

## 26.6.4 Test of the channel assignment procedure

An intracell change of channel can be requested by upper layers in order to change the channel type, or it may be initiated by the RR-sublayer, e.g. for an intra cell handover. This change is performed using the channel assignment procedure. If the procedure is incorrectly implemented in the MS, the establishment and maintenance of connections is endangered. This applies for the successful case and for the assignment failure: the MS's correct return to the old channel after assignment failure is a necessary part of the GSM system design.

### 26.6.4.1 Dedicated assignment / successful case

#### 26.6.4.1.1 Conformance requirements

1. Upon receipt of the ASSIGNMENT COMMAND message, the mobile station initiates a local end release of link layer connections, disconnects the physical channels, commands the switching to the assigned channels and initiates the establishment of lower layer connections (this includes the activation of the channels, their connection and the establishment of the main signalling links).
2. MM-messages and CM-messages using SAPI=0 sent from the mobile station to the network can be duplicated by the data link layer in the following case:
  - a channel change of dedicated channels is required (assignment or handover procedure) and the last layer 2 frame has not been acknowledged by the peer data link layer before the mobile station leaves the old channel.

In this case, the mobile station does not know whether the network has received the message correctly. Therefore, the mobile station has to send the message again after the new dedicated channel is established.

3. An ASSIGNMENT COMMAND message may indicate a frequency change in progress, with a starting time and possibly alternative channel descriptions.

In the case of the reception of an ASSIGNMENT COMMAND message which contains only the description of a channel to be used after the starting time, and if the starting time has not already elapsed, the mobile station shall wait up to the starting time before accessing the channel.

4. The MS shall establish the link with the power level specified in the ASSIGNMENT COMMAND message.

The MS shall confirm the power control level that it is currently employing in the uplink SACCH L1 header. The indicated value shall be the power control level actually used by the mobile for the last burst of the previous SACCH period.

5. The MS shall apply the hopping frequencies specified in ASSIGNMENT COMMAND message in the Mobile Allocation IE or the Frequency List IE at the time of accessing the new channel using the last received Cell Allocation.
6. After receipt of the ASSIGNMENT COMMAND the MS shall perform the assignment and return an ASSIGNMENT COMPLETE without undue delay.

#### References

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|----------|--|
| 1, 3, 5. | 3GPP TS 04.08 / 3GPP TS 44.018, subclause 3.4.3.                               |
| 2.       | 3GPP TS 04.08 / 3GPP TS 44.018, subclause 3.1.4.3.                             |
| 4.       | 3GPP TS 04.08 / 3GPP TS 44.018, subclause 3.4.3; 3GPP TS 05.08, subclause 4.2. |
| 6.       | 3GPP TS 04.13, subclause 5.2.4.  |

#### 26.6.4.1.2 Test purpose

1. To verify that upon receipt of an ASSIGNMENT COMMAND, the MS switches to the channel defined in the ASSIGNMENT COMMAND, establishes the link and sends an ASSIGNMENT COMPLETE message. This is tested for an MS supporting TCH in the special cases of a transition.
  - 1.1 from non-hopping SDCCH to hopping TCH/F using a different timeslot;
  - 1.2 from hopping TCH/F to non-hopping TCH/F using a different timeslot;

- 1.3 from non-hopping TCH/F to non-hopping TCH/F using a different timeslot;
- 1.4 from non-hopping TCH/F to hopping TCH/H using a different timeslot; this test purpose is only applicable if the MS supports TCH/H;
- 1.5 from hopping TCH/H to non-hopping TCH/H using a different timeslot; this test purpose is only applicable if the MS supports TCH/H;
- 1.6 from non-hopping TCH/H to hopping TCH/F using a different timeslot; this test purpose is only applicable if the MS supports TCH/H.
2. To verify that an MS supporting TCH, having sent an MM- or CM message which was not acknowledged on L2 before the channel assignment procedure was initiated and before the MS has left the old channel, repeats that message after completion of the assignment procedure without incrementing N(SD). This is tested in the special case of MM message AUTHENTICATION RESPONSE.
  3. To verify that, if an MS supporting TCH has received an ASSIGNMENT COMMAND message which contains only the description of a channel to be used after the starting time, and if the starting time has not already elapsed, the mobile station shall wait up to the starting time before accessing the channel.
  4. To verify that an MS supporting TCH, having received an ASSIGNMENT COMMAND, having sent an SABM frame to establish the main signalling link on the assigned channel, reports the power level specified in the ASSIGNMENT COMMAND message, in the uplink SACCH L1 header of the SACCH message sent in the SACCH period following the transmission of the SABM frame.
  5. To verify that an MS supporting TCH, having received an ASSIGNMENT COMMAND, is able in the case of frequency hopping to decode the Mobile Allocation and Frequency List IEs correctly and applies the specified frequencies using the correct Cell Allocation.
  6. To verify that after receipt of the ASSIGNMENT COMMAND the MS returns an ASSIGNMENT COMPLETE without undue delay.

#### 26.6.4.1.3 Method of test

##### Initial Conditions

System Simulator:

1 cell, default parameters except:

	<b>BCCH ARFCN</b>	<b>Throughout the test, the CA broadcast in System Information 1 is</b>
GSM 450	263	259, 261, 263, 265, 267, 269, 271, 273, 275, 277
GSM 480	310	306, 308, 310, 312, 314, 316, 318, 320, 322, 324
GSM 710	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496
GSM 750	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496
T-GSM 810	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496
GSM 850	147	137, 144, 147, 153, 161, 169, 172, 173, 179, 186
GSM 900	20	10, 17, 20, 26, 34, 42, 45, 46, 52, 59
DCS 1 800	747	734, 741, 747, 754, 759, 766, 773, 775, 779, 782
PCS 1 900	647	634, 641, 647, 654, 659, 666, 673, 675, 679, 682
		Note that the actual CA of the cell contains other frequencies.

Mobile Station:

The MS is in the "idle, updated" state with a TMSI allocated.

##### Specific PICS statements

- MS supports GSM HR (TSPC\_AddInfo\_Halfrate)

##### PIXIT statements

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## Foreseen Final State of the MS

"Idle, updated", with TMSI allocated.

## Test Procedure

The SS pages the MS and allocates an SDCCH. Then 2 different channels are assigned with ASSIGNMENT COMMANDs. Each time the MS shall switch to the assigned channel, establish the link and send an ASSIGNMENT COMPLETE message.

Then the SS sends a AUTHENTICATION REQUEST message. The MS shall answer with an AUTHENTICATION RESPONSE message, which is not acknowledged on L2 by the SS. Immediately after the AUTHENTICATION RESPONSE message is received, the SS sends an ASSIGNMENT COMMAND. The MS shall switch to the assigned channel, establish the link with the commanded power level and send an ASSIGNMENT COMPLETE message. Then MS shall repeat the AUTHENTICATION RESPONSE message, with the same N(SD) value.

Then the SS sends an ASSIGNMENT COMMAND, which includes a Starting Time IE. The MS shall react as specified above, but this shall be done at the time specified in Starting Time IE.

For an MS not supporting TCH/H, the SS initiates the channel release procedure and the test ends here. For an MS supporting TCH/H, the channel assignment procedure is performed another three times, with half rate channels involved, and again it is checked that the MS correctly completes the procedures, before the SS initiates the channel release procedure.

## Maximum Duration of Test

30 s.

## Expected Sequence

NOTE: 3GPP TS 04.08 / 3GPP TS 44.018 appears to be unclear as to whether timer T3240 shall or shall not be started as a result of the AUTHENTICATION REQUEST message sent in step 10. To allow a variety of test equipment implementations, the IDENTITY REQUEST message is included in order to avoid an unexpected expiry of timer T3240 prior to the end of the expected sequence.

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST TYPE 1	See specific message contents.
2	MS -> SS	CHANNEL REQUEST	
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	PAGING RESPONSE	
5	SS -> MS	ASSIGNMENT COMMAND	
6	MS -> SS	ASSIGNMENT COMPLETE	
7	SS		See specific message contents. Sent on the correct channel after establishment of the main signalling link. This message shall be ready to be transmitted before 600 ms after the completion of step 5. The SS checks that the MS reports the requested power level in the layer 1 header of the SACCH message that is sent in the first SACCH multiframe following the SABM.
8	SS -> MS	ASSIGNMENT COMMAND	See specific message contents. Sent on the correct channel after establishment of the main signalling link. This message shall be ready to be transmitted before 600 ms after the completion of step 8.
9	MS -> SS	ASSIGNMENT COMPLETE	
10	SS -> MS	AUTHENTICATION REQUEST	This message is not L2 acknowledged by the SS. See specific message contents. Sent on the correct channel after establishment of the main signalling link. This message shall be ready to be transmitted before 600 ms after the completion of step 12. N(SD) shall be the same as in step 10.
11	MS -> SS	AUTHENTICATION RESPONSE	
12	SS -> MS	ASSIGNMENT COMMAND	
13	MS -> SS	ASSIGNMENT COMPLETE	See specific message contents. The SS checks that there is no radio transmission on the new channel before the starting time. Sent on the correct channel after establishment of the main signalling link.
14	MS -> SS	AUTHENTICATION RESPONSE	
15	SS->MS	IDENTITY REQUEST	
16	MS->SS	IDENTITY RESPONSE	
17	SS -> MS	ASSIGNMENT COMMAND	
18	SS		
19	MS -> SS	ASSIGNMENT COMPLETE	
A			This test part is performed if the MS does not support TCH/H (see PICS). The main signalling link is released.
A20	SS -> MS	CHANNEL RELEASE	
B			This test part is performed if the MS supports TCH/H (see PICS). See specific message contents. Sent on the correct channel after establishment of the main signalling link. This message shall be ready to be transmitted before 600 ms after the completion of step B20.
B20	SS -> MS	ASSIGNMENT COMMAND	
B21	MS -> SS	ASSIGNMENT COMPLETE	
B22	SS -> MS	IDENTITY REQUEST	
B23	MS -> SS	IDENTITY RESPONSE	
B24	SS -> MS	ASSIGNMENT COMMAND	
B25	MS -> SS	ASSIGNMENT COMPLETE	
B26	SS -> MS	ASSIGNMENT COMMAND	
B27	MS -> SS	ASSIGNMENT COMPLETE	
B28	SS -> MS	CHANNEL RELEASE	

## Specific Message Contents

## Step 3

## IMMEDIATE ASSIGNMENT:

As default message contents except Channel Description <ul style="list-style-type: none"> <li>- Channel Type</li> <li style="padding-left: 20px;">TDMA offset</li> <li>- Timeslot Number</li> <li>- Training Sequence Code</li> <li>- Hopping</li> <li>- ARFCN</li> </ul>	SDCCH/8 Chosen arbitrarily N, chosen arbitrarily Chosen arbitrarily Single RF Channel the ARFCN of the BCCH carrier
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## Step 5

## ASSIGNMENT COMMAND:

Channel Description <ul style="list-style-type: none"> <li>- Channel Type and TDMA offset</li> <li>- Timeslot Number</li> <li>- Training Sequence Code</li> <li>- Hopping</li> <li>- MAIO</li> <li>- HSN</li> </ul> Power Command <ul style="list-style-type: none"> <li>- Power level</li> </ul> Frequency list IE Channel Mode <ul style="list-style-type: none"> <li>- Mode</li> </ul> Mobile Allocation Starting Time	TCH/F (N+1) mod 8 Chosen arbitrarily RF hopping channel Chosen arbitrarily from the set (0, 1 to N-1) where N is the number of frequencies in the Mobile Allocation IE. Chosen arbitrarily from the set (1 to 63)  Chosen arbitrarily but with a changed value. Not included  Signalling Indicates all of the CA (broadcast on the BCCH) except for the BCCH carrier. Not included
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## Step 8

## ASSIGNMENT COMMAND:

Channel Description <ul style="list-style-type: none"> <li>- Channel Type and TDMA offset</li> <li>- Timeslot Number</li> <li>- Training Sequence Code</li> <li>- Hopping</li> <li>- ARFCN</li> </ul> Power Command <ul style="list-style-type: none"> <li>- Power level</li> </ul> Channel Mode  Frequency list IE Cell Channel Description Mobile Allocation Starting Time	TCH/F (N+3) mod 8 Chosen arbitrarily Single RF Channel the ARFCN of the BCCH carrier  Chosen arbitrarily but with a changed value. A non-signalling mode arbitrarily selected from the full rate capabilities declared for the MS Not Included See table below Not included Not included
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ASSIGNMENT COMMAND		
Band	Cell Channel Description	
	Format	ARFCNs
GSM 450	Range 128	271, 273, 275, 277, 278, 279, 281, 282, 284, 287 and 289
GSM 480	Range 128	318, 320, 322, 324, 325, 326, 328, 329, 331, 334 and 336
GSM 710	Range 128	482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508
GSM 750	Range 128	482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508
T-GSM 810	Range 128	482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508
GSM 850	Range 128	172, 173, 179, 186, 193, 200, 201, 202, 203, 235, 241
GSM 900	Bitmap 0	45, 46, 52, 59, 66, 73, 74, 75, 76, 108, 114
DCS 1 800	Range 128	773, 775, 779, 782, 791, 798, 829, 832, 844
PCS 1 900	Range 128	673, 675, 679, 682, 691, 698, 729, 732, 744

Step 12

ASSIGNMENT COMMAND:

Channel Description	
- Channel Type and TDMA offset	TCH/F
- Timeslot Number	(N+4) mod 8
- Training Sequence Code	Chosen arbitrarily
- Hopping	RF hopping channel
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1) where N is the number of frequencies in the Mobile Allocation IE.
- HSN	Chosen arbitrarily from the set (1 to 63)
Power Command	
- Power level	Chosen arbitrarily but with a changed value.
Channel Mode	Not included
Frequency list IE	Not included
Cell Channel Description	Not included (thus the CA from step 8 is used to decode the MA)
Mobile Allocation	Indicates frequencies - See table below
Starting Time	Not included

ASSIGNMENT COMMAND	
Band	Mobile Allocation
	ARFCNs
GSM 450	271, 273, 279, 281, 282, 284, 287 and 289
GSM 480	318, 320, 326, 328, 329, 331, 334 and 336
GSM 710	482, 483, 500, 501, 502, 503, 506, 508
GSM 750	482, 483, 500, 501, 502, 503, 506, 508
T-GSM 810	482, 483, 500, 501, 502, 503, 506, 508
GSM 850	172, 173, 200, 201, 202, 203, 235, 241
GSM 900	45, 46, 73, 74, 75, 76, 108, 114
DCS 1 800	773, 775, 779, 829, 832, 844
PCS 1 900	673, 675, 679, 729, 732, 744

Step 17

ASSIGNMENT COMMAND:

Channel Description	TCH/F
- Channel Type and TDMA offset	(N+5) mod 8
- Timeslot Number	Chosen arbitrarily
- Training Sequence Code	Single RF Channel
- Hopping	See table below
- ARFCN	
Power Command	
- Power level	Chosen arbitrarily but with a changed value.
Channel Mode	signalling
Frequency list IE	Not included
Cell Channel Description	Not included
Mobile Allocation	Not included
Starting Time	indicates (current frame number + 100 frames) mod 42 432

ASSIGNMENT COMMAND	
Band	Channel Description
	ARFCN
GSM 450	259
GSM 480	306
GSM 710	447
GSM 750	447
T-GSM 810	447
GSM 850	137
GSM 900	10
DCS 1 800	734
PCS 1 900	634

Step B20

ASSIGNMENT COMMAND:

Channel Description	TCH/H
- Channel Type	Chosen arbitrarily
TDMA offset	(N+6) mod 8
- Timeslot Number	Chosen arbitrarily
- Training Sequence Code	RF hopping channel
- Hopping	Chosen arbitrarily from the set (0, 1 to N-1) where N is the number of frequencies in the Frequency List IE.
- MAIO	0
- HSN	
Power Command	
- Power level	Chosen arbitrarily but with a changed value.
Channel Mode	A non-signalling mode arbitrarily selected from the half rate capabilities declared for the MS
Cell Channel Description	Not included
Frequency list IE	See table below
Mobile Allocation	Not included
Starting Time	Not included

ASSIGNMENT COMMAND		
Band	Cell Channel Description	
	Format	ARFCNs
GSM 450	Range 128	259, 267, 275, 279, 287 and 289
GSM 480	Range 128	306, 314, 322, 326, 334 and 336
GSM 710	Range 128	447, 471, 489, 500, 506, 508
GSM 750	Range 128	447, 471, 489, 500, 506, 508
T-GSM 810	Range 128	447, 471, 489, 500, 506, 508
GSM 850	Range 128	137, 161, 179, 200, 235, 241
GSM 900	Bitmap 0	10, 34, 52, 73, 108, 114
DCS 1 800	Range 1 024	734, 741, 759, 766, 773, 832, 844
PCS 1 900	Range 1 024	634, 641, 659, 666, 673, 732, 744

Step B24

ASSIGNMENT COMMAND:

Channel Description	
- Channel Type	TCH/H
- TDMA offset	Chosen arbitrarily
- Timeslot Number	(N+7) mod 8
- Training Sequence Code	Chosen arbitrarily
- Hopping	Single RF Channel
- ARFCN	Chosen arbitrarily, but not the BCCH carrier
Power Command	
- Power level	Chosen arbitrarily but with a changed value.
Channel Mode	Not included
Frequency list IE	Not included
Cell Channel Description	Not included
Mobile Allocation	Not included
Starting Time	Not included

Step B26

ASSIGNMENT COMMAND:

Channel Description	
- Channel Type and TDMA offset	TCH/F
- Timeslot Number	(N+1) mod 8
- Training Sequence Code	Chosen arbitrarily
- Hopping	RF hopping channel
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1) where N is the number of frequencies in the Mobile Allocation IE.
- HSN	Chosen arbitrarily from the set (1 to 63)
Power Command	
- Power level	Chosen arbitrarily but with a changed value.
Cell Channel Description	See table below
Frequency list IE	Not included
Mobile Allocation	Indicates ARFCN See table below
Starting Time	Not included

ASSIGNMENT COMMAND			
Band	Cell Channel Description		Mobile Allocation
	Format	ARFCNs	ARFCN
GSM 450	Range 128	261, 263	261
GSM 480	Range 128	308, 310	308
GSM 710	Range 128	454, 457	454
GSM 750	Range 128	454, 457	454
T-GSM 810	Range 128	454, 457	454
GSM 850	Range 128	144, 147	144
GSM 900	Bitmap 0	17, 20	17
DCS 1 800	Variable bitmap	741, 747	741
PCS 1 900	Variable bitmap	641, 647	641



## 26.6.4.2 Dedicated assignment / failure

### 26.6.4.2.1 Dedicated assignment / failure / failure during active state

#### 26.6.4.2.1.1 Conformance requirements

On the mobile station side, if a lower layer failure happens on the new channel before the ASSIGNMENT COMPLETE message has been sent, the mobile station deactivates the new channels, reactivates the old channels, reconnects the TCHs if any and triggers the establishment of the main signalling link. It then sends a ASSIGNMENT FAILURE message, cause "protocol error unspecified" on the main DCCH and resumes the normal operation, as if no assignment attempt had occurred. The operational parameters (e.g. ciphering mode) when returning on the old channel are those applied before the procedure.

#### References

3GPP TS 04.08 / 3GPP TS 44.018 subclause 3.4.3.3.

3GPP TS 05.08 subclause 4.2.

3GPP TS 05.05 subclause 4.1.1.

#### 26.6.4.2.1.2 Test purpose

To test that, when the MS fails to seize the new channel, the MS reactivates the old channel, reporting use of the last power level used on the old channel.

This is tested in the special cases of a transition:

- from TCH/F to hopping TCH/F in state U10 if the MS supports TCH/F and call control;
- from TCH/H to hopping TCH/H in state U10 if the MS supports TCH/H and call control.

#### 26.6.4.2.1.3 Method of test

##### Initial Conditions

System Simulator:

1 cell, default parameters. The SS orders the MS to use a power level P, where P is a power level within the range supported by the Type of MS.

Mobile Station:

The MS is in the active state (U10) of a mobile terminated call.

##### Specific PICS statements

- MS supports GSM HR (TSPC\_AddInfo\_Halfrate)
- Power class (TSPC\_Type\_xxx)

##### PIXIT statements

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##### Foreseen Final State of the MS

The active state (U10) of a mobile terminated call.

##### Test Procedure

The MS is in the active state (U10) of a mobile terminated call. The SS sends an ASSIGNMENT COMMAND allocating a new TCH/F, but does not activate the new channel. It is checked that the MS triggers the establishment of the main signalling link on the old channel and then sends an ASSIGNMENT FAILURE.

##### Maximum Duration of Test

30 s.

## Expected Sequence

The test is repeated for execution counter  $k = 1$ , and for  $k=2$  if the MS supports TCH/H.

Step	Direction	Message	Comments
1	SS -> MS	ASSIGNMENT COMMAND	Channel Type = TCH/F, if $k = 1$ , Channel Type = TCH/H, if $k = 2$ . Power level specified in power command is different from P, again where P is a power level within the range supported by the T type of MS. The MS attempts (and fails) to establish a signalling link on the new channel.
2			The MS re-establishes the signalling link on the old channel.
3	MS -> SS	ASSIGNMENT FAILURE	RR cause value = "protocol error unspecified".
4	SS		The SS checks that the MS reports power level P in the L1 header of the SACCH message that is sent in the first SACCH multiframe following the SABM.

## Specific Message Contents

None.

## 26.6.4.2.2 Dedicated assignment / failure / general case

## 26.6.4.2.2.1 Conformance requirements

On the mobile station side, if a lower layer failure happens on the new channel before the ASSIGNMENT COMPLETE message has been sent, the mobile station deactivates the new channels, reactivates the old channels, reconnects the TCHs if any and triggers the establishment of the main signalling link. It then sends a ASSIGNMENT FAILURE message, cause "protocol error unspecified" on the main DCCH and resumes the normal operation, as if no assignment attempt had occurred. The operational parameters (e.g. ciphering mode) when returning on the old channel are those applied before the procedure.

## References

3GPP TS 04.08 / 3GPP TS 44.018 subclause 3.4.3.3.

## 26.6.4.2.2.2 Test purpose

To test that, when the MS fails to seize the new channel, the MS reactivates the old channel.

This is tested in the special cases of a transition:

- from SDCCH to hopping TCH/F; this test part is only applicable if the MS supports TCH/F.
- from non-hopping SDCCH to hopping TCH/H; this test part is only applicable if the MS supports TCH/H.
- from hopping TCH/F to hopping TCH/H; this test part is only applicable if the MS supports TCH/H.

NOTE: Subclause 26.6.8.4 contains the case of an assignment failure SDCCH -> SDCCH.

## 26.6.4.2.2.3 Method of test

## Initial Conditions

System Simulator:

1 cell, default parameters.

Mobile Station:

The MS is "idle updated".

## Specific PICS statements

- MS supports GSM HR (TSPC\_AddInfo\_Halfrate)

PIXIT statements

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Foreseen Final State of the MS

The MS is "idle updated".

Test Procedure

A mobile terminated RR connection is established on an SDCCH. The SS sends an ASSIGNMENT COMMAND message allocating a hopping TCH/F, but does not activate the assigned channels. The MS shall try to activate the new channel (this is not verified) and shall then reactivate the old channel and trigger the establishment of the main signalling link on the old channel. Then the MS shall send an ASSIGNMENT FAILURE.

For an MS not supporting TCH/H, the SS initiates the channel release procedure and the test ends here. For an MS supporting TCH/H, the test sequence is repeated another two times, with half rate channels involved, and again it is checked that the MS correctly returns to the old channels, before the SS initiates the channel release procedure.

Maximum Duration of Test

30 s.

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST TYPE 1	
2	MS -> SS	CHANNEL REQUEST	
3	SS -> MS	IMMEDIATE ASSIGNMENT	Channel Type: SDCCH.
4	MS -> SS	PAGING RESPONSE	
5	SS -> MS	ASSIGNMENT COMMAND	Channel Type = TCH/F, hopping. The MS attempts (and fails) to establish a signalling link on the new channel.
6			The MS re-establishes the signalling link on the old channel.
7	MS -> SS	ASSIGNMENT FAILURE	RR cause value = "protocol error unspecified".
A			This test part is performed if the MS does not support TCH/H.
A8	SS -> MS	CHANNEL RELEASE	The main signalling link is released.
B			This test part is performed if the MS supports TCH/H (see PICS).
B8	SS -> MS	ASSIGNMENT COMMAND	Channel Type = TCH/H, hopping. The MS attempts (and fails) to establish a signalling link on the new channel.
B9			The MS re-establishes the signalling link on the old channel.
B10	MS -> SS	ASSIGNMENT FAILURE	RR cause value = "protocol error unspecified".
B11	SS -> MS	ASSIGNMENT COMMAND	Channel Type = TCH/F, hopping.
B12	MS -> SS	ASSIGNMENT COMPLETE	Sent on the assigned channel after establishment of the main signalling link.
B13	SS -> MS	ASSIGNMENT COMMAND	Channel Type = TCH/H, hopping. The MS attempts (and fails) to establish a signalling link on the new channel.
B14			The MS re-establishes the signalling link on the old channel.
B15	MS -> SS	ASSIGNMENT FAILURE	RR cause value = "protocol error unspecified".
B16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

None.

## 26.6.5 Test of handover

With the Handover procedure, it is possible to completely alter the channels allocated to a MS. This makes it possible in particular to switch a call in progress from one cell to another. The procedure is always initiated by the network and with the MS in a dedicated mode.

Subclauses 26.6.5.1 to 26.6.5.4 contain generic test procedures to be used for executing successful Handover tests. Table 26.6-1 contains a summary of the different combinations of parameters which have to be tested, together with a reference to the appropriate generic test procedure. If a test uses a channel rate which the MS under test does not support, the test shall be skipped.

Table 26.6-1

From	To	Timing Adv.	Start Time	Syn ?	State of call	Subclause	Exec Counter
TCH/F, no FH	TCH/F, no FH	20	none	no	U10	26.6.5.1	1
TCH/F, no FH	TCH/F, FH	arbitrary	none	no	U10	26.6.5.1	2
TCH/F, FH	TCH/F, no FH	20	1,1s	no	U10	26.6.5.1	3
TCH/F, no FH	TCH/H, FH	arbitrary	none	no	U10	26.6.5.1	4
TCH/H, FH	TCH/H, FH	20	1,1s	no	U10	26.6.5.1	5
TCH/H, FH	TCH/H, no FH	20	none	no	U10	26.6.5.1	6
TCH/H, no FH	TCH/H, FH	arbitrary	none	no	U10	26.6.5.1	7
TCH/H, FH	TCH/F, no FH	arbitrary	none	no	U10	26.6.5.1	8
SDCCH/4, no FH	TCH/F, FH	20	none	no	estab	26.6.5.2	1
SDCCH/4, no FH	TCH/H, FH	20	none	no	estab	26.6.5.2	2
SDCCH/4, no FH	SDCCH/8, FH	20	none	no	estab	26.6.5.2	3
SDCCH/8, no FH	SDCCH/8, FH	arbitrary	none	no	estab	26.6.5.2	4
TCH/F, no FH	TCH/H, no FH	20	none	no	estab	26.6.5.2	5
TCH/H, FH	TCH/F, FH	20	none	no	estab	26.6.5.2	6
TCH/F, FH	TCH/F, FH	arbitrary	none	no	estab	26.6.5.2	7
SDCCH/8, FH	TCH/F, no FH	20	none	no	estab	26.6.5.2	8
SDCCH/8, no FH	TCH/F, FH	20	none	no	estab	26.6.5.2	9
SDCCH/8, no FH	TCH/H, FH	arbitrary	none	no	estab	26.6.5.2	10
TCH/F, FH	TCH/F, no FH	(2k+y) mod 256	none	yes	U10	26.6.5.3	1
TCH/H, FH	TCH/H, no FH	(2k+y) mod 256	none	yes	U10	26.6.5.3	2
SDCCH/8, FH	SDCCH/8, FH	(2k+y) mod 256	none	yes	estab	26.6.5.4	1
SDCCH/8, FH	SDCCH/4, no FH	(2k+y) mod 256	1,1s	yes	estab	26.6.5.4	2
TCH/F, no FH	TCH/F, FH	(2k+y) mod 256	none	yes	estab	26.6.5.4	3
SDCCH/8, no FH	TCH/F, no FH	(2k+y) mod 256	none	yes	estab	26.6.5.4	4

Table 26.6-2

	TCH/FS	TCH/HS	SDCCH
n	10-20	5-10	2-5

In addition to the successful case of Handover, 2 unsuccessful cases shall be tested. These tests are described in subclauses 26.6.5.8 and 26.6.5.9.

### 26.6.5.1 Handover / successful / active call / non-synchronized

#### 26.6.5.1.1 Conformance requirements

The MS shall correctly apply the handover procedure in the non-synchronized case when a call is in progress and when handover is performed from a TCH/F without frequency hopping towards a TCH/F without frequency hopping.

The MS shall correctly apply the handover procedure in the non-synchronized case when a call is in progress and when handover is performed from a TCH/H without frequency hopping to a TCH/H with frequency hopping. This does not apply to MSs not supporting TCH/H.

#### References

3GPP TS 04.08 / 3GPP TS 44.018 subclauses 3.4.4 and 9.1.15.

3GPP TS 04.13 subclause 5.2.6.2.

## 26.6.5.1.2 Test purpose

To test that when the MS is ordered to make a non-synchronized handover it continuously sends access bursts on the main DCCH (and optionally the SACCH) until it receives a PHYSICAL INFORMATION message from the SS. To test that the MS correctly handles the values of any Starting Time IE in the HANDOVER COMMAND message in the case when none of the information elements referring to before the starting time are present. To test that the MS correctly handles the Timing Advance IE in the PHYSICAL INFORMATION message. To test that the MS activates the new channel correctly and transmits the HANDOVER COMPLETE message without undue delay.

## 26.6.5.1.3 Method of test

## Initial Conditions

System Simulator:

2 cells, A and B with same LAI, default parameters except:

Band	Cell A		Cell B		Both Cells Format
	BCCH ARFCN	Cell Allocation	BCCH ARFCN	Cell Allocation	
GSM 450	263	259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291	274	260, 262, 264, 266, 268, 270, 272, 274, 276, 279, 281, 283, 285, 287, 289, 291	Range 128
GSM 480	310	306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338	321	307, 309, 311, 313, 315, 317, 319, 321, 323, 326, 328, 330, 332, 334, 336, 338	Range 128
GSM 710	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508	477	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508	Range 128
GSM 750	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508	477	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508	Range 128
T-GSM810	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508	477	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508	Range 128
GSM 850	147	137, 144, 147, 153, 161, 169, 172, 173, 179, 186, 193, 200, 201, 202, 203, 235, 241	167	141, 145, 149, 151, 157, 158, 165, 167, 187, 193, 200, 201, 202, 203, 235, 241	Range 128
GSM 900	20	10, 17, 20, 26, 34, 42, 45, 46, 52, 59, 66, 73, 74, 75, 76, 108, 114	40	14, 18, 22, 24, 30, 31, 38, 40, 60, 66, 73, 74, 75, 76, 108, 114	Range 128
DCS 1 800	747	734, 741, 747, 754, 759, 762, 766, 767, 773, 775, 779, 782, 791, 798, 829, 832, 844	764	739, 743, 746, 749, 756, 758, 761, 764, 771, 779, 782, 791, 798, 829, 832, 844	Range 256
PCS 1 900	647	634, 641, 647, 654, 659, 662, 666, 667, 673, 675, 679, 682, 691, 698, 729, 732, 744	664	639, 643, 646, 649, 656, 658, 661, 664, 671, 679, 682, 691, 698, 729, 732, 744	Range 256

The frame numbers of cells A and B shall be different by 100.

The timebase of cells A and B shall be such that the edges of their timeslots are not coincident at the antenna connector.

Mobile Station:

The MS is in the active state (U10) of a call on cell A.

Specific PICS statements

- MS supports Speech (TSPC\_TS1x\_Speech)

## PIXIT statements

- supported radio interface rates: 12kbps, 6kbps, 3,6kbps

## Foreseen Final State of the MS

The active state (U10) of a call on cell A.

## Test Procedure

This procedure is repeated for execution counter  $M = 1$  to 8 (see table 26.6-1).

The MS is in the active state (U10) of a call. The SS sends a HANOVER COMMAND on the main DCCH. The MS shall (at the time defined by the Starting Time information element, if included in the message) begin to send access bursts on the new DCCH (and optionally the SACCH) of the target cell. The SS observes the access bursts and after receiving  $n$  ( $n$  being arbitrarily chosen between values according to table 26.6-2 of subclause 26.6.5) access bursts, the SS sends one PHYSICAL INFORMATION message with a Timing Advance as specified in table 26.6-1 of subclause 26.6.5. The MS shall activate the channel in sending and receiving mode. The MS shall establish a signalling link. The MS shall be ready to transmit a HANOVER COMPLETE message, before " $x$ " ms after the end of the PHYSICAL INFORMATION message, but not before a UA frame has been sent by the SS.

The term "ready to transmit" is defined in 3GPP TS 04.13. The value of " $x$ " depends upon the target channel and is specified in the specific message contents section.

## Maximum Duration of Test

5 minutes, including 1 minute for any necessary operator actions.

## Expected Sequence

This sequence is performed for an execution counter  $M = 1, 2, 3$  for an MS which only supports TCH/F.

This sequence is performed for an execution counter  $M = 1, 2.. 8$  for an MS which supports TCH/F and H

Step	Direction	Message	Comments
0	MS -> SS		The MS and SS are in the active state of a call on the channel described below.
1	SS -> MS	HANOVER COMMAND	See Specific message contents.
2	MS -> SS	HANOVER ACCESS	Repeated on every burst of the uplink main DCCH (and optionally the SACCH) until reception of PHYSICAL INFORMATION. Handover Reference as included in the HANOVER COMMAND. If the HANOVER COMMAND includes a starting time IE then the first HANOVER ACCESS message shall be transmitted in the indicated frame (unless the indicated frame is not used by that channel, in which case the next frame used by that channel shall be used).
3	SS -> MS	PHYSICAL INFORMATION	Sent after reception of $n$ HANOVER ACCESS messages. See specific message contents.
4	MS -> SS	SABM	Sent without information field.
5	SS -> MS	UA	
6	MS -> SS	HANOVER COMPLETE	The message shall be ready to be transmitted before " $x$ " ms after the completion of step 3.
7	MS -> SS		The MS and SS are in the active state of a call on the channel described below.

## Specific Message Contents For Mobiles Supporting Speech

For  $M = 1$ :

Step 0: The MS and SS are using a full rate TCH in non-hopping mode on cell A.

#### HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Non synchronized".
- Normal Cell Indication	Ignore out of range timing advance.

Band	BCCH Carrier Number
GSM 450	274
GSM 480	321
GSM 710	477
GSM 750	477
T-GSM 810	477
GSM 850	167
GSM 900	40
DCS 1 800	764
PCS 1 900	664

#### PHYSICAL INFORMATION

Information Element	value/remarks
As default message contents.	

Step 6:  $x = 500$

Step 7: The MS and SS are using a full rate TCH in non hopping mode on cell B.

For  $M = 2$ :

Step 0: The MS and SS are using a full rate TCH in non-hopping mode on cell B.

#### HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/H + ACCHs
- Timeslot number	Chosen arbitrarily, but not Zero.
- Training Sequence Code	Chosen arbitrarily
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Chosen arbitrarily from the set (1,2,..63).
Synchronization Indication IE is not included.	
Channel Mode IE is not included.	
Frequency List after time	
- Frequency List	See table below

HANDOVER COMMAND			
Band	Frequency List		BCCH Carrier Number
	Format	ARFCNs	ARFCN
GSM 450	Range 128	259, 261, 263, 265, 277, 279, 281, 283, 285, 287, 289, 291	263
GSM 480	Range 128	306, 308, 310, 312, 324, 326, 328, 330, 332, 334, 336, 338	310
GSM 710	Range 256	447, 454, 457, 463, 496, 498, 500, 501, 502, 503, 506, 508	457
GSM 750	Range 256	447, 454, 457, 463, 496, 498, 500, 501, 502, 503, 506, 508	457
T-GSM810	Range 256	447, 454, 457, 463, 496, 498, 500, 501, 502, 503, 506, 508	457
GSM 850	Variable bitmap	137, 144, 147, 153, 186, 193, 200, 201, 202, 203, 235, 241	147
GSM 900	Variable bitmap	10, 17, 20, 26, 59, 66, 73, 74, 75, 76, 108, 114	20
DCS 1 800	Range 256	747, 775, 779, 782, 791, 798, 829, 832, 844	747
PCS 1 900	Range 256	647, 675, 679, 682, 691, 698, 729, 732, 744	647

## PHYSICAL INFORMATION

Information Element	value/remarks
As default message contents, except: Timing advance	Arbitrarily selected but different to default value.

Step 6:  $x = 500$ .

Step 7: The MS and SS are using a full rate TCH in hopping mode on cell A.

For  $M = 3$ :

Step 0: The MS and SS are using a full rate TCH in hopping mode on cell A.

## HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Non synchronized".
- Normal Cell Indication	Out of range timing advance shall trigger a handover failure procedure.
Starting Time	Indicates the frame number of cell B that will occur approximately 1,1 seconds (238 frames have elapsed) after the HANDOVER COMMAND is sent by cell A.
Mode of first channel	Speech (full rate version 1 or half rate version 1).

Band	BCCH Carrier Number
GSM 450	274
GSM 480	321
GSM 710	477
GSM 750	477
T-GSM810	477
GSM 850	167
GSM 900	40
DCS 1 800	764
PCS 1 900	664

## PHYSICAL INFORMATION

Information Element	value/remarks
As default message contents.	



Step 6:  $x = 500$ .

Step 7: The MS and SS are using a full rate TCH in non-hopping mode on cell B.

For  $M = 4$ :

Step 0: The MS and SS are using a full rate TCH in non-hopping mode on cell B.

**HANDOVER COMMAND**

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/H + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation.
- HSN	zero (this gives cyclic hopping).
Synchronization Indication IE is not included.	
Cell Channel Description	Use format from table below to encode the complete CA of Cell A.
Mobile Allocation after time	Indicates all of the CA of cell A except for the BCCH frequency.

HANDOVER COMMAND		
	Cell Channel Description	Cell Description
Band	Format	BCCH Carrier Number
GSM 450	Range 128	263
GSM 480	Range 128	310
GSM 710	Range 128	457
GSM 750	Range 128	457
T-GSM 810	Range 128	457
GSM 850	Range 128	147
GSM 900	Bitmap 0	20
DCS 1 800	Range 512	747
PCS 1 900	Range 512	647

**PHYSICAL INFORMATION**

Information Element	value/remarks
As default message contents, except:	
Timing advance	Arbitrarily selected but different to default value.

Step 6:  $x = 750$ .

Step 7: The MS and SS are using a half rate TCH in hopping mode on cell A.

For  $M = 5$ :

Step 0: The MS and SS are using a half rate TCH in hopping mode on cell A.

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/H + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Chosen arbitrarily, but not Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Chosen arbitrarily from the set. (1,2,..63).
Frequency List after time	
- Frequency List	See table below
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Non synchronized".
- Normal Cell Indication	Ignore out of range timing advance.
Starting Time	Indicates the frame number of cell B. that will occur approximately 1,1 seconds (238 frames have elapsed) after the HANDOVER COMMAND is sent by cell A.

HANDOVER COMMAND			
Band	Frequency List		BCCH Carrier Number
	Format	ARFCNs	ARFCN
GSM 450	Range 128	260, 262, 264, 266, 276, 279, 281, 283, 285, 287, 289, 291	274
GSM 480	Range 128	307, 309, 311, 313, 323, 326, 328, 330, 332, 334, 336, 338	321
GSM 710	Range 128	451, 455, 459, 461, 497, 498, 500, 501, 502, 503, 506, 508	477
GSM 750	Range 128	451, 455, 459, 461, 497, 498, 500, 501, 502, 503, 506, 508	477
T-GSM 810	Range 128	451, 455, 459, 461, 497, 498, 500, 501, 502, 503, 506, 508	477
GSM 850	Range 128	141, 145, 149, 151, 187, 193, 200, 201, 202, 203, 235, 241	167
GSM 900	Bitmap 0	14, 18, 22, 24, 60, 66, 73, 74, 75, 76, 108, 114	40
DCS 1 800	Range 1 024	749, 758, 761, 764, 771, 779, 782, 791, 798, 829, 832, 844	764
PCS 1 900	Range 1 024	649, 658, 661, 664, 671, 679, 682, 691, 698, 729, 732, 744	664

For M = 6:

Step 0: The MS and SS are using a half rate TCH in hopping mode on cell B.

#### HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/H + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Chosen arbitrarily but not Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	Single RF channel.
- ARFCN	Chosen arbitrarily from the Cell Allocation of Cell A.
Synchronization Indication IE not included.	

ASSIGNMENT COMMAND	
Band	Channel Description
	ARFCN
GSM 450	263
GSM 480	310
GSM 710	457
GSM 750	457
T-GSM 810	457
GSM 850	147
GSM 900	20
DCS 1 800	747
PCS 1 900	647

#### PHYSICAL INFORMATION

Information Element	value/remarks
As default message contents.	

Step 6: x = 750.

Step 7: The MS and SS are using a half rate TCH in non-hopping mode on cell A.

For M = 7:

Step 0: The MS and SS are using a half rate TCH in non-hopping mode on cell A.

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	Chosen arbitrarily but not Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Chosen arbitrarily from the set. (1,2,..63).
Frequency List after time	
- Frequency List	See table below
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Non synchronized".
- Normal Cell Indication	Ignore out of range timing advance.
Mode of first channel	speech (full rate version 1 or half rate version 1).

HANDOVER COMMAND			
Band	Frequency List		BCCH Carrier Number
	Format	ARFCNs	ARFCN
GSM 450	Range 128	274, 279, 281, 283, 285, 287, 289, 291	274
GSM 480	Range 128	321, 326, 328, 330, 332, 334, 336, 338	321
GSM 710	Range 128	477, 498, 500, 501, 502, 503,506, 508	477
GSM 750	Range 128	477, 498, 500, 501, 502, 503,506, 508	477
T-GSM810	Range 128	477, 498, 500, 501, 502, 503,506, 508	477
GSM 850	Range 128	167, 193, 200, 201, 202, 203 ,235, 241	167
GSM 900	Range 128	40, 66, 73, 74, 75, 76,108, 114	40
DCS 1 800	Variable Bitmap	764, 779, 782, 791, 798, 829, 832, 844	764
PCS 1 900	Variable Bitmap	(664, 679, 682, 691, 698, 729, 732, 744	664

PHYSICAL INFORMATION

Information Element	value/remarks
As default message contents, except:	
Timing advance	Arbitrarily selected but different to default value.

Step 6: x = 750.

Step 7: The MS and SS are using a half rate TCH in hopping mode on cell B.

For M = 8:

Step 0: The MS and SS are using a half rate TCH in hopping mode on cell B.

#### HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	Chosen arbitrarily but not Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	Single RF channel.
- ARFCN	See table below
Synchronization Indication IE not included.	

Band	Cell Description BCCH Carrier Number and Channel Description ARFCN
GSM 450	263
GSM 480	310
GSM 710	457
GSM 750	457
T-GSM 810	457
GSM 850	147
GSM 900	20
DCS 1 800	747
PCS 1 900	647

#### PHYSICAL INFORMATION

Information Element	value/remarks
As default message contents, except:	
Timing advance	Arbitrarily selected but different to default value.

Step 6: x = 500.

Step 7: The MS and SS are using a full rate TCH in non-hopping mode on cell A.

#### Specific Message Contents For Mobiles not Supporting Speech

If the mobile station supports half rate, then the 12 kbps radio interface rate is not used for this test. With this restriction, the radio interface rate is selected arbitrarily from those supported.

The message contents shall be the same for the Mobile Station supporting speech , except for:

M = 3:

#### HANDOVER COMMAND

Information Element	value/remarks
Mode of first channel	Data, with the full rate radio interface rate that is in use.

M = 4, 7 and 8:

#### HANDOVER COMMAND

Information Element	value/remarks
Mode of first channel	Data, with half rate radio interface rate that is supported.

## 26.6.5.2 Handover / successful / call under establishment / non-synchronized

### 26.6.5.2.1 Conformance requirements

The MS shall correctly apply the handover procedure from SDCCH/8, TCH/F or TCH/H with or without frequency hopping to SDCCH/8, TCH/F or TCH/H with or without frequency hopping in the non-synchronized case during call establishment. The mobile shall correctly apply the handover procedures from non frequency hopping SDCCH/4 to SDCCH/8, TCH/F or TCH/H with or without frequency hopping. If during call establishment a Layer 3 MM or CC message just sent by the MS is not Layer 2 acknowledged before the channel change caused by the HANOVER COMMAND message, the MS shall send the Layer 3 message to the new cell, using the same value in the N(SD) field, after the handover procedure.

### References

3GPP TS 04.08 / 3GPP TS 44.018, subclauses 3.1.4.2, 3.4.4 and 9.1.15.

3GPP TS 04.13, subclause 5.2.6.2.

### 26.6.5.2.2 Test purpose

To test that when the MS is ordered to make a non-synchronized handover, it continuously sends access bursts on the main DCCH (and optionally the SACCH) until it receives a PHYSICAL INFORMATION message from the SS. To test that the MS correctly takes the values of the Timing Advance information element in the PHYSICAL INFORMATION message into account. To test that the MS activates the new channel correctly and transmits the HANOVER COMPLETE message without undue delay. To test that the MS correctly retransmits Layer 3 MM or CC messages, that were not acknowledged by Layer 2 before the Handover, after completion of the Handover.

### 26.6.5.2.3 Method of test

#### Initial Conditions

System Simulator:

2 cells A and B with same LAI, default parameters, except:

Cell A has:

BCCH ARFCN = See table below.

Cell Allocation = See table below

PLMN colour code, NCC = as defaults.

BS colour code, BCC = as defaults.

PLMN\_PERM = 00001010.

Cell B has:

BCCH ARFCN = See table below.

Cell Allocation = See table below

PLMN colour code, NCC = 3.

BS colour code, BCC = 0.

Both cells send SYSTEM INFORMATION TYPE 1 messages containing the complete Cell Allocation of the cell, see table below for format.

The timebase of Cells A and B shall be such that the edges of their timeslots are not coincident at the antenna connector.

For execution counter M = 1, 2 and 3 a combined CCH/SDCCH is used.

For execution counter M = 4 to 10 a non combined SDCCH is used.

Band	Cell A		Cell B		Both Cells
	BCCH ARFCN	Cell Allocation	BCCH ARFCN	Cell Allocation	Format
GSM 450	263	259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291	274	260, 262, 264, 266, 268, 270, 272, 274, 276, 279, 281, 283, 285, 287, 289, 291	Range 128
GSM 480	310	306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338	321	307, 309, 311, 313, 315, 317, 319, 321, 323, 326, 328, 330, 332, 334, 336, 338	Range 128
GSM 710	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508	477	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508	Range 128
GSM 750	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508	477	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508	Range 128
T-GSM810	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508	477	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508	Range 128
GSM 850	147	137, 144, 147, 153, 161, 169, 172, 173, 179, 186, 193, 200, 201, 202, 203, 235, 241	167	141, 145, 149, 151, 157, 158, 165, 167, 187, 193, 200, 201, 202, 203, 235, 241	Range 128
GSM 900	20	10, 17, 20, 26, 34, 42, 45, 46, 52, 59, 66, 73, 74, 75, 76, 108, 114	40	14, 18, 22, 24, 30, 31, 38, 40, 60, 66, 73, 74, 75, 76, 108, 114	Bitmap 0
DCS 1 800	747	734, 741, 747, 754, 759, 762, 766, 767, 773, 775, 779, 782, 791, 798, 829, 832, 844	764	739, 743, 746, 749, 756, 758, 761, 764, 771, 779, 782, 791, 798, 829, 832, 844	Range 512
PCS 1 900	647	634, 641, 647, 654, 659, 662, 666, 667, 673, 675, 679, 682, 691, 698, 729, 732, 744	664	639, 643, 646, 649, 656, 658, 661, 664, 671, 679, 682, 691, 698, 729, 732, 744	Range 512

Mobile Station:

The MS is in the "idle, updated" state, with a TMSI allocated and camped on cell A.

Specific PICS statements

- MS supports Speech (TSPC\_TS1x\_Speech)

PIXIT statements

- supported radio interface rates: 12kbps, 6kbps, 3,6kbps

Foreseen Final State of the MS

"Idle, updated" with TMSI allocated and camped on cell B.

Test Procedure

This procedure is repeated for execution counter M = 1, 2 .. 10 (See table 26.6-1.)

A Mobile Originating Call is initiated on Cell A. After the MS has sent the SETUP message (and before the last L2 frame carrying the SETUP message is acknowledged by the SS) the SS sends a HANDOVER COMMAND message, ordering the MS to switch to cell B. The MS shall then begin to send access bursts on the new DCCH (and optionally the SACCH) to cell B. The SS observes the access bursts and after receiving n (n being arbitrarily chosen between values according to table 26.6-2 of subclause 26.6.5) access bursts, the SS sends one PHYSICAL INFORMATION message with a Timing Advance as specified in table 26.6-1 of subclause 26.6.5. The MS shall activate the channel in sending and receiving mode. The MS shall establish a signalling link. The MS shall be ready to transmit a HANDOVER COMPLETE message before x ms after the end of the PHYSICAL INFORMATION message, but not before a UA frame has been sent by the SS. The MS shall then again send the SETUP message to the SS, using the same value in the N(SD) field. Finally the SS sends a CHANNEL RELEASE to end the test.

The term "ready to transmit" is defined in 3GPP TS 04.13. The value of "x" depends upon the target channel and is specified in the specific message contents section.

## Maximum Duration of Test

5 minutes, including 1 minute for any necessary operator actions.

## Expected Sequence

The sequence is performed for execution counter M = 1, 2..10 (unless a particular TCH is not supported).

Step	Direction	Message	Comments
1	-----	-----	A MO call is initiated on cell A.
2	MS -> SS	CHANNEL REQUEST	Establish. Cause = "Originating call, NECI not set to 1"
3	SS -> MS	IMMEDIATE ASSIGNMENT	See specific message contents.
4	MS -> SS	CM SERVICE REQUEST	CM Service Type = Mobile Originating Call Establishment.
5	SS -> MS	CIPHERING MODE COMMAND	
6	MS -> SS	CIPHERING MODE COMPLETE	
7	MS -> SS	SETUP	Last L2 frame not acknowledged by the SS.
8	SS -> MS	HANDOVER COMMAND	See specific message contents.
9	MS -> SS	HANDOVER ACCESS	Repeated on every burst of the uplink main DCCH (and optionally the SACCH) until reception of PHYSICAL INFORMATION. Handover Reference as included in the HANDOVER COMMAND
10	SS -> MS	PHYSICAL INFORMATION	Sent after reception of n HANDOVER ACCESS message. Timing Advance as specified in table 26.6-1 of subclause 26.6.5.
11	MS -> SS	SABM	Sent without information field.
12	SS -> MS	UA	
13	MS -> SS	HANDOVER COMPLETE	This message shall be ready to be transmitted before "x" ms after the completion of step 10.
14	MS -> SS	SETUP	Same N(SD) as in step 7.
15	SS -> MS	CHANNEL RELEASE	

## Specific Message Contents For Mobiles Supporting Speech

M = 1.

## IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents.	

## HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency Short List IE.
- HSN	Chosen arbitrarily from the set. (1,2,..63).
Synchronization IE is not included.	
Frequency Short List after time	
- Frequency Short List	See table below
Mode of the First Channel	Speech (full rate version 1 or half rate version 1).



HANDOVER COMMAND			
Band	Frequency Short List		BCCH Carrier Number
	Format	ARFCNs	ARFCN
GSM 450	Range 128	260, 262, 264, 266, 268, 270, 272, 292, 279, 281, 283, 285, 287, 289, 291	274
GSM 480	Range 128	307, 309, 311, 313, 315, 317, 319, 339, 326, 328, 330, 332, 334, 336, 338	321
GSM 710	Range 128	451, 455, 459, 461, 467, 468, 475, 490, 498, 500, 501, 502, 503, 506, 508	477
GSM 750	Range 128	451, 455, 459, 461, 467, 468, 475, 490, 498, 500, 501, 502, 503, 506, 508	477
T-GSM 810	Range 128	451, 455, 459, 461, 467, 468, 475, 490, 498, 500, 501, 502, 503, 506, 508	477
GSM 850	Range 128	141, 145, 149, 151, 157, 158, 165, 180, 193, 200, 201, 202, 203, 235, 241	167
GSM 900	Range 128	14, 18, 22, 24, 30, 31, 38, 53, 66, 73, 74, 75, 76, 108, 114	40
DCS 1 800	Range 128	756, 758, 761, 771, 779, 782, 791, 798, 829, 832, 844	764
PCS 1 900	Range 128	656, 658, 661, 671, 679, 682, 691, 698, 729, 732, 744	664

Step 13: "x" = 500.

M = 2.

#### IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents.	

#### HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/H + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Chosen arbitrarily but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation.
- HSN	Chosen arbitrarily from the set (1, 2.. 63).
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Non synchronized".
- Normal Cell Indication	Ignore out of range timing advance.
Cell Channel Description	See table below
Mobile Allocation after time	Indicates ARFCNs in table below.
Mode of First Channel	Speech (full rate version 1 or half rate version 1).

HANDOVER COMMAND					
Band	BCCH Carrier Number	Frequency Short List			Mobile Allocation after time
	ARFCN	Format	ARFCNs		ARFCNs
GSM 450	274	Range 128	274, 279, 281, 283, 285, 287, 289, 291		281, 283, 285
GSM 480	321	Range 128	321, 326, 328, 330, 332, 334, 336, 338		328, 330, 332
GSM 710	477	Range 128	477, 498, 500, 501, 502, 503, 506, 508		500, 501, 502
GSM 750	477	Range 128	477, 498, 500, 501, 502, 503, 506, 508		500, 501, 502
T-GSM810	477	Range 128	477, 498, 500, 501, 502, 503, 506, 508		500, 501, 502
GSM 850	167	Range 128	167, 193, 200, 201, 202, 203, 235, 241		200, 201, 202
GSM 900	40	Bitmap 0	40, 66, 73, 74, 75, 76, 108, 114		73, 74, 75
DCS 1 800	764	Range 512	761, 764, 771, 779, 782, 791, 798, 829, 832		791, 798, 829
PCS 1 900	664	Range 512	661, 664, 671, 679, 682, 691, 698, 729, 732		691, 698, 729

Step 13: "x" = 750.

M = 3.

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents.	

DCS 1 800 or PCS 1 900 begin:

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	DCS 1 800: 764 PCS 1 900: 664
Channel Description	
- Channel Type	SDCCH/8
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency Short List IE.
- HSN	Zero (this gives cyclic hopping).
Synchronization Indication IE not included.	
Frequency Short List after time	
- Frequency Short List	Use Range 128 to encode the following 2 frequencies: DCS 1 800: 746, 779 PCS 1 900: 646, 679
Mode of First Channel	Signalling Only.

DCS 1 800 or PCS 1 900 end:

Other bands begin:

#### HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	SDCCH/8
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Chosen arbitrarily from the set {1, 2, ..., 63}.
Synchronization Indication IE is not included	Frequency list after time.
- Frequency List	See table below
Channel Mode IE	signalling only.

HANDOVER COMMAND			
Band	Cell Description	Frequency List	
	BCCH Carrier Number	Format	ARFCNs
GSM 450	274	Range 128	260, 262, 264, 266, 268, 270, 272, 276, 279, 281, 283, 285, 287, 289, 291
GSM 480	321	Range 128	307, 309, 311, 313, 315, 317, 319, 323, 326, 328, 330, 332, 334, 336, 338
GSM 710	477	Range 128	451, 455, 459, 461, 467, 468, 475, 497, 498, 500, 501, 502, 503, 506, 508
GSM 750	477	Range 128	451, 455, 459, 461, 467, 468, 475, 497, 498, 500, 501, 502, 503, 506, 508
T-GSM 810	477	Range 128	451, 455, 459, 461, 467, 468, 475, 497, 498, 500, 501, 502, 503, 506, 508
GSM 850	167	Range 128	141, 145, 149, 151, 157, 158, 165, 187, 193, 200, 201, 202, 203, 235, 241
GSM 900	40	Bitmap 0	14, 18, 22, 24, 30, 31, 38, 60, 66, 73, 74, 75, 76, 108, 114
DCS 1 800	764	Range 128	746, 779
PCS 1 900	664	Range 128	646, 679

Other bands end:

Step 13: "x" = 1 500.

M = 4.

#### IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except:	
- Timeslot number	Arbitrary value, but not zero.
- ARFCN	See table below

Band	ARFCN
GSM 450	263
GSM 480	310
GSM 710	457
GSM 750	457
T-GSM 810	457
GSM 850	147
GSM 900	20
DCS 1 800	747
PCS 1 900	647

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	SDCCH/8
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Arbitrary value but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	zero (this gives cyclic hopping).
Frequency List after time	
- Frequency List	Use format from table below to encode the complete CA of Cell B.
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Non synchronized".
- Normal Cell Indication	Ignore out of range timing advance.
Channel Mode IE is not included.	

HANDOVER COMMAND			
Band	Cell Description	Frequency List	
	BCCH ARFCN	Format	ARFCNs
GSM 450	274	Range 128	260, 262, 264, 266, 268, 270, 272, 276, 279, 281, 283, 285, 287, 289
GSM 480	321	Range 128	307, 309, 311, 313, 315, 317, 319, 323, 326, 328, 330, 332, 334, 336
GSM 710	477	Range 128	451, 455, 459, 461, 467, 468, 475, 477, 498, 500, 501, 502, 503, 506
GSM 750	477	Range 128	451, 455, 459, 461, 467, 468, 475, 477, 498, 500, 501, 502, 503, 506
T-GSM 810	477	Range 128	451, 455, 459, 461, 467, 468, 475, 477, 498, 500, 501, 502, 503, 506
GSM 850	167	Range 128	141, 145, 149, 151, 157, 158, 165, 167, 193, 200, 201, 202, 203, 235
GSM 900	40	Range 128	14, 18, 22, 24, 30, 31, 38, 40, 66, 73, 74, 75, 76, 108
DCS 1 800	764	Range 1 024	complete CA of Cell B
PCS 1 900	664	Range 1 024	complete CA of Cell B

Step 13: "x" = 1 500.

M = 5.

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except: Channel Description - Channel Type - Timeslot number - Hopping Channel - ARFCN	TCH/F + ACCH's Arbitrary value but not zero. Single RF Channel. Chosen arbitrarily from the Cell Allocation of cell A.

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except: Cell Description - Network Colour Code - Base Station Colour Code - BCCH Carrier Number Channel Description - Channel Type - TDMA offset - Timeslot number - Training Sequence Code - Hopping - ARFCN Synchronization Indication - Report Observed Time Difference - Synchronization Indication - Normal Cell Indication Mode of First Channel	3 0 See table below TCH/H + ACCH's Chosen arbitrarily. Arbitrary value but not zero. Chosen arbitrarily. Single RF Channel. Chosen arbitrarily from the Cell Allocation of cell B. Shall not be included. "Non synchronized". Ignore out of range timing advance. Signalling only.

HANDOVER COMMAND	
Band	ARFCN
GSM 450	274
GSM 480	321
GSM 710	477
GSM 750	477
T-GSM 810	477
GSM 850	167
GSM 900	40
DCS 1 800	764
PCS 1 900	664

Step 13: "x" = 750.

M = 6.

## IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except: L2 pseudo length	14 octets (11 + contents of the MA).
Channel Description	Channel Description.
- Channel Type	TCH/H + ACCHs
- TDMA offset	As default message contents.
- Timeslot number	Arbitrary value but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation.
- HSN	Chosen arbitrarily from the set. (1,2,..63).
Mobile Allocation	
- Length	3 octets.
- Contents	Indicates all of the CA of cell A.

DCS 1 800 or PCS 1 900 begin:

## HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	DCS 1 800: 764 DCS 1 900: 664
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	Arbitrary value but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Chosen arbitrarily from the set. (1,2,..63).
Frequency List after time	
- Frequency List	Use Range 256 to encode the following 9 frequencies: DCS 1 800: 746, 749, 756, 761, 764, 798, 829, 832,844 PCS 1 900: 646, 649, 656, 661, 664, 698, 729, 732,744
Synchronization Indication IE not included.	
Channel Mode	Signalling Only.

DCS 1 800 or PCS 1 900 end:Other bands begin:

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except: Cell Description - Network Colour Code - Base Station Colour Code - BCCH Carrier Number Channel Description - Channel Type - Timeslot number - Training Sequence Code - Hopping - MAIO  - HSN Cell Channel Description Mobile Allocation after time  Synchronization Indication IE not included. Channel Mode	3 0 See table below  TCH/F + ACCHs Arbitrary value but not zero. Chosen arbitrarily. RF hopping channel. Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation IE. Chosen arbitrarily from the set (1,2,..63). uses Range 128 to encode the complete CA of cell B. Indicates the following 5 frequencies: (260, 262, 264, 270, 274  Signalling Only.

HANDOVER COMMAND			
Band	Cell Description	Cell Channel Description	Mobile Allocation
	BCCH ARFCN	Format	ARFCNs
GSM 450	274	Range 128	260, 262, 264, 270, 274
GSM 480	321	Range 128	307, 309, 311, 317, 321
GSM 710	477	Range 128	451, 455, 459, 468, 477
GSM 750	477	Range 128	451, 455, 459, 468, 477
T-GSM 810	477	Range 128	451, 455, 459, 468, 477
GSM 850	167	Range 128	141, 145, 149, 158, 167
GSM 900	40	Bitmap 0	14, 18, 22, 31, 40

Other bands end:

M = 7:

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except: L2 pseudo length Channel Description - Channel Type - Timeslot number - Training Sequence Code - Hopping - MAIO  - HSN Mobile Allocation - Length - Contents	14 octets (11 + contents of the MA). Channel Description. TCH/F + ACCHs Zero. Chosen arbitrarily. RF hopping channel. Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation. Zero.  3 octets. Indicates only one frequency (see table below).

IMMEDIATE ASSIGNMENT	
Band	ARFCN
GSM 450	291
GSM 480	338
GSM 710	508
GSM 750	508
T-GSM 810	508
GSM 850	235
GSM 900	114
DCS 1 800	844
PCS 1 900	744

## HANDOVER COMMAND

DCS 1 800 or PCS 1 900

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	DCS 1 800: 764 PCS 1 900: 664
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	Arbitrary value but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation.
- HSN	Chosen arbitrarily from the set. (1,2,..63).
Cell Channel Description	Use Variable bit map to encode the complete CA of cell B.
Mobile Allocation	Indicates all of the CA of cell B except for the following three frequencies: DCS 1 800: 764, 832 and 844 PCS 1 900: 664, 732, 744
Mode of First channel	Speech (full rate version 1 or half rate version 1).

## Other Bands

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	Arbitrary value but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Chosen arbitrarily from the set (1,2,..63).
Synchronization Indication IE is not included:	
Frequency list after time.	
- Frequency List IE	See table below
Mode of First channel	Speech (full rate version 1 or half rate version 1).



HANDOVER COMMAND			
Band	Cell Description	Frequency List	
	BCCH Carrier Number	Format	ARFCNs
GSM 450	274	Range 128	260, 262, 264, 266, 268, 270, 272, 274, 276, 279, 281, 283, 285, 287, 289, 291
GSM 480	321	Range 128	307, 309, 311, 313, 315, 317, 319, 321, 323, 326, 328, 330, 332, 334, 336, 338
GSM 710	477	Range 128	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508
GSM 750	477	Range 128	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508
T-GSM 810	477	Range 128	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508
GSM 850	167	Range 128	141, 145, 149, 151, 157, 158, 165, 167, 187, 193, 200, 201, 202, 203, 235, 241
GSM 900	40	Bitmap 0	14, 18, 22, 24, 30, 31, 38, 40, 60, 66, 73, 74, 75, 76, 108, 114

Step 13: "x" = 500.

M = 8:

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except: L2 pseudo length Channel Description <ul style="list-style-type: none"> <li>- Channel Type</li> <li>- TDMA offset</li> <li>- Timeslot number</li> <li>- Training Sequence Code</li> <li>- Hopping</li> <li>- MAIO</li> </ul> <ul style="list-style-type: none"> <li>- HSN</li> </ul> Mobile Allocation <ul style="list-style-type: none"> <li>- Length</li> <li>- Contents</li> </ul>	14 octets (11 + contents of the MA). Channel Description. SDCCH/8 As default message contents. Arbitrary value but not zero. Chosen arbitrarily. RF hopping channel. Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation. Chosen arbitrarily from the set (1,2,..63).  3octets. Indicates only three frequencies: (see table below).

IMMEDIATE ASSIGNMENT	
Band	ARFCNs
GSM 450	281, 283, 285
GSM 480	328, 330, 332
GSM 710	500, 501, 502
GSM 750	500, 501, 502
T-GSM 810	500, 501, 502
GSM 850	200, 201, 202
GSM 900	73, 74, 75
DCS 1 800	773, 775, 779
PCS 1 900	673, 675, 679

## HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	Single RF Channel.
- ARFCN	Chosen arbitrarily from the Cell Allocation of Cell B, but not the BCCH carrier of Cell B.
Synchronization Indication IE not included.	
Mode of First Channel	Speech (full rate version 1 or half rate version 1).

HANDOVER COMMAND	
Band	ARFCN
GSM 450	274
GSM 480	321
GSM 710	477
GSM 750	477
T-GSM 810	477
GSM 850	167
GSM 900	40
DCS 1 800	764
PCS 1 900	664

Step 13: "x" = 500.

M = 9:

## IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents.	

## HANDOVER COMMAND

DCS 1 800 and PCS 1 900 begin:

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	DCS 1 800: 764 PCS 1 900: 664
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	Arbitrary value, but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency Short List IE.
- HSN	Zero (this gives cyclic hopping).
Frequency Short List after time	
- Frequency Short List	Use Range 256 to encode the following 3 frequencies: DCS 1 800: 764, 779, 782 PCS 1 900: 664, 679, 682
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Non synchronized".
- Normal Cell Indication	Ignore out of range timing advance.
Channel mode	Speech (full rate version 1 or half rate version 1)

DCS 1 800 and PCS 1 900 end:

Other bands begin:

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel
- MAIO	Chosen arbitrarily from the set {0, 1}.
- HSN	Chosen arbitrarily from the set {1, 2,..., 63}.
Synchronization Indication IE is not included	
Frequency List, after time.	
- Frequency List	allocates the following two frequencies See table below.
Mode of the first channel	Speech (full rate version 1 or half rate version 1).

HANDOVER COMMAND		
Band	BCCH Carrier Number	Frequency List ARFCNs
GSM 450	274	260, 291
GSM 480	321	307, 338
GSM 710	447	451, 508
GSM 750	447	451, 508
T-GSM810	447	451, 508
GSM 850	167	141, 241
GSM 900	40	14, 114

Other bands end:

Step 13: "x" = 500.

M = 10:

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents.	

HANDOVER COMMAND

DCS 1 800 or PCS 1 9 00 begin:

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	DCS 1 800: 764 PCS 1 900: 664
Channel Description	
- Channel Type	TCH/H + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Arbitrary value, but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Zero (this gives cyclic hopping).
Frequency List after time	
- Frequency List	Use Variable Bit Map to encode the following 15 frequencies: DCS 1 800: 739, 743, 746, 749, 756, 758, 764, 771, 779, 782, 791, 798, 829, 832, 844 PCS 1 900: 639, 643, 646, 649, 656, 658, 664, 671, 679, 682, 691, 698, 729, 732, 744
Synchronization Indication IE is not included.	
Channel mode	Speech (full rate version 1 or half rate version 1).

DCS 1 800 or PCS 1 9 00 end:

Step 13: "x" = 750.

Other bands begin:

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/H + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Chosen arbitrarily but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set {0, 1}.
- HSN	Chosen arbitrarily from the set {1, 2,..., 63}.
Synchronization Indication IE is not included	
Frequency List, after time	
- Frequency List	allocates the following two frequencies { See table below }.
Channel Mode IE	speech (full rate version 1 or half rate version 1).

HANDOVER COMMAND		
Band	BCCH Carrier Number	Frequency List ARFCNs
GSM 450	274	274, 291
GSM 480	321	321, 338
GSM 710	447	477, 508
GSM 750	447	477, 508
T-GSM 810	447	477, 508
GSM 850	167	167, 241
GSM 900	40	40, 114

Other bands end:

Step 13: "x" = 750.

Specific Message Contents For Mobiles not Supporting Speech

The message contents shall be the same for the Mobile Station supporting speech, except for:

M = 1, 7, 8 and 9:

HANDOVER COMMAND

Information Element	value/remarks
Mode of first channel	Data, with full rate radio interface rate which is supported.

M = 2 and 10:

HANDOVER COMMAND

Information Element	value/remarks
Mode of first channel	Data, with half rate radio interface rate which is supported.

### 26.6.5.3 Handover / successful / active call / finely synchronized

#### 26.6.5.3.1 Conformance requirements

The MS shall correctly apply the handover procedure from TCH/F with frequency hopping to TCH/F without frequency hopping in the finely synchronized case when a call is in progress.

The MS shall correctly apply the handover procedure from TCH/H with frequency hopping to TCH/H without frequency hopping in the finely synchronized case when a call is in progress. This requirement does not apply to MSs not supporting TCH/H.

#### References

3GPP TS 04.08 / 3GPP TS 44.018 subclauses 3.4.4, 9.1.14, 9.1.15 and 9.1.16.

3GPP TS 04.13 subclause 5.2.6.

3GPP TS 05.05 subclause 4.1.1.

3GPP TS 05.10, subclause 6.6.

#### 26.6.5.3.2 Test purpose

To test that when the MS is ordered to make a finely synchronized handover to a synchronized cell, it sends 4 access bursts on the main DCCH (and optionally on the SACCH) and then activates the channel correctly, taking into account the value of any Starting Time information element, power command and correctly calculating the timing advance to use. To test the MS activates the new channel correctly and transmits the HANDOVER COMPLETE message without undue delay.

#### 26.6.5.3.3 Method of test

##### Initial Conditions

System Simulator:

2 cells, A and B, with same LAI, default parameters, except:

The BCCH of cell A is sent  $k$  bit periods before the BCCH of cell B. The timing advance in cell A sent to the MS is  $y$  bit periods.  $k$  and  $y$  are selected such that  $0 < (2k+y) \bmod 256 < 60$ .

	Cell B BCCH ARFCN
GSM 450	274
GSM 480	321
GSM 710	477
GSM 750	477
T-GSM 810	477
GSM 850	167
GSM 900	40
DCS 1 800	764
PCS 1 900	647

##### Mobile Station:

The MS is in the active state (U10) of a call (on cell A). The MS is using a power level  $P$ . Where  $P$  is a power level within the supported range of that type of MS.

##### Specific PICS statements

- TSPC\_Type\_xxx (all appropriate power classes)
- MS supports Speech (TSPC\_TS1x\_Speech)

##### PIXIT statements

- supported radio interface rates: 12kbps, 6kbps, 3,6kbps

##### Foreseen Final State of the MS

The active state (U10) of a mobile call (on cell B).

## Test Procedure

This procedure is repeated for execution counter  $M = 1$  to 2. (See table 26.6-1.)

The MS is in the active state (U10) of a call on cell A. The SS sends a HANOVER COMMAND on the main DCCH. The MS shall (at the time specified in the Starting Time information element, if included) send 4 access bursts, in 4 successive slots on the new DCCH to cell B (Note: Before completion of the 4 access bursts on the DCCH, additional access bursts may also be sent on the SACCH). Then the MS shall establish a signalling link indicating the correct Timing Advance and power level and send a HANOVER COMPLETE message.

The MS shall be "ready to transmit" a HANOVER COMPLETE message before "x" ms after the end of the HANOVER COMMAND message, but not before a UA frame has been sent by the SS.

The term "ready to transmit" is defined in 3GPP TS 04.13. The value of "x" depends upon the target channel and is specified in the specific message contents section.

## Maximum Duration of Test

5 minutes, including 1 minute for any necessary operator actions.

## Expected Sequence

This sequence is performed for execution counter  $M = 1$  for an MS which only supports TCH/F.

This sequence is performed for execution counter  $M = 1$  to 2 for an MS which supports TCH/F and H.

Step	Direction	Message	Comments
0	MS -> SS		$M = 1$ , The MS and SS are using a full rate TCH in hopping mode on cell A. $M = 2$ , The MS and SS are using a half rate TCH in hopping mode on cell A.
1	SS -> MS	HANOVER COMMAND	See Specific Message Contents.
2	MS -> SS	HANOVER ACCESS	See specific message contents. Four messages.
3	MS -> SS	HANOVER ACCESS	are transmitted to Cell B in 4 successive slots.
4	MS -> SS	HANOVER ACCESS	on the new DCCH.
5	MS -> SS	HANOVER ACCESS	Before completion of the 4 access bursts on the new DCCH, additional access bursts may also be sent on the SACCH
6	MS -> SS	SABM	Sent without information field.
7	SS -> MS	UA	
8	MS -> SS	HANOVER COMPLETE	This message shall be ready to be transmitted before "x" ms after the completion of step 1. See specific message contents.
9	SS		The header of the next uplink SACCH is examined and the Timing Advance and Power Level indications are examined. The correct timing advance shall be indicated. A tolerance of $\pm 2$ bit periods is allowed. The power level indication shall indicate the power level used in the handover command (see note).
10	MS, SS		$M = 1$ , The MS and SS are using a full rate TCH in non-hopping mode on cell B. $M = 2$ , The MS and SS are using a half rate TCH in non-hopping mode on cell B.
<p><b>NOTE:</b> In case the Handover procedure is completed within 1 SACCH multiframe, the powerlevel indication, of the power level used in the handover command, will be done in the second uplink SACCH sent on the target cell. As the indicated value shall be the power control level actually used by the mobile for the last burst of the previous SACCH period, the first uplink SACCH header will indicate the powerlevel used by the MS on the old cell, if the Handover procedure is completed within 1 SACCH multiframe. In this case the powerlevel examination shall be done in the second uplink SACCH header sent on the target cell. Reference: 05.08/45.008 clause 4.2.</p>			

Specific Message Contents

M = 1:

HANDOVER COMMAND

Information Element	value/remark
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel type	TCH/F + ACCHs
- Timeslot Number	Arbitrary value, but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	Single RF Channel.
- ARFCN	See table below
Handover Reference	
- Value	Chosen arbitrarily from the range (0, 1..255).
Power command	
- Power Level	Arbitrarily chosen, but different to the one already in use and within the range supported by that type of MS.
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Synchronized".
- Normal Cell Indication	Ignore out of range timing advance.

HANDOVER COMMAND	
Band	BCCH Carrier Number and Channel Description ARFCN
GSM 450	274
GSM 480	321
GSM 710	477
GSM 750	477
T-GSM 810	477
GSM 850	167
GSM 90	40
DCS 1 800	764
PCS 1 900	647

HANDOVER ACCESS

Information Element	value/remark
As default message contents except:	
Handover Reference	
- Value	Same as HANDOVER COMMAND

Step 8: x = 650 ms.



M = 2:

HANDOVER COMMAND

Information Element	value/remark
As default message contents, except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel type	TCH/H + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot Number	Arbitrary value, but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	Single RF Channel.
- ARFCN	See table below
Handover Reference	
- Value	Chosen arbitrarily from the range (0, 1..255).
Power command	
- Power Level	Arbitrarily chosen, but different to the one already in use and within the range supported by that type of MS.
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Synchronized".
- Normal Cell Indication	Ignore out of range timing advance.
Mode of First Channel	If speech supported: Speech half rate version 1. if speech not supported: Arbitrary from the half rate data rates supported.

HANDOVER COMMAND	
Band	BCCH Carrier Number and Channel Description ARFCN
GSM 450	274
GSM 480	321
GSM 710	477
GSM 750	477
T-GSM 810	477
GSM 850	167
GSM 90	40
DCS 1 800	764
PCS 1 900	647

HANDOVER ACCESS

Information Element	value/remark
As default message contents except:	
Handover Reference	
- Value	Same as HANDOVER COMMAND

Step 8: x = 900 ms.

26.6.5.4 Handover / successful / call under establishment / finely synchronized

26.6.5.4.1 Conformance requirements

The MS shall correctly apply the handover procedure from SDCCH/8 or TCH/F with or without frequency hopping to SDCCH4, SDCCH/8 or TCH/F with or without frequency hopping in the finely synchronized case, during call establishment.

If during call establishment a Layer 3 MM or CC message just sent by the MS is not Layer 2 acknowledged before the channel change caused by the HANDOVER COMMAND message, the MS shall send the Layer 3 message to the new cell, using the same value in the N(SD) field, after the handover procedure.

## References

3GPP TS 05.10, subclause 6.6.

3GPP TS 04.08 / 3GPP TS 44.018, subclause 3.4.4.

3GPP TS 04.08 / 3GPP TS 44.018, subclause 3.1.4.2.

3GPP TS 04.13, subclause 5.2.6.

#### 26.6.5.4.2 Test purpose

To test that when the MS is ordered to make a finely synchronized handover to a synchronized cell, it sends 4 access bursts on the main DCCH (and optionally the SACCH) and then activates the channel correctly, taking into account the value of any Starting Time information element, power command and correctly calculating the timing advance to use. To test that the MS correctly retransmits Layer 3 MM or CC messages that were not acknowledged by Layer 2 before the Handover, after completion of the Handover. To verify the MS transmits the HANDOVER COMPLETE message without undue delay.

#### 26.6.5.4.3 Method of test

##### Initial Conditions

System Simulator:

2 cells, A and B, with same LAI, default parameters, except:

The BCCH of cell A is sent  $k$  bit periods before the BCCH of cell B. The timing advance in cell A sent to the MS is  $y$  bit periods.  $k$  and  $y$  are selected such that  $0 < (2k + y) \bmod 256 < 60$ .

The frame numbers of cells A and B shall be different by 100.

Band	Cell A		Cell B	
	BCCH ARFCN	Cell Allocation	BCCH ARFCN	Cell Allocation
GSM 450	263	259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291	274	260, 262, 264, 266, 268, 270, 272, 274, 276, 279, 281, 283, 285, 287, 289, 291
GSM 480	310	306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338	321	307, 309, 311, 313, 315, 317, 319, 321, 323, 326, 328, 330, 332, 334, 336, 338
GSM 710	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508	477	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508
GSM 750	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508	477	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508
T-GSM 810	457	447, 454, 457, 463, 471, 479, 482, 483, 489, 496, 498, 500, 501, 502, 503, 506, 508	477	451, 455, 459, 461, 467, 468, 475, 477, 497, 498, 500, 501, 502, 503, 506, 508
GSM 850	147	137, 144, 147, 153, 161, 169, 172, 173, 179, 186, 193, 200, 201, 202, 203, 235, 24	167	141, 145, 149, 151, 157, 158, 165, 167, 187, 193, 200, 201, 202, 203, 235, 241
GSM 900	20	10, 17, 20, 26, 34, 42, 45, 46, 52, 59, 66, 73, 74, 75, 76, 108, 114	40	14, 18, 22, 24, 30, 31, 38, 40, 60, 66, 73, 74, 75, 76, 108, 114
DCS 1 800	747	734, 741, 747, 754, 759, 762, 766, 767, 773, 775, 779, 782, 791, 798, 829, 832, 844	764	739, 743, 746, 749, 756, 758, 761, 764, 771, 779, 782, 791, 798, 829, 832, 844
PCS 1 900	647	634, 641, 647, 654, 659, 662, 666, 667, 673, 675, 679, 682, 691, 698, 729, 732, 744	664	639, 643, 646, 649, 656, 658, 661, 664, 671, 679, 682, 691, 698, 729, 732, 744

Mobile Station:

The MS is in the "idle, updated" state, with a TMSI allocated and camped on cell A. The MS is using a power level P, where P is a power level within the supported range of that type of MS.

#### Specific PICS statements

- MS supports Speech (TSPC\_TS1x\_Speech)
- TSPC\_Type\_xxx (all appropriate power classes)

#### PIXIT statements

- supported radio interface rates: 12kbps, 6kbps, 3,6kbps

#### Foreseen Final State of the MS

"Idle, updated" with TMSI allocated and camped on cell B.

#### Test Procedure

This procedure is repeated for execution counter M = 1, 2, 3, 4 (see table 26.6-1).

A Mobile Originating Call is initiated on cell A. After the MS has sent the SETUP message (and before the last L2 frame carrying the SETUP message is acknowledged by the SS) the SS sends a HANOVER COMMAND message, ordering the MS to switch to cell B. The MS shall then (at the time specified in the Starting Time information element, if included) send 4 access bursts, in successive slots on the new DCCH to cell B (Note: Before completion of the 4 access bursts on the new DCCH, additional access bursts may also be sent on the SACCH). Then the MS shall establish a signalling link indicating the correct timing advance and power level and send a HANOVER COMPLETE message. The MS shall be "ready to transmit" the HANOVER COMPLETE message before "x" ms after the end of the HANOVER COMMAND message, but not before a UA frame has been sent by the SS. The MS shall then again send the SETUP message to the SS, using the same value in the N(SD) field. Finally the SS sends a CHANNEL RELEASE to end the test.

The term "ready to transmit" is defined in 3GPP TS 04.13. The value "x" depends upon the target channel and is specified in the specific message contents section.

#### Maximum Duration of Test

5 minutes, including 1 minute for any necessary operator actions.

#### Expected Sequence

This procedure is repeated for execution counter M = 1, 2, 3, 4 (unless a particular TCH is not supported).

Step	Direction	Message	Comments
1	-----	-----	A MO call is initiated.
2	MS -> SS	CHANNEL REQUEST	Establish. Cause = "Originating call, NECI not set to 1"
3	SS -> MS	IMMEDIATE ASSIGNMENT	See Specific Message contents.
4	MS -> SS	CM SERVICE REQUEST	CM Service Type = Mobile Originating Call Establishment.
5	SS -> MS	CIPHERING MODE COMMAND	
6	MS -> SS	CIPHERING MODE COMPLETE	
7	MS -> SS	SETUP	Last L2 frame not acknowledged by the SS.
8	SS -> MS	HANDOVER COMMAND	See Specific Message Contents.
9	MS -> SS	HANDOVER ACCESS	
10	MS -> SS	HANDOVER ACCESS	
11	MS -> SS	HANDOVER ACCESS	See Specific message contents. Four.
12	MS -> SS	HANDOVER ACCESS	Messages are transmitted to cell B in 4 successive slots on the new DCCH. If the HANDOVER COMMAND message includes a starting time IE then the first HANDOVER ACCESS message shall be transmitted in the indicated frame (unless the starting time has elapsed). Before completion of the 4 access bursts on the new DCCH, additional access bursts may also be sent on the SACCH.
13	MS -> SS	SABM	Sent without information field.
14	SS -> MS	UA	
15	MS -> SS	HANDOVER COMPLETE	The message shall be ready to be transmitted before "x" ms after the completion of step 8.
16	SS		The header of the next uplink SACCH is examined and the Timing Advance and Power Level indications are examined. The correct timing advance shall be indicated. A tolerance of $\pm 2$ bit periods is allowed. The power level indication shall indicate the power level used in the handover command (see note).
17	MS -> SS	SETUP	Same N(SD) as in step 7.
18	SS -> MS	CHANNEL RELEASE	
NOTE: In case the Handover procedure is completed within 1 SACCH multiframe, the powerlevel indication, of the power level used in the handover command, will be done in the second uplink SACCH sent on the target cell. As the indicated value shall be the power control level actually used by the mobile for the last burst of the previous SACCH period, the first uplink SACCH header will indicate the powerlevel used by the MS on the old cell, if the Handover procedure is completed within 1 SACCH multiframe. In this case the powerlevel examination shall be done in the second uplink SACCH header sent on the target cell. Reference: 05.08/45.008 clause 4.2.			

## Specific Message Contents

M = 1:

## IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except:	
Channel Description	Channel Description.
- Channel Type	SDCCH/8
- TDMA offset	As default message contents.
- Timeslot number	Arbitrary value, but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation.
- HSN	Chosen arbitrarily from the set. (1,2,..63).
Mobile Allocation	Indicates all of the CA of cell A except for the BCCH frequency.

HANDOVER COMMAND

Information Element	value/remark
As default message contents except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	SDCCH/8
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Arbitrary value, but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Zero (this gives cyclic hopping).
Frequency List after time	
- Frequency List	Use format from table below to encode the complete CA of Cell B.
Handover Reference	
- Value	Chosen arbitrarily from the range (0, 1..255).
Power command	
- Power Level	Arbitrarily chosen, but different to the one already in use and within the range supported by the MS.
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Synchronized".
- Normal Cell Indication	Ignore out of range timing advance.
Mode of First Channel	Signalling only

HANDOVER COMMAND		
Band	Cell Description	Frequency List
	BCCH Carrier Number	Format
GSM 450	274	Range 128
GSM 480	321	Range 128
GSM 710	477	Range 128
GSM 750	477	Range 128
T-GSM 810	477	Range 128
GSM 850	167	Range 128
GSM 900	40	Bitmap 0
DCS 1 800	764	Range 512
PCS 1 900	664	Range 512

HANDOVER ACCESS

Information Element	value/remark
As default message contents except:	
Handover Reference	
- Value	Same as HANDOVER COMMAND

Step 15: x = 1 500 ms.

M = 2:

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except: Channel Description <ul style="list-style-type: none"> <li>- Channel Type</li> <li>- TDMA offset</li> <li>- Timeslot number</li> <li>- Training Sequence Code</li> <li>- Hopping</li> <li>- MAIO</li> </ul> <ul style="list-style-type: none"> <li>- HSN</li> </ul> Mobile Allocation	Channel Description. SDCCH/8 As default message contents. zero. Chosen arbitrarily. RF hopping channel. Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation. Zero (this gives cyclic hopping). Indicates all of the CA of cell A except for the following 2 frequencies: See table below.

IMMEDIATE ASSIGNMENT	
Band	Mobile Allocation ARFCNs
GSM 450	263 and 275
GSM 480	310 and 322
GSM 710	457 and 489
GSM 750	457 and 489
T-GSM 810	457 and 489
GSM 850	147 and 179
GSM 900	20 and 52
DCS 1 800	747 and 767
PCS 1 900	647 and 667

HANDOVER COMMAND

Information Element	value/remark
As default message contents except: Cell Description <ul style="list-style-type: none"> <li>- Network Colour Code</li> <li>- Base Station Colour Code</li> <li>- BCCH Carrier Number</li> </ul> Channel Description <ul style="list-style-type: none"> <li>- Channel Type</li> <li>- TDMA offset</li> <li>- Timeslot number</li> <li>- Training Sequence Code</li> <li>- Hopping</li> <li>- ARFCN</li> </ul> Handover Reference <ul style="list-style-type: none"> <li>- Value</li> </ul> Power command <ul style="list-style-type: none"> <li>- Power Level</li> </ul> Synchronization Indication <ul style="list-style-type: none"> <li>- Report Observed Time Difference</li> <li>- Synchronization Indication</li> <li>- Normal Cell Indication</li> </ul> Starting Time	 1 5 See table below  SDCCH/4 Chosen arbitrarily. zero. same as the BCCH. Single RF Channel. See table below  Chosen arbitrarily from the range (0, 1..255).  Arbitrarily chosen, but different to the one already in use and within the range supported by the MS.  Shall not be included. "Synchronized". Ignore out of range timing advance. Indicates the frame number of cell B that will occur approximately 1,1 seconds after the HANDOVER COMMAND message is sent by cell A.

HANDOVER COMMAND	
Band	BCCH Carrier Number and Channel Description ARFCN
GSM 450	274
GSM 480	321
GSM 710	477
GSM 750	477
T-GSM810	477
GSM 850	167
GSM 900	40
DCS 1 800	764
PCS 1 900	664

## HANDOVER ACCESS

Information Element	value/remark
As default message contents except: Handover Reference - Value	Same as HANDOVER COMMAND

Step 15:  $x = 2\ 600$  ms.

M = 3:

## IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except: Channel Description - Channel Type - Timeslot number - Training Sequence Code - Hopping - ARFCN	Channel Description. TCH/F + ACCHs Arbitrary value, but not zero. Chosen arbitrarily. Single RF Channel. See table below

IMMEDIATE ASSIGNMENT	
Band	Channel Description ARFCN
GSM 450	263
GSM 480	310
GSM 710	457
GSM 750	457
T-GSM810	457
GSM 850	147
GSM 900	20
DCS 1 800	747
PCS 1 900	647

## HANDOVER COMMAND

DCS 1 800 or PCS 1 900

Information Element	value/remark
As default message contents except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	DCS 1 800: 764 PCS 1 900: 664
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	zero
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency Short list IE.
- HSN	Chosen arbitrarily from the set (1,2,..63).
Frequency Short List after time	
- Frequency Short List	Use Range 128 to encode the following 3 frequencies: DCS 1 800: 758, 761, 771 PCS 1 900: 658, 661, 671
Handover Reference	
- Value	Chosen arbitrarily from the range (0, 1..255).
Power command	
- Power Level	Arbitrarily chosen, but different to the one already in use and within the range supported by the MS.
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Synchronized".
- Normal Cell Indication	Ignore out of range timing advance.

GSM 450, GSM 480, GSM 850:

Information Element	value/remark
As default message contents except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Chosen arbitrarily from the set (1,2,..63).
Frequency List after time	
- Frequency List	See table below
Handover Reference	
- Value	Chosen arbitrarily from the range (0, 1..255).
Power command	
- Power Level	Arbitrarily chosen, but different to the one already in use and within the range supported by the MS.
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Synchronized".
- Normal Cell Indication	Ignore out of range timing advance.



Band	BCCH ARFCN	Frequency List after Time
GSM 450	274	279, 285, 287, 289
GSM 480	321	326, 332, 334, 336
GSM 850	167	193, 202, 203, 235

GSM 710, GSM 750, T-GSM 810, GSM 900:

Information Element	value/remark
As default message contents except:	
Cell Description	
- Network Colour Code	1
- Base Station Colour Code	5
- BCCH Carrier Number	See table below
Channel Description	
- Channel Type	TCH/F + ACCHs
- Timeslot number	zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency Channel Sequence IE.
- HSN	Chosen arbitrarily from the set (1,2,..63).
Frequency Channel Sequence after time	
- Frequency Channel Sequence	See table below
Handover Reference	
- Value	Chosen arbitrarily from the range (0, 1..255).
Power command	
- Power Level	Arbitrarily chosen, but different to the one already in use and within the range supported by the MS.
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Synchronized".
- Normal Cell Indication	Ignore out of range timing advance.

Band	BCCH ARFCN	Frequency Channel Sequence
GSM 710	477	498, 502, 503, 506
GSM 750	477	498, 502, 503, 506
T-GSM 810	477	498, 502, 503, 506
GSM 900	40	66, 75, 76, 108

#### HANDOVER ACCESS

Information Element	value/remark
As default message contents except:	
Handover Reference	
- Value	Same as HANDOVER COMMAND

Step 15: x = 650 ms.

M = 4:

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except: Channel Description - Channel Type - TDMA offset - Timeslot number - Training Sequence Code - Hopping - ARFCN	Channel Description. SDCCH/8 As default message contents. As default message contents. Chosen arbitrarily. Single RF Channel. Chosen arbitrarily from the Cell Allocation of Cell A.

HANDOVER COMMAND

Information Element	value/remark
As default message contents except: Cell Description - Network Colour Code - Base Station Colour Code - BCCH Carrier Number Channel Description - Channel Type - Timeslot number - Training Sequence Code - Hopping - ARFCN Handover Reference - Value Power command - Power Level Synchronization Indication - Report Observed Time Difference - Synchronization Indication - Normal Cell Indication Channel Mode	1 5 See table below TCH/F + ACCHs Arbitrary value, but not zero. Chosen arbitrarily. Single RF Channel. Chosen arbitrarily from the Cell Allocation of Cell B. Chosen arbitrarily from the range (0, 1..255). Arbitrarily chosen, but different to the one already in use and within the range supported by the MS. Shall not be included. "Synchronized". Ignore out of range timing advance. If speech is supported: Speech (full rate version 1 or half rate version 1). If speech is not supported: arbitrary from those supported (12, 6, 3,6 kbps).

HANDOVER COMMAND	
Band	BCCH Carrier Number
GSM 450	274
GSM 480	321
GSM 710	477
GSM 750	477
T-GSM 810	477
GSM 850	167
GSM 900	40
DCS 1 800	764
PCS 1 900	664

HANDOVER ACCESS

Information Element	value/remark
As default message contents except: Handover Reference - Value	Same as HANDOVER COMMAND

Step 15: x = 650 ms.

## 26.6.5.5 Pre-synchronized handovers

### 26.6.5.5.1 Handover / successful / active call / pre-synchronized / Timing Advance IE not included

If an MS does not implement the pre-synchronized handover procedure correctly then calls may fail.

#### 26.6.5.5.1.1 Conformance requirements

- 1 The MS shall correctly apply the handover procedure from TCH/F without frequency hopping to TCH/F without frequency hopping in the pre-synchronized case when a call is active.
- 2 When the Timing Advance information element is not included in the HANOVER COMMAND, the MS shall access the new cell with the default timing advance of 1 bit period.
- 3 The MS shall be ready to transmit the HANOVER COMPLETE message within 650 ms of the end of the HANOVER COMMAND message.

#### References

Conformance requirement 1: 3GPP TS 04.08 / 3GPP TS 44.018 subclause 3.4.4.

Conformance requirement 2: 3GPP TS 05.10, subclause 6.6.

Conformance requirement 3: 3GPP TS 04.13, subclause 5.2.6.1.

#### 26.6.5.5.1.2 Test purpose

To verify that when the MS is ordered to make a pre-synchronized handover to another cell, it sends 4 access bursts on the main DCCH (and optionally on the SACCH) and then activates the channel correctly and correctly calculates the time to transmit.

#### 26.6.5.5.1.3 Method of test

##### Initial Conditions

System Simulator:

2 cells, A and B, with same LAI, default parameters.

The BCCH of cell A is sent k bit periods before the BCCH of cell B. k is arbitrarily selected.

Mobile Station:

The MS is in the active state (U10) of a call (on cell A) using a full rate TCH in non-hopping mode.

##### Specific PICS statements

-

##### PIXIT statements

-

##### Foreseen Final State of the MS

The active state (U10) of a mobile call (on cell B) using a full rate TCH in non-hopping mode.

##### Test Procedure

The MS is in the active state (U10) of a call on cell A. The SS sends a HANOVER COMMAND for a pre-synchronized handover without the Timing Advance IE on the main DCCH. The MS shall send 4 access bursts, in 4 successive slots of the new DCCH to cell B with a Timing Advance of zero (Note: Before completion of the 4 access bursts on the new DCCH, additional access bursts may also be sent on the SACCH). Then the MS shall establish a signalling link using a Timing Advance of one and send a HANOVER COMPLETE message. The MS shall be ready to transmit the HANOVER COMPLETE message before 650 ms after the end of the HANOVER COMMAND message, but not before a UA frame has been sent by the SS.

The term "ready to transmit" is defined in 3GPP TS 04.13.

#### Maximum Duration of Test

5 s.

#### Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	HANDOVER COMMAND	See specific message contents below.
2	MS -> SS	HANDOVER ACCESS	Handover Reference as included in the
3	MS -> SS	HANDOVER ACCESS	HANDOVER COMMAND.
4	MS -> SS	HANDOVER ACCESS	
5	MS -> SS	HANDOVER ACCESS	Before completion of the 4 access bursts on the new DCCH, additional access bursts may also be sent on the SACCH.
6	MS -> SS	SABM	Sent without information field.
7	SS -> MS	UA	
8	MS -> SS	HANDOVER COMPLETE	This message shall be ready to be transmitted before 650 ms after the completion of step 1.
9	SS	-	The SS checks that the timing advance reported in the layer 1 header of the SACCH message that is sent in the first SACCH multiframe following the SABM is 1 bit period.

#### Specific Message Contents

##### HANDOVER COMMAND

As default message contents, except: Synchronization Indication	pre-synchronized; ROT=0; NCI=0.
--	---------------------------------

#### 26.6.5.5.2 Handover / successful / call being established / pre-synchronized / timing advance IE is included / reporting of observed time difference requested

If an MS does not implement the pre-synchronized handover procedure correctly then calls may fail.

If an MS does not report the observed time difference between cells correctly then pseudo synchronized handovers might not be possible for any MS.

##### 26.6.5.5.2.1 Conformance requirements

- 1 The MS shall correctly apply the handover procedure from an SDCCH/4 to a TCH/F without frequency hopping in the pre-synchronized case while a call is being established.
- 2 If during call establishment a Layer 3 MM or CC message just sent by the MS is not Layer 2 acknowledged before the channel change caused by the HANDOVER COMMAND message, the MS shall send the Layer 3 message to the new cell, using the same value in the N(SD) field, after the handover procedure.
- 3 When the Timing Advance information element is included in the HANDOVER COMMAND, the MS shall access the new cell with the timing advance included in the Timing Advance IE.
- 4 The MS shall be ready to transmit the HANDOVER COMPLETE message within 650 ms of the end of the HANDOVER COMMAND message.
- 5 When requested to do so in the HANDOVER COMMAND message, the MS shall return the Mobile Time Difference IE in the HANDOVER COMPLETE message indicating the sum of the observed time difference between the cells and the timing advance used on the old cell.

## References

Conformance requirement 1: 3GPP TS 04.08 / 3GPP TS 44.018, subclause 3.4.4.

Conformance requirement 2: 3GPP TS 04.08 / 3GPP TS 44.018, subclause 3.1.4.3.

Conformance requirement 3: 3GPP TS 05.10, subclause 6.6.

Conformance requirement 4: 3GPP TS 04.13, subclause 5.2.6.1.

Conformance requirement 5: 3GPP TS 04.08 / 3GPP TS 44.018, subclause 10.5.2.39.

### 26.6.5.5.2.2 Test purpose

To test that when the MS is ordered to make a pre-synchronized handover to another cell, it sends 4 access bursts on the main DCCH (and optionally on the SACCH) and then activates the channel correctly and correctly calculates the time to transmit. To test that the MS correctly retransmits Layer 3 MM or CC messages that were not acknowledged by Layer 2 before the Handover, after completion of the Handover. To test that the MS correctly reports on the time difference between the cells.

### 26.6.5.5.2.3 Method of test

#### Initial Conditions

System Simulator:

2 cells, A and B, with same LAI, default parameters.

The BCCH of cell A is sent k bit periods before the BCCH of cell B.

Mobile Station:

The MS is in the "idle, updated" state, with a TMSI allocated and camped on cell A.

#### Specific PICS statements

-

#### PIXIT statements

-

#### Foreseen Final State of the MS

"Idle, updated" with TMSI allocated and camped on cell B.

#### Test Procedure

A Mobile Originating Call is initiated. The SS sends an IMMEDIATE ASSIGNMENT message allocating an SDCCH/4. The MS is commanded to use a timing advance of y bit periods on cell A. After the MS has sent the SETUP message (and before the last L2 frame carrying the SETUP message is acknowledged by the SS) the SS sends a HANDOVER COMMAND, ordering the MS to switch to cell B. The MS shall then send 4 access bursts, in 4 successive slots of the new DCCH to cell B (Note: Before completion of the 4 access bursts on the new DCCH, additional access bursts may also be sent on the SACCH). Then the MS shall establish a signalling link using the correct timing advance and send a HANDOVER COMPLETE message. The MS shall be ready to transmit the HANDOVER COMPLETE message before 650 ms after the end of the HANDOVER COMMAND message, but not before a UA frame has been sent by the SS.

The term "ready to transmit" is defined in 3GPP TS 04.13.

The MS shall then again send the SETUP message to the SS, using the same value in the N(SD) field. Finally the SS sends a CHANNEL RELEASE to end the test.

#### Maximum Duration of Test

20 s.

## Expected Sequence

Step	Direction	Message	Comments
1	-----	-----	A MO call is initiated.
2	MS -> SS	CHANNEL REQUEST	
3	SS -> MS	IMMEDIATE ASSIGNMENT	to an SDCCH/4.
4	MS -> SS	CM SERVICE REQUEST	
5	SS -> MS	CIPHERING MODE COMMAND	
6	MS -> SS	CIPHERING MODE COMPLETE	
7	MS -> SS	SETUP	Last L2 frame not acknowledged by the SS.
8	SS -> MS	HANDOVER COMMAND	See specific message contents below.
9	MS -> SS	HANDOVER ACCESS	Handover Reference as included in the
10	MS -> SS	HANDOVER ACCESS	HANDOVER COMMAND
11	MS -> SS	HANDOVER ACCESS	
12	MS -> SS	HANDOVER ACCESS	Before completion of the 4 access bursts on the new DCCH, additional access bursts may also be sent on the SACCH.
13	MS -> SS	SABM	Sent without information field.
14	SS -> MS	UA	
15	MS -> SS	HANDOVER COMPLETE	This message shall be ready to be transmitted before 650 ms after the completion of step 8. Shall include the Mobile Time Difference IE with value $(2k+y) \bmod 2,097,152$ half bit periods. A tolerance of $\pm 2$ half bit periods is allowed.
16	MS -> SS	SETUP	Same N(SD) as in step 7
17	SS	-	The SS checks that the timing advance reported in the layer 1 header of the SACCH message that is sent in the first SACCH multiframe following the SABM is 9 bit periods. A tolerance of $\pm 2$ bit periods is allowed.
18	SS -> MS	CHANNEL RELEASE	

## Specific Message Contents

## HANDOVER COMMAND

As default message contents, except: Synchronization Indication Timing Advance	pre-synchronized; ROT=1; NCI=0. 9 bit periods.
--	---

## 26.6.5.6 Handover / successful / active call / pseudo synchronized

If MSs that claim to support this procedure do not correctly implement it, then calls may fail.

## 26.6.5.6.1 Conformance requirements

- 1 The MS shall correctly apply the handover procedure from TCH/F without frequency hopping to TCH/F without frequency hopping in the pseudo synchronized case when a call is in progress.
- 2 The MS shall access the new cell with the correct timing advance.
- 3 The MS shall be ready to transmit the HANDOVER COMPLETE message within 650 ms of the end of the HANDOVER COMMAND message.
- 4 When requested to do so in the HANDOVER COMMAND message, the MS shall return the Mobile Time Difference IE in the HANDOVER COMPLETE message indicating the sum of the observed time difference between the cells and the timing advance used on the old cell.

## References

Conformance requirement 1: 3GPP TS 04.08 / 3GPP TS 44.018 subclause 3.4.4.

Conformance requirement 2: 3GPP TS 05.10, subclause 6.6.

Conformance requirement 3: 3GPP TS 04.13, subclause 5.2.6.1.

Conformance requirement 4: 3GPP TS 04.08 / 3GPP TS 44.018, subclause 10.5.2.39.

#### 26.6.5.6.2 Test purpose

To test that when the MS is ordered to make a pseudo synchronized handover to another cell, it sends 4 access bursts on the main DCCH (and optionally the SACCH) and then activates the channel correctly and correctly calculates the time to transmit. To test that the MS correctly reports the time difference between the cells.

#### 26.6.5.6.3 Method of test

##### Initial Conditions

###### System Simulator:

2 cells, A and B, with same LAI, default parameters.

The BCCH of cell A is sent  $k$  bit periods before the BCCH of cell B.  $k$  is arbitrarily selected.

The MS is being commanded to use a timing advance of  $y$  bit periods on cell A, where  $y$  is arbitrarily selected from the set  $\{11, 12, \dots, 62\}$ .

###### Mobile Station:

The MS is in the active state (U10) of a call (on cell A) using a full rate TCH in non-hopping mode.

##### Specific PICS statements

-

##### PIXIT statements

-

- .

##### Foreseen Final State of the MS

The active state (U10) of a mobile call (on cell B) using a full rate TCH in non-hopping mode.

##### Test Procedure

The MS is in the active state (U10) of a call on cell A. The SS sends a HANOVER COMMAND for a pseudo-synchronized handover with the Real Time Difference IE included. The Time Difference value is set to  $(2k+10)$  modulo 256. The MS shall send 4 access bursts, in 4 successive slots of the new DCCH to cell B with a Timing Advance of zero (Note: Before completion of the 4 access bursts on the new DCCH, additional access bursts may also be sent on the SACCH). Then the MS shall establish a signalling link using a Timing Advance of  $(y-10)$  bit periods and send a HANOVER COMPLETE message. The MS shall be ready to transmit the HANOVER COMPLETE message before 650 ms after the end of the HANOVER COMMAND message, but not before a UA frame has been sent by the SS.

The term "ready to transmit" is defined in 3GPP TS 04.13.

##### Maximum Duration of Test

5 s.

## Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	HANDOVER COMMAND	See specific message contents below.
2	MS -> SS	HANDOVER ACCESS	Handover Reference as included in the
3	MS -> SS	HANDOVER ACCESS	HANDOVER COMMAND.
4	MS -> SS	HANDOVER ACCESS	
5	MS -> SS	HANDOVER ACCESS	Before completion of the 4 access bursts on the new DCCH, additional access bursts may also be sent on the SACCH.
6	MS -> SS	SABM	Sent without information field.
7	SS -> MS	UA	
8	MS -> SS	HANDOVER COMPLETE	This message shall be ready to be transmitted before 650 ms after the completion of step 1. Shall include the Mobile Time Difference IE with value $(2k+y) \bmod 2,097,152$ half bit periods. A tolerance of $\pm 2$ half bit periods is allowed.
9	SS	-	The SS checks that the timing advance reported in the layer 1 header of the SACCH message that is sent in the first SACCH multiframe following the SABM is $(y-10)$ bit periods. A tolerance of $\pm 2$ bit periods is allowed.

## Specific Message Contents

## HANDOVER COMMAND

As default message contents, except: Synchronization Indication Time Difference	pseudo-synchronized; ROT=1; NCI=0. $(2k+10) \bmod 256$ .
---	---

### 26.6.5.7 Handover / successful / active call / non-synchronized / reporting of observed time difference requested

If an MS does not report the observed time difference between cells correctly then pseudo synchronized handovers might not be possible for any MS.

#### 26.6.5.7.1 Conformance requirements

- 1 The MS shall correctly apply the handover procedure from a TCH/F without frequency hopping to a TCH/F without frequency hopping in the non-synchronized case while a call is active.
- 2 When requested to do so in the HANDOVER COMMAND message, the MS shall return the Mobile Time Difference IE in the HANDOVER COMPLETE message indicating the sum of the observed time difference between the cells and the timing advance used on the old cell.

## References

Conformance requirement 1: 3GPP TS 04.08 / 3GPP TS 44.018, subclause 3.4.4.

Conformance requirement 2: 3GPP TS 04.08 / 3GPP TS 44.018, subclause 10.5.2.39.

#### 26.6.5.7.2 Test purpose

To verify that when the MS is ordered to make a non-synchronized handover to another cell and is ordered to report on the time difference between the cells, that it does so correctly.



## 26.6.5.7.3 Method of test

## Initial Conditions

## System Simulator:

2 cells, A and B with default parameters except the LAI of cell B has MNC = 02 (PCS 1 900: MNC = 021) decimal, MCC = 315 decimal, and LAC = 5344 H.

The BCCH of cell A is sent k bit periods before the BCCH of cell B.

The MS is commanded to use a timing advance of y bit periods on cell A.

## Mobile Station:

The MS is in the active state (U10) of a call (on cell A) using a full rate TCH in non-hopping mode.

## Specific PICS statements

-

## PIXIT statements

-

## Foreseen Final State of the MS

The active state (U10) of a mobile call (on cell B) using a full rate TCH in non-hopping mode.

## Test Procedure

The MS is in the active state (U10) of a call on cell A. The SS sends a HANOVER COMMAND on the main DCCH. The HANOVER COMMAND includes a Synchronization Indication IE that instructs the MS to supply the observed time difference between the cells. The MS shall begin to send access bursts on the new DCCH (and optionally the SACCH) to cell B and the SS sends one PHYSICAL INFORMATION message. The MS shall activate the channel in sending and receiving mode and establish a signalling link using the correct timing advance. The MS shall transmit a HANOVER COMPLETE message containing the Mobile Time Difference IE with a correct value.

## Maximum Duration of Test

5 s.

## Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	HANOVER COMMAND	See specific message contents below.
2	MS -> SS	HANOVER ACCESS	Repeated on every burst of the uplink main DCCH until reception of PHYSICAL INFORMATION. Handover Reference as included in the HANOVER COMMAND.
3	SS -> MS	PHYSICAL INFORMATION	
4	MS -> SS	SABM	Sent without information field.
5	SS -> MS	UA	
6	MS -> SS	HANOVER COMPLETE	Shall include the Mobile Time Difference IE with value $(2k+y) \bmod 2,097,152$ half bit periods. A tolerance of $\pm 2$ half bit periods is allowed.

## Specific Message Contents

## HANOVER COMMAND

as default message contents, except: Synchronization Indication	"not synchronized"; ROT=1; NCI=0.
--	-----------------------------------

## 26.6.5.8 Handover / layer 3 failure

### 26.6.5.8.1 Conformance requirements

The MS shall return to the old channel in the case of an handover failure caused by the non reception of the PHYSICAL INFORMATION message. On the old channel the MS shall use the Power Level that it was previously using on that channel.

#### References

3GPP TS 04.08 / 3GPP TS 44.018 subclause 3.4.4.

### 26.6.5.8.2 Test purpose

To verify the function of timer T3124 and the contents in the message HANOVER FAILURE and in the layer 1 header on the SACCH.

### 26.6.5.8.3 Method of test

#### Initial Conditions

System Simulator:

2 cells with same LAI, default parameters.

Mobile Station:

The MS is in the active state (U10) of a call (on cell A). Used power level is the maximum supported by the MS.

#### Specific PICS statements

-

#### PIXIT statements

-

#### Foreseen Final State of the MS

The active state (U10) of a mobile call (on cell A). Used power level is the maximum supported by the MS.

#### Test Procedure

The MS is in the active state (U10) of a call on cell A. The SS sends a HANOVER COMMAND with Power Command set to 8 on the main DCCH. The MS shall begin to send access bursts on the new DCCH (and optionally the SACCH) to cell B. The SS activates the SACCH, but does not send PHYSICAL INFORMATION (thus causing a time-out of T3124). The MS shall re-establish the old link on cell A and send a HANOVER FAILURE within 3 s from the transmission of HANOVER COMMAND, using the old Power Control Level.

#### Maximum Duration of Test

5 minutes, including 1 minute for any necessary operator actions.

## Expected Sequence

Step	Direction	Message	Comments
0	SS	-	The SS records the Power Control Level in the layer 1 header of the last SACCH message sent by the MS before step 1.
1	SS -> MS	HANDOVER COMMAND	Channel description: non-hopping, full rate Power Command: 8. Synchronization Indication: non synchronized.
2	MS -> SS	HANDOVER ACCESS	Several messages are sent, all with correct Handover References.
3	MS -> SS	HANDOVER FAILURE	Sent on old channel, RR cause value = "Abnormal release, unspecified", "Abnormal release, channel unacceptable", "Abnormal release, timer expired", "Abnormal release, no activity on the radio path" or "Protocol error unspecified". Shall be sent within 3 s from the transmission of HANDOVER COMMAND.
4	SS	-	The SS checks that the Power Control Level reported in the layer 1 header of the SACCH message that is sent in the first SACCH multiframe following the SABM is the same as in step 0.

## Specific Message Contents

None.

### 26.6.5.9 Handover / layer 1 failure

#### 26.6.5.9.1 Conformance requirements

The MS shall return to the old channel in the case of an handover failure caused by a layer 1 failure on the target cell. On the old channel the MS shall use the Power Level that it was previously using on that channel.

## References

3GPP TS 04.08 / 3GPP TS 44.018 subclause 3.4.4.

#### 26.6.5.9.2 Test purpose

To verify the function of timer T3124 and the contents in the message HANDOVER FAILURE and in the layer 1 header on the SACCH.

#### 26.6.5.9.3 Method of test

## Initial Conditions

System Simulator:

2 cells with same LAI, default parameters.

Mobile Station:

The MS is in the active state (U10) of a call (on cell A). Used power level is the maximum supported by the MS.

## Specific PICS statements

-

## PIXIT statements

-

## Foreseen Final State of the MS

The active state (U10) of a mobile call (on cell A). Used power level is the maximum supported by the MS.

### Test Procedure

The MS is in the active state (U10) of a call on cell A. The SS sends a HANOVER COMMAND on the main DCCH. The MS shall begin to send access bursts at the commanded Power Control Level on the new DCCH (and optionally the SACCH) to cell B ( the commanded Power Control Level must be different than that already used for Cell A). With the exception of normal BCCH signalling, the SS does not transmit anything on cell B (thus causing a time-out of T3124). The MS shall re-establish the old link on cell A and send a HANOVER FAILURE within 3 s from the transmission of HANOVER COMMAND, using the old Power Control Level.

### Maximum Duration of Test

5 minutes, including 1 minute for any necessary operator actions.

### Expected Sequence

Step	Direction	Message	Comments
0	SS	-	The SS records the Power Control Level in the layer 1 header of the last SACCH message sent by the MS before step 1.
1	SS -> MS	HANOVER COMMAND	Channel description: non-hopping, full rate. Synchronization Indication: non synchronized. Power Level: different than that recorded in step 0.
2	MS -> SS	HANOVER ACCESS	Several messages are sent, all with correct Handover References.
3	MS -> SS	HANOVER FAILURE	Sent on old channel, RR cause value = "Abnormal release, unspecified", "Abnormal release, channel unacceptable", "Abnormal release, timer expired", "Abnormal release, no activity on the radio path" or "Protocol error unspecified". Shall be sent within 3 s from the transmission of HANOVER COMMAND.
4	SS	-	The SS checks that the Power Control Level reported in the layer 1 header of the SACCH message that is sent in the first SACCH multiframe following the SABM is the same as in step 0.

### Specific Message Contents

None.