK	
8	MS → SS	CP-DATA	Contains RP-ACK RPDU
9	SS → MS	CP-ACK	
10	MS		The MS is made to send an SMS-COMMAND message enquiring about the previously submitted SM
11	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS-COMMAND TPDU) which shall contain the correct TP-MR
12	SS → MS	CP-ACK	
13	SS → MS	CP-DATA	Contains RP-ACK RPDU
14	MS → SS	CP-ACK	
15	MS		The MS is made to send an SMS-COMMAND message requiring to delete the previously submitted SM.
16	MS → SS	CP-DATA	Contains RP-DATA RPDU (SMS-COMMAND TPDU) which shall contain the correct TP-MR
17	SS → MS	CP-ACK	
18	SS → MS	CP-DATA	Contains RP-ACK RPDU
19	MS → SS	CP-ACK	

Specific Message Contents

SMS SUBMIT TPDU

Information element	Comment Value
TP-SRR	status report is requested "1"B

SMS-STATUS-REPORT TPDU (SS to MS in step 6):

Information element	Comment Value
TP-MR	same as previous SMS-SUBMIT
TP-MMS	no more messages "1"B
TP-SRQ	result of SMS-SUBMIT "0"B
TP-RA	same as the Destination address of the SMS-SUBMIT
TP-ST	SM received "00000000"B

First SMS-COMMAND TPDU (MS to SS in step 10)

Information element	Comment Value
TP-MR	TP-MR in previous SMS-SUBMIT plus "1"
TP-SRR	status report requested "1"B
TP-CT	Enquiry relating to previously submitted short message "00000000"B
TP-MN	not checked (TP-MR in previous SMS-SUBMIT)

Second SMS-COMMAND TPDU (MS to SS in step 15)

Information element	Comment Value
TP-MR	TP-MR in previous SMS-COMMAND plus "1"
TP-CT	Delete previously submitted short message "00000010"B
TP-MN	not checked (TP-MR in previous SMS-SUBMIT)

34.4.4 Test of capabilities of simultaneously receiving a short message whilst sending a mobile originated short message

34.4.4.1 Definition

34.4.4.2 Conformance requirements

An active MS shall be able to receive a short message TPDU (SMS-DELIVER) at any time, independently of whether or not there is an SMS mobile originated call (SMS-SUBMIT or SMS-COMMAND) in progress.

Reference(s):

3GPP TS 03.40 / 3GPP TS 23.040 clause 3.1, 9.2.3.16.

3GPP TS 04.11 / 3GPP TS 24.011 clause 3.2.

34.4.4.3 Test purpose

The test verifies that the MS is capable of simultaneously receiving a network originated SM whilst sending a mobile originated SM.

34.4.4.4 Method of test

Initial Conditions

System Simulator:

- 1 cell, default parameters.

Mobile Station:

- the MS shall be in GMM-state "GMM-REGISTERED";
- the SMS message storage shall be empty.

Specific PICS Statements

-

PIXIT Statements

Test procedure

The MS is triggered to send an SM to the SS. Upon the reception of the CP-DATA, the SS sends an SM to the MS.

The MS shall use the correct transaction identifiers and correctly receive the SM and indicate that a message has arrived.

Expected sequence

Step	Direction	Message	Comments
1	MS		The MS is triggered to send an SM.
2	MS -> SS	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
3	SS		The SS sends an SM to the MS triggered by the end of the CP-DATA message from the MS
4	MS <- SS	CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
5	MS -> SS	CP-ACK	
6	MS -> SS	CP-DATA	Contains RP-ACK RPDU
7	MS <- SS	CP-ACK	
8	MS <- SS	CP-ACK	
9	MS <-SS	CP-DATA	Contains RP-ACK RPDU
10	MS -> SS	CP-ACK	

Specific Message Contents

None.

34.4.5 Void

34.4.6 Concatenated MO SMS over GPRS

Concatenation allows short messages to be concatenated to form a longer message.

34.4.6.1 Conformance requirement

This facility allows short messages to be concatenated to form a longer message.

The Information-Element-Data field contains information set by the application in the SMS-SUBMIT so that the receiving entity is able to re-assemble the short messages in the correct order. Each concatenated short message contains a reference number, which together with the originating address and Service Centre address allows the receiving entity to discriminate between concatenated short messages sent from different originating SMEs and/or SCs

References

3GPP TS 23.040 Clause 9.2.3.24.1

34.4.6.2 Test purpose

To verify that MS is able to send longer messages (user data exceeding 140 octets) using concatenation feature.

34.4.6.3 Method of test

Initial conditions

System Simulator:

1 cell, default parameters

Mobile Station:

The MS shall be in GMM-state "GMM-REGISTERED"

Specific PICS Statements

-

PIXIT Statements

-

Test procedure

a) The MS is made to send a short message with user data exceeding 140 octets

b) Repeat steps c) to e) for n=1..N; N is the total number of segments in SM triggered in step a)

c) MS sends CP-DATA containing RP-DATA with "TP User Data" as *nth* segment of SM

d) The SS responds to the CP-DATA in step c) with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU

e) The SS waits a maximum of 25 s for CP-ACK message

f) Check for 60 s that no CP-DATA is received from the MS.

Maximum Duration of Test

-

Expected sequence

Step	Direction	Message	Comments
1	MS		MS is setup to send SM with user data exceeding 140 octets Repeat steps 2 to 6 for n = 1..N
2	MS → SS	CP-DATA	Contains RP-DATA with "TP User Data" as *nth* segment of SM. See specific message contents below
3	SS → MS	CP-ACK	
4	SS → MS	CP-DATA	Contains RP-ACK RPDU
5	SS		Waits max 25 s for CP-ACK
6 (Optional)	MS → SS	CP-ACK	Depends on the MS implementation if the CP-ACK is received.
7	SS		Check for 60 s that no CP-DATA is received from the MS.

Specific Message Contents

TP USER DATA (8 bits / 16 bits concatenation reference numbers) in step 2

Information element	Comment Value
UDHL	05 (8 bits) / 06 (16 bits)
IEI	00 (8 bits) / 08 (16 bits)
IEI-Length	03 (8 bits) / 04 (16 bits)
IEI Data	
MR	*M*, any value between 0 to 255 (8 bits) / 65535 (16 bits)
MAX SEGMENT COUNT	*N*, Total number of segments
SEQUENCE NUMBER	*n*, segment number
TP-UD (<=134 (8 bit) / 133 (16 bit) octets)	User data in *n*th segment of SM

34.4.7 Concatenated MT SMS over GPRS

Concatenation allows short messages to be concatenated to form a longer message

34.4.7.1 Conformance requirement

This facility allows short messages to be concatenated to form a longer message.

The Information-Element-Data field contains information set by the application in the SMS-DELIVER so that the receiving entity is able to re-assemble the short messages in the correct order. Each concatenated short message contains a reference number, which together with the originating address and Service Centre address allows the receiving entity to discriminate between concatenated short messages sent from different originating SMEs and/or SCs

The TP elements in the SMS-DELIVER PDU, apart from TP-UDL and TP-UD, should remain unchanged for each SM that forms part of a concatenated SM; otherwise this may lead to irrational behavior.

References

3GPP TS 23.040 Clause 9.2.3.24.1

34.4.7.2 Test purpose

To verify that MS is able to combine concatenated message segments to form a long message.

34.4.7.3 Method of test

Initial conditions

System Simulator:

1 cell, default parameters

Mobile Station:

The MS shall be in GMM-state "GMM-REGISTERED"

The SMS message storage shall be empty.

Specific PICS Statements

-

PIXIT Statements

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Test procedure

a) Repeat steps b) to d) for n= 1..N; N is the total number of segments in SM

b) The SS sends a CP-DATA message. The information element of the CP-DATA message will be RP-DATA (SMS DELIVER TPDU) with “TP User Data” as the *n*th segment of SM

c) The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

d) The SS sends a CP-ACK to the MS.

Maximum Duration of Test

-

Expected sequence

Step	Direction	Message	Comments
			Repeat steps 1 to 4 for *n = 1..N*
1	SS → MS	CP-DATA	RP-DATA with “TP User Data” as the *n*th segment of SM
2	MS→ SS	CP-ACK	Wait for CP-ACK for 25 s
3	MS→ SS	CP-DATA	Waits max 60 s for RP-ACK RPDU
4	SS → MS	CP-ACK	
5	MS		SS prompts operator to verify stored long message

Specific Message Contents

TP USER DATA in step 1

Information element	Comment Value
UDHL	05
IEI	00
IEI-Length	03
IEI Data	
MR	00
MAX SEGMENT COUNT	*N*, Total number of segments
SEQUENCE NUMBER	*n*, segment number
TP-UD (<=134 octets)	user data equal to 134 octets for *n = 1, N-1* and user data less than or equal to 134 octets for *n = N*

34.4.8 Short Messaging Service – Handling of unknown, unforeseen, and erroneous protocol data

34.4.8.1 CP Error Handling

34.4.8.1.1 Conformance requirements

a) The Mobile Station shall ignore a CP message (CP-DATA, CP-ACK, CP-ERROR) received with TI value "111".

b) Whenever a CP-ACK message is received specifying a Transaction Identifier which is not associated with an active SM transfer, the mobile station shall discard the message and return a CP-ERROR message with cause #81, "Invalid Transaction Identifier" using the received Transaction Identifier, if an appropriate connection exists

c) The Mobile Station shall ignore a CP-ERROR message that is received specifying a Transaction Identifier, which is not associated with an active SM transfer.

d) The Mobile Station shall ignore a CP-DATA message that is received specifying a Transaction Identifier which is not associated with an active SM transfer and with transaction identifier flag set to "1".

e) If the Mobile Station receives a message with message type not defined for the PD or not implemented by the receiver, it shall ignore the message and return a CP-ERROR message with cause #97 "message type non-existent or not implemented", if an appropriate connection exists.

f) If the Mobile Station receives a message not consistent with the protocol state, the Mobile Station shall ignore the message and return a CP-ERROR message with cause #98 "Message type not compatible with the short message protocol state", if an appropriate connection exists.

g) When on receipt of a message:

h) an "imperative message part" error; or

- a "missing mandatory IE" error.

is diagnosed or when a message containing a syntactically incorrect mandatory IE is received, the mobile station shall proceed as follows.

- When the corresponding SM transfer is not seen as successfully transferred, i.e. the transaction is not completed, the mobile station shall ignore the message and return a CP-ERROR message with cause #96 "invalid mandatory information", if an appropriate connection exists.

Reference

3GPP TS 24.011clause 9.2

34.4.8.1.2 Test purpose

a) To Verify that MS ignores CP-DATA message with TI value "111".

b) To verify that MS ignores CP-ACK message with TI value not associated with active SMS transfer and sends CP-ERROR with cause # 81

c) To verify that MS ignores CP-ERROR with TI value not associated with active SMS transfer

d) To verify MS response when received CP-DATA with TI value not associated with active SMS transfer and “TI” flag set to ‘1’B

e) To verify that MS ignores a message with “message type” not defined for the PD ‘1001’B and returns CP-ERROR with cause#97

f) To verify that MS ignores a message not consistent with protocol state and returns CP-ERROR with cause#98

g) To Verify that MS ignores CP-DATA with “missing mandatory IE” and returns CP-ERROR with cause#96 when the corresponding SM transaction is not completed

34.4.8.1.3 Method of test

Initial Conditions

System simulator:

1 cell, default parameters

Mobile Station:

The MS shall be in GMM-state "GMM-REGISTERED"

Specific PICS Statements

-

PIXIT Statements

-

Test procedure

a) The SS sends CP-DATA with TI value '111'B. Check for no response from MS for 60 s.

b) The MS shall be set up to send a short message to the SS. The MS sends CP-DATA containing RP-DATA (SMS SUBMIT PDU). SS send CP-ACK with TI value different from the TI value in CP-DATA received from MS. MS sends CP-ERROR with cause #81 (Invalid Transaction Identifier).

c) The MS shall be set up to send a short message to the SS. The MS sends CP-DATA containing RP-DATA (SMS SUBMIT PDU). SS send CP-ERROR with TI value different from the TI value in CP-DATA received from MS. SS sends CP-ACK and then CP-DATA containing RP-ACK. The SS waits a maximum of 25 s for the CP-ACK message.

d) The MS shall be set up to send a short message to the SS. The MS sends CP-DATA containing RP-DATA (SMS SUBMIT PDU). SS sends CP-ACK and then sends CP-DATA with TI value different from the TI value in CP-DATA received from MS. MS shall not send CP-ACK.

e) SS sends a message with PD value '1001'B and message type '00000010'B. MS sends CP-ERROR with cause #97 (Message type non-existent or not implemented).

f) The MS shall be set up to send a short message to the SS. MS sends CP-DATA (SMS SUBMIT PDU). SS sends CP-ACK twice. MS sends CP-ERROR with cause #98 (Message type not compatible with the short message protocol state)

g) The MS shall be set up to send a short message to the SS. MS sends CP-DATA (SMS SUBMIT PDU). SS sends CP-ACK and then sends CP-DATA with "CP-User data" IE missing. MS sends a CP-ERROR message with cause #96 ("invalid mandatory information").

Maximum Duration of Test

10 min

Expected sequence

Step	Direction	Message	Comments
1	SS → MS	CP-DATA	With TI value set to '111'B.
2	SS		Check for no response from the MS for 60 s
3	MS		The MS is set up to send an SM
4	MS → SS	CP-DATA	Containing RP-DATA (SMS SUBMIT PDU)
5	SS → MS	CP-ACK	With TI value different from CP-DATA in step 4.
6	MS → SS	CP-ERROR	Cause #81
			Complete the transaction initiated by MS.
7	MS		The MS is set up to send an SM
8	MS → SS	CP-DATA	Containing RP-DATA (SMS SUBMIT PDU)
9	SS → MS	CP-ERROR	With TI value different from CP-DATA in step 8.
10	SS → MS	CP-ACK	
11	SS → MS	CP-DATA	Containing RP-ACK
12	SS		Wait 25 s for CP-ACK.
13	MS → SS	CP-ACK	
14	MS		The MS is set up to send an SM
15	MS → SS	CP-DATA	Containing RP-DATA (SMS SUBMIT PDU)
16	SS → MS	CP-ACK	
17	SS → MS	CP-DATA	With TI different from CP-DATA in step 15 and containing RP-ACK
18	SS		Check for no CP-ACK within 25 s
			Complete the transaction initiated by MS.
19	SS → MS	CP-Message	Message type '00000010'B and PD '1001'B
20	MS → SS	CP-ERROR	Cause #97
21	MS		The MS is set up to send an SM
22	MS → SS	CP-DATA	Containing RP-DATA (SMS SUBMIT PDU)
23	SS → MS	CP-ACK	
24	SS → MS	CP-ACK	
25	MS → SS	CP-ERROR	Cause #98
			Complete the transaction initiated by MS.
26	MS		The MS is set up to send an SM
27	MS → SS	CP-DATA	Containing RP-DATA (SMS SUBMIT PDU)
28	SS → MS	CP-ACK	
29	SS → MS	CP-DATA	With TI flag set to '1'B, TI value same as the TI value of CP-DATA in step 27 and Missing "CP-User-Data" IE.
30	MS → SS	CP-ERROR	Cause#96
			Complete the transaction initiated by MS.

Specific Message Contents

None

34.4.8.2 RP Error Handling

34.4.8.2.1 Conformance Requirement

a) Whenever any RP-ACK message is received specifying a Message Reference which is not associated with an active SM transfer, the mobile station shall discard the message and return an RP-ERROR message with cause #81, "Invalid short message transfer reference value" using the received Message Reference, if an appropriate connection exists.
If the MS is attached to GPRS and the circuit-switched domain, and an SMS transfer via GPRS fails either due to a reception of an RP-ERROR message with cause #69 or due to the complete lack of network response, then the MS shall take the following actions:
The MS shall use the circuit-switched domain instead of GPRS for SMS transfer for an implementation dependent time. When a different PLMN is selected, if the MS preferred method is the sending of SMS over GPRS, the MS shall revert to trying an SMS transfer via GPRS.

b) When an RP-ERROR message is received specifying a Message Reference, which is not associated with an active SM transfer, the mobile station shall discard the message.

c) If the Mobile Station receives a RP-message indicating a value of the message type indicator (MTI) defined as reserved, it shall ignore the message and return an RP-ERROR message with cause #97 "message type non-existent or not implemented", if an appropriate connection exists.

d) If the Mobile Station receives a message (except RP-ERROR) not consistent with the protocol state, the Mobile Station shall ignore the message and return a RP-ERROR message with cause #98 "Message type not compatible with Short Message protocol state", if an appropriate connection exists.

e) If the Mobile Station receives an RP-ERROR message not consistent with the protocol state, the Mobile Station shall ignore the message.

f) When on receipt of a message:

- an "imperative message part" error; or

- a "missing mandatory IE" error;

is diagnosed or when a message containing a syntactically incorrect mandatory IE is received, the mobile station shall (except for the case of a reserved value of the MTI as defined above) proceed as follows:

- when the message is an RP-DATA or RP-ACK, the mobile station shall ignore the message and return an RP-ERROR message with cause #96 "invalid mandatorinformation", if an appropriate connection exists.

Reference

3GPP TS 24.011clauses 2.6, 9.3

34.4.8.2.2 Test Purpose

a) To verify that MS ignores RP-ACK with message reference which is not associated with active SM transfer and sends RP-ERROR with cause #81, “Invalid short message transfer reference value"

b) To verify that MS ignores RP-ERROR with message reference which is not associated with active SM transfer

c) To verify that MS ignores a RP-message with reserved MTI value and sends RP-ERROR with cause #97 "message type non-existent or not implemented"

d) To verify that MS ignores the RP-ACK when SMR is in idle state and sends RP-ERROR with cause #98 "Message type not compatible with Short Message protocol state"

e) To verify that MS ignores RP-ERROR when SMR is in idle state

f) To verify that MS ignores RP-DATA with “missing mandatory IE” and sends RP-ERROR with cause #96, “Invalid mandatory information”

34.4.8.2.3 Method of test

Initial Conditions

System simulator:

1 cell, default parameters

Mobile Station:

The MS shall be in GMM-state "GMM-REGISTERED"

Specific PICS Statements

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PIXIT Statements

-

Test procedure

a) The MS shall be set up to send a short message to the SS. MS sends CP-DATA containing RP-DATA (SMS SUMBIT PDU). SS sends CP-ACK and CP-DATA containing RP-ACK with "RP Message Reference (RP-MR)" different from RP-MR in RP_DATA received. MS sends RP-ERROR with cause # 81, "Invalid short message transfer reference value", if an appropriate connection exists. The MS may switch to CS domain for completing the transaction.

b) The MS shall be set up to send a short message to the SS. MS sends CP-DATA containing RP-DATA (SMS SUMBIT PDU). SS sends CP-ACK and CP-DATA containing RP-ERROR with "RP Message Reference (RP-MR)" different from RP-MR in RP_DATA received. Check for no CP-ACK 60 s. MS may switch to CS domain.

c) The SS sends CP-DATA containing RP-Message with TP-MTI value'010'B, "Reserved". MS sends CP-DATA containing RP-ERROR with cause#97, "message type not compatible with short message state"

d) The SS sends CP-DATA containing RP-ACK when there is no active SMS transfer. MS sends CP-DATA containing RP-ERROR with cause#98, "Message type not compatible with short message protocol state"

e) The SS sends CP-DATA containing RP-ERROR when there is no active SMS transfer.

f) The SS sends CP-DATA containing "RP-DATA without RP-User Data IE". MS sends CP-DATA containing RP-ERROR with cause#96, "Invalid mandatory information"

Maximum Duration of Test

10min

Expected sequence

Step	Direction	Message	Comments
1	MS		The MS is set up to send an SM
2	MS → SS	CP-DATA	Containing RP-DATA (SMS SUBMIT PDU)
3	SS → MS	CP-ACK	
4	SS → MS	CP-DATA	Containing RP-ACK with RP-MR different from CP-DATA in step 2
5	MS → SS	CP-ACK	
6 (optional)	MS → SS	CP-DATA	Containing RP-ERROR with cause #81
7 (conditional)	SS->MS	CP-ACK	Send if step 6 is performed
8			Complete the transaction initiated by MS. MS may switch to CS domain.
9	MS		The MS is set up to send an SM
10	MS → SS	CP-DATA	Containing RP-DATA (SMS SUBMIT PDU)
11	SS → MS	CP-ACK	
12	SS → MS	CP-DATA	Containing RP-ERROR with RP-MR different from CP-DATA in step 10
13	MS → SS	CP-ACK	
14	SS → MS	CP-DATA	Containing RP-ACK with correct RP-MR.
15 (optional)	MS → SS	CP-ACK	MS may switch to CS domain.
16	SS → MS	CP-DATA	Containing RP-Message with MTI value '010'B
17	MS → SS	CP-ACK	
18	MS → SS	CP-DATA	Containing RP-ERROR with cause #97.
19	SS → MS	CP-ACK	
20	SS → MS	CP-DATA	Containing RP-ACK
21	MS → SS	CP-ACK	
22	MS → SS	CP-DATA	Containing RP-ERROR with cause #98.
23	SS → MS	CP-ACK	
24	SS → MS	CP-DATA	Containing RP-ERROR
25	MS->SS	CP-ACK	
26	SS		Check for no response from MS
27	SS → MS	CP-DATA	Containing RP-DATA without RP-User Data IE.
28	MS → SS	CP-ACK	
29	MS → SS	CP-DATA	Containing RP-ERROR with cause #96
30	SS → MS	CP-ACK	

Specific Message Contents

None

34.5 Default message contents

CP-DATA (including RP-DATA SS->MS)

Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TI value	any value from the set {0, ..., 6}
TI flag	0
Message type	00000001
CP-User data	
length indicator	
RP-DATA	max 248 octets
RP-Message Type	001 (RP-DATA SS->MS)
RP-Message Reference	see 3GPP TS 04.11 subclause 8.2.3
RP-Originator Address	see 3GPP TS 04.11 subclause 8.2.5.1
RP-Destination Address	length indicator set to 0
RP-User Data	
length indicator	
TP-DATA	max 233 octets

CP-DATA (including RP-DATA MS->SS)

Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TI value	any value from the set {0, ..., 6}
TI flag	0
Message type	00000001
CP-User data	
length indicator	
RP-DATA	max 248 octets
RP-Message Type	000 (RP-DATA MS->SS)
RP-Message Reference	see 3GPP TS 04.11 subclause 8.2.3
RP-Originator Address	length indicator set to 0
RP-Destination Address	see 3GPP TS 04.11 subclause 8.2.5.2
RP-User Data	
length indicator	
TP-DATA	max 233 octets

CP-DATA (including RP-ACK MS->SS)

Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TI value	
TI flag	
Message type	00000001
CP-User data	
length indicator	
RP-ACK	
RP-Message Type	010 (RP-ACK MS->SS)
RP-Message Reference	see 3GPP TS 04.11 subclause 8.2.3

CP-DATA (including RP-ACK SS->MS)

Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TI value	
TI flag	
Message type	00000001
CP-User data	
length indicator	
RP-ACK	
RP-Message Type	011 (RP-ACK SS->MS)
RP-Message Reference	see 3GPP TS 04.11 subclause 8.2.3

CP-DATA (including RP-ERROR MS->SS)

Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TI value	
TI flag	
Message type	00000001
CP-User data	
length indicator	
RP-ERROR	
RP-Message Type	100 (RP-ERROR MS->SS)
RP-Message Reference	see 3GPP TS 04.11 subclause 8.2.3
RP-Cause	see 3GPP TS 04.11 subclause 8.2.5.4
RP_User Data	see 3GPP TS 04.11 subclause 8.2.5.3: optional, may be present or not
Length indicator	
TP-Data	max 233 octets

CP-DATA (including RP-ERROR SS->MS)

Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TI value	
TI flag	
Message type	00000001
CP-User data	
length indicator	
RP-ERROR	
RP-Message Type	101 (RP-ERROR SS->MS)
RP-Message Reference	see 3GPP TS 04.11 subclause 8.2.3
RP-Cause	see 3GPP TS 04.11 subclause 8.2.5.4
RP_User Data	see 3GPP TS 04.11 subclause 8.2.5.3 : optional, may be present or not
Length indicator	
TP-Data	max 233 octets

CP-DATA (including RP-SMMA MS->SS)

Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TI value	
TI flag	
Message type	00000001
CP-User data	
length indicator	
RP-SMMA	
RP-Message Type	110 (RP-SMMA MS->SS)
RP-Message Reference	see 3GPP TS 04.11 subclause 8.2.3

CP-ACK

Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TI value	
TI flag	
Message type	00000100

CP-ERROR

Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TI value	
TI flag	
Message type	00010000
CP-Cause	
Cause value	see 3GPP TS 04.11 subclause 8.1.4.2

35 Low battery voltage detection

35.1 Definition

Low battery or shutdown voltage detection is used to trigger inhibition of all RF transmission before the MS supply voltage reaches a level where effective use of the radio frequency spectrum is no longer guaranteed.

35.2 Conformance requirement

1. The MS shall not make ineffective use of the radio frequency spectrum. In no case shall the MS exceed the transmitted levels as defined in 3GPP TS 05.05 for extreme operation.

   3GPP TS 05.05, subclause D.2.2.

2. The MS shall inhibit all RF transmission when the power supply voltage is below the manufacturer declared approximate shutdown voltage.

   3GPP TS 05.05, subclause D.2.2.

35.3 Test purpose

1. To verify that the MS does not make ineffective use of the RF spectrum.
2. To verify that the MS inhibits all RF transmission when the battery voltage falls below the manufacturer declared shutdown level.

35.4 Method of test

35.4.1 Initial conditions

The SS transmits a BCCH with a location updating time set to 0,1 hours.

The SS sends a paging request message to the MS.

The MS responds with a channel request message.

The SS sends an immediate assignment message establishing an SDCCH.

35.4.2 Procedure

a) The SS gradually reduces the power supply voltage until the MS ceases the production of RF output.

   The RF output spectrum shall be monitored for any anomalies while the supply voltage is being reduced.

NOTE 1: The declared approximate shutdown voltage gives an indication of the voltage where the MS will cease RF output.

NOTE 2: If any anomalies occur, then additional testing using the transmitter tests at the voltage where the anomaly occurred is performed to determine in an objective manner, whether or not the conformance requirement is met.

c) After 7 minutes, the SS sends a paging message to the MS.

d) The SS observes whether or not the MS produces any RF output.

This measurement is performed over the relevant transmit band.

The spectrum analyser is set to:

Bandwidth: 3 MHz.

Peak Hold.

e) The SS modifies the location area of the BCCH.

f) For 7 minutes, the SS observes whether or not the MS produces any RF output.

NOTE 3: It is anticipated that the MS might attempt location updating.

g) The MS is switched off and on.

h) The SS pages the MS.

i) The SS observes whether or not the MS produces any RF output.

35.5 Test requirement

1. In step a) no anomalies shall occur.
2. In step a), the MS shall cease the production of RF output.
3. In steps d), f) and i), the MS shall not produce any RF output above -30 dBm.

36 Individual equipment type requirements and interworking - special conformance testing functions

Refer to 3GPP TS 04.14 for complete specification

37 to 39 Void

Void