# 17 Access times during handover

## 17.1 Intra cell channel change

### 17.1.1 Definition and applicability

The access times are:

- the time between either receipt by the MS of the last timeslot of the message block containing an ASSIGNMENT COMMAND or HANDOVER COMMAND and the time it has to be ready to transmit on the new channel, and
- the time between the end of the last complete speech or data frame or message block sent on the old channel and the time the MS is ready to transmit on the new channel.

The requirement and this test apply to all types of GSM 400, GSM 900and DCS 1 800 MS. For E-GSM 900 and R-GSM 900 MS this test is performed in the P-GSM band (ref. table 3.3 P-GSM 900ARFCN ranges).

### 17.1.2 Conformance requirement

1) When for an intracell channel change, the MS receives an ASSIGNMENT COMMAND command or a HANDOVER COMMAND it shall be ready to transmit on the new channel within 120 ms of the last timeslot of the message block containing the command.

   GSM 05.10, 6.8.

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

   GSM 05.10, 6.8.

### 17.1.3 Test purpose

1) To verify that the MS, when commanded to perform an intracell channel change to a new ARFCN and/or a new timeslot number within the same cell, if the starting time is not used in the ASSIGNMENT COMMAND, is ready to transmit on the new channel within 120 ms of the last timeslot containing the ASSIGNMENT COMMAND.

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

### 17.1.4 Method of test

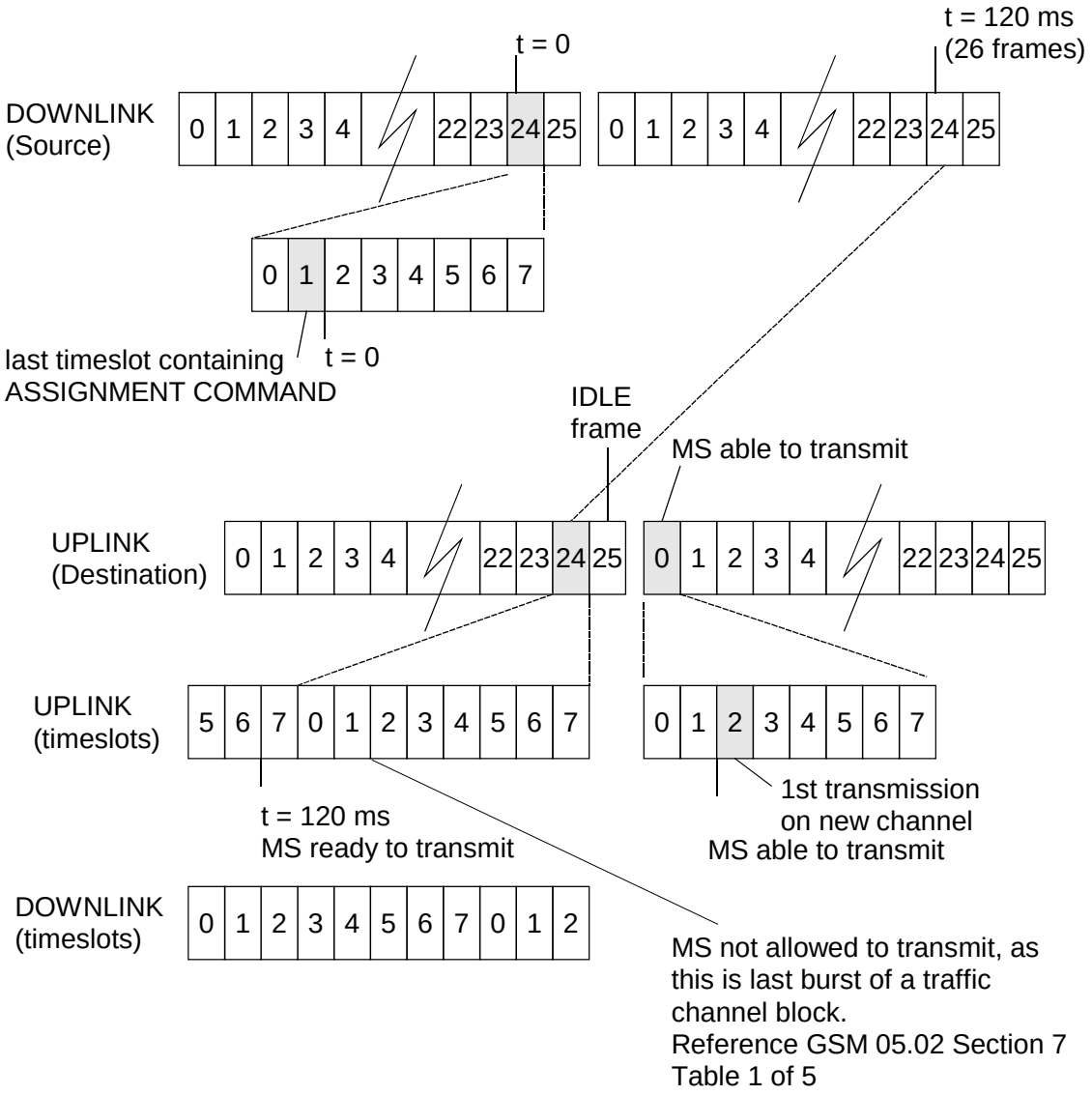
#### 17.1.4.1 Initial conditions

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

#### 17.1.4.2 Procedure

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

b) The SS, after it has sent the ASSIGNMENT COMMAND, measures the reception time of bursts received on the new channel, and the time at which transmission ceases on the old channel.




Timing difference between Downlink and Uplink is 3 timeslots.

Relative timing difference between the 2 carriers is a 1/4 bit period.

Maximum time to first transmission on the new channel is 131 ms (120ms + 2 frames + 3 timeslots + 1/4 bit period)

**Figure 17-1: Access time - Intra cell channel change (Test Requirement 1)**

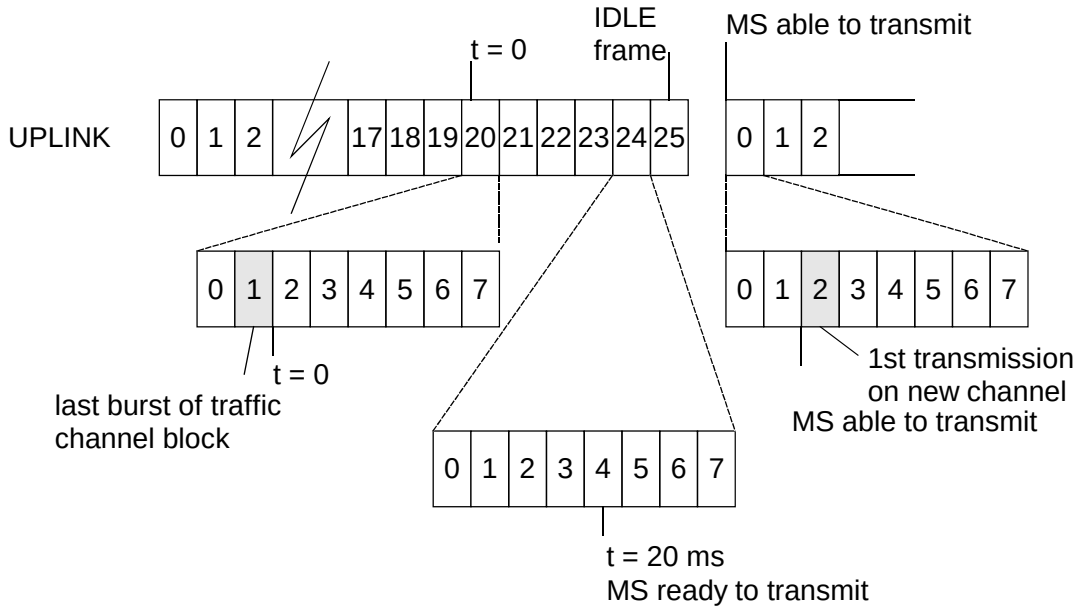



**Figure 17-2: Access time - Intra cell channel change (Test Requirement 2)**

17.1.5 Test requirement

1) The MS shall transmit its first burst on the new channel within 131 ms from the last timeslot of the message block containing the ASSIGNMENT COMMAND.

NOTE 1: The requirement time of 120 ms, at which the MS shall be ready to transmit, will expire right at the beginning of a new downlink burst on timeslot 2, which will be the last burst of a traffic channel block, The following frame could be an IDLE frame and the MS would then transmit in the next frame. Taking into account the 3 timeslot shift between up and downlink, and the 1/4 bit relative timing tolerance between the carriers, means that the MS may first transmit on the new channel after 131 ms (120 ms + 2 frames + 3 timeslots + 1/4 bit period). See figure 17-1.

2) The MS shall transmit its first burst on the new channel within 27,7 ms from the last complete speech or data frame or message block sent on the old channel.

NOTE 2: The requirement time of 20 ms, at which the MS shall be ready to transmit, will expire at just over 4 frames after the sending of the last bit on the old channel. The next frame could be an IDLE frame and the MS would then transmit in the following frame. This equates to 6 frames so in the worst case, including the 1/4 bit relative timing tolerance between the carriers, the MS may take 27,7 ms before starting transmissions on the new channel.

## 17.2 Inter cell handover

17.2.1 Definition and applicability

The access times are:

- the time between receipt by the MS of the last timeslot of the message block containing a HANDOVER COMMAND and the time it has to be ready to transmit on the new channel, and

- the time between the end of the last complete speech or data frame or message block sent on the old channel and the time the MS is ready to transmit on the new channel.

The requirement and this test apply to all types of GSM 400, GSM 900and DCS 1 800 MS.

### 17.2.2 Conformance requirement

1) When the MS receives a HANDOVER COMMAND it shall be ready to transmit on the new channel within 120 ms of the last timeslot of the message block containing the HANDOVER COMMAND.

   GSM 05.10, 6.8

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

   GSM 05.10, 6.8.

3) When the MS receives a new TA value in response to a handover access burst, the MS shall be ready to transmit using the new TA value within 40 ms of the end of the last timeslot of the message block containing the new TA.

   GSM 05.10, 6.9.

4) The MS shall use a TA value of 0 for the handover access bursts sent.

   GSM 05.10, 6.6.

### 17.2.3 Test purpose

1) To verify that the MS, when commanded to handover on a new ARFCN and a new timeslot number in a new, not synchronized cell, starting time not used in the HANDOVER COMMAND, will be ready to transmit on the new channel within 120 ms of the last timeslot containing the HANDOVER COMMAND.

2) To verify that the MS, when commanded to handover on a new ARFCN and a new timeslot number in a new, not synchronized cell, starting time not used in the HANDOVER COMMAND, will be ready to transmit on the new channel within 20 ms of the last complete speech or data frame or message block sent on the old channel.

3) To verify that the MS, when it receives a new TA value in response to a handover access burst, is ready to transmit using the new TA value within 50 ms of the end of the last timeslot of the message block containing the new TA value.

4) To verify that the MS uses a TA value of 0 for the handover access burst sent.

### 17.2.4 Method of test

#### 17.2.4.1 Initial conditions

The SS establishes two non-synchronized cells, A and B, under ideal radio conditions. A is the old cell and B is the target for the handover.

The SS uses two traffic channels with the following properties:

| | | GSM900 | DCS1800 |
|---|---|---|---|
| Cell A | TN | 2 | 2 |
| | ARFCN | 1 | 512 |
| | offset | +267 Hz | +320 Hz |
| Cell B | TN | 0 | 0 |
| | ARFCN | 124 | 885 |
| | offset | -267 Hz | -320 Hz |

| | | GSM450 | GSM480 |
|---|---|---|---|
| Cell A | TN | 2 | 2 |
| | ARFCN | 259 | 306 |
| | offset | +240 Hz | +260 Hz |
| Cell B | TN | 0 | 0 |
| | ARFCN | 293 | 340 |
| | offset | -240 Hz | -260 Hz |

NOTE: This offset is representing worst cases for Doppler shift at 500 km/h, 250 km/h and 130 km/h for GSM 400, GSM 900 and DCS respectively, and a frequency inaccuracy of 0,05 ppm.

The BCCH for the two cells have the following differences in timing:

| | |
|---|---|
| Timer T1 | 50 |
| Timer T2 | 15 |
| Timer T3 | 40 |
| 1/4 bit number | 17 |
| Timeslots | 2 |

The SS sets up a call according to the generic call set up procedure on the channel in cell A.

#### 17.2.4.2 Procedure

a) The SS sends a HANDOVER COMMAND on the main DCCH on cell A ordering the MS to go to the channel in cell B. The power command is set to 7.

b) After the SS has sent HANDOVER COMMAND it measures the reception time of bursts received on the new channel and the time at which transmission ceases on the old channel.

c) The SS also measures the absolute transmit/receive delay for the access bursts on the new channel.

d) The SS sends the PHYSICAL INFORMATIONwith TA set to 50. The SS then measures the reception time and absolute delay of the bursts transmitted on the new cell.

### 17.2.5 Test requirement

1) The MS shall transmit its first burst on cell B within 142,6 ms from the last timeslot of the message block containing the HANDOVER COMMAND.

NOTE 1: The requirement time of 120 ms, at which the MS shall be ready to transmit, will expire right at the end of the last burst of a downlink traffic channel block on the old channel. Due to the two timeslot difference in cell timing, the two timeslots difference in the channel allocation and the 15 frames difference in multiframe timing, this point could occur 2,5 frames before the end of the last burst of a downlink traffic channel block on the new channel. The following frame could be an IDLE frame and the MS would then transmit in the next frame. Taking into account the three timeslot shift between up and downlink, and the 17 1/4 bit periods timing difference between the two carriers, means that the MS may first transmits on the new channel after 142,6 ms (120 ms + 2,5 frames + 2 frames + 3 timeslots + 17 1/4 bit periods).

2) The MS shall transmit its first burst on cell B within 39,2 ms from the last complete speech or data frame or message block sent on cell A.

NOTE 2: The requirement time of 20 ms, at which the MS shall be ready to transmit, will expire at just over 4 frames after the sending of the last bit on the old channel. Due to the two timeslot difference in cell timing, the two timeslots difference in the channel allocation and the 15 frames difference in multiframe timing, this point could occur 2 frames before the end of the last burst of an uplink traffic channel block on the new channel. The following frame could be an IDLE frame and the MS would then transmit in the next frame. This equates to 8,5 frames so in the worst case the MS may take 39,2 ms between cessation of transmission on the old channel and transmission beginning on the new channel.

3) The MS shall transmit using the TA value in the PHYSICAL INFORMATIONwithin 50 ms from the end of the last timeslot of the message block containing the new TA value.

4) The measured absolute delay for the access bursts in steps c) and d) shall equal 3 timeslots (=45/26 ms), with an absolute tolerance of +/- 1 bit.