*MAINTENANCE INFORMATION*
*BSS TIMERS*

***GSM SOFTWARE RELEASE 7 HALF RATE***

***GSR7***
***Half Rate***

***CONTROLLED INTRODUCTION***

***68P02901W58-Q***

MAINTENANCE INFORMATION
BSS TIMERS
**GSM SOFTWARE RELEASE 7 HALF RATE**

**CONTROLLED INTRODUCTION**

# GSR7 Half Rate

**68P02901W58-Q**

# Maintenance Information: BSS Timers



68P02901W58-Q



CONTROLLED INTRODUCTION

24 May 2004

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# Maintenance Information: BSS Timers

## What is Covered In This Manual?

This maintenance manual contains descriptions of the operation of the time based software components within the GSM BSS. It is provided to maintenance engineers for optimization purposes.

## Related Information

The corresponding commands and parameters are described in the *Technical Description: BSS Command Reference (68P02901W23)* manual.

# Issue status of this manual

The following shows the issue status of this manual since it was first released.

## Version information

The following table lists the versions of this manual in order of issue:

**Table 1** Manual version history

| Manual issue | Date of issue | Remarks |
|---|---|---|
| G | 12 Mar 1999 | Issue G- GSM Software Release 4 |
| H | 14 Jul 2000 | Issue H- GSM Software Release 4.1 |
| J | 31 Jul 2001 | Issue J- GSM Software Release 5 |
| K | 31 May 2002 | Issue K - GSM Software Release 5.1 |
| L | 30 Nov 2002 | Issue L- GSM Software Release 6 |
| M | 02 May 2003 | Issue M- GSM Software Release 6 (Horizon II) |
| P | 13 Nov 2003 | Issue P- GSM Software Release 7 |
| Q | 24 May 2004 | Issue Q- GSM Software Release 7 Half Rate (Controlled Introduction) |

## Resolution of Service Requests

The following Service Requests are now resolved in this manual:

**Table 2** Service requests resolved in this manual

| Service Request | GMR Number | Remarks |
|---|---|---|
| N/A | N/A | |

# Version updates

The following timer operations in this manual are affected by version updates in software release GSR7:

- bep_period
- bep_period2
- bss_overload_control
- gprs_penalty_time
- hop_count_timer
- pcch_drx_timer_max
- ps1_repeat_period
- red_psp_audit_tmr
- rsl_congestion_alarm_timer
- zone_pingpong_disable_win
- zone_pingpong_enable_win

# General information

IMPORTANT

- Motorola disclaims all liability whatsoever, implied or express, for any risk of damage, loss or reduction in system performance arising directly or indirectly out of the failure of the customer, or any one acting on the customers behalf, to abide by the instructions, system parameters or recommendations made in this manual
- If this manual was obtained when attending a Motorola training course, it will not be updated or amended by Motorola. It is intended for TRAINING PURPOSES ONLY. If it was supplied under normal operational circumstances, to support a major software release, then corrections will be supplied automatically by Motorola in the form of General Manual Revisions (GMRs).

## Purpose

Motorola cellular communications manuals are intended to instruct and assist personnel in the operation, installation and maintenance of the Motorola cellular infrastructure equipment and ancillary devices. It is recommended that all personnel engaged in such activities be properly trained by Motorola.

WARNING

**Failure to comply with Motorola's operation, installation and maintenance instructions may, in exceptional circumstances, lead to serious injury or death.**

These manuals are not intended to replace the system and equipment training offered by Motorola, although they can be used to supplement and enhance the knowledge gained through such training.

## Feature references

Most of the manuals in the set, of which this manual is part, are revised to accommodate features released at Motorola General System Releases (GSRn) or GPRS Support Node (GSNn) releases. In these manuals, new and amended features are tagged to help users to assess the impact on installed networks. The tags are the appropriate Motorola Roadmap DataBase (RDB) numbers or Research and Development Prioritization (RDP) numbers. The tags include index references which are listed in the manual Index. The Index includes the entry feature which is followed by a list of the RDB or RDP numbers for the released features, with page references and hot links in electronic copy.

The tags have the format: {nnnn} or {nnnnn}

| **Where:** | **is:** |
|---|---|
| {nnnn} | the RDB number |
| {nnnnn} | the RDP number |

The tags are positioned in text as follows:

| New and amended feature information | Tag position in text |
|---|---|
| New sentence/s or new or amended text. | Immediately before the affected text. |
| Complete new blocks of text as follows:<br>• Full sections under a main heading<br>• Full paragraphs under subheadings | Immediately after the headings as follows:<br>• Main heading<br>• Subheading |
| New or amended complete Figures and Tables | After the Figure or Table number and before the title text. |
| Warning, Caution and Note boxes. | Immediately before the affected text in the box. |
| General command syntax, operator input or displays (in special fonts). | On a separate line immediately above the affected item. |

For a list of Roadmap numbers and the RDB or RDP numbers of the features included in this software release, refer to the manual*System Information: GSM Overview (68P02901W01)*, or to the manual *System Information: GPRS Overview (68P02903W01)*.

# Cross references

Throughout this manual, references are made to external publications, chapter numbers and section names. The references to external publications are shown in italics, chapter and section name cross references are emphasised blue in text.

This manual is divided into uniquely identified and numbered chapters that, in turn, are divided into sections. Sections are not numbered, but are individually named at the top of each page, and are listed in the table of contents.

# Data encryption

In order to avoid electronic eavesdropping, data passing between certain elements in the GSM and GPRS network is encrypted. In order to comply with the export and import requirements of particular countries, this encryption occurs at different levels as individually standardised, or may not be present at all in some parts of the network in which it is normally implemented. The manual set, of which this manual is a part, covers encryption as if fully implemented. Because the rules differ in individual countries, limitations on the encryption included in the particular software being delivered, are covered in the Release Notes that accompany the individual software release.

# Text conventions

The following conventions are used in the Motorola cellular infrastructure manuals to represent keyboard input text, screen output text and special key sequences.

## Input

**`Characters typed in at the keyboard are shown like this.`**

## Output

**`Messages, prompts, file listings, directories, utilities, and environmental variables that appear on the screen are shown like this.`**

## Special key sequences

Special key sequences are represented as follows:

| | |
|---|---|
| **CTRL-c** | Press the Control and c keys at the same time. |
| **ALT-f** | Press the Alt and f keys at the same time. |
| ¦ | Press the pipe symbol key. |
| **CR or RETURN** | Press the Return key. |

# Reporting safety issues

Whenever a safety issue arises, carry out the following procedure in all instances. Ensure that all site personnel are familiar with this procedure.

## Procedure

Whenever a safety issue arises:

**Procedure 1** Safety issue reporting

| | |
|---|---|
| **1** | Make the equipment concerned safe, for example by removing power. |
| **2** | Make no further attempt to adjust or rectify the equipment. |
| **3** | Report the problem directly to the Customer Network Resolution Centre, Swindon +44 (0)1793 565444 or China +86 10 88417733 (telephone) and follow up with a written report by fax, Swindon +44 (0)1793 430987 or China +86 10 68423633 (fax). |
| **4** | Collect evidence from the equipment under the guidance of the Customer Network Resolution Centre. |

# Warnings and cautions

The following describes how warnings and cautions are used in this manual and in all manuals of this Motorola manual set.

## Warnings

A definition and example follow below:

### Definition of Warning

A warning is used to alert the reader to possible hazards that could cause loss of life, physical injury, or ill health. This includes hazards introduced during maintenance, for example, the use of adhesives and solvents, as well as those inherent in the equipment.

### Example and format

**WARNING**

**Do not look directly into fibre optic cables or data in/out connectors. Laser radiation can come from either the data in/out connectors or unterminated fibre optic cables connected to data in/out connectors.**

## Failure to comply with warnings

Observe all warnings during all phases of operation, installation and maintenance of the equipment described in the Motorola manuals. **Failure to comply with these warnings, or with specific warnings elsewhere in the Motorola manuals, or on the equipment itself, violates safety standards of design, manufacture and intended use of the equipment. Motorola assumes no liability for the customer's failure to comply with these requirements.**

## Cautions

A definition and example follow below:

## Definition of Caution

A caution means that there is a possibility of damage to systems, software or individual items of equipment within a system. However, this presents no danger to personnel.

## Example and format

**CAUTION**

**Do not use test equipment that is beyond its due calibration date; arrange for calibration to be carried out.**

# General warnings

Observe the following specific warnings during all phases of operation, installation and maintenance of the equipment described in the Motorola manuals:

- Potentially hazardous voltage.
- Electric shock.
- RF radiation.
- Laser radiation.
- Heavy equipment.
- Parts substitution.
- Battery supplies.
- Lithium batteries.

Failure to comply with these warnings, or with specific warnings elsewhere in the Motorola manuals, violates safety standards of design, manufacture and intended use of the equipment. Motorola assumes no liability for the customer's failure to comply with these requirements.

## Warning labels

Warnings particularly applicable to the equipment are positioned on the equipment. Personnel working with or operating Motorola equipment must comply with any warning labels fitted to the equipment. Warning labels must not be removed, painted over or obscured in any way.

## Specific warnings

Specific warnings used throughout the GSM manual set are shown below, and will be incorporated into procedures as applicable.

These must be observed by all personnel at all times when working with the equipment, as must any other warnings given in text, in the illustrations and on the equipment.

## Potentially hazardous voltage

**WARNING**

**This equipment operates from a potentially hazardous voltage of 230 V a.c. single phase or 415 V a.c. three phase supply. To achieve isolation of the equipment from the a.c. supply, the a.c. input isolator must be set to off and locked.**

When working with electrical equipment, reference must be made to the Electricity at Work Regulations 1989 (UK), or to the relevant electricity at work legislation for the country in which the equipment is used.

**NOTE**

Motorola GSM equipment does not utilise high voltages.

## Electric shock

**WARNING**

**Do not touch the victim with your bare hands until the electric circuit is broken. Switch off. If this is not possible, protect yourself with dry insulating material and pull or push the victim clear of the conductor.**
**ALWAYS send for trained first aid or medical assistance IMMEDIATELY.**

In cases of low voltage electric shock (including public supply voltages), serious injuries and even death, may result. Direct electrical contact can stun a casualty causing breathing, and even the heart, to stop. It can also cause skin burns at the points of entry and exit of the current.

In the event of an electric shock it may be necessary to carry out artificial respiration. ALWAYS send for trained first aid or medical assistance IMMEDIATELY.

If the casualty is also suffering from burns, flood the affected area with cold water to cool, until trained first aid or medical assistance arrives.

## RF radiation

**WARNING**

**High RF potentials and electromagnetic fields are present in this equipment when in operation. Ensure that all transmitters are switched off when any antenna connections have to be changed. Do not key transmitters connected to unterminated cavities or feeders.**

Relevant standards (USA and EC), to which regard should be paid when working with RF equipment are:

- ANSI IEEE C95.1-1991, *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*
- CENELEC 95 ENV 50166-2, *Human Exposure to Electromagnetic Fields High Frequency (10 kHz to 300 GHz).*

## Laser radiation

**WARNING**

**Do not look directly into fibre optic cables or optical data in/out connectors. Laser radiation can come from either the data in/out connectors or unterminated fibre optic cables connected to data in/out connectors.**

## Lifting equipment

**WARNING**

**When dismantling heavy assemblies, or removing or replacing equipment, a competent responsible person must ensure that adequate lifting facilities are available. Where provided, lifting frames must be used for these operations.**

When dismantling heavy assemblies, or removing or replacing equipment, the competent responsible person must ensure that adequate lifting facilities are available. Where provided, lifting frames must be used for these operations. When equipment has to be manhandled, reference must be made to the Manual Handling of Loads Regulations 1992 (UK) or to the relevant manual handling of loads legislation for the country in which the equipment is used.

## Parts substitution

**WARNING**

**Do not install substitute parts or perform any unauthorized modification of equipment, because of the danger of introducing additional hazards. Contact Motorola if in doubt to ensure that safety features are maintained.**

## Battery supplies

**WARNING**

**Do not wear earth straps when working with stand-by battery supplies. Use only insulated tools.**

## Lithium batteries

**WARNING**

**Lithium batteries, if subjected to mistreatment, may burst and ignite. Defective lithium batteries must not be removed or replaced. Any boards containing defective lithium batteries must be returned to Motorola for repair.**

Contact your local Motorola office for how to return defective lithium batteries.

# General cautions

Observe the following cautions during operation, installation and maintenance of the equipment described in the Motorola manuals. Failure to comply with these cautions or with specific cautions elsewhere in the Motorola manuals may result in damage to the equipment. Motorola assumes no liability for the customer's failure to comply with these requirements.

## Caution labels

Personnel working with or operating Motorola equipment must comply with any caution labels fitted to the equipment. Caution labels must not be removed, painted over or obscured in any way.

## Specific cautions

Cautions particularly applicable to the equipment are positioned within the text of this manual. These must be observed by all personnel at all times when working with the equipment, as must any other cautions given in text, on the illustrations and on the equipment.

### Fibre optics

**CAUTION**

**Fibre optic cables must not be bent in a radius of less than 30 mm.**

### Static discharge

**CAUTION**

**Motorola equipment contains CMOS devices. These metal oxide semiconductor (MOS) devices are susceptible to damage from electrostatic charge. See the section Devices sensitive to static in the preface of this manual for further information.**

# Devices sensitive to static

Certain metal oxide semiconductor (MOS) devices embody in their design a thin layer of insulation that is susceptible to damage from electrostatic charge. Such a charge applied to the leads of the device could cause irreparable damage.

These charges can be built up on nylon overalls, by friction, by pushing the hands into high insulation packing material or by use of unearthed soldering irons.

MOS devices are normally despatched from the manufacturers with the leads short circuited together, for example, by metal foil eyelets, wire strapping, or by inserting the leads into conductive plastic foam. Provided the leads are short circuited it is safe to handle the device.

## Special handling techniques

In the event of one of these devices having to be replaced, observe the following precautions when handling the replacement:

- Always wear an earth strap which must be connected to the electrostatic point (ESP) on the equipment.
- Leave the short circuit on the leads until the last moment. It may be necessary to replace the conductive foam by a piece of wire to enable the device to be fitted.
- Do not wear outer clothing made of nylon or similar man made material. A cotton overall is preferable.
- If possible work on an earthed metal surface or anti-static mat. Wipe insulated plastic work surfaces with an anti-static cloth before starting the operation.
- All metal tools should be used and when not in use they should be placed on an earthed surface.
- Take care when removing components connected to electrostatic sensitive devices. These components may be providing protection to the device.

When mounted onto printed circuit boards (PCBs), MOS devices are normally less susceptible to electrostatic damage. However PCBs should be handled with care, preferably by their edges and not by their tracks and pins, they should be transferred directly from their packing to the equipment (or the other way around) and never left exposed on the workbench.

# Motorola manual set

The Motorola manual sets provide the information needed to operate, install and maintain the Motorola equipment. Manuals for the GSM, GPRS and UMTS products are available on the following media:

- Printed hard copy.
- Electronic, as fully navigable PDF files on:
  - The Motorola customer support web site at: (https://mynetworksupport.motorola.com/index.asp).
  - CD-ROM produced in support of a major system software release.

Each CD-ROM includes all manuals related to a specified main GSM, GPRS or UMTS software release, together with current versions of appropriate hardware manuals, and has additional navigation facilities. A snapshot copy of on-line documentation is also included, though it will not be updated in line with subsequent point releases.

The CD-ROM does not include Release Notes or documentation supporting specialist products such as MARS or COP.

## Ordering manuals and CD-ROMs

Use the Motorola 68Pxxxxxxxx order (catalogue) number to order hard copy manuals or CD-ROMs.

All orders must be placed with your Motorola Local Office or Representative.

# GMR amendment

Changes to a manual that occur after the printing date are incorporated into the manual using General Manual Revisions (GMRs). GMRs are issued to correct Motorola manuals as and when required. A GMR has the same identity as the target manual. Each GMR is identified by a number in a sequence that starts at 01 for each manual at each issue.

## GMR availability

GMRs are published as follows:

- Printed hard copy - Complete replacement content or loose leaf pages with amendment list.
  - Remove and replace pages in this manual, as detailed on the GMR instruction sheet.
- Motorola service web - Updated at the same time as hard copies.
- CD-ROM - Updated periodically as required.

## GMR instructions

When a GMR is inserted in this manual, the amendment record below is completed to record the GMR. Retain the instruction sheet that accompanies each GMR and insert it in a suitable place in this manual for future reference.

# GMR amendment record

Record the insertion of GMRs in this manual in the following table:

| GMR number | Incorporated by (signature) | Date |
|---|---|---|
| 01 | | |
| 02 | | |
| 03 | | |
| 04 | | |
| 05 | | |
| 06 | | |
| 07 | | |
| 08 | | |
| 09 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |

Chapter

1

# GSM network overview

This chapter contains descriptions of the internal timer processes within the Base Station Controller (BSC) and Base Transceiver Station (BTS) that affect timer control. It also provides diagrams showing the main signal flows between the BCS and BTSs for the Base Station System (BSS) system process, and the control interfaces for the BTS subsystem process

A description of the Global System for Mobile Communications (GSM) as implemented by Motorola, is contained in the *System Information: General (68P02901W01)* manual. It also contains a description of the Motorola document set, specifications for the Motorola entities, and a glossary of technical terms and acronyms as used in this and other Motorola documents.

# Internal timer processes

This section describes the BSC and BTS internal timer processes with the aid of system process diagrams

## BSC process

The internal software processes within the BSC that affect timer control are:

- MTPL1, MTPL2 and MTPL3 (Message Transfer Part Layers 1, 2 and 3). Provide the connection to the MSC (SS7). All messages to and from the Message Switching Centre (MSC) are verified and routed by these processes.
- SCCP State Machine (SSM). Connection oriented signalling messages are processed by the module, which also provides the Handover Evaluator functions.
- SM (Switch Manager). Controls the switching of messages between the BSC (designated by the MSC) and BTS radio channel of the Mobile System (MS) (allocated by CRM in the BTS).
- CLM (ConnectionLess Manager). Coordinates global control over the BSS by handling of all connectionless messages (that is, messages that are not directly concerned with a connected call). This includes such messages as global resets, load limiting and circuit blocking.

## BTS process

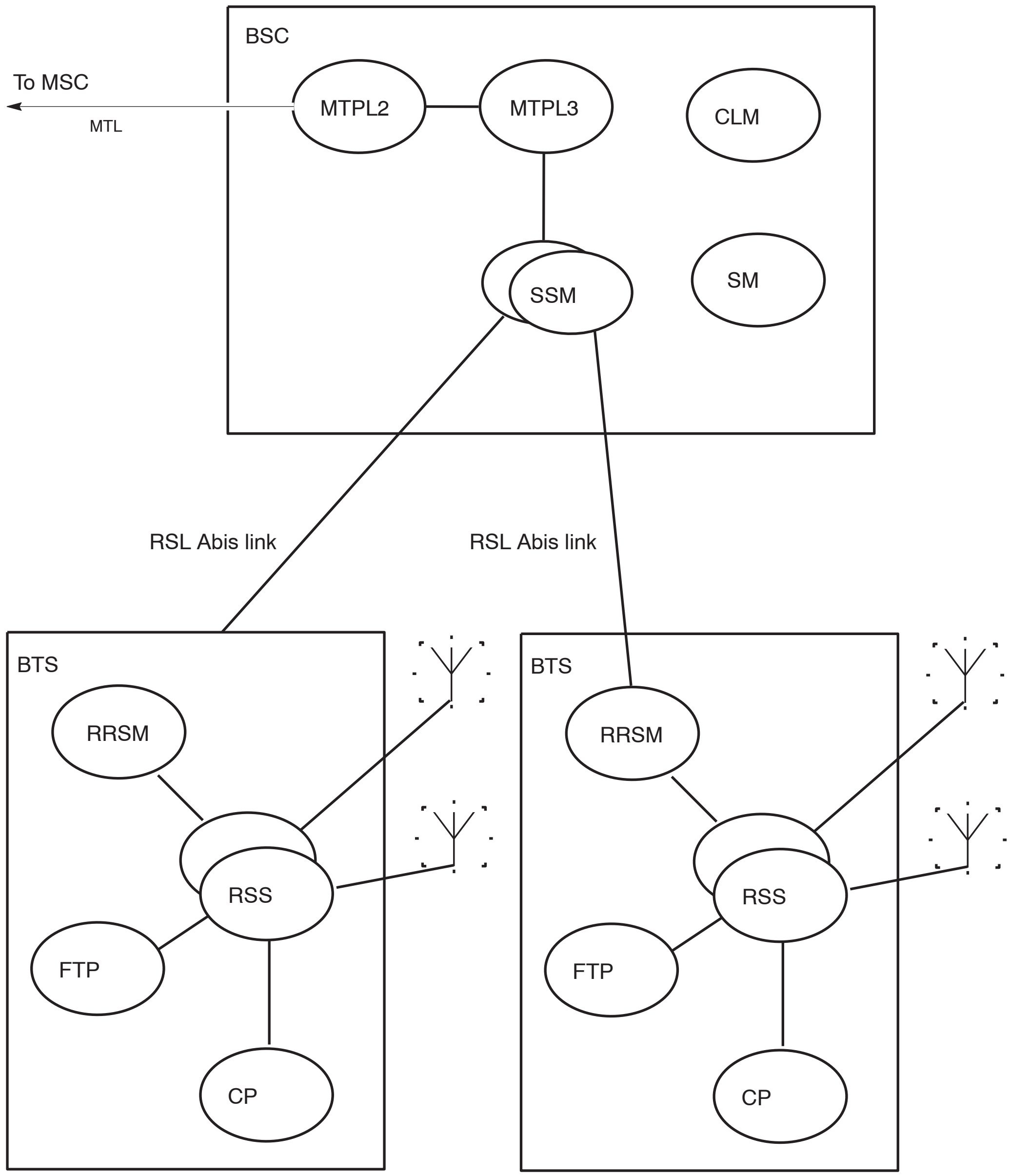
The internal software processes within a BTS that affect timer control are:

- RRSM (Radio Resource State Machine). Translates messages through Call Processing (CP). Activates and deactivates radio channels as controlled by the CRM.
- RSS (Radio SubSystem). One per transceiver; controls timeslots and channels for the associated transceiver.
- FTP (Fault Translation Process). Linked to the Fault Management (FM) system at the OMC-R.
- CP (Call Processing). Handles the MS to BSS to MS signalling link, MS originated and terminated calls, and inter-BSS and inter-BTS handovers.

## BSS system process diagram

Figure 1-1 below shows the main signal flow between subsystems within the BSC and BTS elements that affect timer control.

**Figure 1-1** BSS system process diagram



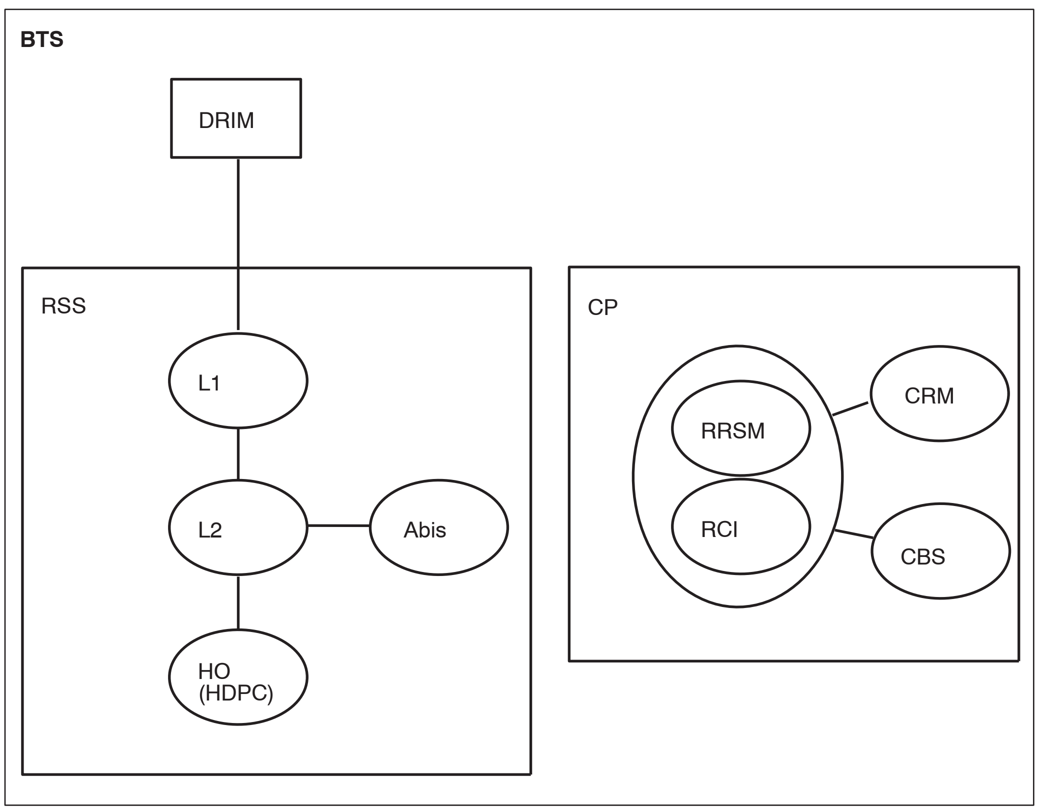

# BTS subsystem process diagram

Figure 1-2 below shows the direct control interfaces between the RSS and CP subsystems of the BTS, that affect timer control, as follows:

- DRIM (Digital Radio Interface extended Memory). Provides encoding/decoding and encryption/decryption for the radio channel.
- L1 (Layer 1 interface). The physical channel control.

- L2 (Layer 2 interface). Performs the data link.
- Abis (Abis interface). The interface and message protocol between the RSS and CP.
- HO (HandOver detection and power control - also known as HDPC). Controls transmission power and instigates and controls handovers.
- RRSM (Radio Resource State Machine). The centre of call processing at the BTS.
- CRM (Cell Resource Manager). Allocates and activates timeslots and subchannels on the available carriers.
- RCI (Radio Channel Interface). Changes the MS address used in the RSS (channel number) to the address used in Layer 3 in the BSC CP.
- CBS (Cell Broadcast Scheduler). Controls broadcast messages at the BTS.

**Figure 1-2** BTS subsystem process diagram



Chapter

2

# Call model

This chapter provides an overview of the functions and handover procedure within the telephone call model for the GSM network.

The following message sequence diagrams are described:

# GSM telephone call model

This section describes the GSM telephone call model is in terms of the functions of the BSS, BSC, and MSC network elements for call handling within the GSM network including the handover of a mobile call as an MS moves between radio coverage areas. Also described is the representation of internal and external messages that flow within and between network elements, as displayed by the message sequence diagrams in the remaining sections of this chapter.

## BSS functions

The GSM BSS is a combination of digital and RF equipment, the purpose of which is to provide the radio air interface linking subscribers into the network and providing them with service. It communicates with the mobile switching centre (MSC), the operations and maintenance centre, radio (OMC-R), and the mobile systems (MSs).

## BSC functions

The main functions of the BSC include managing the radio channels (TCH ASSIGNMENT) and transferring control messages (CONNECTION ESTABLISHMENT) to and from the MS. Control channels and bearer channels are always under the control of the BSC. However, many types of call handling messages do not directly affect the BSC and for these the BSC serves simply as a relay point between the MSC and the MS.

The BSC also incorporates a digital switching matrix. No fixed correspondence exists between the radio channels at the BSS and the terrestrial circuits, which connect the BSS to the MSC. While the BSC selects the radio channel, the terrestrial circuit is selected by the MSC and it is the BSCs switching matrix that is used to connect the two together. The switching matrix also allows the BSC to perform handovers between the BTSs under its control without involving the MSC (inter-BTS, inter-cell and intra-cell).

## MSC functions

The MSC handles the call set up procedures and controls the location registration and handover procedures for all except inter-BTS, inter-cell and intra-cell handovers. MSC controlled inter-BTS handovers can be set as an option at the switch. Location registration (and location update) allows MSs to report changes in their locations enabling automatic completion of MS-terminated calls.

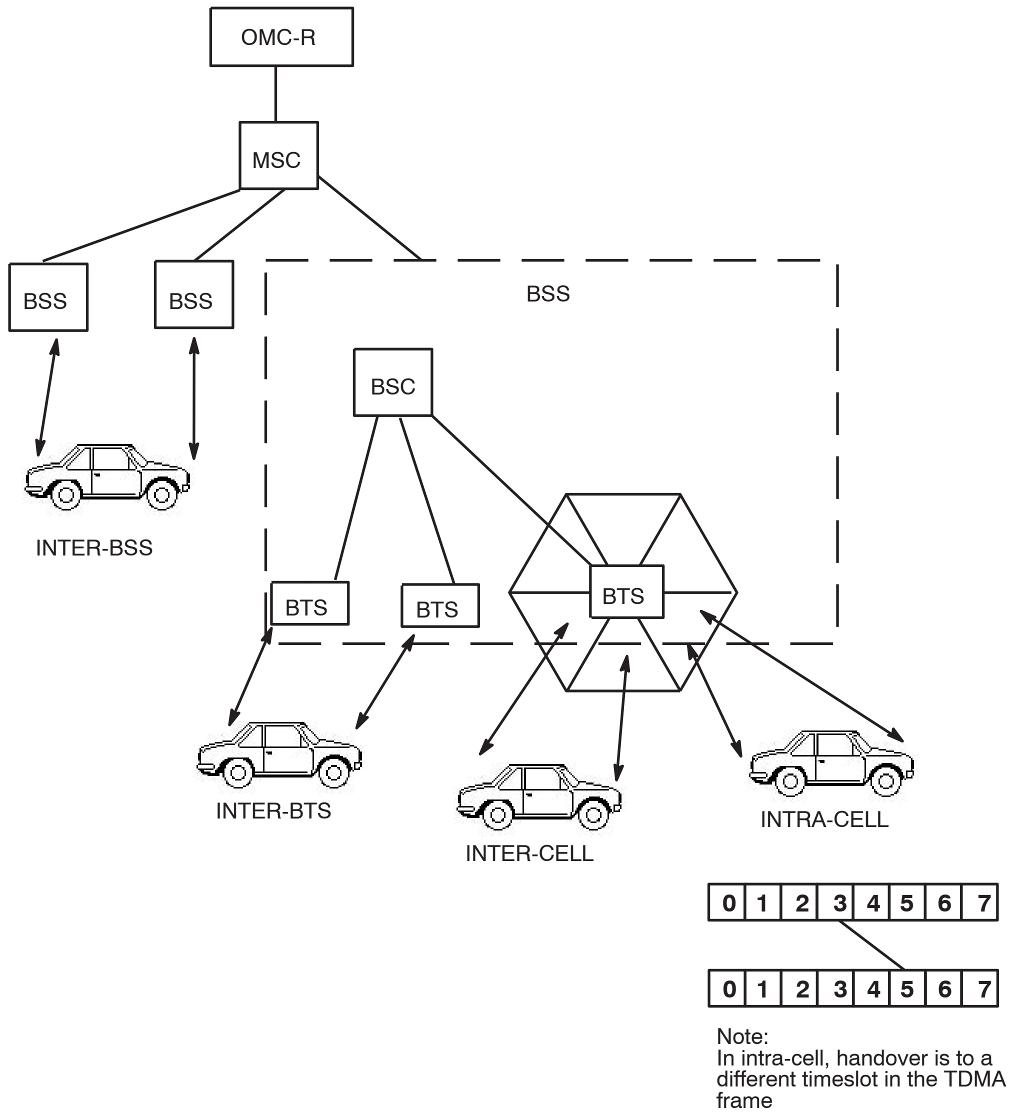
## Handover procedure

The handover procedure preserves call connections as MSs move from one radio coverage area to another during an established call. Handovers within cells controlled by a single BSC are handled by that BSC (inter-BTS, inter-cell and intra-cell). When handovers are between cells controlled by different BSCs, the primary control is at the MSC (inter-BSS). Handovers can also be performed between BSSs connected to two different MSCs (inter-MSC handover). In this case, GSM specifications define standard procedures allowing the two MSCs to coordinate the handover. Inter-MSC handover timers are not covered in this manual.

# Diagram of BSS handover situations

Figure 2-1 shows possible handover situations between and within BSSs.

**Figure 2-1** BSS handover situations



# Representation of messages

In the following message sequence diagrams, messages between GSM elements (external) are shown in all upper case characters, preceded by the type of message, for example BSSMAP **CLEAR COMPLETE**.

Messages between systems and subsystems within the GSM elements are shown in all lower case characters in parenthesis, for example **(establish indication)**.

# Connection establishment

In this section message sequences are shown as ladder diagrams for the establishment of a connection to a Mobile System (MS) as follows:

- Successful connection establishment between:
  - GSM elements.
  - Internal systems and subsystems.
- Audit timers during connection establishment and call clearing.
- Unsuccessful connection establishment, due to:
  - Individual timer expiry before expected events.

# Successful connection establishment

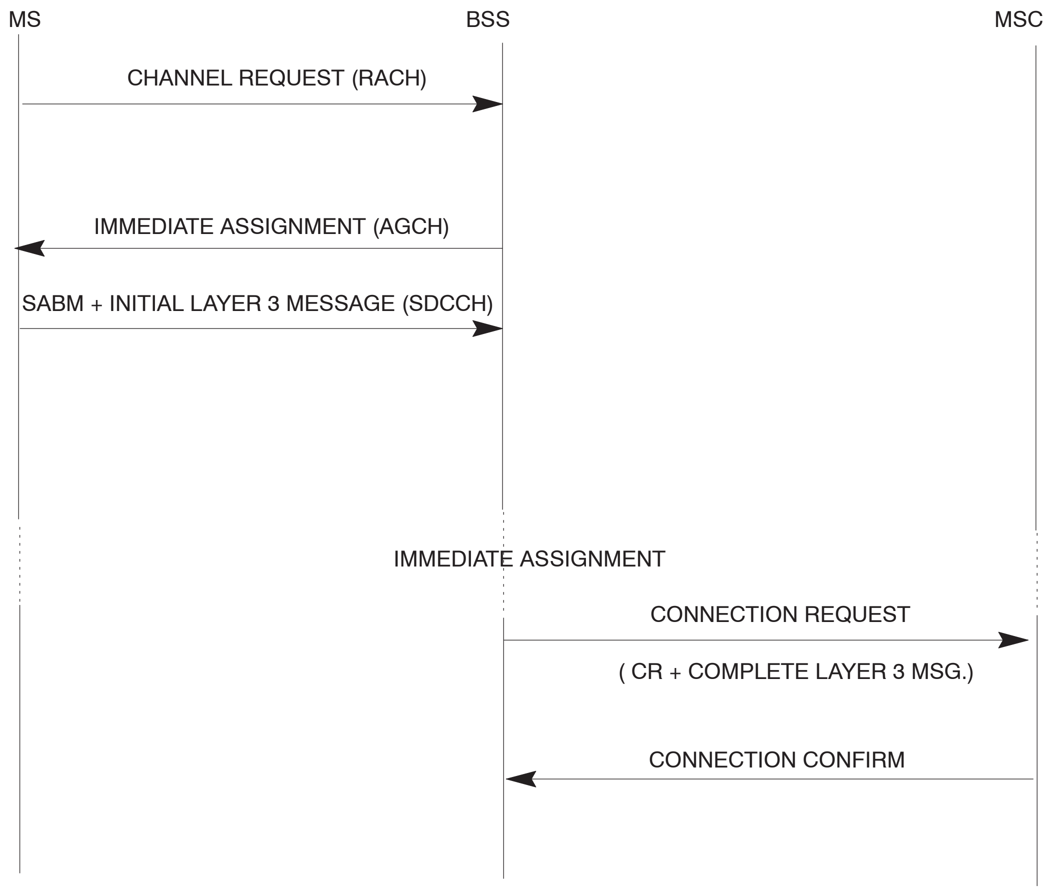
The following message sequence diagrams show successful connection establishment between:

- GSM elements.
- Internal (sub)systems

## Successful connection between GSM elements

Figure 2-2 shows a successful connection establishment between GSM elements.

**Figure 2-2** Successful connection establishment between GSM elements

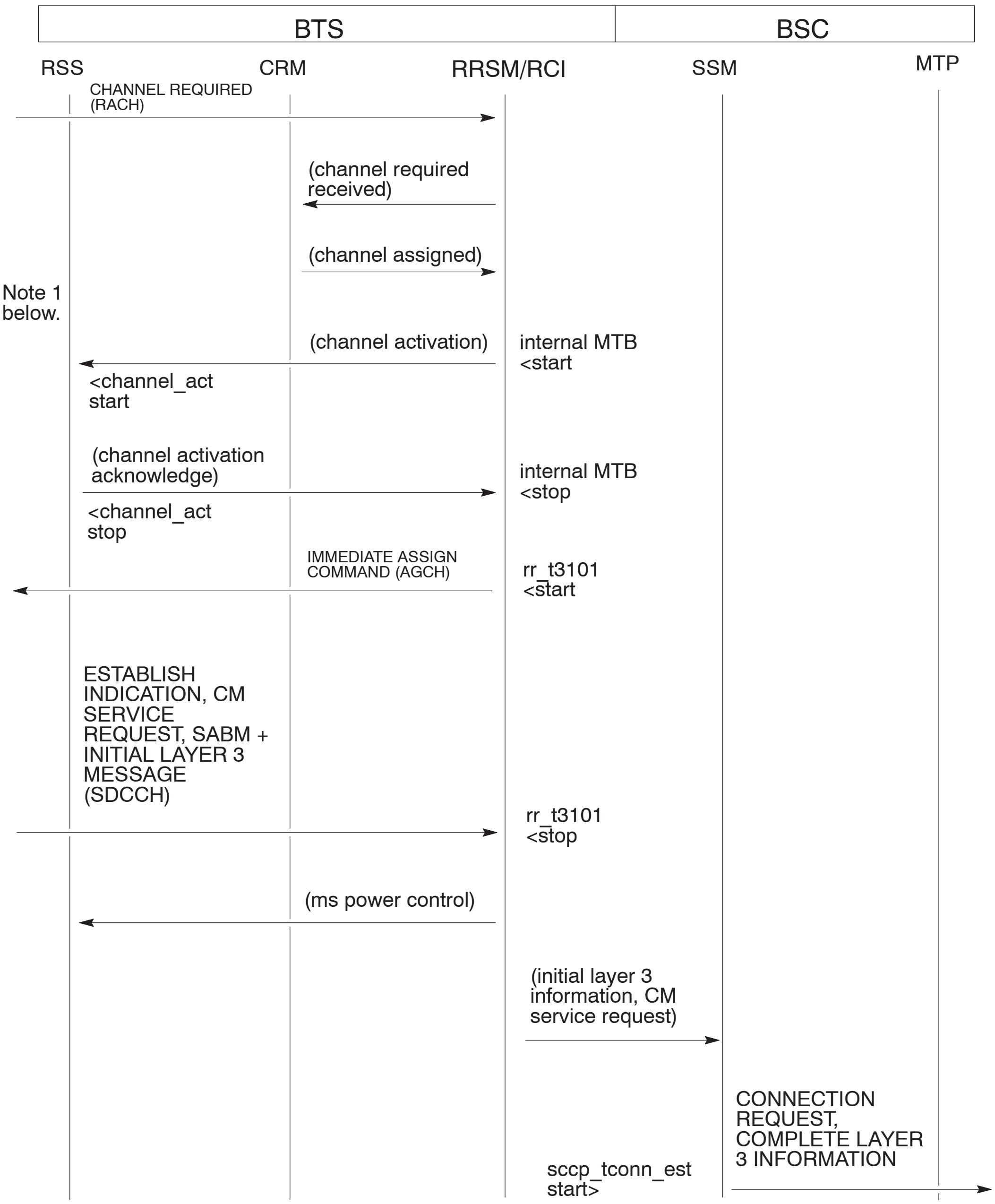


## Successful connection between internal (sub)systems

Figure 2-3 and Figure 2-4 show (in two parts) the successful connection establishment sequence within and between the BSC and BTS systems and subsystems. Audit timers are not shown.

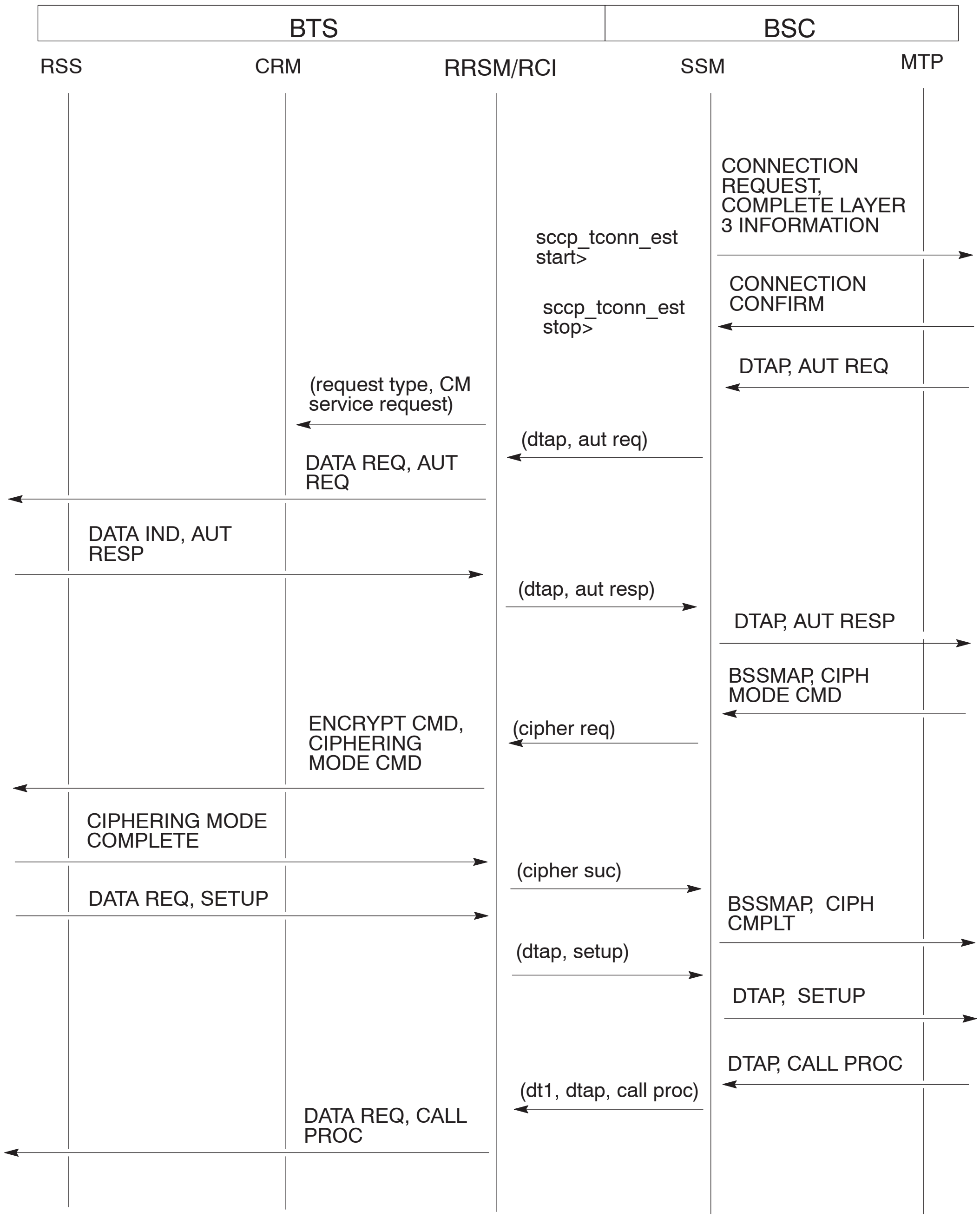
As audit timers monitor inactivity on released channels, they apply in all release activity. They are shown separately for connection establishment after Figure 2-3 and Figure 2-4. In the remainder of this chapter they are not again shown.

**Figure 2-3** Successful connection establishment within/between BSC and BTS (Part 1)




Note 1 - RSS internal messaging not shown.

**Figure 2-4** Successful connection establishment within/between BSC and BTS (Part 2)




Note 1 - RSS internal messaging not shown.

# Audit timers during connection establishment and call clearing

Audit timers that operate during call connection establishment and call clearing are:

- **bts_audit**
- **bts_audit_response**
- **bsc_audit**
- **bsc_audit_response**

In the examples the following assumptions are made:

- The BSS parameter **num_audit_retries** is set to 2, allowing two audit retries before taking tear down action.
- The timers are set to equal values.

Figure 2-5 and Figure 2-6 show (in two parts) an example of when the MSC takes initial tear down action and SSM sends a **CLEAR COMMAND** message.

Figure 2-7 and Figure 2-8 show (in two parts) an example of no response from SSM to the RRSM **audit call** message. This example shows the two attempts then made by RRSM (as set in the **num_audit_retries** parameter) before tearing down the call.

## Audit response fail message from SSM

**Figure 2-5** Audit response fail message from SSM (Part 1)

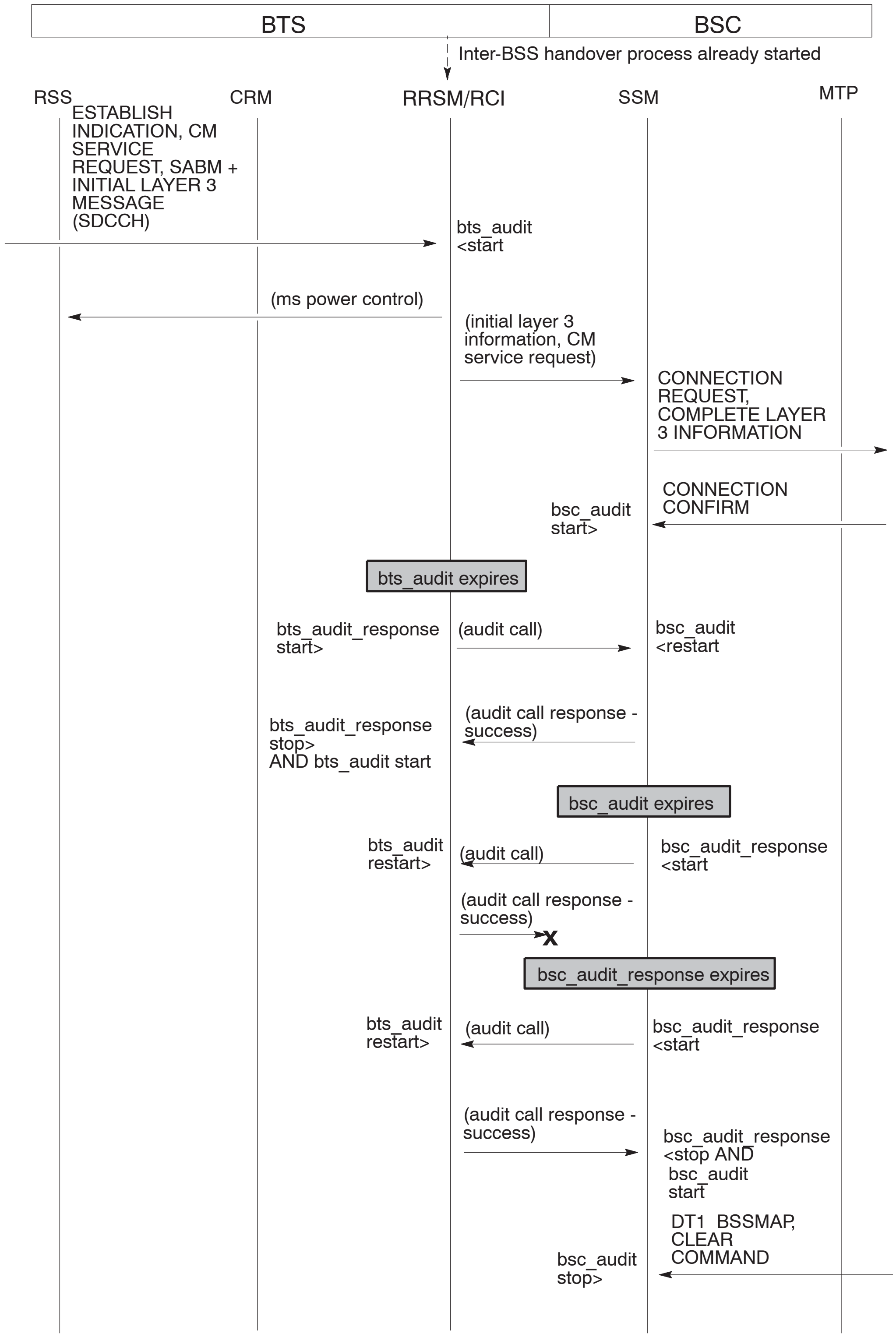
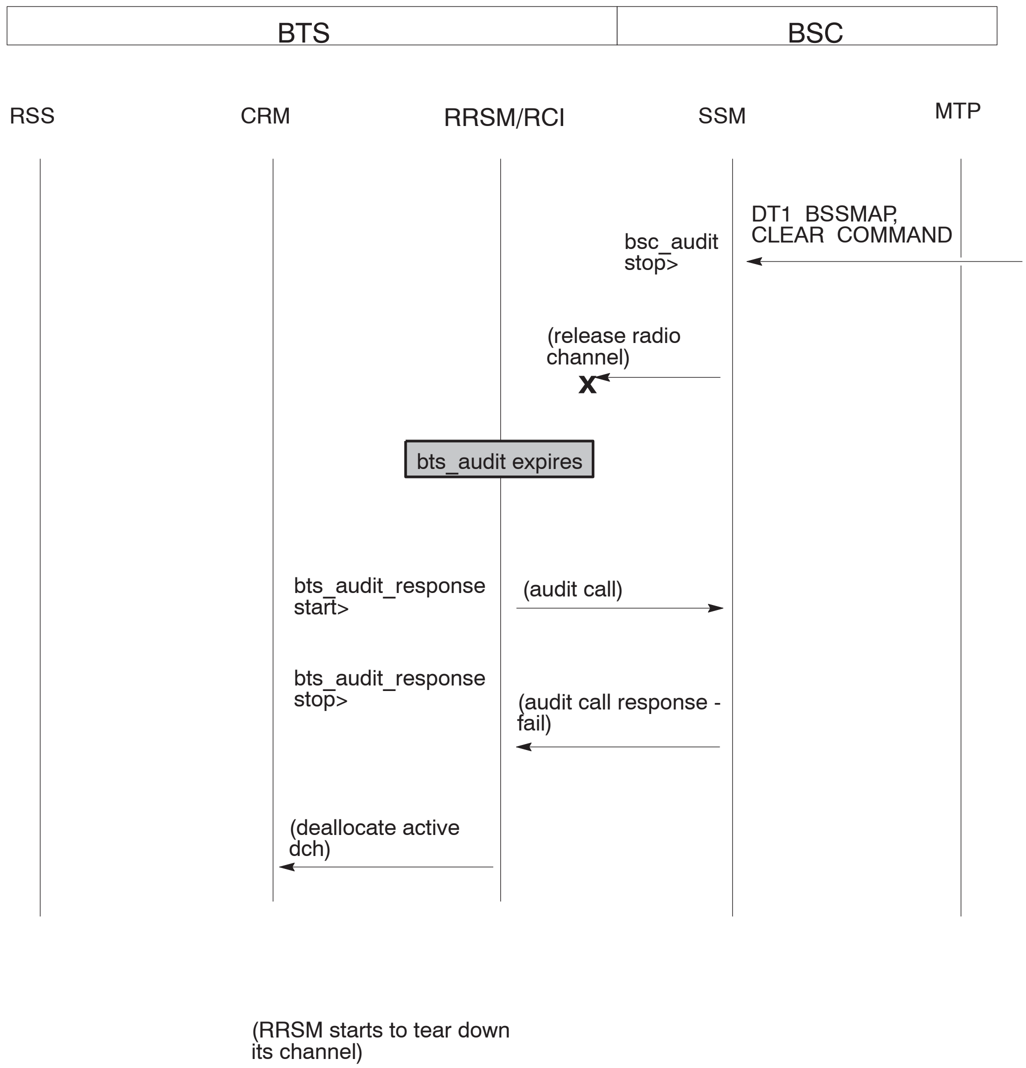


**Figure 2-6** Audit response fail message from SSM (Part 2)



## No audit response from the SSM

**Figure 2-7** No audit response from the SSM (Part 1)

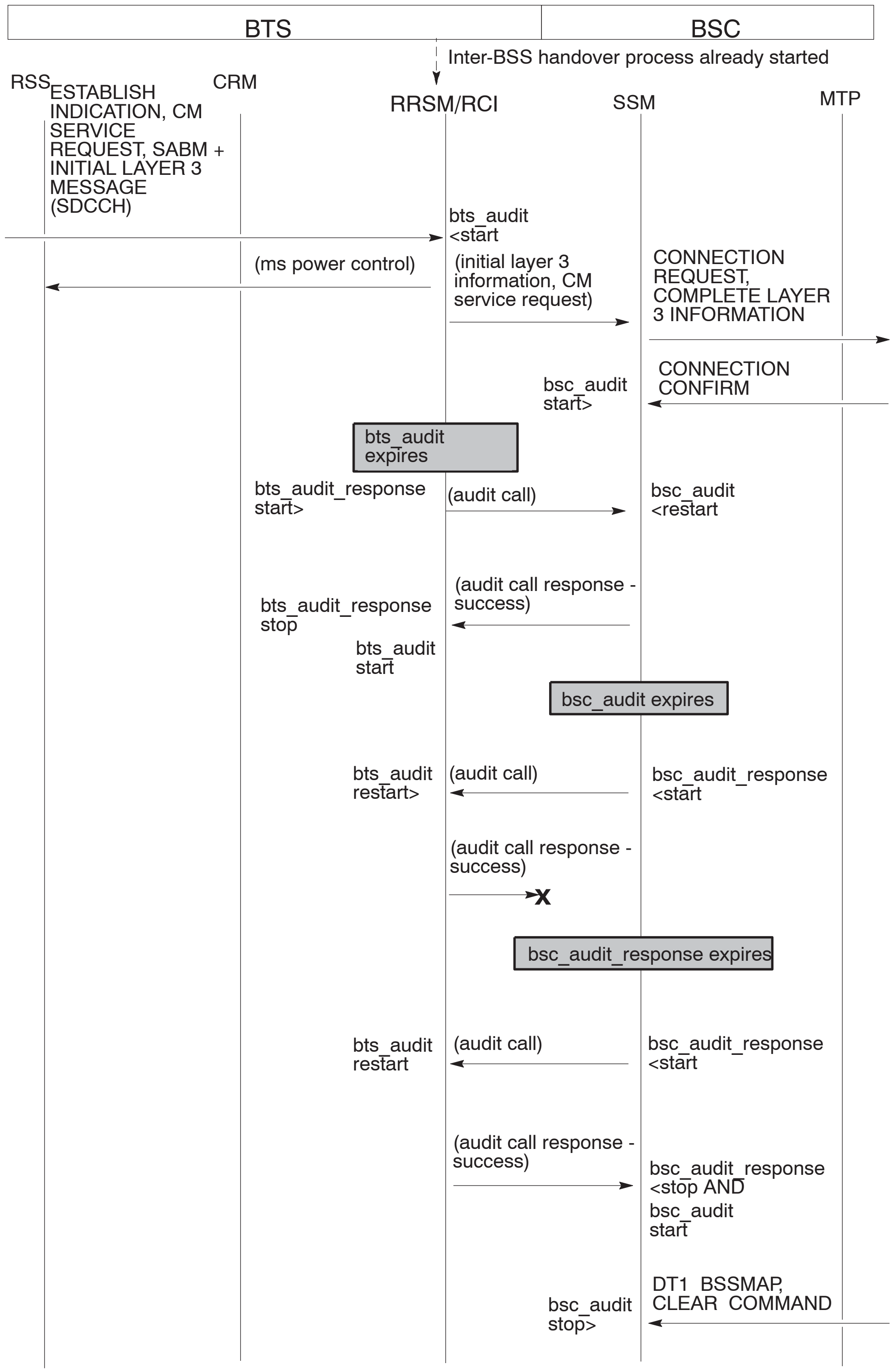
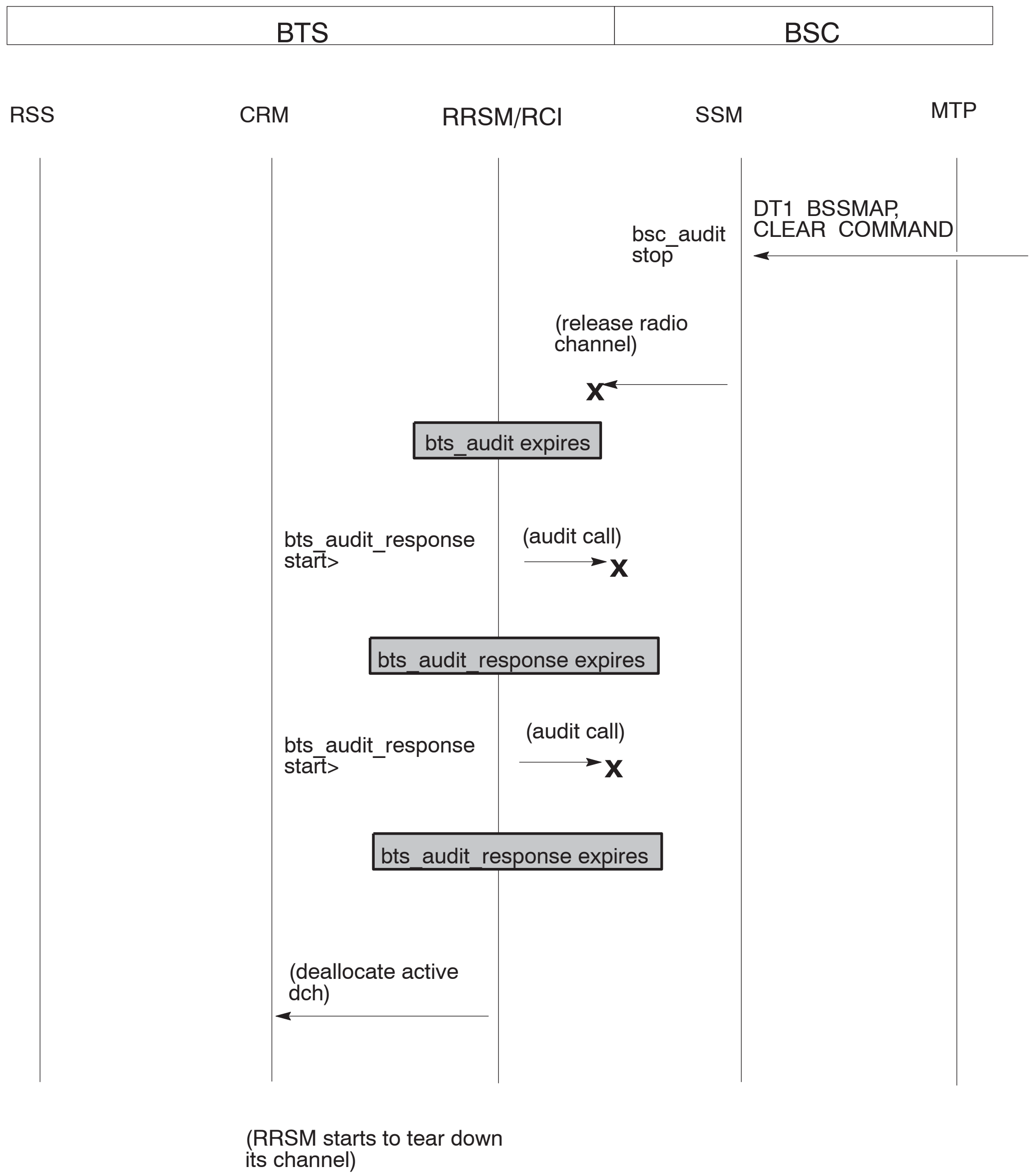


**Figure 2-8** No audit response from the SSM (Part 2)



# Unsuccessful connection

Timers that affect connection establishment message sequence, due to expiry before expected events, are:

The timers that affect connection establishment, due to expiring before expected events, are:

- **channel_act**

  Expiring before RSS internal processing is complete.

  Expiring before the internal processes are complete.

- **sccp_tconn_est**

  Expiring before the MSC confirms connection.

- **rr_t3101**

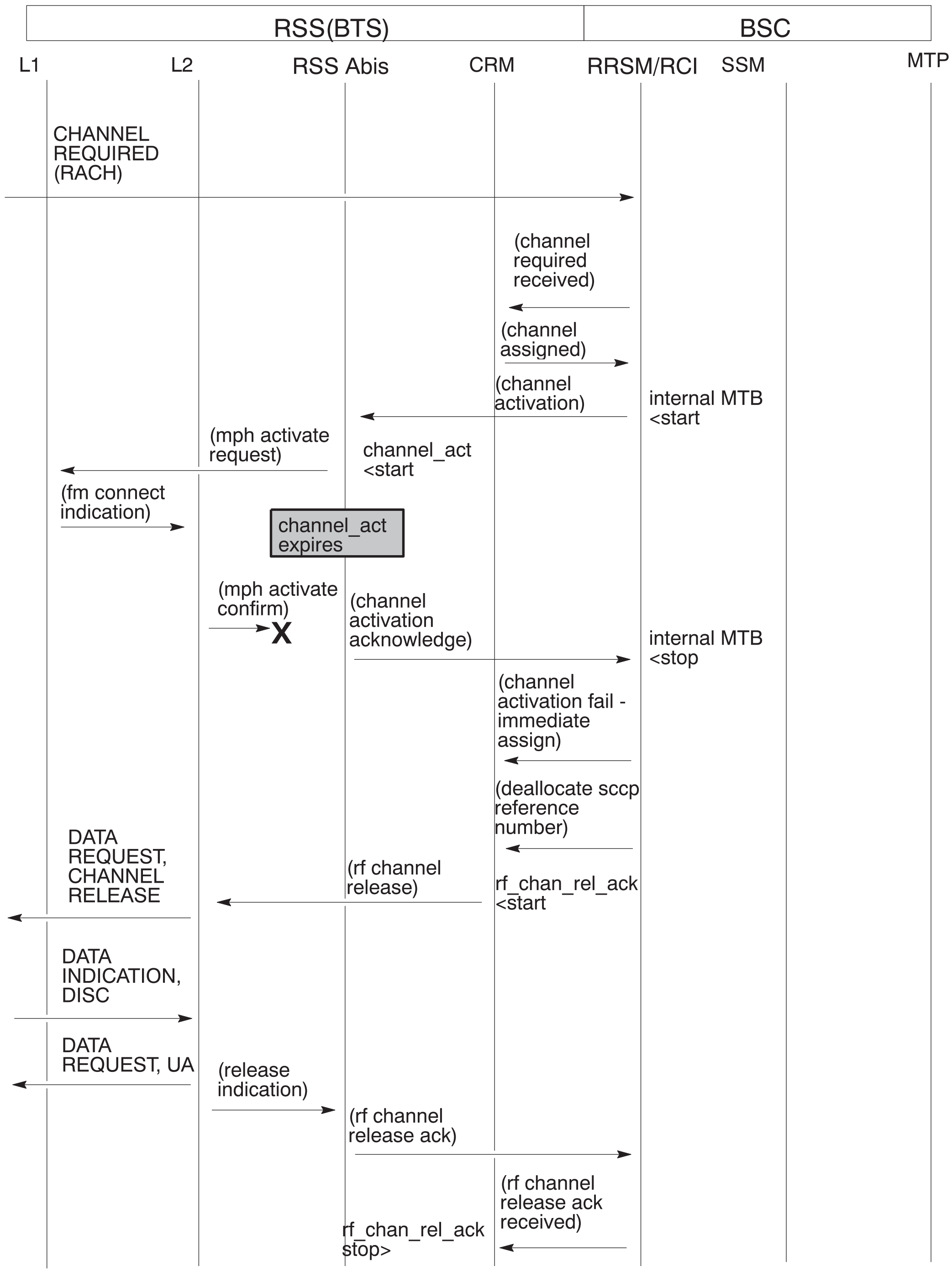
  Expiring before the **Establish Indication** message is received from the MS.

- **internal MTB** (cannot be optimized).

## channel_act timer expires before RSS internal processing complete

Figure 2-9 shows an unsuccessful connection establishment due to the internal RSS timer **channel_act** expiring before the internal processes are complete.

**Figure 2-9** Unsuccessful internal RSS timer connection due to **channel_act** expiring



## sccp_tconn_est expires before CONNECTION CONFIRM received from the MSC

Figure 2-10 and Figure 2-11 show (in two parts) an unsuccessful connection establishment due to the **sccp_tconn_est** timer expiring before the MSC confirms connection.

**Figure 2-10** Unsuccessful connection due to the **sccp_tconn_est** timer expiring (Part 1)

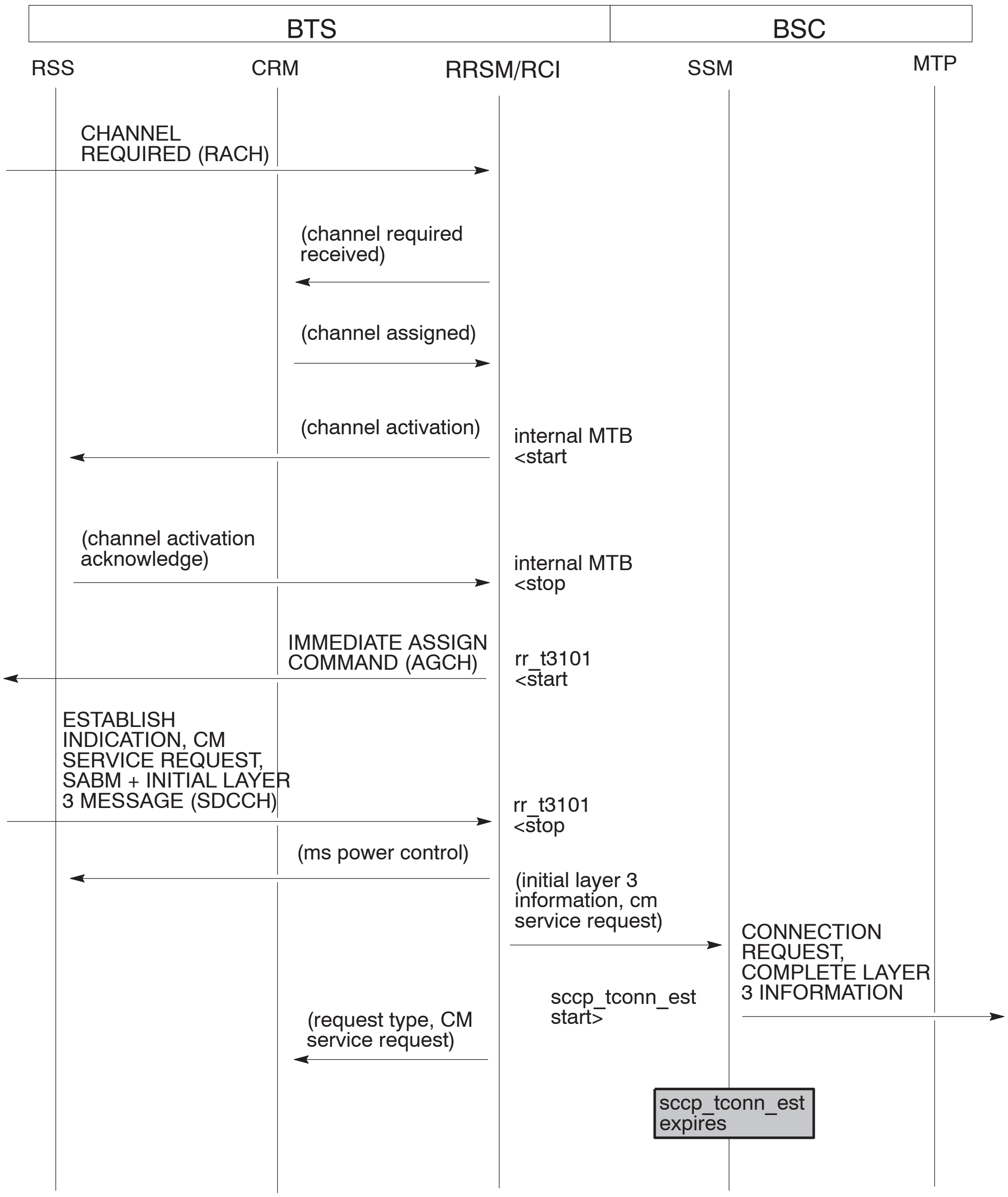
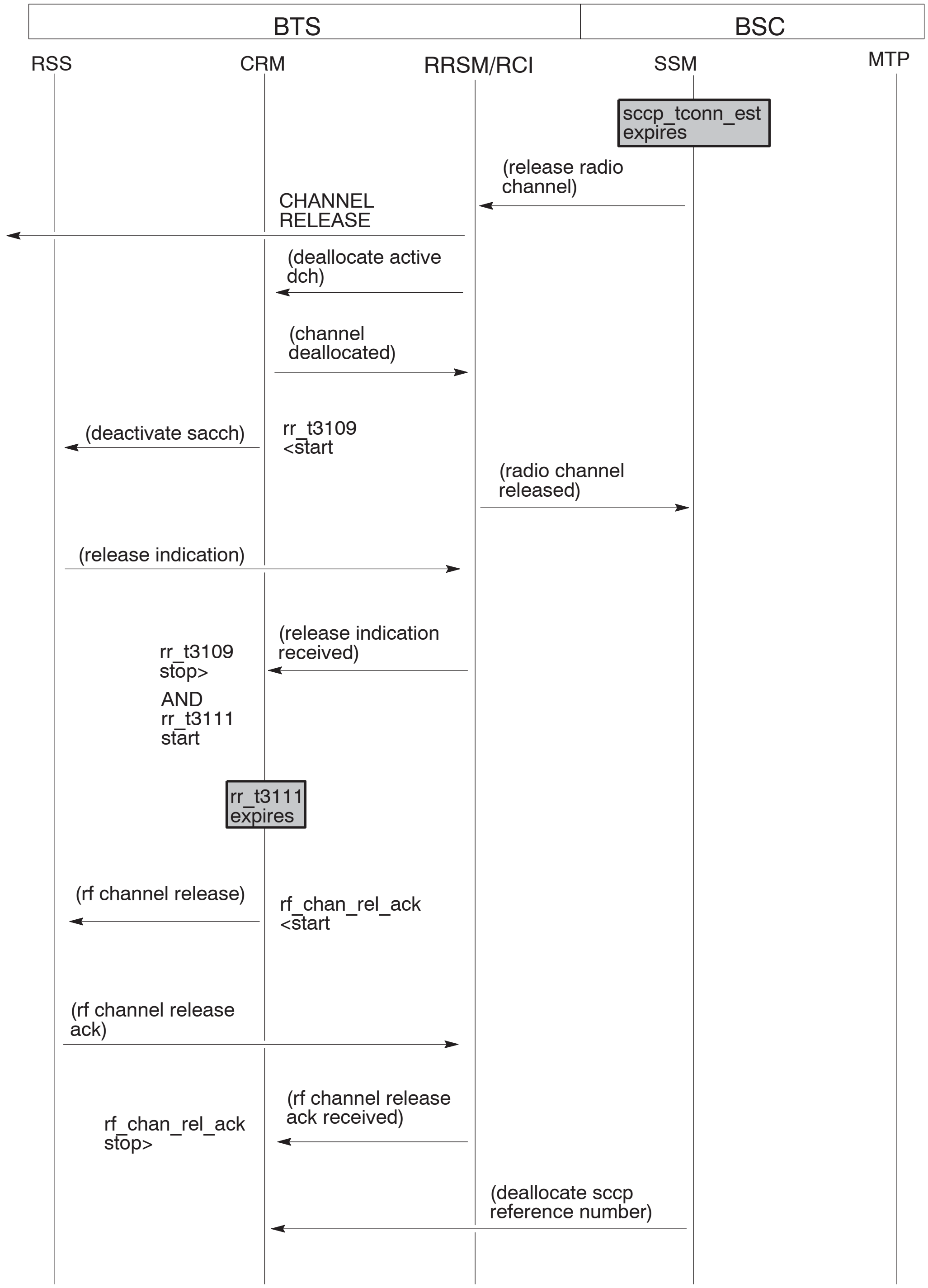


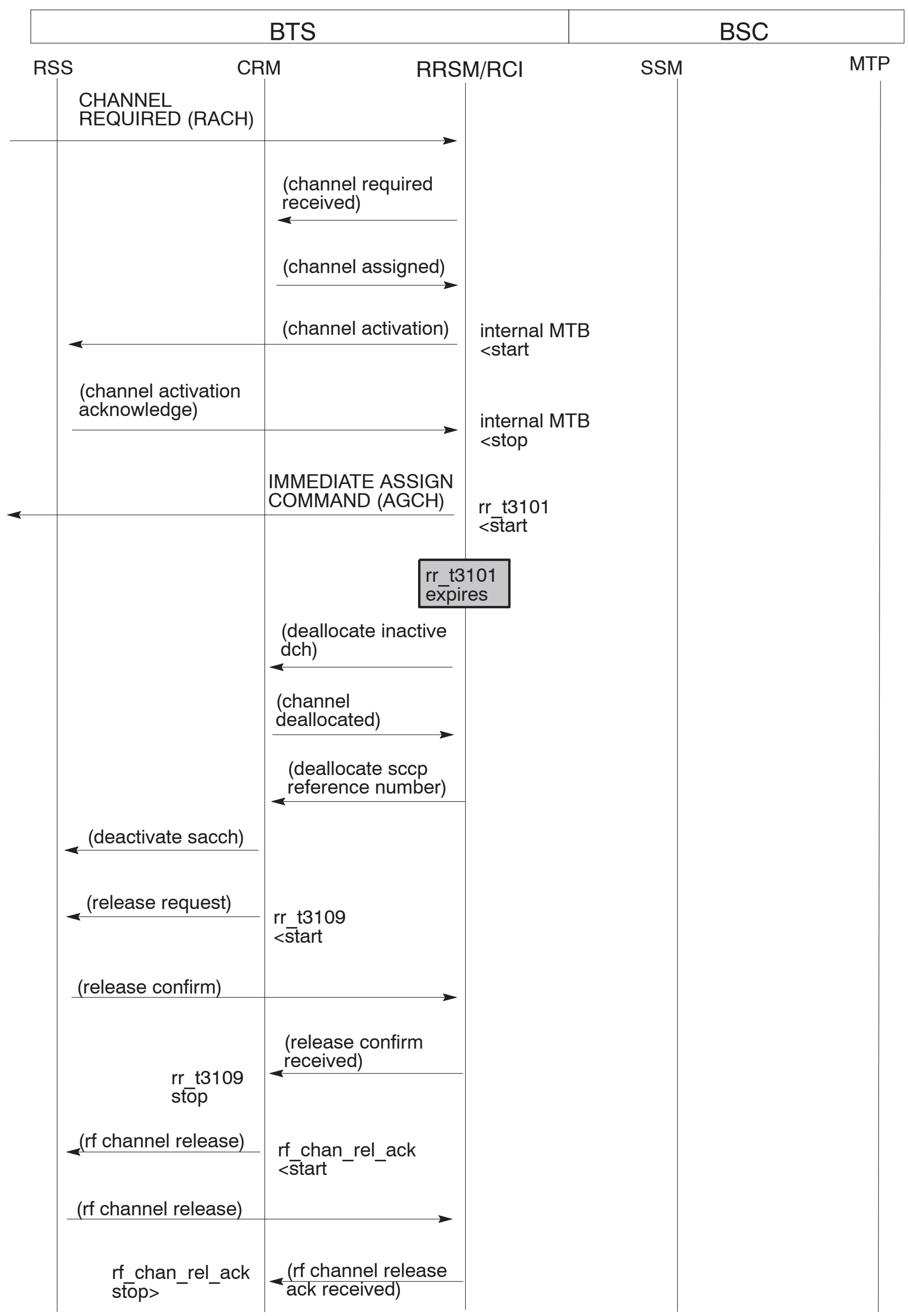
**Figure 2-11** Unsuccessful connection due to the **sccp_tconn_est** timer expiring (Part 2)



## rr_t3101 expires before ESTABLISH INDICATION message from MS

Figure 2-12 shows an unsuccessful connection establishment due to the **rr_t3101** timer expiring before the **ESTABLISH INDICATION** message is received from the MS.

**Figure 2-12** Unsuccessful connection due to **rr_t3101** timer expiring



# Assignment to TCH

In this section message sequences are shown as ladder diagrams for the assignment of a Traffic CHannel (TCH) to a Mobile System (MS) as follows:

- Successful assignment between:
  - GSM elements.
  - Internal systems and subsystems.
- Unsuccessful assignment
  - Individual timer expiry before expected events.

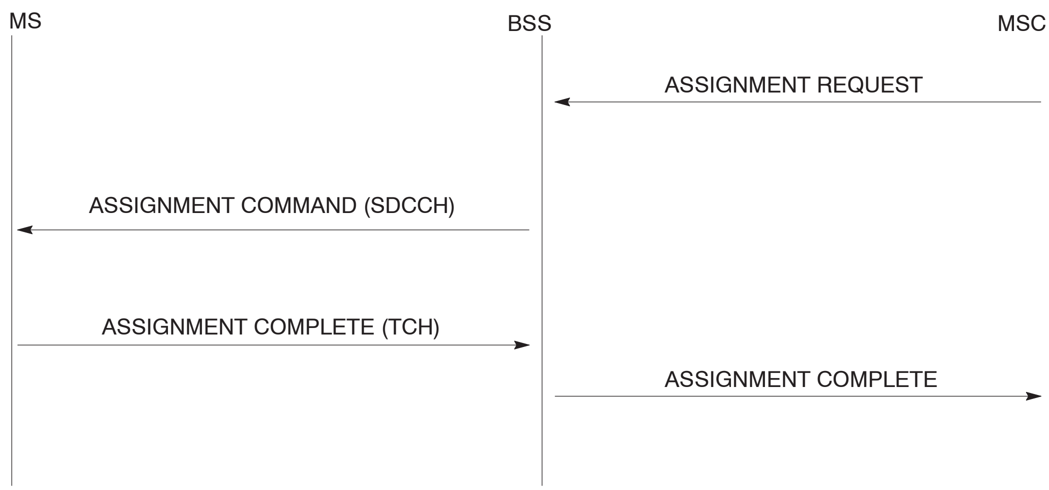
# Successful TCH assignment

This section shows message sequence diagrams for successful TCH assignment between GSM elements and between internal (sub)systems, and for unsuccessful TCH assignment due to timer expiry.

### Successful assignment sequence between GSM elements

Figure 2-13 shows a successful TCH assignment between GSM elements.

**Figure 2-13** Successful TCH assignment



## Successful assignment sequence between internal (sub)systems

Figure 2-14 and Figure 2-15 show (in two parts) the successful assignment sequence within and between the BSC and BTS systems and subsystems.

**Figure 2-14** Successful assignment sequence within/between BSC and BTS (Part 1)

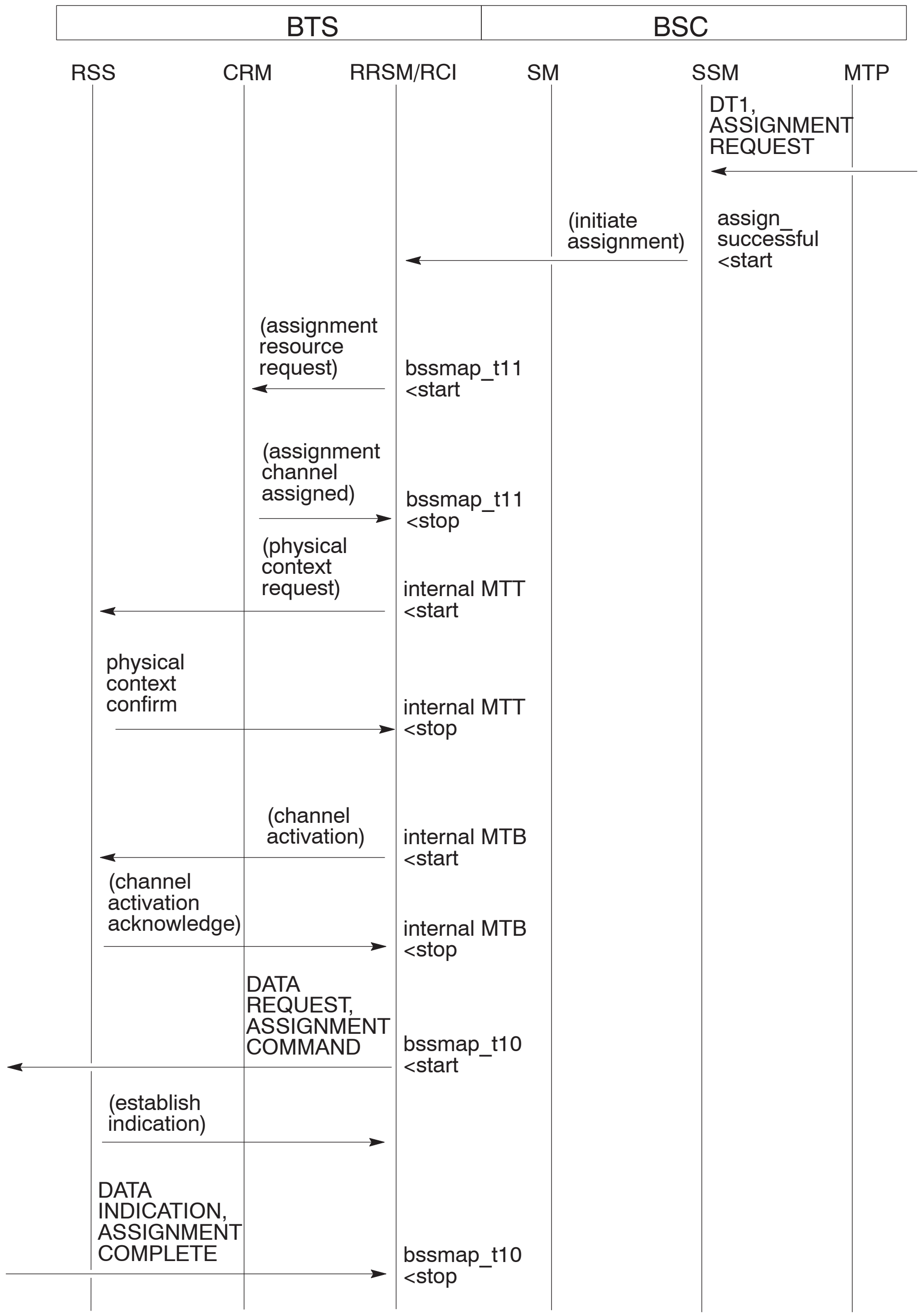
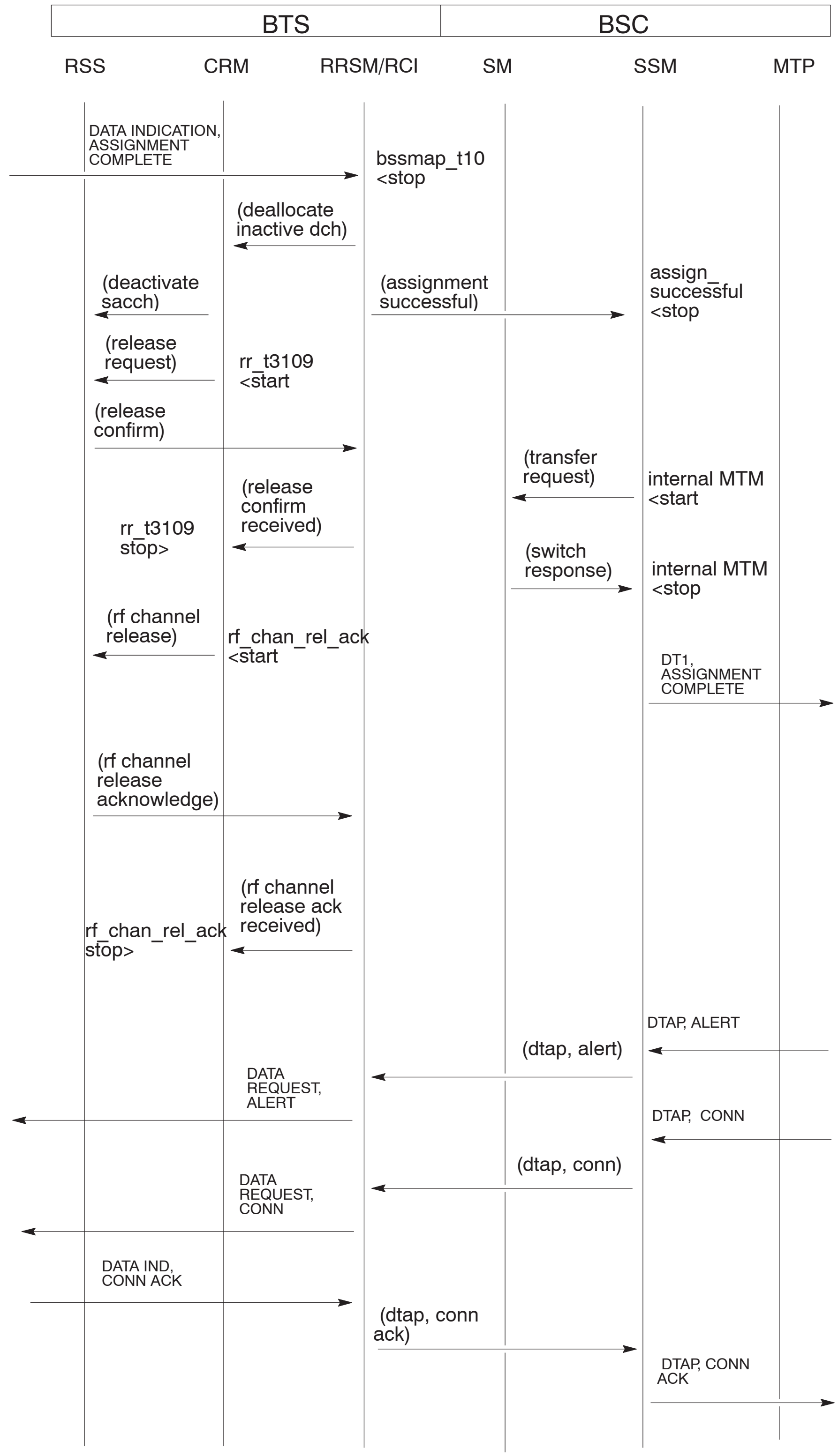


**Figure 2-15** Successful assignment sequence within/between BSC and BTS (Part 2)



# Unsuccessful TCH assignment

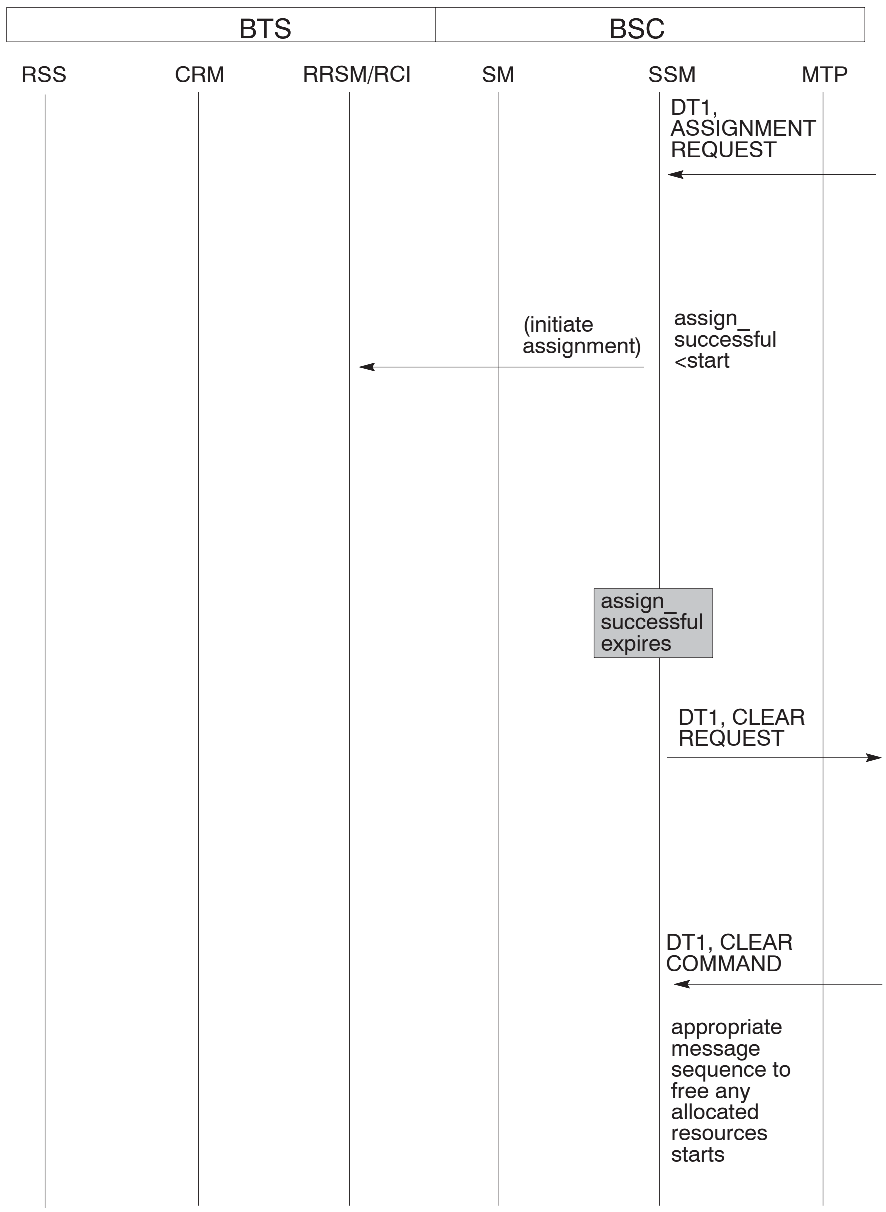
The timers that can affect message sequence due to expiry before expected events are as follows:

- **assign_successful**
- **bssmap_t10**
- **bssmap_t11**
- **bsc_audit**
- **internal MTB** (cannot be optimized)
- **internal MTT** (cannot be optimized)

## Timer assign_successful expires before ASSIGNMENT COMPLETE sent to MSC

Figure 2-16 shows a TCH assignment failure due to the **assign_successful** timer expiring before the DT1 message **ASSIGNMENT COMPLETE** has been returned to the MSC.

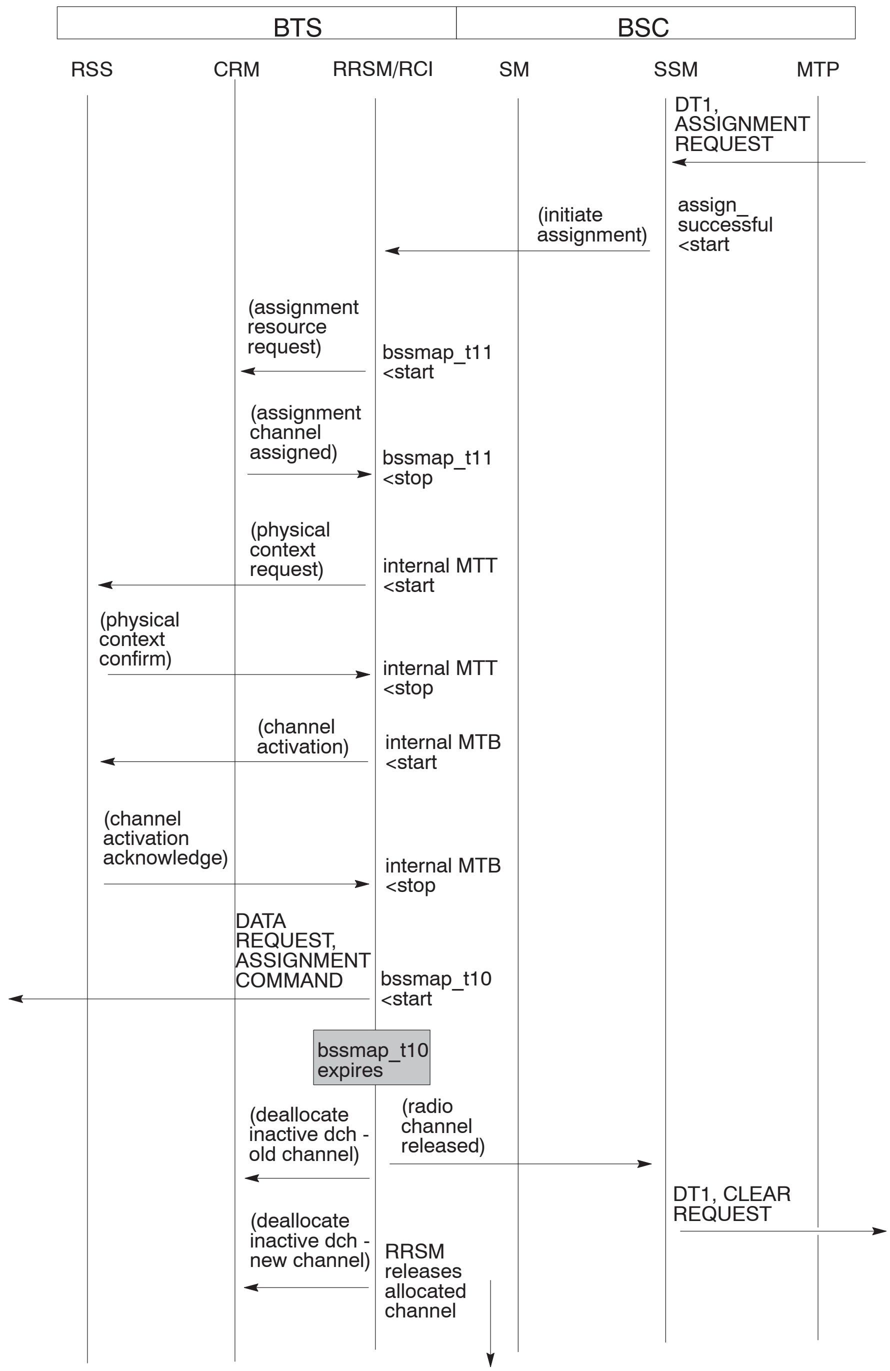
**Figure 2-16** TCH assignment failure due to **assign_successful** timer expiring



## Timer bssmap_t10 expires before ASSIGNMENT COMPLETE sent to MSC

Figure 2-17 shows a TCH assignment failure due to the **bssmap_t10** timer expiring before the 4.08 message **ASSIGNMENT COMPLETE** has been returned from the MS.

**Figure 2-17** TCH assignment failure due to **bssmap_t10** timer expiring



# Inter-BSS handover

In this section message sequences are shown for inter-BSS handover as follows:

- Successful inter-BSS handover
  - Between GSM elements.
  - Between internal systems and subsystems.
- Unsuccessful handover
  - Individual timer expiry before expected events.

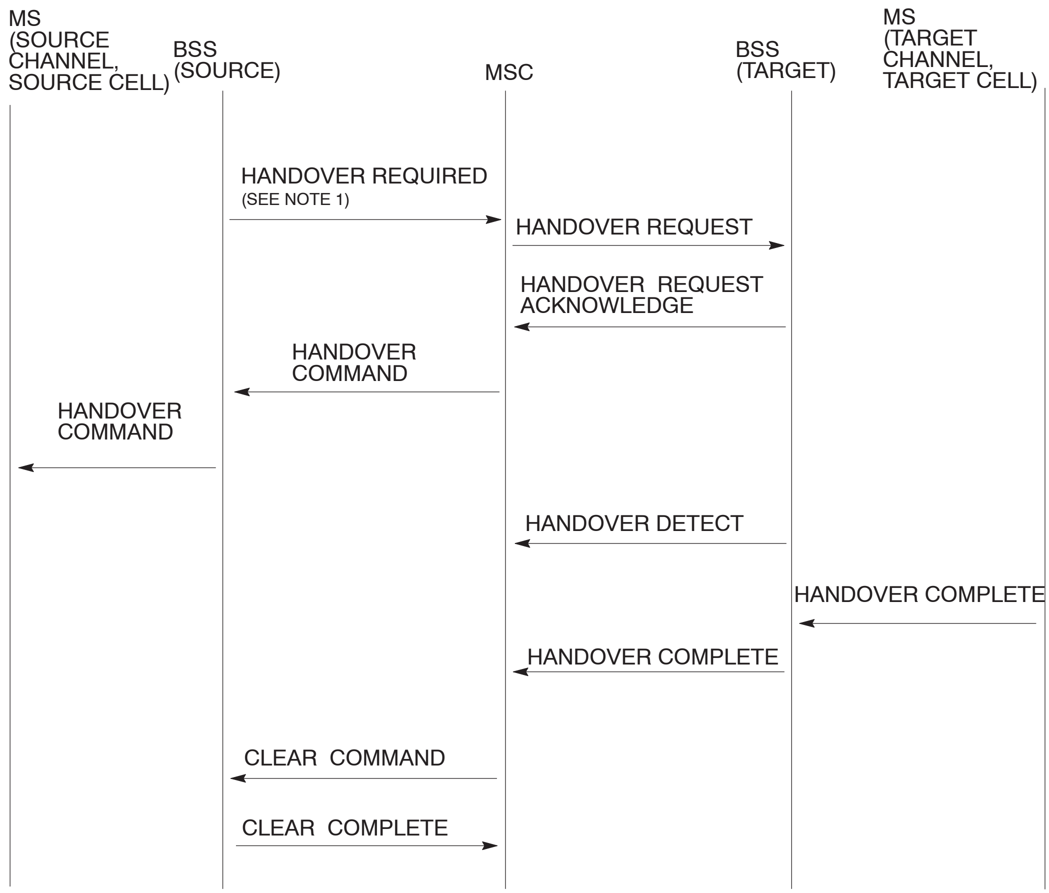
# Successful inter-BSS handover

The following message sequence diagrams show successful inter-BSS handover between GSM elements and between internal (sub)systems.

## Successful handover between GSM elements

Figure 2-18 shows the successful inter-BSS handover sequence between the GSM elements.

**Figure 2-18** Successful inter-BSS handover between GSM elements

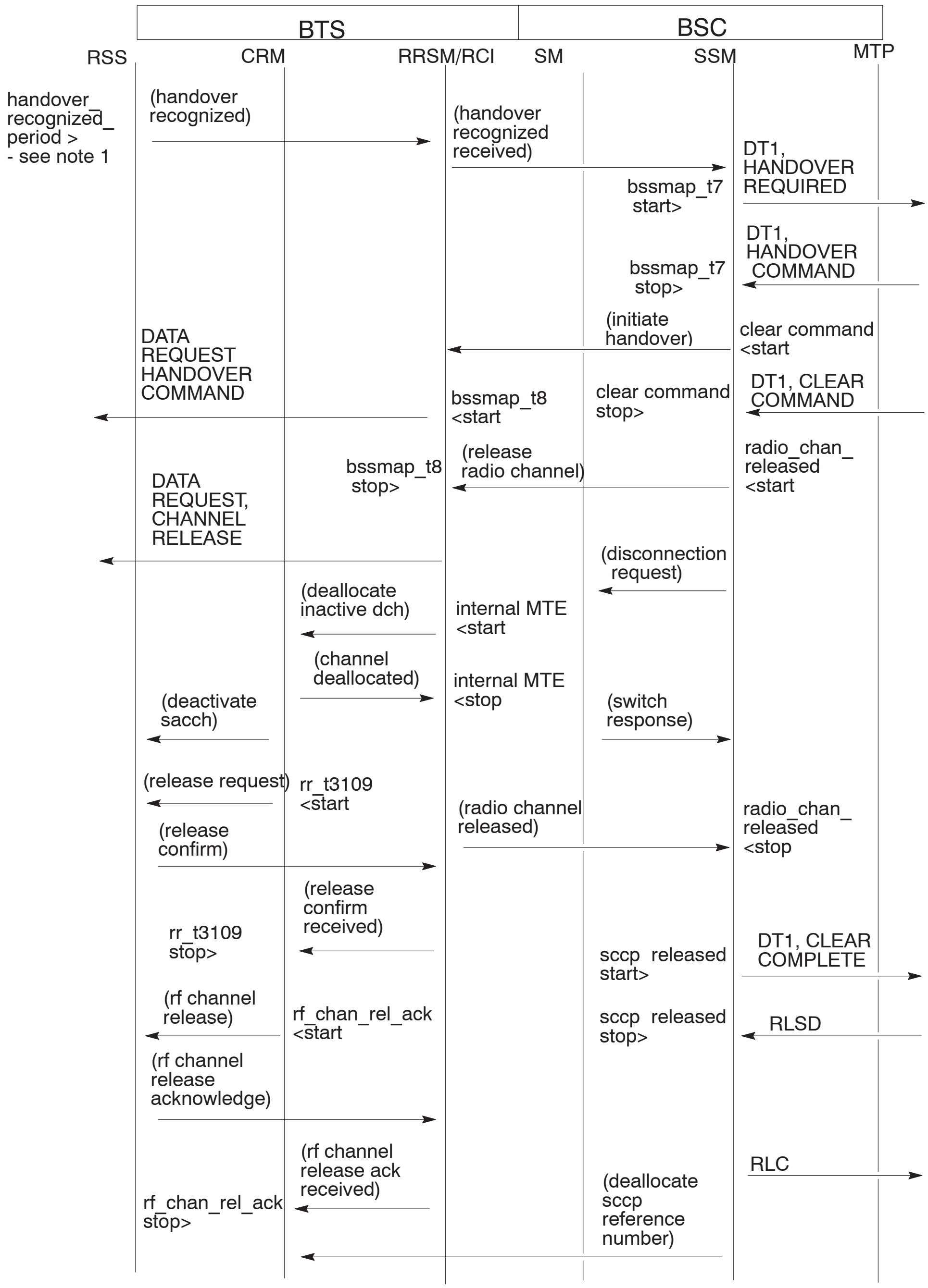



Note 1 - The need for a handover is recognized within the BSS.

## Between internal systems and subsystems - source cell

Figure 2-19 shows the successful inter-BSS handover sequence within and between the BSC and BTS systems and subsystems in the source cell.

**Figure 2-19** Successful inter-BSS handover sequence (source cell)



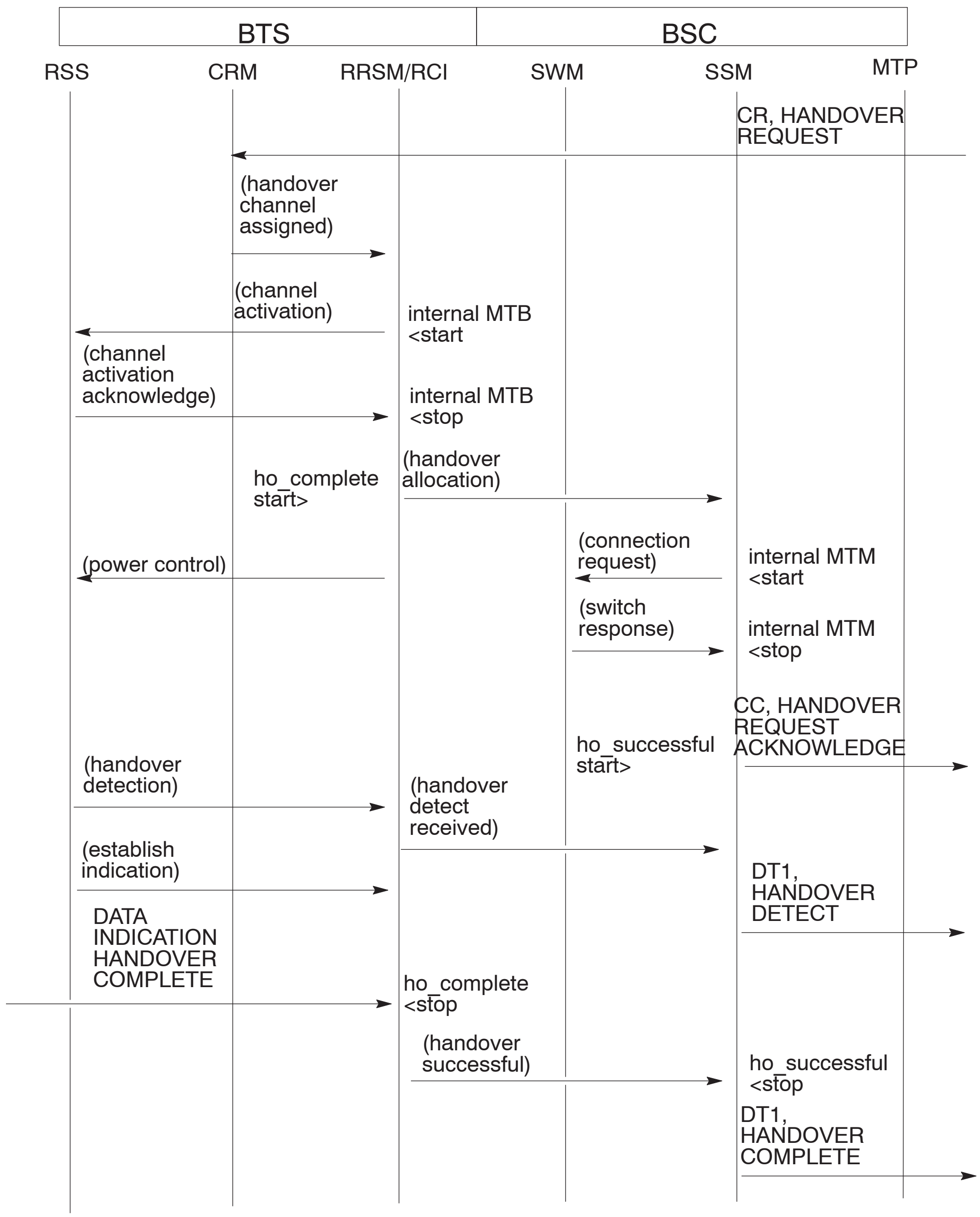

Note 1 - The handover_recognized_period timer expiry is not shown. It is a minimum interval timer for sending handover recognized messages to RRSM.

## Between internal systems and subsystems - target cell (piggy-backed)

A **HANDOVER REQUEST** message from the MSC can be encapsulated within a **CR** (Connection Request) message, or be separate when a connection has already been established by a preceding **CR** message. Both methods are valid GSM MSC implementations. The former is also known as a piggy-backed handover request, and is the most common method. The differences in message sequence and timers in the target cell are shown in the two diagrams that follow.

Figure 2-20 shows the successful inter-BSS handover sequence within and between the BSC and BTS systems and sub-systems in the target cell, when the **HANDOVER REQUEST** message is received encapsulated (piggy-backed) within a **CR** message.

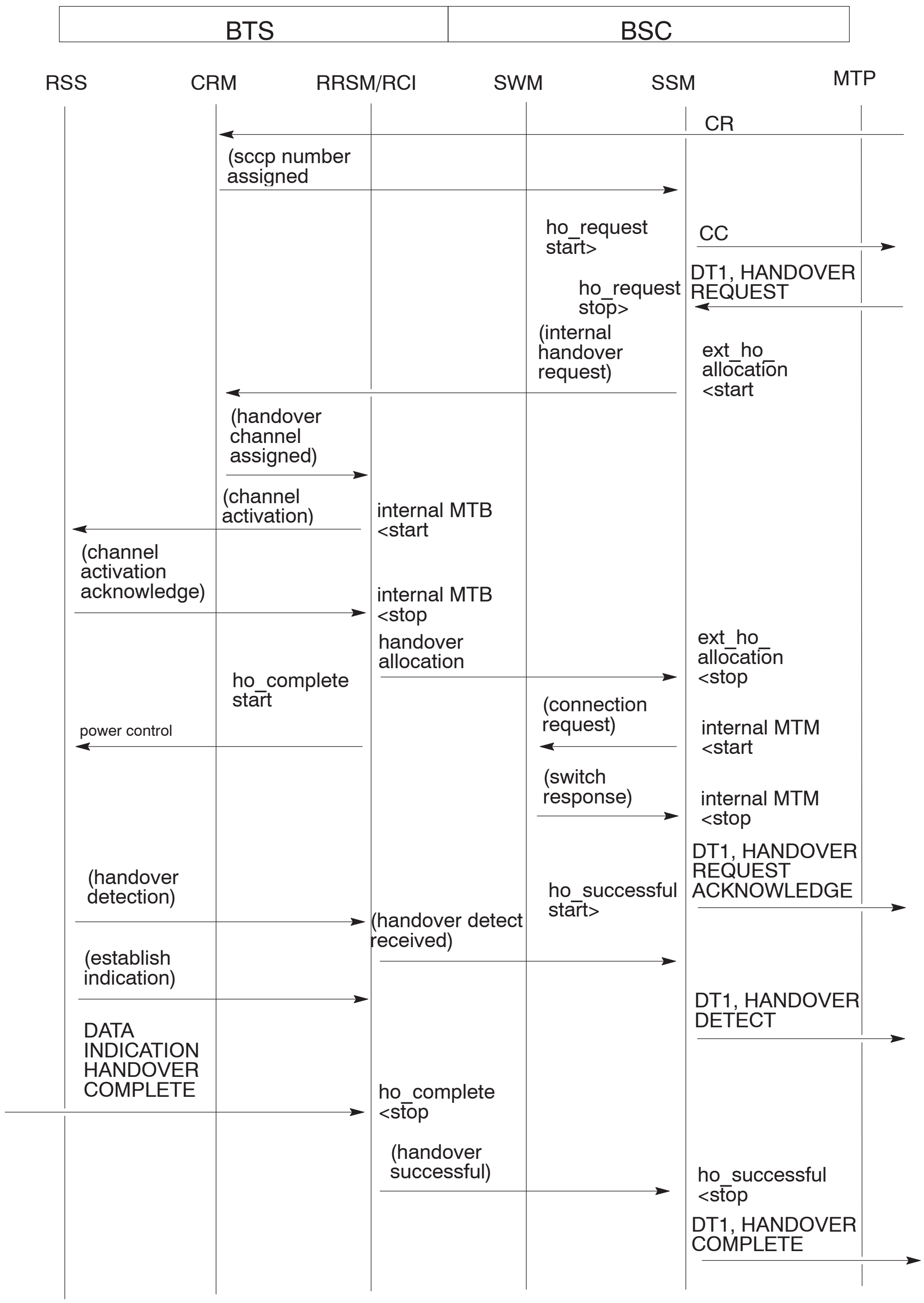
**Figure 2-20** Successful inter-BSS handover sequence (target cell)



## Between internal systems and subsystems - target cell (separate from CR)

Figure 2-21 shows the successful inter-BSS handover sequence within and between the BSC and BTS systems and sub-systems in the target cell, when the **HANDOVER REQUEST** message is received separately from a **CR** (Connection Request) message. A connection has already been established.

**Figure 2-21** Successful inter-BSS handover sequence (separate from CR)



# Unsuccessful inter-BSS handover

Timers that can affect inter-BSS message sequence due to expiry before expected events are:

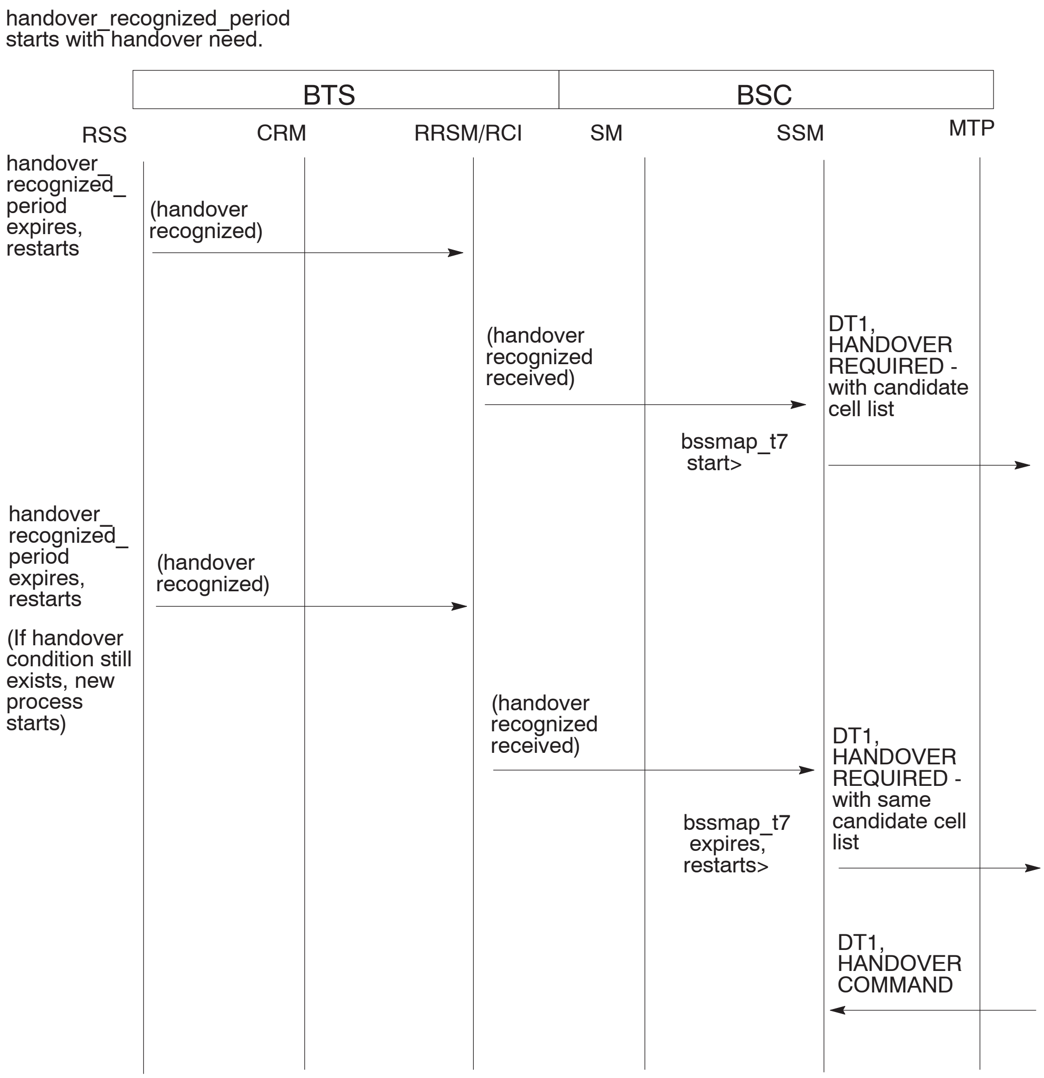
- **bssmap_t7**
- **bssmap_t8**
- **ext_ho_allocation**
- **handover_recognized_period**
- **ho_successful**
- **ho_complete**
- **ho_request**
- **radio_chan_released**
- **rr_t3109**
- **internal MTB** (cannot be optimized).
- **internal MTM** (cannot be optimized).

## handover_recognized_period is less than bssmap_t7

Figure 2-22 shows an inter-BSS handover (source cell) where the **handover_recognized_period** timer expires with the **bssmap_t7** timer still running. The **handover_recognized_period** timer is a minimum interval timer which controls how often the SSM is notified of the need for handover. It is shown here as already started. Each expiry allows another **handover recognized** message to be sent by the RSS to the RRSM, provided the need for handover still exists.

See Chapter 3 for settings of the **handover_required_reject_switch** associated with the **bssmap_t7** timer. In the diagrams below it is assumed that only one external candidate exists for handover with no internal candidates, and that handover needs do not change, that is, the same cell is involved.

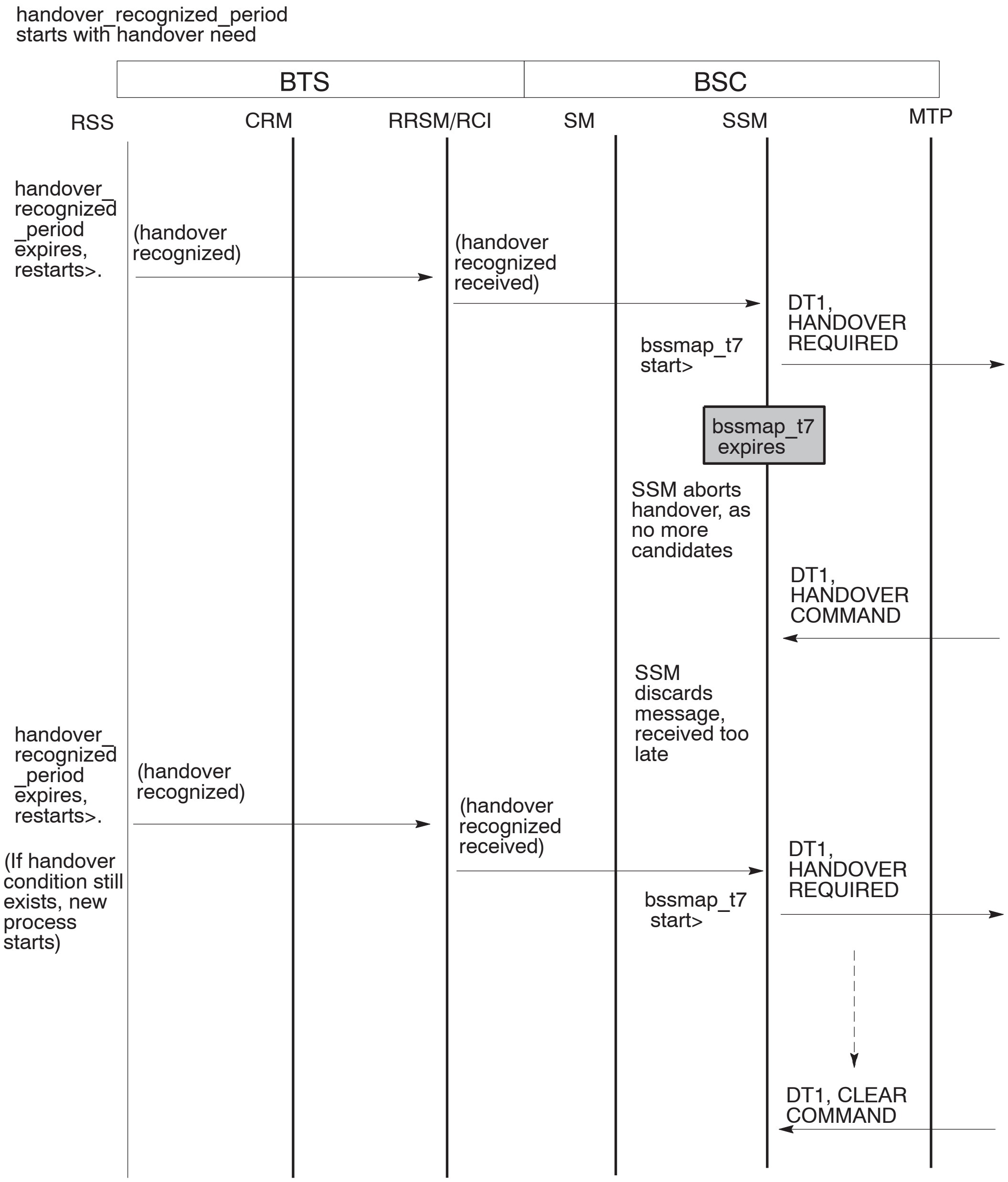
**Figure 2-22** Inter-BSS handover with **handover_recognized_period** timer restarts



## bssmap_t7 is less than handover_recognized_period

Figure 2-23 shows an inter-BSS handover (source cell) in which the **bssmap_t7** timer expires with the **handover_recognized_period_start** timer still running. It is assumed that the **handover_required_reject_switch** associated with this timer is set to 0. This example sequence is described in Chapter 3 under **bssmap_t7** as **Example sequence one**. See Chapter 3 for settings of the **handover_required_reject_switch** associated with the **bssmap_t7** timer.

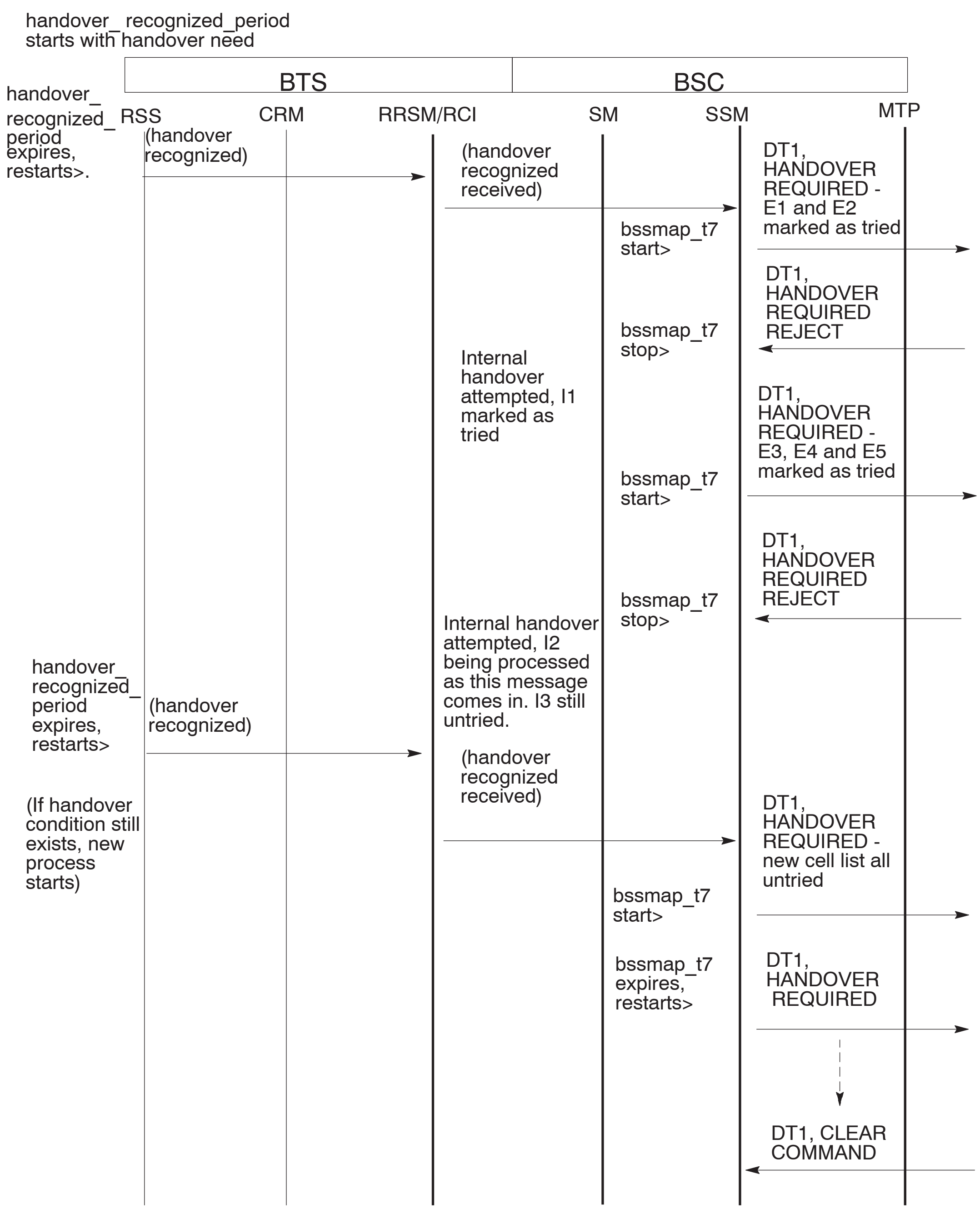
**Figure 2-23** Inter-BSS handover with **bssmap_t7** timer expiring



## MSC rejects handover with bssmap_t7 running

Figure 2-24 shows an unsuccessful inter-BSS handover (source cell) due to a **HANDOVER REQUIRED REJECT** message from the MSC, with **bssmap_t7** still running. It is assumed that the **handover_required_reject_switch** associated with this timer is set to 1, and that the cell list available is E1, E2, I1, E3, E4, E5, I2 and I3, and assuming that the MSC eventually sends a **CLEAR COMMAND** message to clear up the call. This example sequence is described in Chapter 3 under **bssmap_t7** as **Example sequence two**.

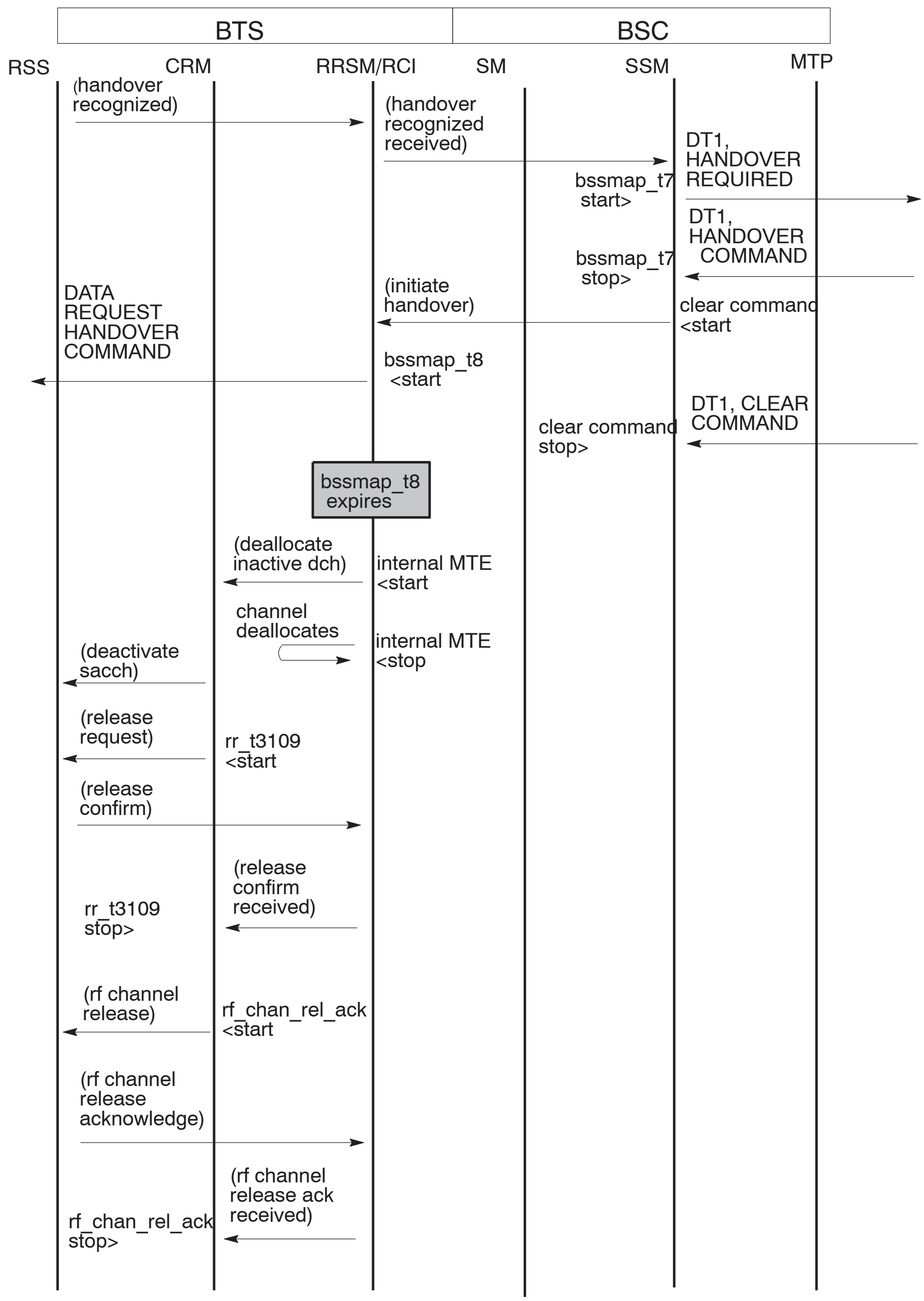
**Figure 2-24** Inter-BSS handover rejected with **bssmap_t7** running



## bssmap_t8 expires

Figure 2-25 shows an unsuccessful inter-BSS handover due to the **bssmap_t8** timer expiring before a **release radio channel** message is received from SSM. RRSM sends a **deallocate inactive dch** message to CRM and the source cell release procedure starts.

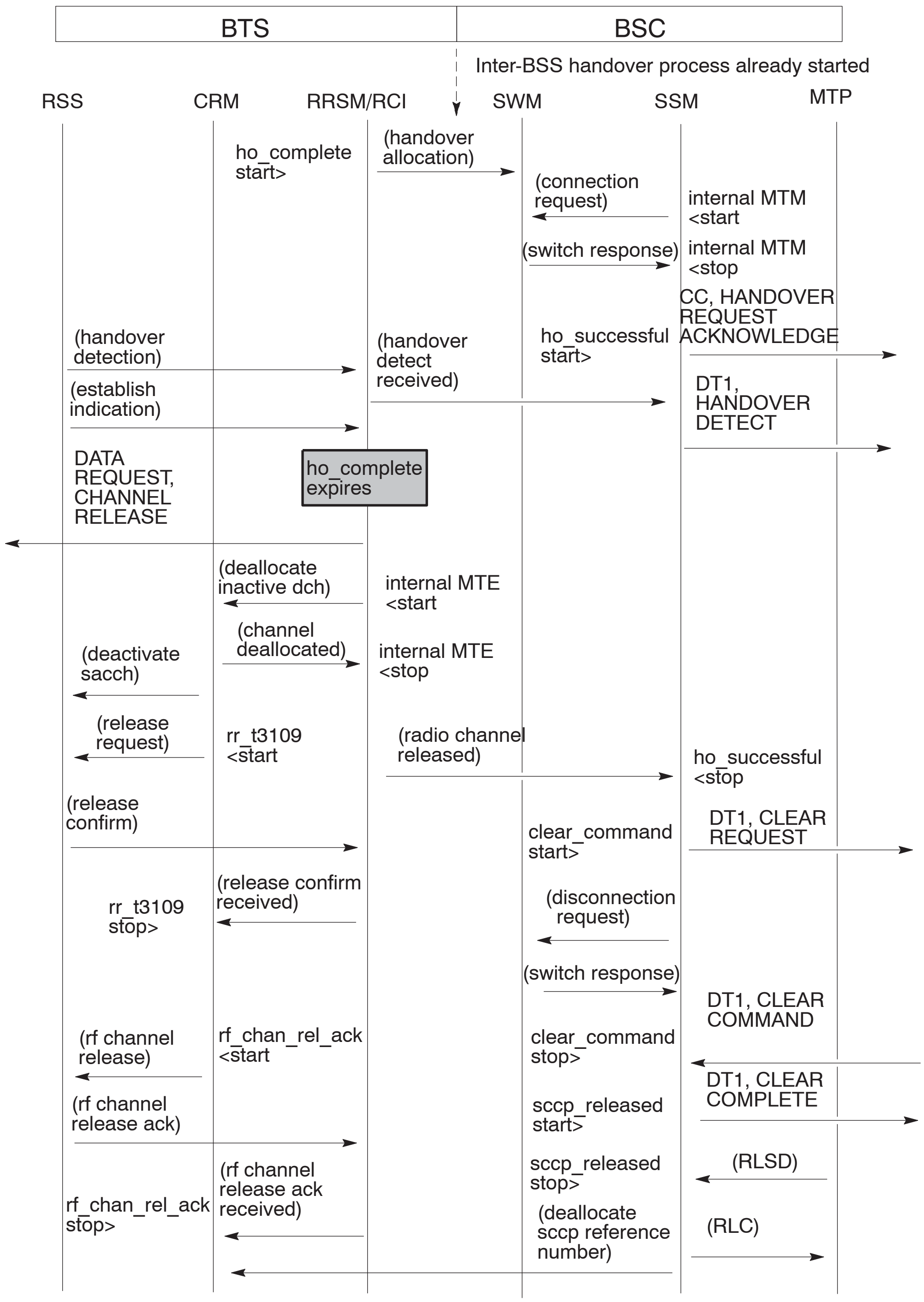
**Figure 2-25** Unsuccessful inter-BSS handover due to **bssmap_t8** timer expiring



## ho_complete expires before HANDOVER COMPLETE from MS

Figure 2-26 shows an unsuccessful inter-BSS handover (target cell) due to the **ho_complete** timer expiring before the **HANDOVER COMPLETE** message is received from the MS. See Chapter 3 for settings of the **ho_complete** parameter associated with this timer.

**Figure 2-26** Unsuccessful inter-BSS handover due to **ho_complete** timer expiring



## ho_successful expires before handover successful received from target RRSM

Figure 2-27 and Figure 2-28 show (in two parts) an unsuccessful inter-BSS handover (target cell) due to the **ho_successful** timer expiring before the **handover successful** message is received from RRSM. See Chapter 3 for settings of the **ho_complete** parameter associated with this timer.

**Figure 2-27** Unsuccessful inter-BSS handover due to **ho_successful** expiring (Part 1)

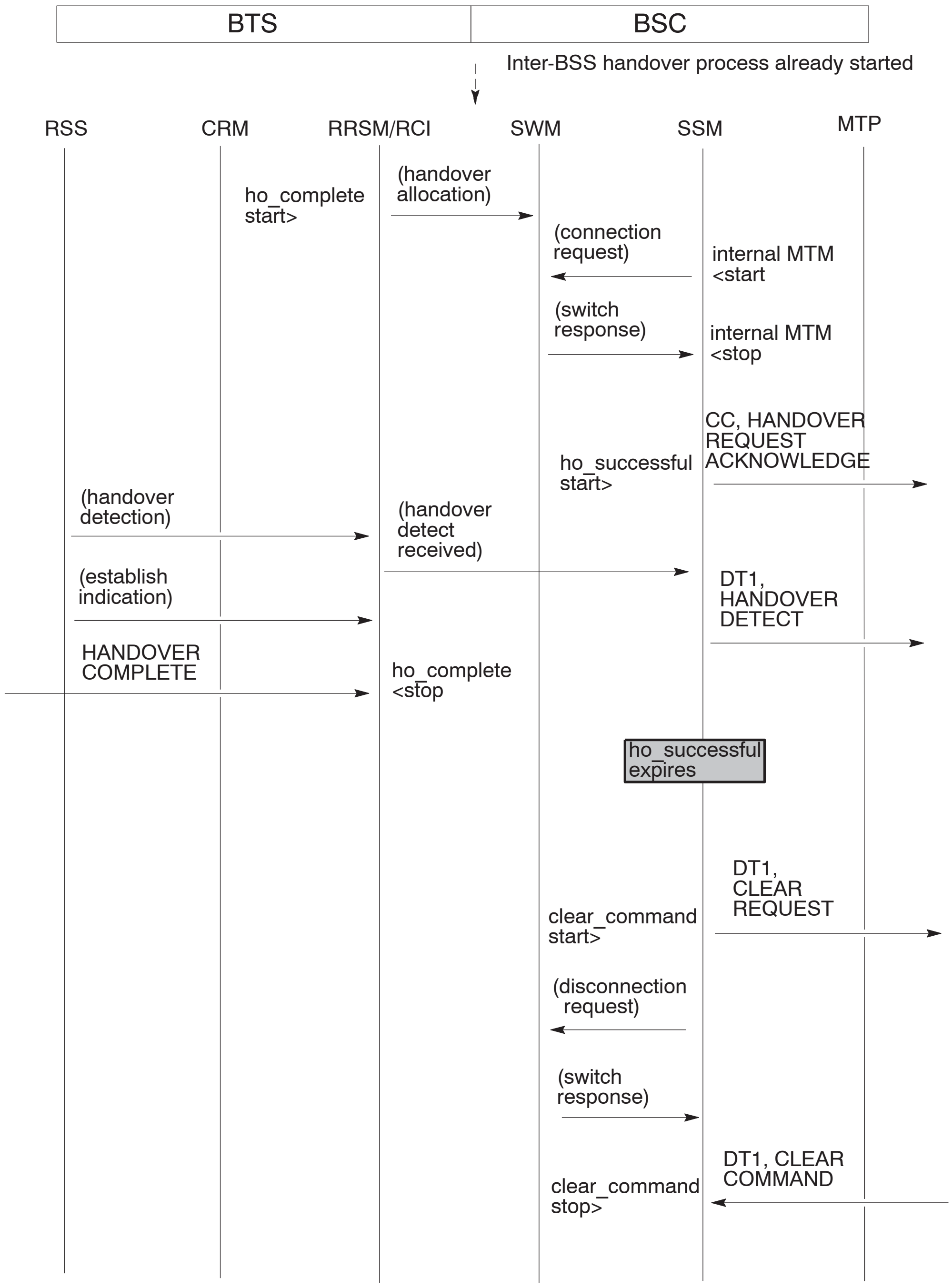
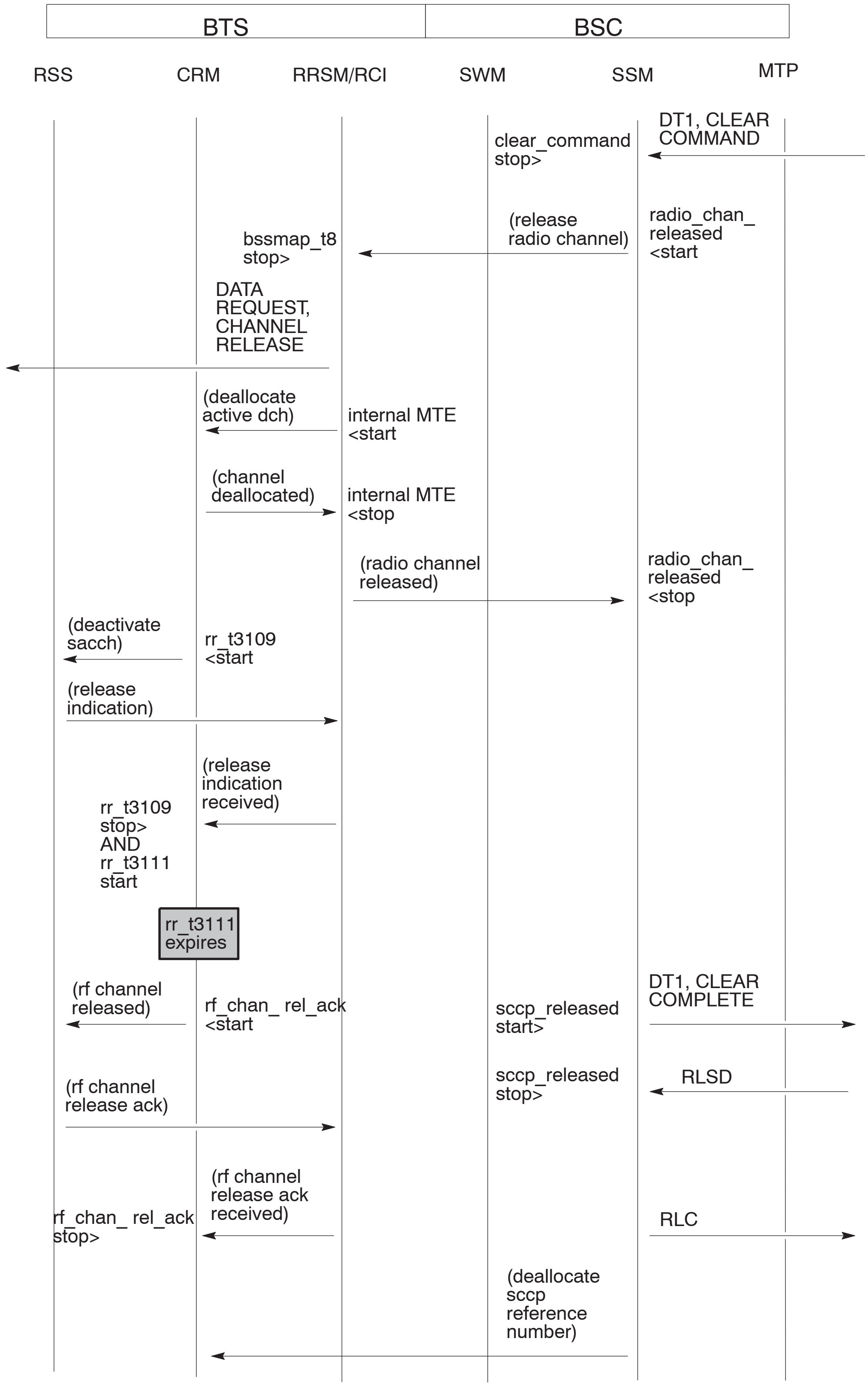


**Figure 2-28** Unsuccessful inter-BSS handover due to **ho_successful** expiring (Part 2)



# Inter-BTS handover

In this section message sequences are shown for the inter-BTS handover procedure as follows:

- Successful handover
  - Between GSM elements.
  - Between internal systems and subsystems.
- Unsuccessful handover
  - Individual timer expiry before expected events.

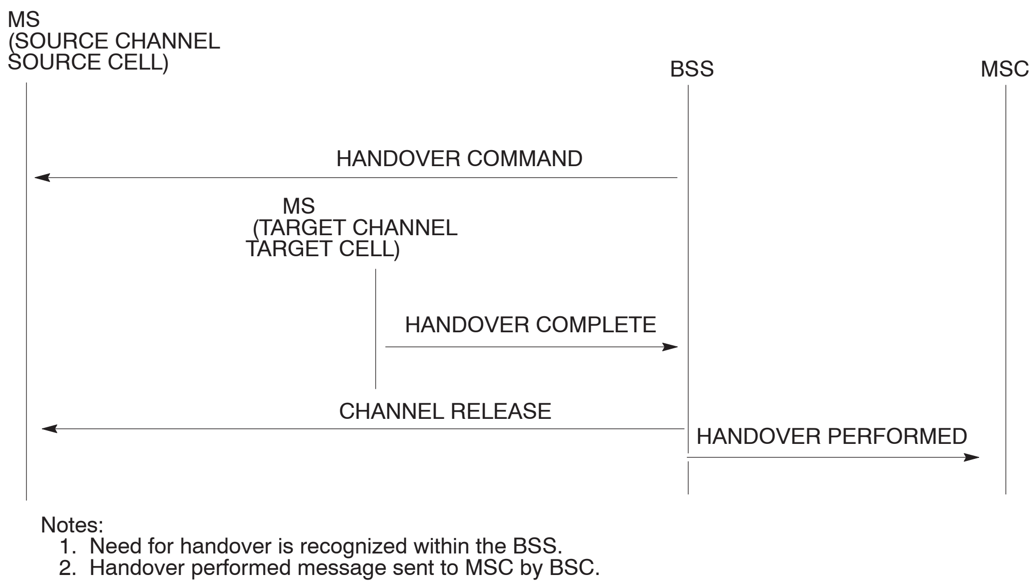
This is handover between two different cells in the same BSS and controlled by a common BSC.

## Successful inter-BTS handover

### Successful handover between GSM elements

Figure 2-29 shows a successful inter-BTS handover between GSM elements.

**Figure 2-29** Successful inter-BTS handover between GSM elements




### Handover successful between internal (sub)systems

Figure 2-30 and Figure 2-31 show (in two parts) a successful inter-BTS handover between internal modules and GSM elements.

**Figure 2-30** Successful inter-BTS handover (Part 1)

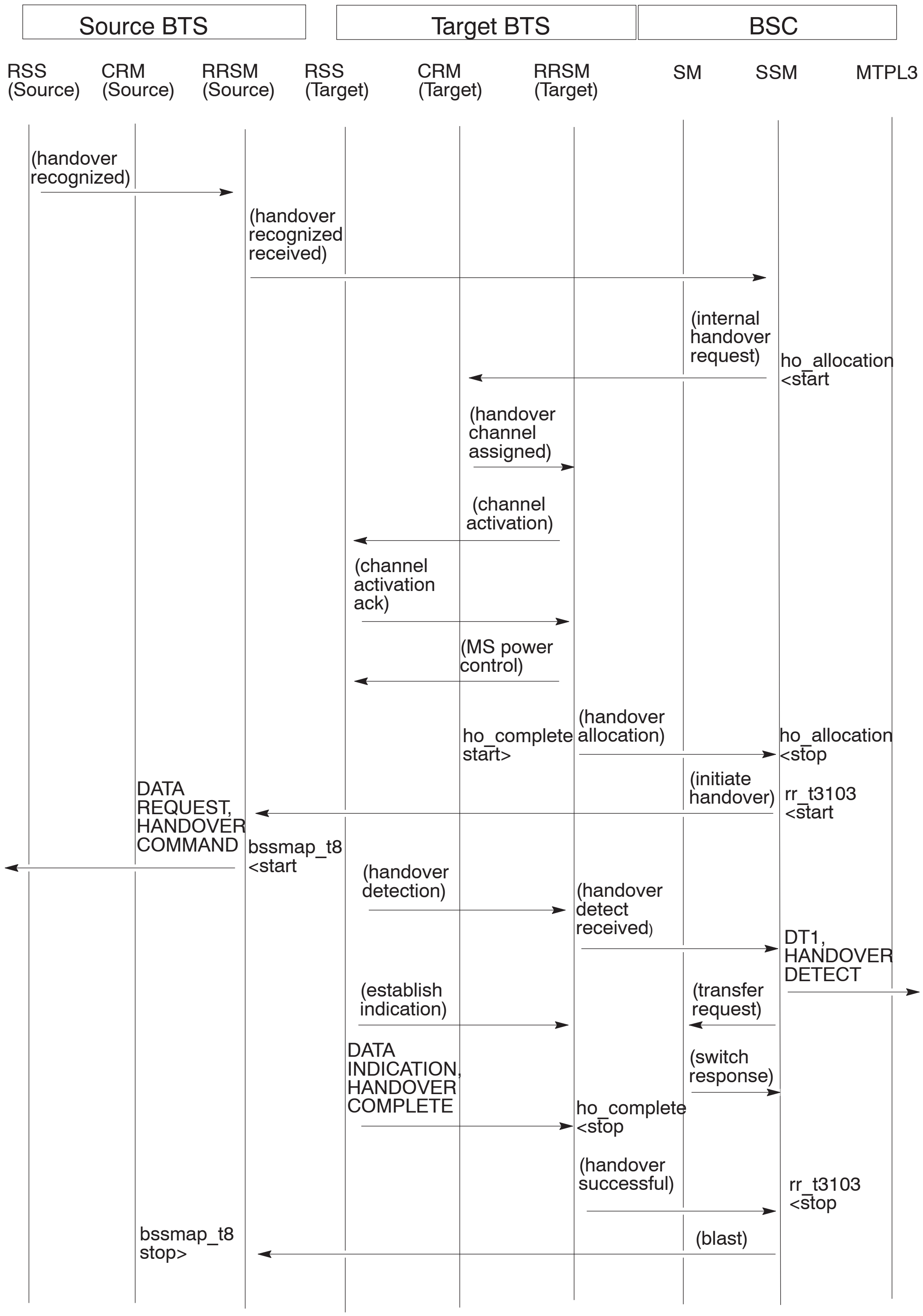
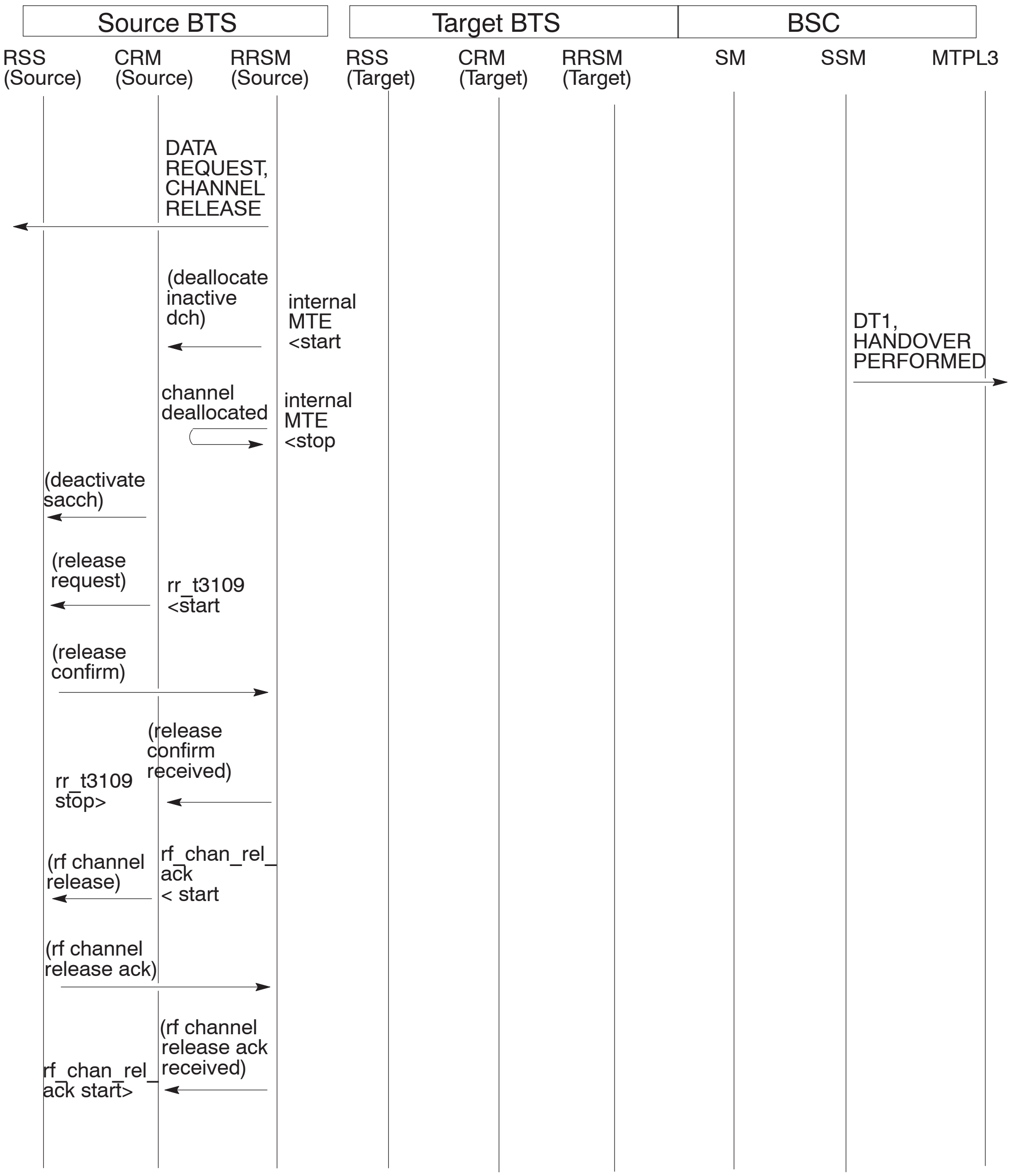


**Figure 2-31** Successful inter-BTS handover (Part 2)



# Unsuccessful inter-BTS handover

The timers that can affect message sequence due to expiry before expected events are as follows:

- **bssmap_t8**
- **ho_allocation**
- **ho_complete**
- **rr_t3103**
- **internal MTE** (cannot be optimized)

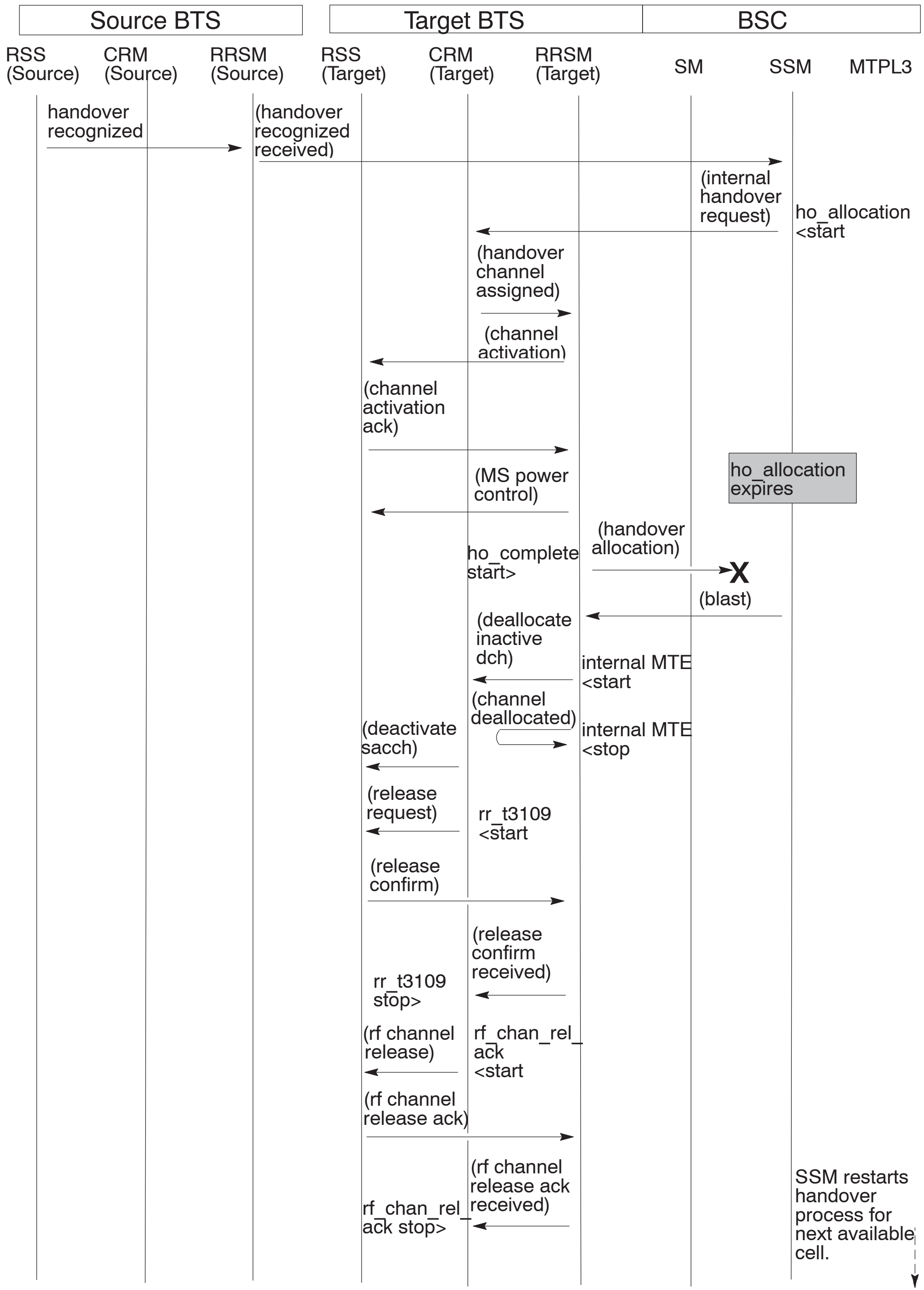
## ho_allocation expires

Figure 2-32 shows an unsuccessful handover due to the **ho_allocation** timer expiring before the expected **handover allocation** message is received from the target RRSM.

**NOTE**

The case shown is an example, showing inter-BTS handover. The **ho_allocation** timer could expire at any point up to the **ASSIGNMENT COMPLETE** message.

**Figure 2-32** Unsuccessful handover due to **ho_allocation** timer expiring



## ho_complete expires

Figure 2-33 and Figure 2-34 show (in two parts) an unsuccessful handover due to the **ho_complete** timer expiring before the expected **HANDOVER COMPLETE** message is received from the target MS.

**Figure 2-33** Unsuccessful handover due to **ho_complete** timer expiring (Part 1)

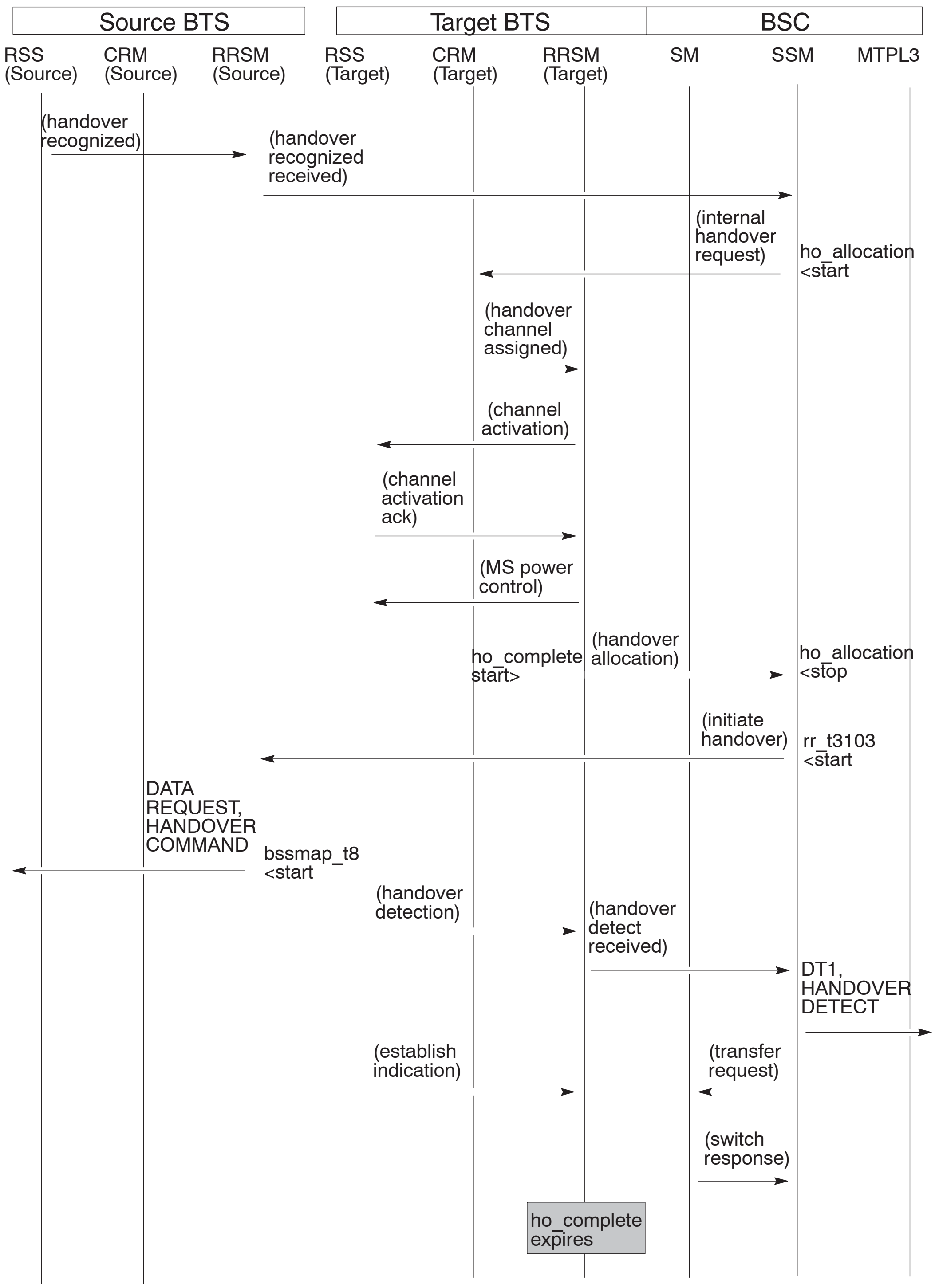
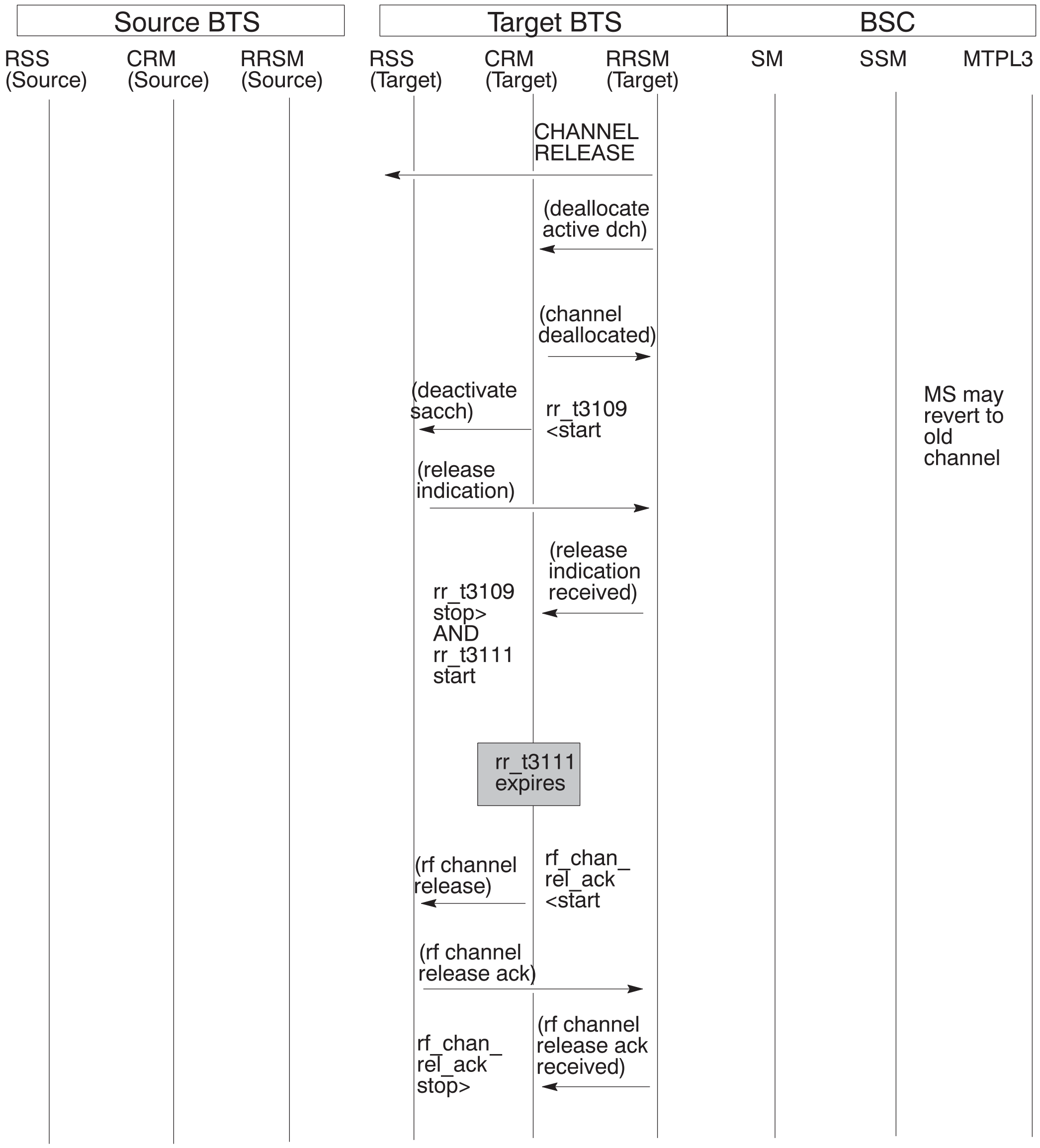


**Figure 2-34** Unsuccessful handover due to **ho_complete** timer expiring (Part 2)



## rr_t3103 expires

Figure 2-35, Figure 2-36 and Figure 2-37 show (in three parts) an unsuccessful handover due to the **rr_t3103** timer expiring before the expected **HANDOVER SUCCESSFUL** message is received from the target RRSM.

**Figure 2-35** Unsuccessful handover due to **rr_t3103** timer expiring (Part 1)

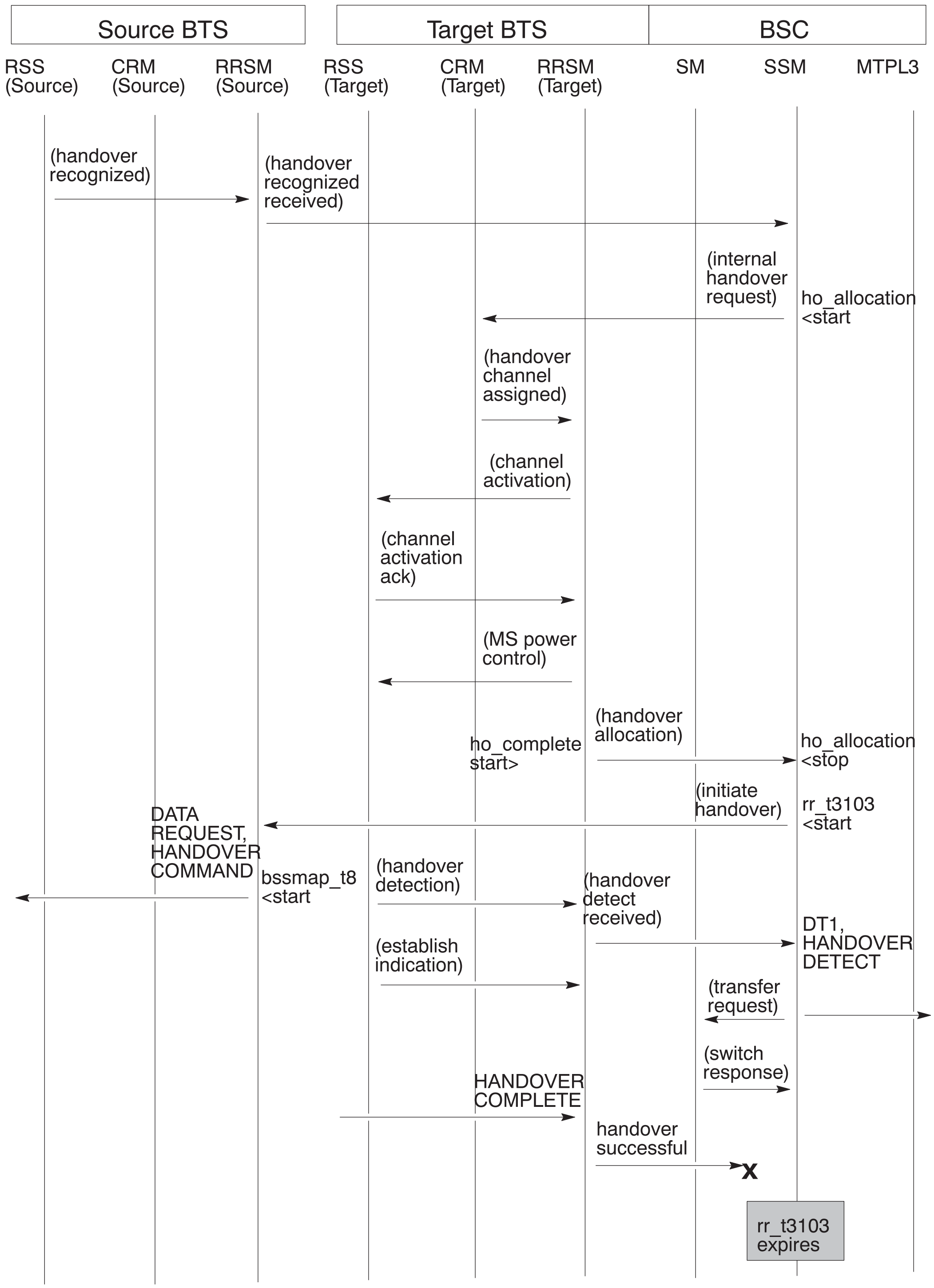


**Figure 2-36** Unsuccessful handover due to **rr_t3103** timer expiring (Part 2)

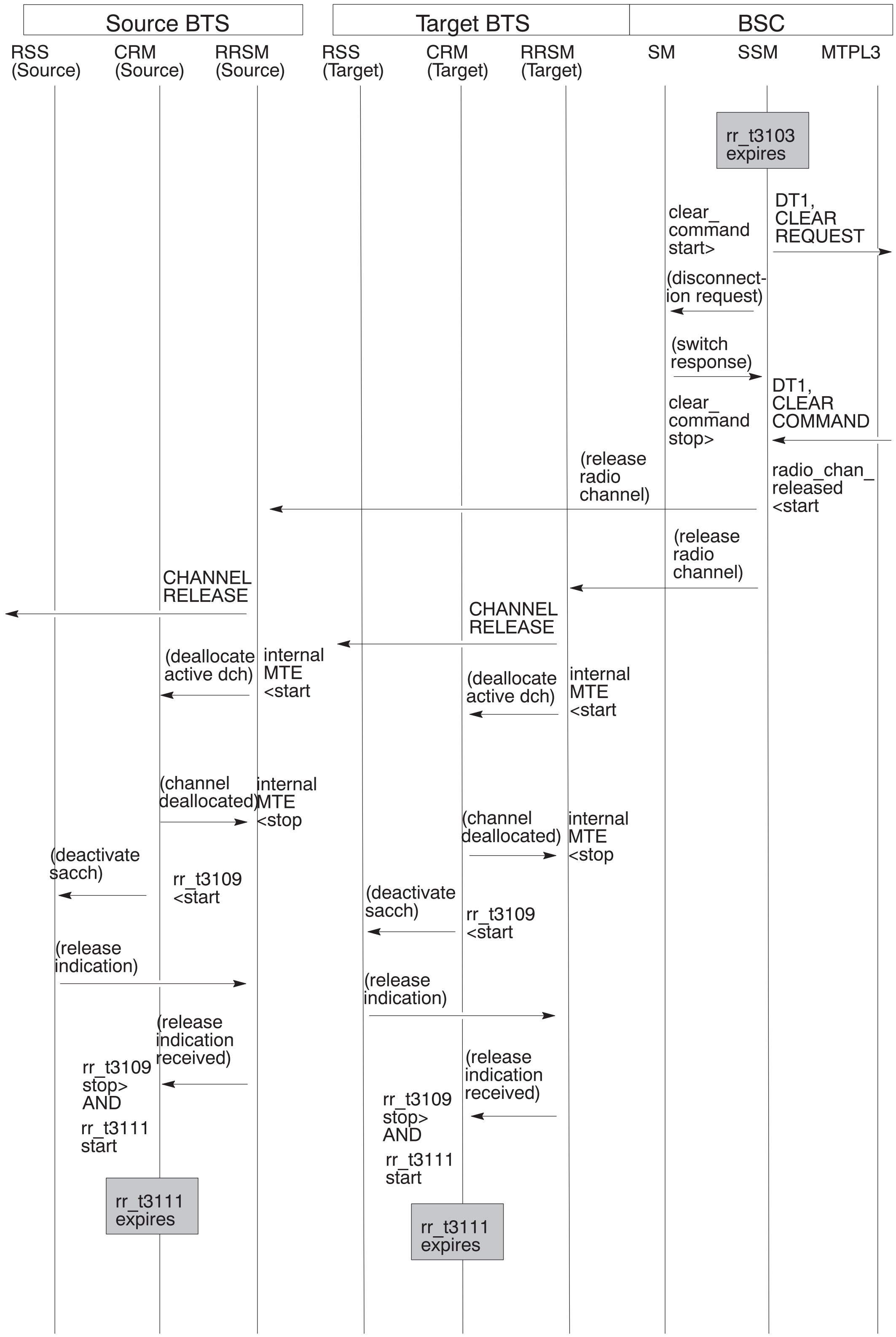
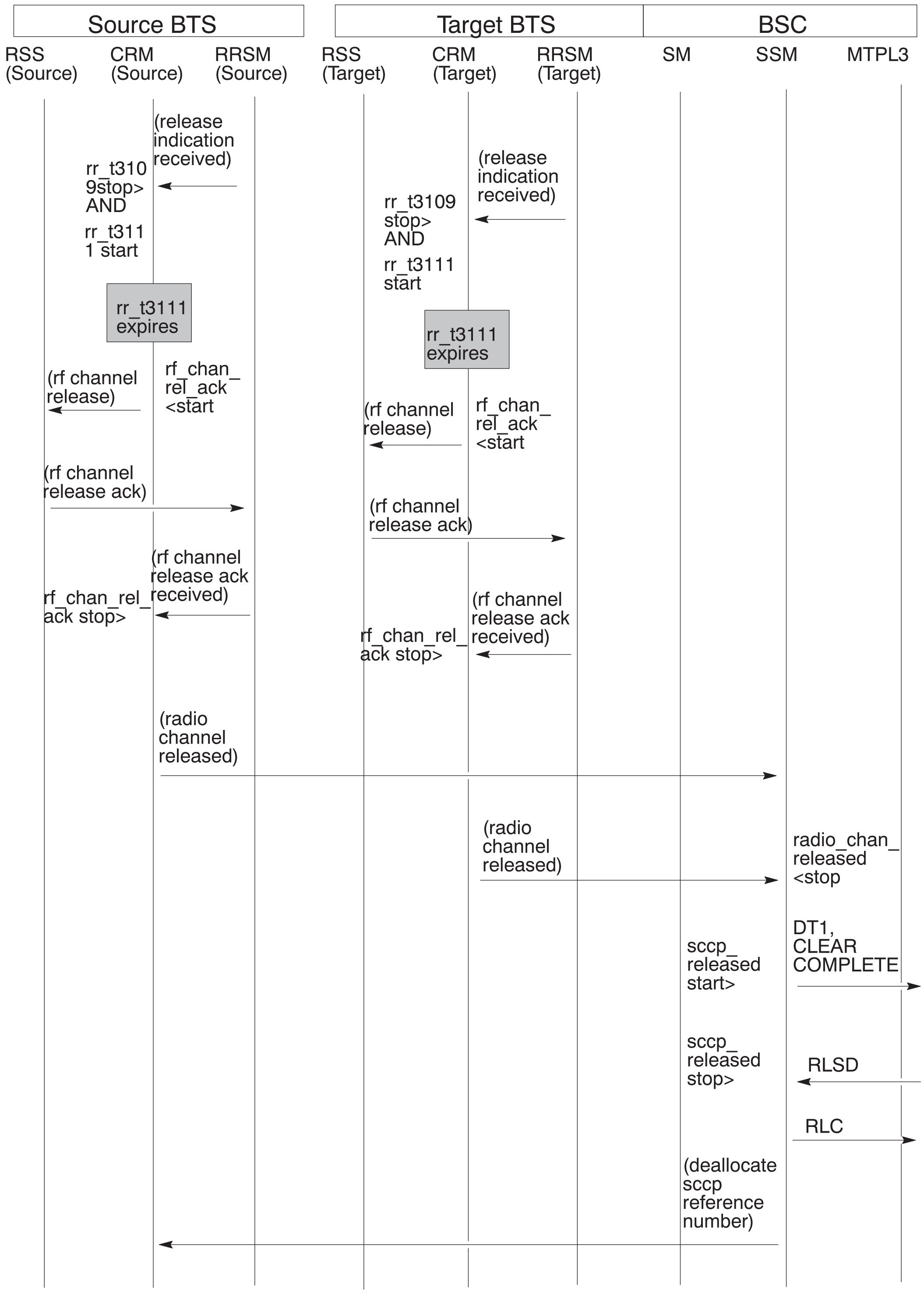


**Figure 2-37** Unsuccessful handover due to **rr_t3103** timer expiring (Part 3)



## bssmap_t8 expires

Figure 2-38 and Figure 2-39 show (in two parts) an unsuccessful handover due to the **bssmap_t8** timer expiring before the expected **release radio channel** message is received from the target SSM.

**Figure 2-38** Unsuccessful handover due to **bssmap_t8** timer expiring (Part 1)

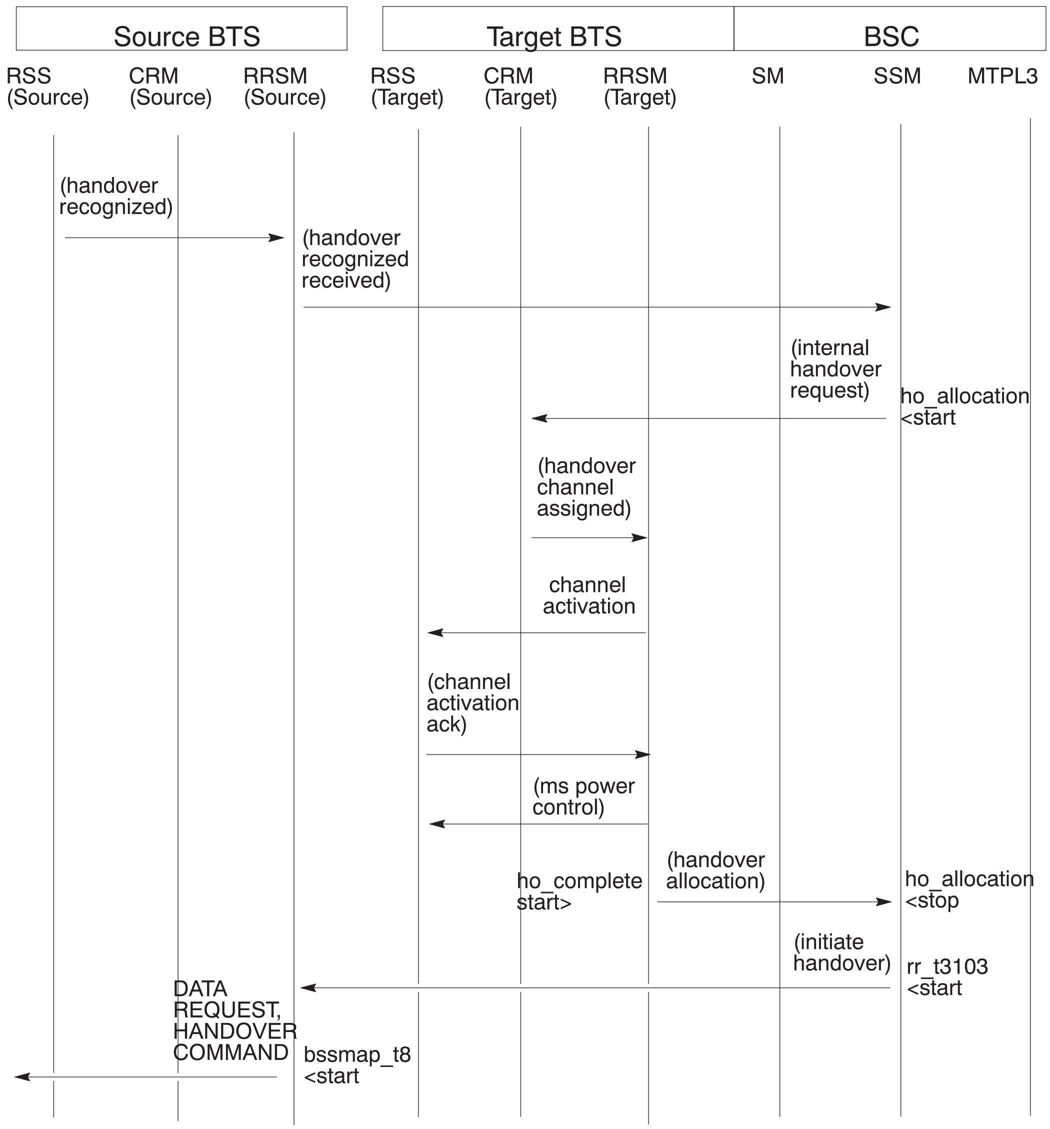
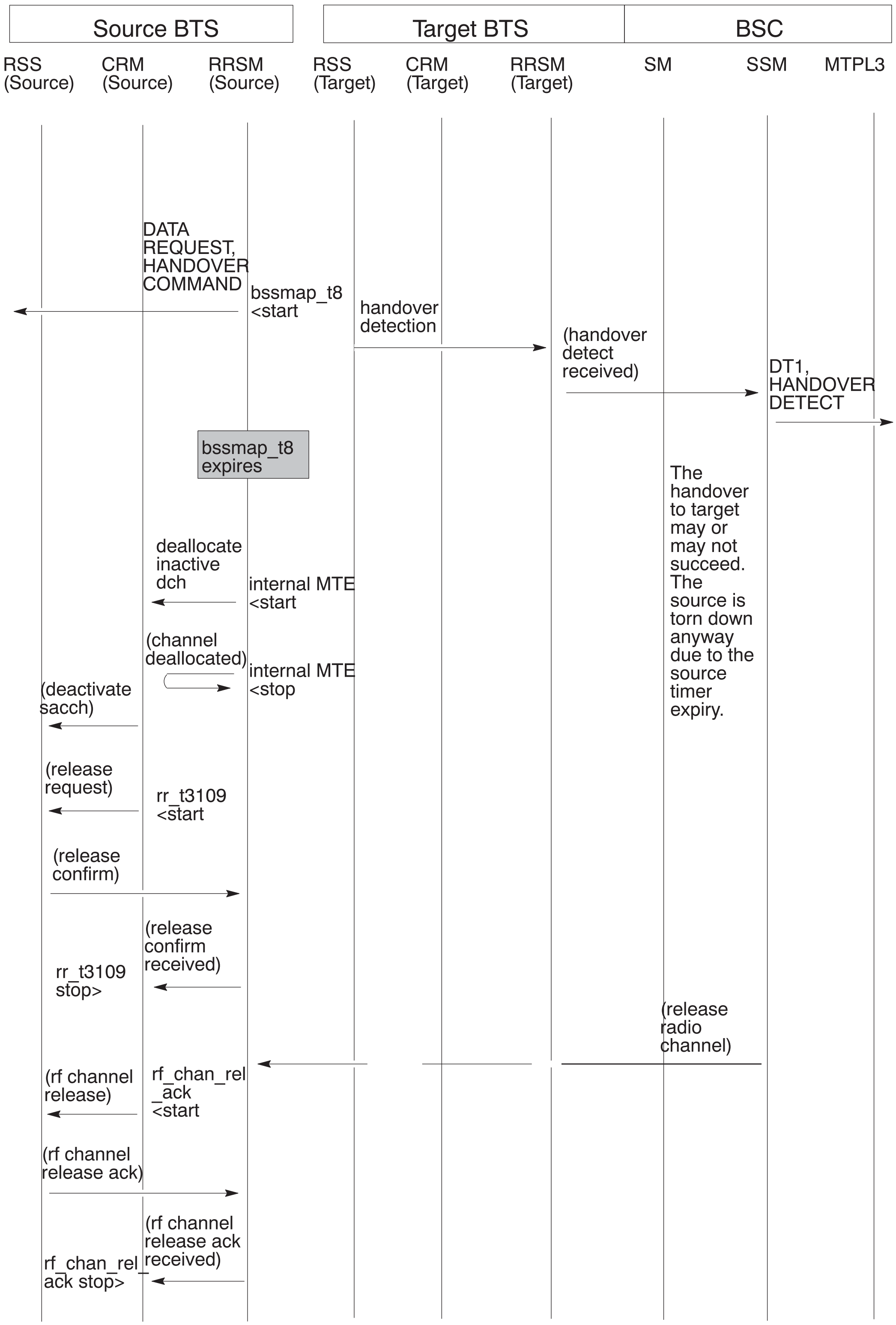


**Figure 2-39** Unsuccessful handover due to **bssmap_t8** timer expiring (Part 2)



# Intra-cell handover

In this section message sequences are shown for intra-cell handover as follows:

- Successful handover
  - Between GSM elements.
  - Between internal systems and subsystems.
- Unsuccessful handover
  - Individual timer expiry before expected events.

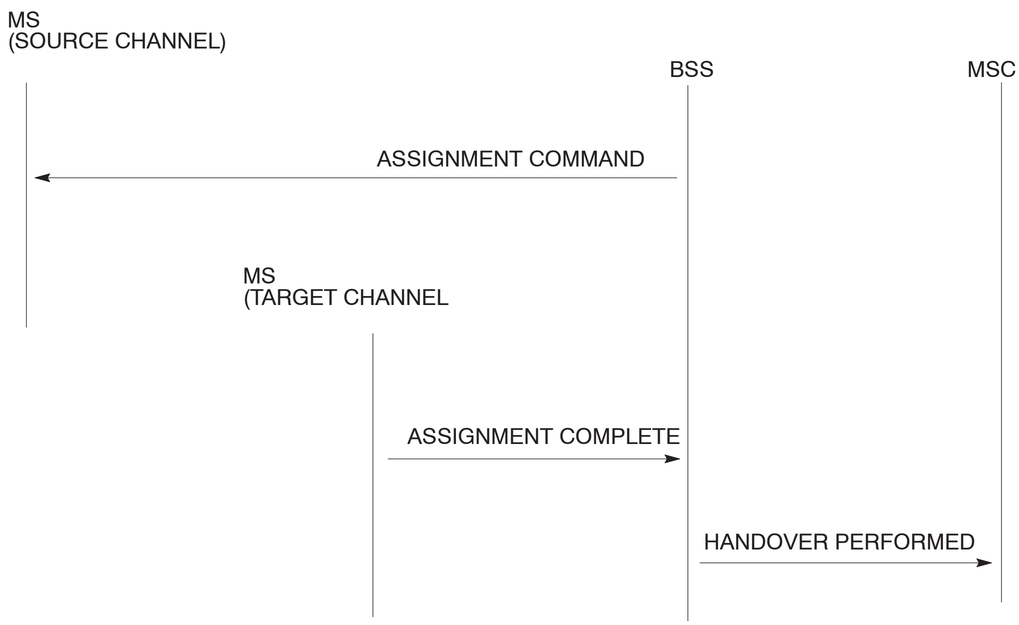
Intra-cell handovers are between channels within the same cell, that is, the target cell is the same as the source cell.

## Successful intra-cell handover

### Successful handover between GSM elements

Figure 2-40 shows a successful intra-cell handover between GSM elements.

**Figure 2-40** Successful intra-cell handover



## Between internal systems - intra-cell

Figure 2-41 and Figure 2-42 show (in two parts) a successful intra-cell handover between internal systems and subsystems (source and target cells).

**Figure 2-41** Successful intra-cell handover between source and target cells (Part 1)

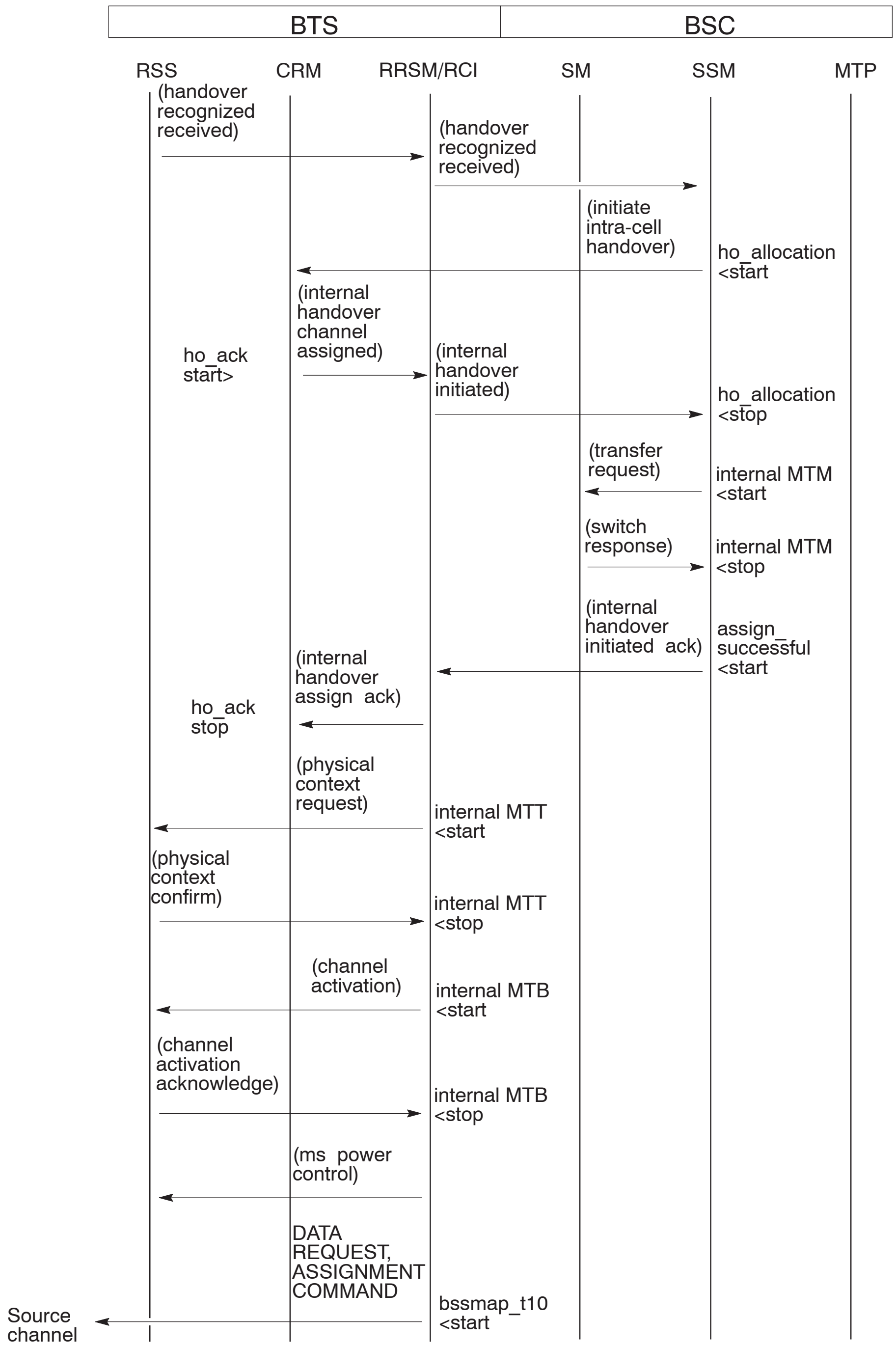
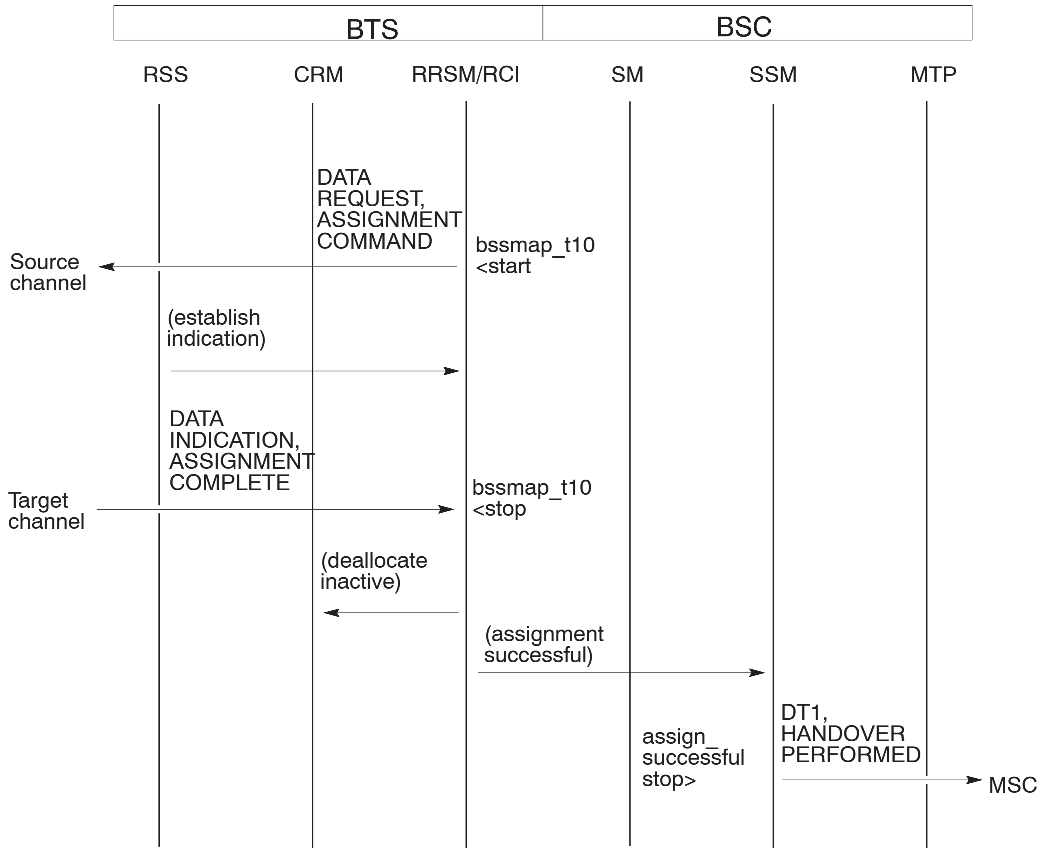


**Figure 2-42** Successful intra-cell handover between source and target cells (Part 2)



# Unsuccessful intra-cell handover

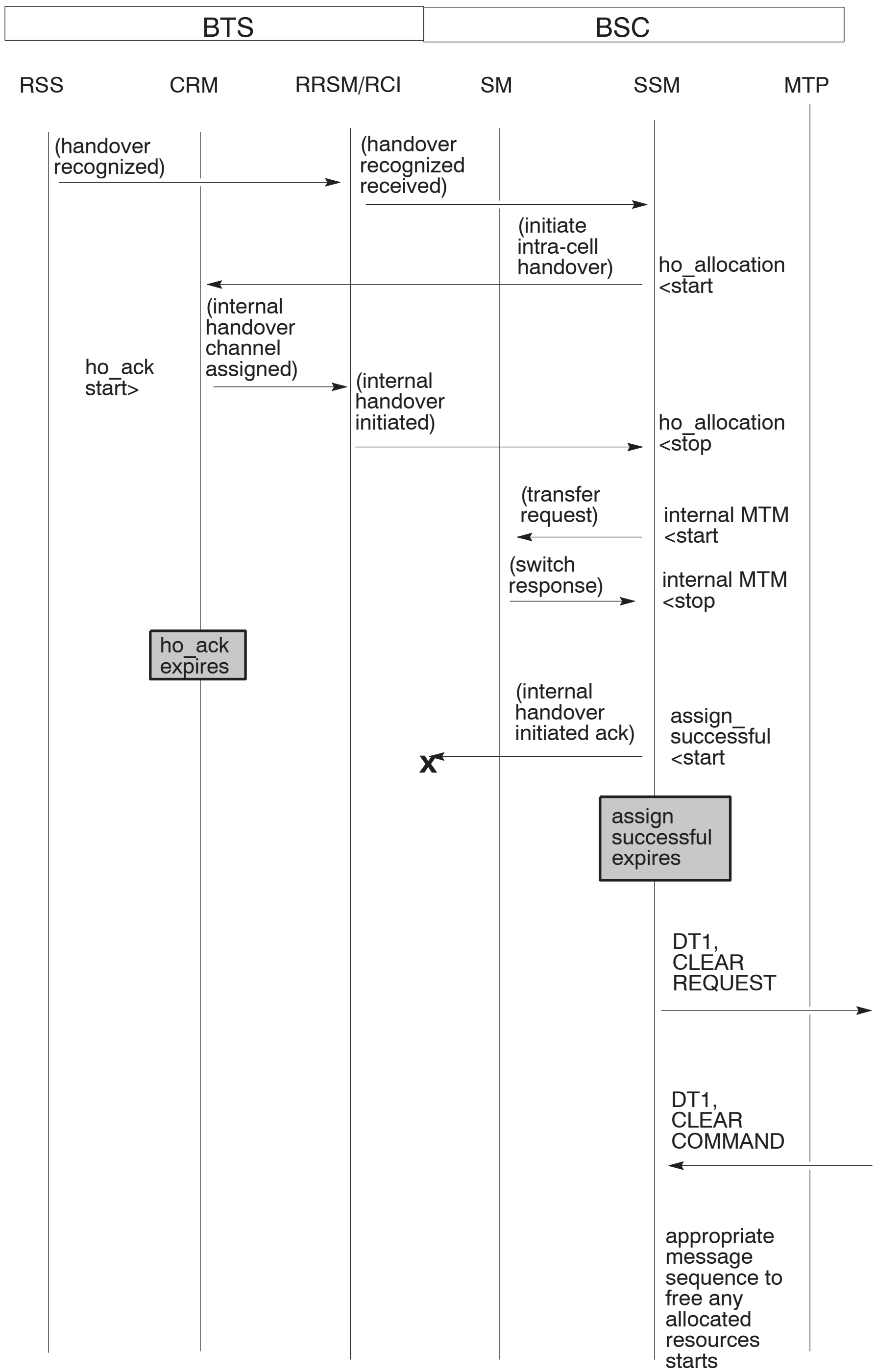
The timers that can affect intra-cell handover message sequence due to expiry before expected events are as follows:

- **assign_successful**
- **bssmap_t10**
- **ho_ack**
- **internal MTM** (cannot be optimized).

## ho_ack expires

Figure 2-43 shows an unsuccessful handover due to the **ho_ack** timer expiring before the expected **internal handover assign ack** message is received from RRSM.

**Figure 2-43** Unsuccessful handover due to **ho_ack** timer expiring



# Call clearing

In this section message sequences are shown for call clearing. Call clearing can be originated by the MS, the BSS or the MSC.

Timers that can affect call clearing message sequences due to expiry before expected events are:

- **radio_chan_released**
- **rf_chan_rel_ack**
- **rr_t3109**
- **rr_t3111**
- **sccp_released**
- **internal MTE** (cannot be optimized).

# MS originated call clearing

Figure 2-44 and Figure 2-45 show (in two parts) the call clearing message sequence when initiated by the MS.

**Figure 2-44** Call clearing initiated by MS (Part 1)

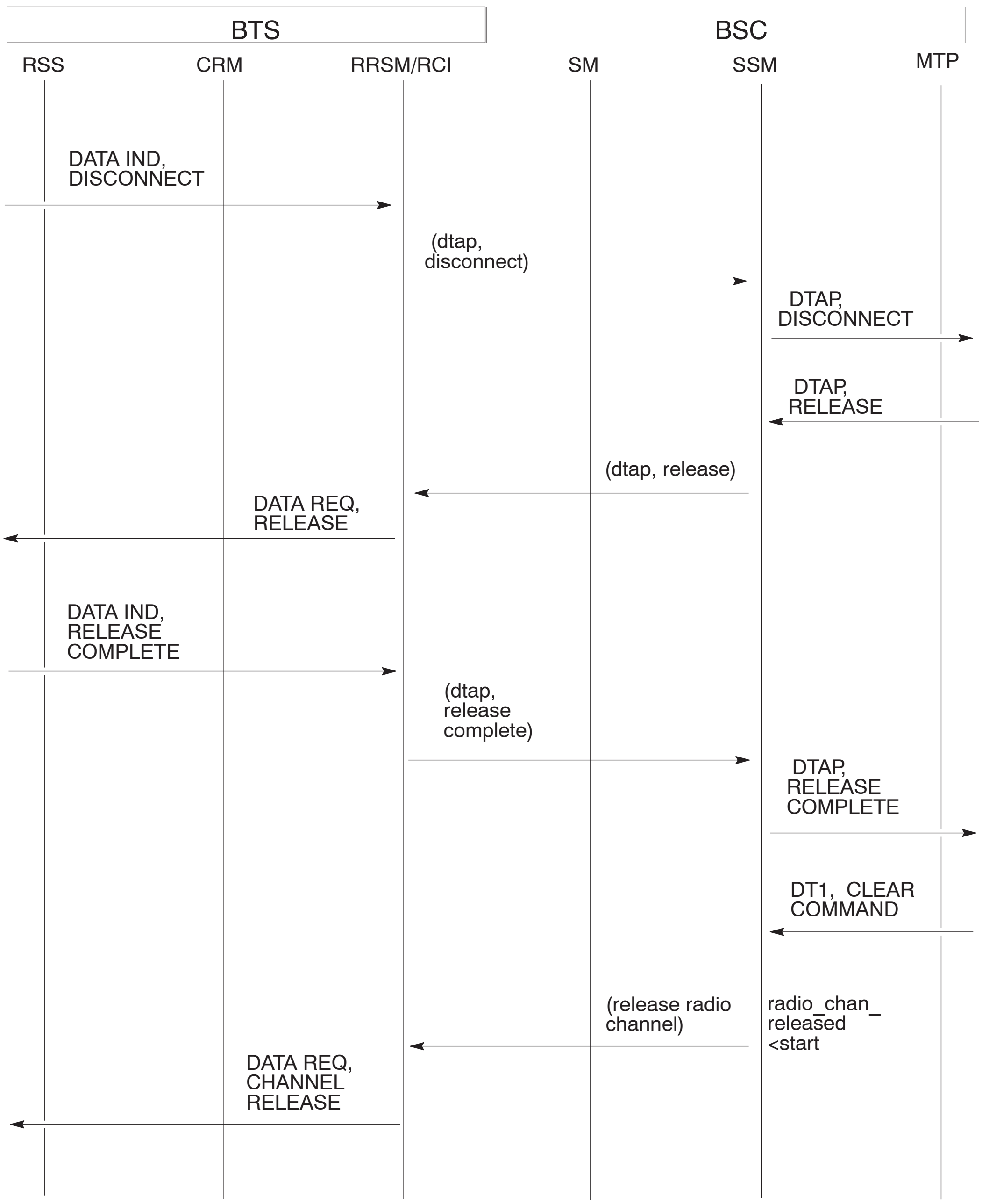
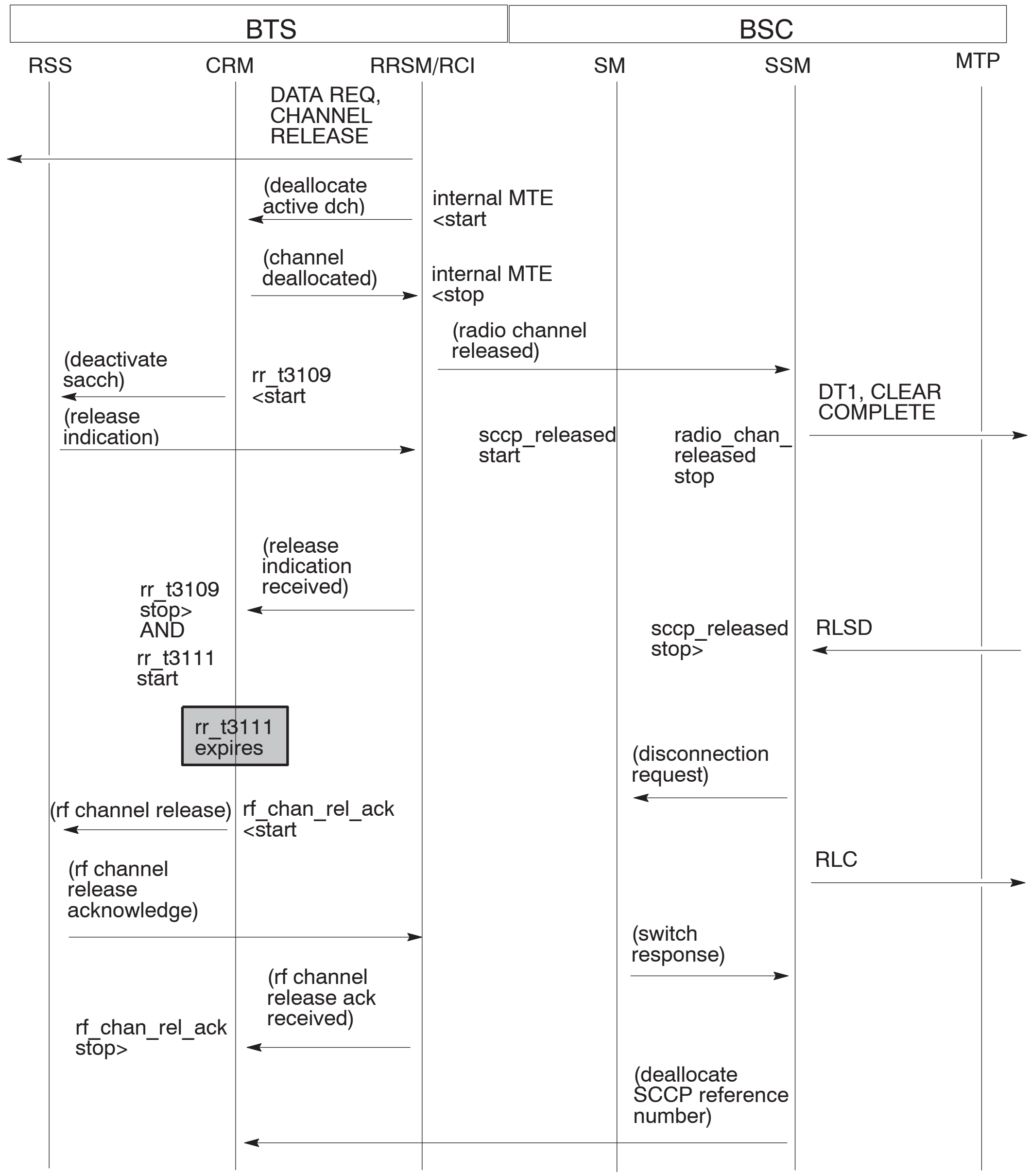


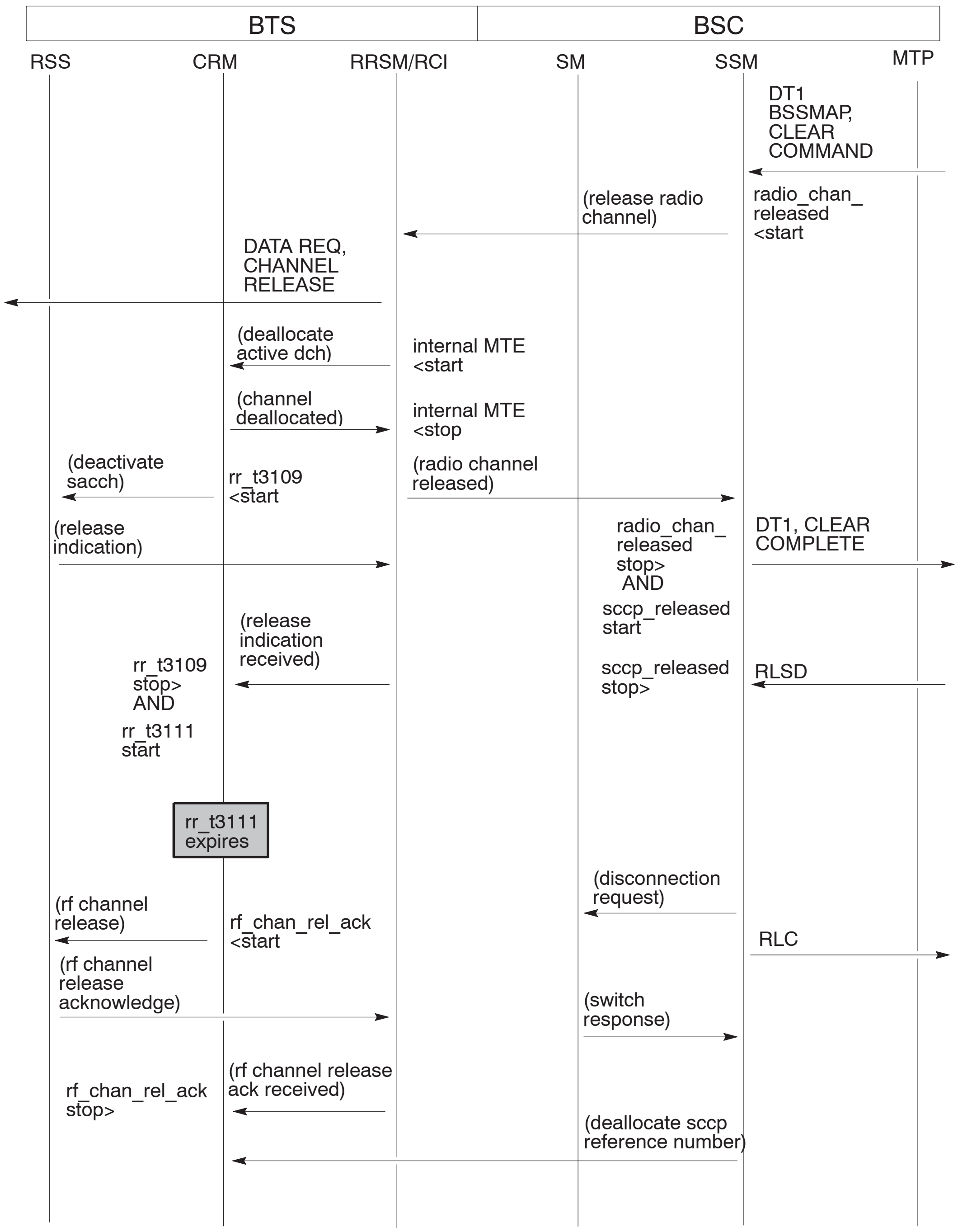
**Figure 2-45** Call clearing initiated by MS (Part 2)



# MSC originated call clearing

Figure 2-46 shows the call clearing message sequence when initiated by the MSC.

**Figure 2-46** Call clearing initiated by MSC



# Ciphering

This section describes the message sequences for specifying ciphering requirements to an MS.

## Ciphering successful

Figure 2-47 shows ciphering commands between the GSM elements.

**Figure 2-47** Ciphering commands between GSM elements

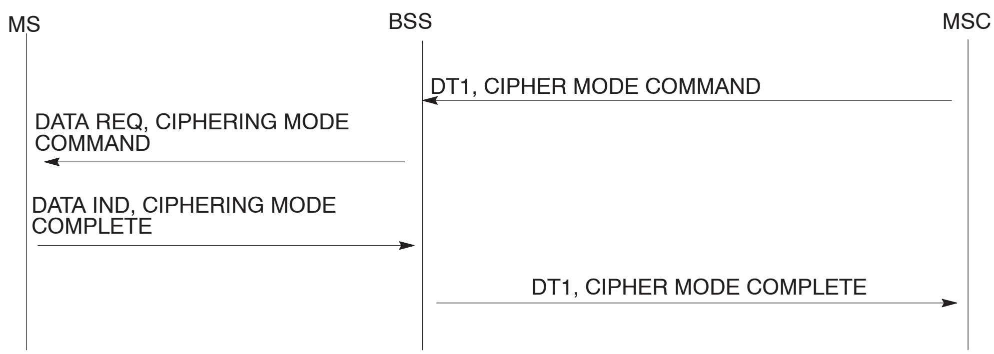
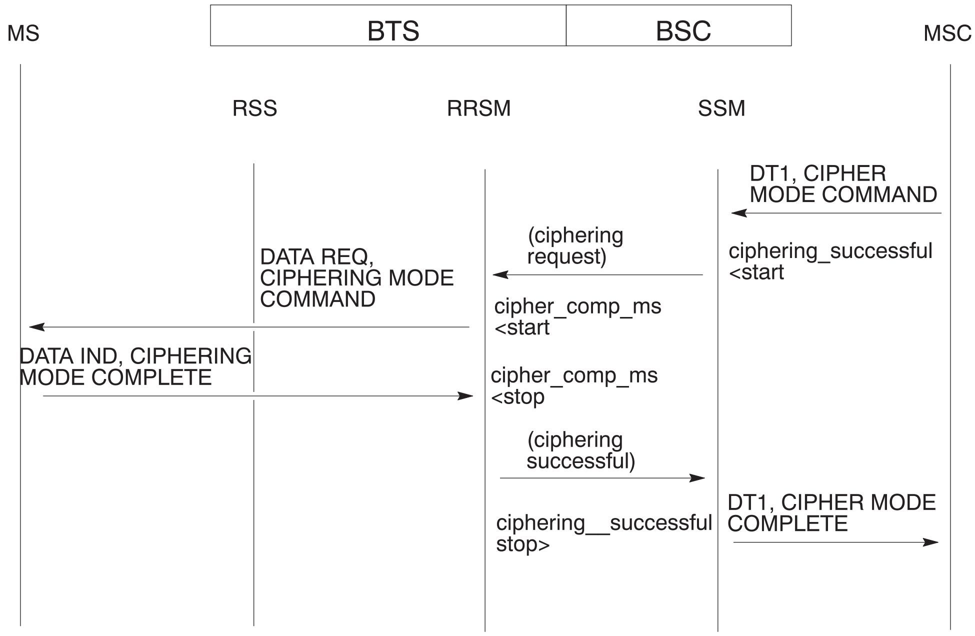



Figure 2-48 shows the signal sequence in a successful ciphering specification, within and between the BSC and BTS systems and subsystems.

**Figure 2-48** Successful signal sequence in ciphering specification



# Ciphering unsuccessful

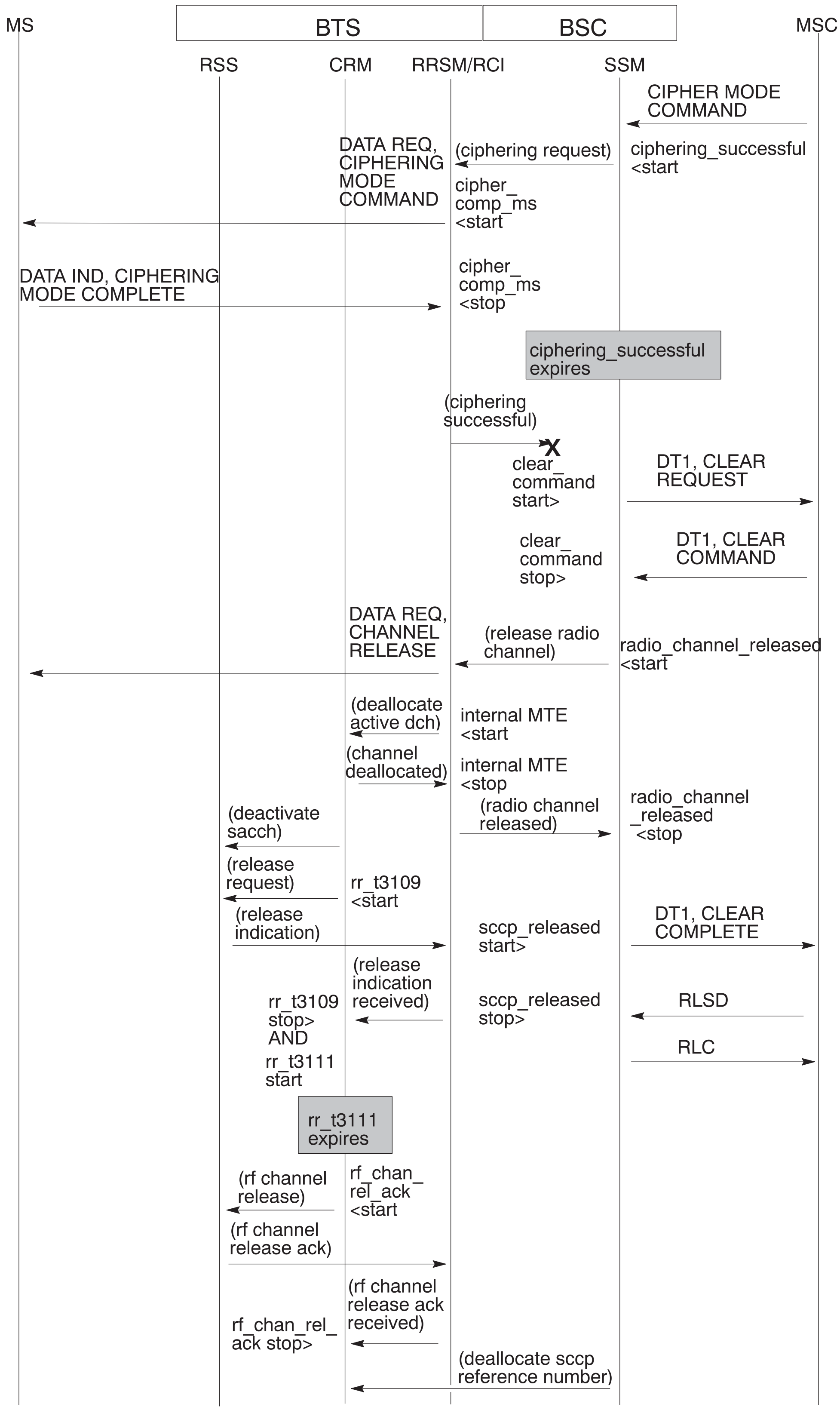
The timers that can affect ciphering message sequence due to expiry before expected events are as follows:

- **ciphering_successful**
- **cipher_comp_ms**

## ciphering_successful expires before ciphering successful message from RRSM

Figure 2-49 shows the signal sequence in an unsuccessful ciphering command, within and between the BSC and BTS systems and subsystems. The **ciphering_successful** timer expires before the RRSM returns its **ciphering successful** message.

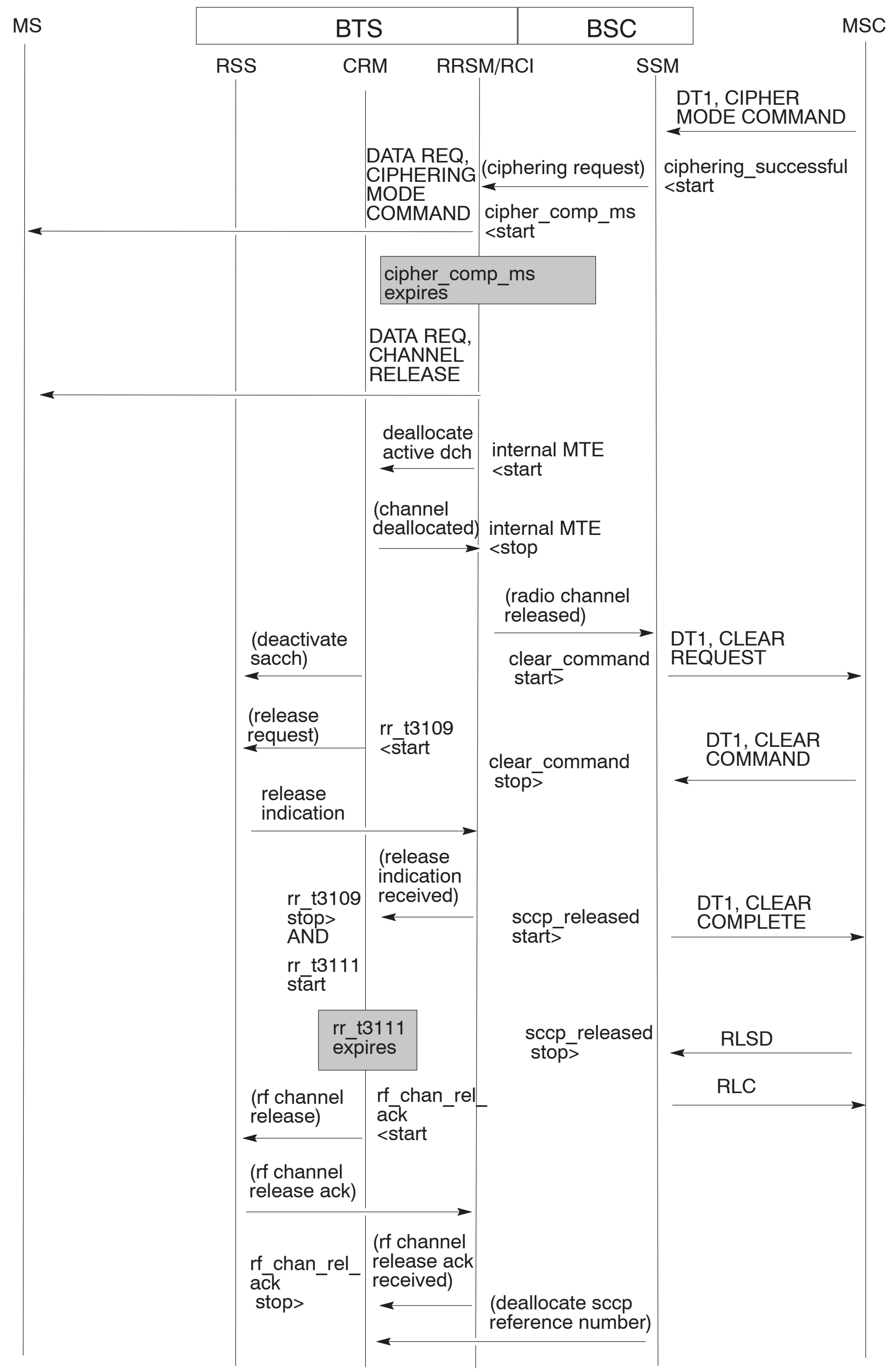
**Figure 2-49** Unsuccessful ciphering command due to **ciphering successful** expiring



## cipher_comp_ms expires before CIPHERING MODE COMPLETE message from MS

Figure 2-50 shows the signal sequence in an unsuccessful ciphering command, within and between the BSC and BTS systems and subsystems. The **cipher_comp_ms** timer expires before the MS returns its **CIPHERING MODE COMPLETE** message.

**Figure 2-50** Unsuccessful ciphering command due to **cipher_comp_ms** expiring



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Chapter

3

# Timer operations

This chapter contains a description of the operation of every BSS timer and time-related command parameter in the BSS system. The timers and time-related BSS command parameters are presented in strict alphabetical order.

Each timer and parameter is defined and the recommended values given within the description. For every timer or parameter described, the Motorola internal name is used (for example in the source listings) and is included to help Motorola engineers diagnose problems. In addition the GSM name, if one exists, is also given with the GSM specification identifier.

The setting of BSS timers and time-related parameters is described in the *Technical Description: BSS Command Reference (68P02901W23)* to which this manual is a supplement.

# add_access_class

## Definition

When a carrier is brought into service, assuming that the BCCH carrier is already INS (IN Service) or this carrier is the BCCH carrier, it is important that the BTS is not flooded with new mobile access classes. All classes therefore start up barred.

The BTS (CRM) timer **add_access_class** specifies the interval between individual mobile access classes coming into service. They are unbarred one at a time, separated by the **add_access_class** interval. This timer therefore allows MSs to gradually access the system one class at a time.

## Recommended values

The BSS command parameter **add_access_class** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 60000 milliseconds, which is also the default.

## Internal name

MTCRM_ADD_ACC_CLASS

# assign_successful

## Definition

During an intra-cell handover or a normal establishment (initiated TCH assignment) process, the BSC (SSM) timer **assign_successful** guards against non-receipt of confirmation of successful assignment to a new channel from RRSM.

It can be set in the BSS database by the parameter **assign_successful**.

## Normal operation

### Intra-cell handover

In normal operation SSM receives an **internal handover initiated** message from RRSM. SSM sends the RRSM an **internal handover initiated ack** message. SSM starts **assign_successful** to guard for the expected **assignment successful** response. After RRSM has received the 4.08 **ASSIGNMENT COMPLETE** message from the MS, it sends SSM an **assignment successful** message. SSM stops the **assign_successful** timer, and sends a BSSMAP **HANDOVER PERFORMED** message.

### TCH assignment

In normal operation, when the SSM receives the BSSMAP **ASSIGNMENT REQUEST**, it sends an **initiate assignment** message to RRSM to establish the radio link to the MS, and starts **assign_successful** to guard for the expected **assign successful** message. The RRSM responds with an **assignment successful** message after receipt of a 4.08 **ASSIGNMENT COMPLETE** message from the MS. SSM then stops **assign_successful**, sets up the TDM connections, and sends a BSSMAP **ASSIGNMENT COMPLETE** message to the MSC.

## Abnormal operation

If the RRSM sends SSM an **unsuccessful assignment** message (meaning the handover could not take place), SSM stops **assign_successful** and the MS stays on the SDCCH.

If the **assign successful** message is not received before the **assign_successful** timer expires, SSM sends a **CLEAR REQUEST** message to the MSC which returns a **CLEAR COMMAND** message to tear down the associated radio connections.

## Recommended values

The BSS command parameter **assign_successful** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

NOTE

The **assign_successful** timer must be larger than the **bssmap_t11** timer which sets queuing time for a radio resource. If not, the assignment could be terminated unsuccessfully while awaiting a resource.

## Internal name

SSM_MTN

# auto_dl_dur

## Definition

The **auto_dl_dur** auto downlink duration BSS parameter sets the number of block periods (1 block period = 20 ms) for which the network delays the release of a live downlink TBF, created through the auto downlink mechanism, that is waiting for new downlink data to arrive.

It can be set in the BSS database by the parameter **auto_dl_dur**.

## Normal operation

The GPRS feature must be unrestricted.

The network releases a downlink TBF for waiting data every time the timer expires.

## Abnormal operation

This is a periodicity timer and there is no abnormal operation.

## Recommended values

The BSS command parameter **auto_dl_dur** is set as an integer in the range 15 to 250 block periods of 20 ms each.

The default value is 50 (1000 ms or 1 second).

# bcch_info

## Definition

The CP subsystem provides RSS with sets of **SYSTEM INFORMATION** messages to be broadcast on the BCCH. The BTS (RSS) timer **bcch_info** sets the period for which RSS waits for all the **SYSTEM INFORMATION** messages in a set to be received before broadcasting the set on the BCCH. These must all arrive in a set period of time.

It can be set in the BSS database by the database parameter **bcch_info**.

## Normal operation

In normal operation, when RSS receives the first **SYSTEM INFORMATION** message, it starts timer **bcch_info** to ensure that it receives all **SYSTEM INFORMATION** messages in the specified set period. As soon as all the **SYSTEM INFORMATION** messages have been received from CP, RSS stops timer **bcch_info**, and sends them to the channel coders to be broadcast on the BCCH.

The information is sent immediately if all necessary BCCH system information messages have been received, and the **bcch_info** timer is stopped.

As soon as the first **SYSTEM INFORMATION** message of the next set arrives, the procedure begins again.

## Abnormal operation

If the **bcch_info** timer expires before all the **SYSTEM INFORMATION** messages in a set have been received, the stored **SYSTEM INFORMATION** messages are sent out, and a SWFM is generated to say that an incomplete list has been sent out. On receipt of the next **SYSTEM INFORMATION** message, for the next set, the **bcch_info** timer is started again.

## Recommended values

The BSS command parameter **bcch_info** is set as an integer in the range 0 to 10000 milliseconds.

The recommended value is 2000 milliseconds.

# Internal name

TM_BCCH_INFO

# bep_period

{23658}

## Definition

The **bep_period** parameter is used in an EGPRS cell to indicate the BEP (Bit Error Probability) filter averaging period used for filtering channel quality measurements by the mobile.

NOTE

A BSS software process is notified whenever the **bep_period** element value is changed.

## Normal operation

The EGPRS feature must be unrestricted.

The local maintenance flag must be enabled to set this parameter at a local terminal.

## Recommended values

The BSS command parameter **bep_period** is set as integer in the range 0 to 10.

The default value is 0. This eliminates forgetting factor 'e' from the channel quality measurement algorithms.

## Internal name

None.

## GSM name

This is a Motorola defined timer.

# bep_period2

{23658}

## Definition

The **bep_period2** parameter is optionally used in an EGPRS cell to further indicate the BEP (Bit Error Probability) filter averaging period used for filtering channel quality measurements by the mobile.

The **bep_period2** parameter is a forgetting factor for the mobile station to use when filtering the Bit Error Probability. This parameter, if sent, is used by the mobile station in the cell, until a new **bep_period2** is received by the mobile station in the same cell, or the mobile station leaves the cell or the MS enters packet idle mode.

## Normal operation

The EGPRS feature must be unrestricted.

The local maintenance flag must be enabled to set this parameter at a local terminal.

## Recommended values

The BSS command parameter **bep_period2** is set as integer in the range 0 to 15.

The default value is 15. This allows normal filtering.

## Internal name

None.

## GSM name

This is a Motorola defined timer.

# bounce_protect_cong_tmr

## Definition

When a channel is activated by the call processing (CP) subsystem as the target channel for a traffic management handover (congestion, multiband), or traffic handover (external cause value), and the number of SACCH periods is greater than zero, CP starts the **bounce_protect_cong_tmr** timer.

## Normal operation

When the **bounce_protect_cong_tmr** timer is running and a handover is detected, the parameter **bounce_protect_margin** is applied to the original serving cell as follows:

- When neighbours are sorted for better cell, UL/DL RXQUAL, or UL/DL RXLEV handovers, add **bounce_protect_margin**.
- Neighbours are excluded as candidates for better cell handovers.

When the timer reaches zero, these conditions are not applied.

## Recommended values

The range of **bounce_protect_cong_tmr** is zero to 255 SACCH periods. The default value is zero.

The recommended value is network dependent on the length of time the original serving cell is to be penalized with the parameter **bounce_protect_margin**.

## Internal name

None.

# bounce_protect_qual_tmr

## Definition

When a channel is activated by the call processing (CP) subsystem as the target channel for a RXQUAL handover, and the number of SACCH periods is greater than zero, CP starts the **bounce_protect_qual_tmr** timer.

## Normal operation

When the **bounce_protect_qual_tmr** timer is running and a handover is detected, the parameter **bounce_protect margin** is applied to the original serving cell as follows:

- When neighbours are sorted for better cell, UL/DL RXQUAL, or UL/DL RXLEV handovers, add **bounce_protect margin**.
- Neighbours are excluded as candidates for better cell, UL/DL RXQUAL, and UL/DL RXLEV handovers.

When the timer reaches zero, these conditions are not applied.

## Recommended values

The range of **bounce_protect_qual_tmr** is zero to 255 SACCH periods. The default value is zero.

The recommended value is network dependent on the length of time the original serving cell is to be penalized with the parameter **bounce_protect margin**.

## Internal name

None.

# bsc_audit

## Definition

For every call running on a dedicated channel, the BSC (SSM) timer **bsc_audit** is an interval timer which is designed to audit dedicated channel activity (either SDCCH or TCH) at a BTS.

It can be set in the BSS database by the database parameter **bsc_audit**.

## Normal operation

In normal operation the **bsc_audit** timer is started by SSM when a call moves to a dedicated channel. On expiry of the **bsc_audit** timer, SSM sends an **audit call** message to RRSM to check whether the state of the channel is still active. RRSM replies with an **audit call response** message indicating success (still active) or failure (not active). If successful, the timer is restarted, if unsuccessful (not active) SSM acts as if RRSM had sent a **radio channel released** message, and sends a BSSMAP **CLEAR REQUEST** message to the MSC.

## Abnormal operation

The **bsc_audit** timer does not have an abnormal operation effect. It is an interval timer which merely times the channel audit checks from SSM in the BSC to RRSM in the BTS.

## Recommended values

The BSS command parameter **bsc_audit** is set as integer in the range 0 to 1000000 milliseconds.

The recommended value is 120000 milliseconds.

## Related timers

There are no directly related timers but note that the timer **bsc_audit_response** is also used by SSM to guard for the **audit call response** message from RRSM. If RRSM does not respond, SSM sends another **audit call** message, and so on until a count set up by the BSS command parameter **num_audit_retries** is reached, when the call is torn down.

The timers **bsc_audit** and **bsc_audit_response** have no direct relationship because the interval timer **bsc_audit** will not be operating if the guard timer **bsc_audit_response** is operating.

The **bsc_audit** timer is stopped by SSM if an **audit call** message is received from RRSM. This is an exact complement of the SSM auditing the RRSM but the other way round. The timers **bts_audit** and **bts_audit_response** have exactly complementary functions.

# Internal name

SSM_MTV

# bsc_audit_response

## Definition

As described for the interval timer **bsc_audit**, every call on an SDCCH or a TCH is audited regularly by SSM sending an **audit call** message to the RRSM. The BSC (SSM) timer **bsc_audit_response** guards for the resulting **audit call response** message.

It can be set in the BSS database by the database parameter **bsc_audit_response**.

## Normal operation

In normal operation the **bsc_audit_response** timer is started by SSM whenever an **audit call** message is sent to an RRSM. It is stopped on receipt of the resulting **audit call response** message.

## Abnormal operation

If the **bsc_audit_response** timer expires before the **audit call response** message is received from RRSM, a counter is incremented, the **audit call** message is sent again, and the **bsc_audit_response** timer is restarted. If the counter eventually reaches the value set by the BSS command parameter **num_audit_retries**, SSM assumes the call has been lost, and a BSSMAP **CLEAR REQUEST** message is sent to the MSC.

## Recommended values

The BSS command parameter **bsc_audit_response** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds.

## Related timers

There are no directly related timers but note that the timer **bsc_audit** is also used by SSM as the regular interval timer for sending the **audit call** messages, and starting this guard timer for the responses.

The timers **bsc_audit** and **bsc_audit_response** have no direct relationship because the interval timer **bsc_audit** will not be operating if the guard timer **bsc_audit_response** is operating.

The timers **bts_audit** and **bts_audit_response** have exactly complementary functions to the SSM auditing the RRSM but the other way round. The **bts_audit_response** timer guards for the SSM response to the RRSM **audit call** message.

## Internal name

SSM_AUDIT_TIMER

# bss_overload_control

{24660, 24661}

## Description

The timer **bss_overload_control** defines the BSS Overload message interval sent to the MSC. The BSS Overload message is sent to the MSC during RSL congestion.

This timer can be set in the BSS database by the parameter **bss_overload_control**.

## Normal operation

It is recommended that this timer is set less than or equal to **bssmap_t7** at the MSC.

## Recommended values

The BSS command parameter **bss_overload_control** is set in the range 1000 to 1000000 milliseconds.

The default value is 12500 milliseconds.

## Internal name

None.

# bssgp_fc_period_c

## Definition

The **bssgp_fc_period_c** timer specifies the rate at which the BSS is allowed to send flow control messages for a given BVC or MS. The BSS may send a new Flow Control PDU every C seconds, where C is a value which is predefined and common to the BSS and SGSN.

The timer starts when the BSS sends a Flow Control PDU for a BVC or MS to the SGSN. When the timer expires, the BSS may send another Flow Control PDU if the condition which caused the sending of the PDU still exists.

If the BSS detects a missing FLOW-CONTROL-ACK from the SGSN and the condition which causes the sending of a FLOW-CONTROL PDU still remains, the FLOW-CONTROL PDU may be retransmitted immediately. In this case, the BSS may violate the repetition rate defined by the C value.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **bssgp_fc_period_c** is set as an integer in the range 1 to 1000 tenths of a second.

The default value is 10 tenths of second.

## GSM name

This is a Motorola defined timer.

# bssgp_t1_timer

## Definition

The **bssgp_t1_timer** guards the BVC Blocking and Unblocking procedures between the BSS and SGSN.

This timer is set when the BSS sends a BVC-BLOCK or BVC-UNBLOCK PDU to the SGSN. This timer is cleared when the BVC-BLOCK-ACK or BVC-UNBLOCK-ACK PDU is received by the BSS from the SGSN. If the timer expires before an ACK is received, the BVC Blocking or Unblocking procedure is repeated a maximum of **bssgp_block_retries** attempts. After the maximum attempts fail, the BVC remains unblocked.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **bssgp_t1_timer** is set as an integer in the range 1 to 120 seconds.

The default value is 3 seconds.

## Internal name

BSSGP T1

## GSM name

This is a Motorola defined timer.

# bssgp_t2_timer

## Definition

The **bssgp_t2_timer** guards the BVC Reset procedure between the BSS and the SGSN.

This timer is set when the BSS sends a BVC-RESET to the SGSN. This timer is cleared when the BVC-RESET-ACK is received by the BSS from the SGSN. If the timer expires before the ACK is received, the BVC Reset procedure is repeated a maximum of **bssgp_reset_retries**. After the maximum attempts fail, the BVC remains blocked.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **bssgp_t2_timer** is set as an integer in the range 1 to 120 seconds.

The default value is 60 seconds.

## Internal name

BSSGP T2

## GSM name

This is a Motorola defined timer.

# bssmap_t1

## Definition

The BSC (CLM) timer **bssmap_t1** guards for a **blocking acknowledge** or an **unblocking acknowledge** acknowledgement message from the MSC.

It can be set in the BSS database by the parameter **bssmap_t1**.

## Normal operation

In normal operation **bssmap_t1** is started on the sending of a **block** or **unblock** message to the MSC and stopped on receipt of a **blocking acknowledge** or **unblocking acknowledge** acknowledgement message from the MSC, as relevant.

## Abnormal operation

If either a **blocking acknowledge** or **unblocking acknowledge** message is not received before the **bssmap_t1** timer expires, the CLM subsystem sends the **block** or **unblock** message again, as appropriate, and restarts the timer. If the relevant acknowledgement (ack) message is received before the timer expires, normal operations are resumed. If, however, the timer again expires, CLM marks the affected channel as blocked in an internal BSS database table and generates the relevant alarmed event report:

```
No MSC Ack for Circuit Block
```

or:

```
No MSC Ack for Circuit Unblock
```

## Recommended values

The BSS command parameter **bssmap_t1** is set as an integer in the range 0 to 1000000 milliseconds. Although the range starts at 0, in practice it should start at 1000.

The default value is 30000 milliseconds.

## Internal name

CLM_T1

# GSM name

T1 Specification: GSM 8.08.

# bssmap_t4

## Definition

The BSC (CLM) timer **bssmap_t4** guards the time allowed for the MSC to respond to a **RESET** message with a **RESET ACKNOWLEDGE** message.

It can be set in the BSS database by the parameter **bssmap_t4**.

## Normal operation

When the BSC (CLM) has initiated a global reset, it sends a BSSMAP **RESET** message to the MSC, and starts the timer **bssmap_t4** to guard for a BSSMAP **RESET ACKNOWLEDGE** acknowledgement message from the MSC. On receipt of this, CLM stops the timer and starts call processing backup.

## Abnormal operation

If a BSSMAP **RESET ACKNOWLEDGE** message is not received before the **bssmap_t4** timer expires, the CLM subsystem sends the BSSMAP **RESET** message again and restarts the timer, and so on. If on any retry, a **RESET ACKNOWLEDGE** message is received before the timer expires, normal operations are resumed. A counter is incremented for each of these retries until it reaches the value set by the BSS command parameter **global_reset_repetitions**. On this count, if the timer again expires, MSC marks the affected channel as blocked in an internal BSS database table, and generates the alarmed event report:

```
No MSC Acknowledgement for Global Reset
```

CLM then waits for either a BSSMAP **RESET** or BSSMAP **RESET ACKNOWLEDGE** from the MSC. If BSSMAP **RESET** is received, CLM restarts the reset process. If BSSMAP **RESET ACKNOWLEDGE** is received, CLM resumes call processing.

**NOTE**

If the BSS parameter **global_reset_repetitions** is set to 0, CLM continues to send the BSSMAP **RESET** message indefinitely.

## Recommended values

The BSS command parameter **bssmap_t4** is set as an integer in the range 0 to 1000000 milliseconds. Although the range starts at 0, in practice it should start at 1000.

The default value is 50000 milliseconds.

## Internal name

CLM_T4

## GSM name

T4 Specification: GSM 8.08.

# bssmap_t7

## Definition

In an inter-BSS (external) handover, the BSC (SSM) timer **bssmap_t7** guards against something going wrong at the MSC with the handover that the BSC has triggered. SSM responds to the MSC and sets the timer to guard against non-receipt of the MSC approval to proceed with the handover.

It can be set in the BSS database by the parameter **bssmap_t7**.

NOTE

The **bssmap_t7** timer is not stopped by the HANDOVER REQUIRED REJECT message.

## Normal operation

In normal operation timer **bssmap-t7** is started on the sending of a BSSMAP **HANDOVER REQUIRED** message to the MSC and stopped on receipt of a BSSMAP **HANDOVER COMMAND** message from the MSC.

When the Radio Sub System (RSS) detects the need for a handover, it sends a **handover recognized** message to RRSM. RRSM sends SSM a **handover recognized received** message to SSM. SSM evaluates the type of handover (external or internal) and if external, sends a BSSMAP **HANDOVER REQUIRED** message to the MSC via MTP. The timer **bssmap_t7** is started. The MSC establishes the connection with the new BSC, and after the new radio channel is established, sends a BSSMAP **HANDOVER COMMAND** message to the SSM of the old BSC. On receipt of this the **bssmap_t7** timer is stopped.

NOTE

The operation of this timer is sometimes confused with that of the database element **handover_recognized_period**, which, on a per cell basis, specifies the periodicity for repetition of **handover recognized** messages. In other words it sets the intervals at which RSS can repeat handover requests.

# Abnormal operation

There are four different sequences of **bssmap_t7** operation:

- **Sequence 1**

  **bssmap_t7** set to greater than **handover_recognized_period** interval, **handover_required_reject_switch** set to 0 to indicate that the BSS does not expect to receive a **HANDOVER REQUIRED REJECT** message from the MSC if a target channel is not available.

- **Sequence 2**

  **bssmap_t7** set to less than **handover_recognized_period** interval, **handover_required_reject_switch** set to 0 to indicate that the BSS does not expect to receive a **HANDOVER REQUIRED REJECT** message from the MSC if a target channel is not available.

- **Sequence 3**

  **bssmap_t7** set to greater than **handover_recognized_period** interval, **handover_required_reject_switch** set to 1 to indicate that the BSS expects to receive a **HANDOVER REQUIRED REJECT** message from the MSC in response to a **HANDOVER REQUIRED** message if a target channel is not available.

- **Sequence 4**

  **bssmap_t7** set to less than **handover_recognized_period** interval, **handover_required_reject_switch** set to 1 to indicate that the BSS expects to receive a **HANDOVER REQUIRED REJECT** message from the MSC in response to a **HANDOVER REQUIRED** message if a target channel is not available.

These four sequences of operation are described in the following process tables. Message sequence diagrams that show the operation of **bssmap_t7** in inter-BSS (external) handovers are provided in Chapter 2.

## Sequence one

**bssmap_t7** set to greater than **handover_recognized_period** interval. **handover_required_reject_switch** is set to 0.

| Stage | Process |
|---|---|
| 1 | SSM sends the **HANDOVER REQUIRED** message to the MSC with all internal and external handover candidate cells included, marks the cells as **tried**, and starts **bssmap_t7**. |
| 2 | The MSC does not respond to the **HANDOVER REQUIRED** message with the expected **HANDOVER COMMAND** message. |
| 3 | Because **handover_recognized_period** is set to less than **bssmap_t7**, **handover_recognized_period** expires before **bssmap_t7**. If a handover condition still exists the source RSS sends a **handover recognized** message to the RRSM. |
| 4 | The RRSM sends a **handover recognized received** message to SSM. |
| 5 | SSM re-initializes the target list with the latest candidate list received and marks all cells as **untried**. SSM does not send a **HANDOVER REQUIRED** message to the MSC at this time because **bssmap_t7** is still running. |

| Stage | Process |
|---|---|
| 6 | When bssmap_t7 expires, SSM still has **untried** cells available, and sends a **HANDOVER REQUIRED** message to the MSC again, starts **bssmap_t7** again, and marks the cells as **tried**. |
| 7 | This can continue until the need for the handover ceases, when the RSS stops sending **handover recognized** messages to RRSM, which consequently stops sending **handover recognized received** messages to SSM. |
| 8 | On the next **bssmap_t7** expiry, SSM has no further **untried** candidate cells and the handover procedure terminates. |
| 9 | If any **handover recognized received** messages are received after this, a new handover procedure starts. |

The process above shows that because **handover_recognized_period** is less than **bssmap_t7**, SSM always has an **untried** target cell list at **bssmap_t7** expiry. The repetition rate of **HANDOVER REQUIRED** messages sent to the MSC (while the need for handover still exists) is therefore governed by **bssmap_t7**.

## Sequence two

**bssmap_t7** set to less than **handover_recognized_period** interval. **handover_required_reject_switch** is set to 0.

| Stage | Process |
|---|---|
| 1 | SSM sends the **HANDOVER REQUIRED** message to the MSC with all internal and external handover candidate cells included, marked as **tried**, and starts **bssmap_t7**. |
| 2 | The MSC does not respond to the **HANDOVER REQUIRED** message with the expected **HANDOVER COMMAND** message. |
| 3 | Because **handover_recognized_period** is greater than **bssmap_t7**, **bssmap_t7** expires before **handover_recognized_period**. SSM has only **tried** cells available as a new **handover recognized** message has not been generated by RSS. SSM therefore ends the handover procedure. |
| 4 | If a **HANDOVER COMMAND** is then received after **bssmap_t7** expiry, SSM discards the message and no handover takes place. |
| 5 | When **handover_recognized_period** expires, if a handover condition still exists, RSS sends a **handover recognized** message to RRSM. |
| 6 | RRSM then sends a **handover recognized received** message to SSM. |
| 7 | SSM starts a new handover procedure, initializes the cell list and marks all cells as **untried**. |
| 8 | Timer **bssmap_t7** is not now running and SSM sends a new **HANDOVER REQUIRED** message to the MSC with all handover candidate cells (external and internal) included. |
| 9 | SSM restarts **bssmap_t7**, and marks all available cells as **tried**. |
| 10 | When the need for the handover ceases, the RSS stops sending **handover recognized** messages to RRSM, which consequently stops sending **handover recognized received** messages to SSM. |
| 11 | On the next **bssmap_t7** expiry, SSM has no further **untried** candidate cells and the handover procedure terminates. |
| 12 | If any **handover recognized received** messages are received after this, a new handover procedure starts. |

The process above shows that if **handover_recognized_period** is greater than **bssmap_t7**, SSM always has a **tried** target cell list at **bssmap_t7** expiry, and starts a new handover procedure the next time a **handover recognized received** message is received. The repetition rate of **handover required** messages sent to the MSC is therefore governed by **handover_recognized_period** periodicity parameter.

## Sequence three

**bssmap_t7** set to greater than **handover_recognized_period** interval. **handover_required_reject_switch** is set to 1.

| Stage | Process |
|---|---|
| 1 | SSM sends the **HANDOVER REQUIRED** message without including any internal cells that are candidates for the handover but including all the external handover candidate cells up to the first internal handover candidate cell in the target list. SSM marks the cells included in the message as **tried**, and starts **bssmap_t7**. |
| 2 | If a **HANDOVER REQUIRED REJECT** message is returned by the MSC, the BSS attempts an internal handover to each internal cell up to the next external cell in the candidate list and marks them as **tried**. |
| 3 | If an internal candidate is available, SSM performs the internal handover. |
| 4 | Assume that **handover_recognized_period** expires before the currently running **bssmap_t7**. If a handover condition still exists RSS initiates a new handover by sending another **handover recognized** message to RRSM. |
| 5 | RRSM sends a new **handover recognized received** message to SSM. |
| 6 | SSM re-initializes the target list with the latest candidate list received and marks all cells as **untried**. Because **bssmap_t7** is still running, SSM does not now send a further **HANDOVER REQUIRED** message to the MSC. |
| 7 | When **bssmap_t7** expires, SSM still with **untried** cells available sends a **HANDOVER REQUIRED** message to the MSC again. This **HANDOVER REQUIRED** message again contains all external handover candidate cells up to the first internal handover candidate cell in the target list, now marked as **tried**. SSM restarts **bssmap_t7** again. This is effectively back to stage 1. |
| 8 | The process is repeated as from stage 2 until when the need for the handover ceases, the RSS stops sending **handover recognized** messages to RRSM, which consequently stops sending **handover recognized received** messages to SSM. |
| 9 | On the next **bssmap_t7** expiry, SSM continues to loop through scanning the **untried** cells in the candidate list, alternating between external and internal cells as available. |
| 10 | If unsuccessful, SSM restarts **bssmap_t7** and continues scanning the candidate cell list in order until all cells are marked as **tried**, thus finishing the handover attempt. |
| 11 | If a new **handover recognized received** message is now received, a new handover procedure is started. |

If **handover_recognized_period** is less than **bssmap_t7**, SSM always has an **untried** target cell list at **bssmap_t7** expiry (while the need for handover still exists). The repetition rate of **HANDOVER REQUIRED** messages sent to the MSC is therefore governed by **bssmap_t7**.

### Sequence four

**bssmap_t7** set to less than **handover_recognized_period** interval. **handover_required_reject_switch** is set to 1.

| Stage | Process |
|---|---|
| 1 | SSM sends the **HANDOVER REQUIRED** message without including any internal cells that are candidates for the handover but including all the external handover candidate cells up to the first internal handover candidate cell in the target list. SSM marks the cells included in the message as **tried**, and starts **bssmap_t7** . |
| 2 | If a **HANDOVER REQUIRED REJECT** message is returned by the MSC, the BSS attempts an internal handover to each internal cell up to the next external cell in the candidate list and marks them as **tried**. |
| 3 | If an internal candidate is available, SSM performs the internal handover. |
| 4 | When **bssmap_t7** expires, SSM still with **untried** cells available sends a **HANDOVER REQUIRED** message to the MSC again. This **HANDOVER REQUIRED** message again contains all external handover candidate cells up to the first internal handover candidate cell in the target list, now marked as **tried**. SSM restarts **bssmap_t7** again. This is effectively back to stage 1. |
| 5 | The process is repeated until all cells in the candidate cell list are marked as **tried**. If this is before **handover_recognized_period** expires, SSM ends the handover procedure. |
| 6 | If **handover_recognized_period** expires before all candidate cells are marked as **tried**, and a handover condition still exists, RSS will send a **handover recognized** message to RRSM. |
| 7 | RRSM sends a **handover recognized received** message to SSM. |
| 8 | The whole process is repeated from stage 1, until the handover condition disappears and all candidate cells have been marked as **tried**. |

Therefore, at **bssmap_t7** expiry, SSM may have a combination of **tried** and **untried** cells in the target cell list, and the repetition rate of **HANDOVER REQUIRED** messages sent to the MSC depends on the contents of the candidate list. If there is only one external candidate in the list, the repetition rate is governed by **handover_recognized_period**.

## Example sequence one

The parameter settings in the BSS database are as follows:

- **bssmap_t7**: 5 seconds.
- **handover_recognized_period**: 12 SACCH (9.76 seconds).
- **handover_required_reject_switch**: 0 (no **HANDOVER REQUIRED REJECT** message expected).

The resulting sequence of events is:

| Lapsed time (seconds) | Events |
|---|---|
| 0 | **HANDOVER REQUIRED** message sent to MSC, and**bssmap_t7** started. Cells are marked as **tried**. |
| 5 | Timer **bssmap_t7** expires. There are no untried cells, so handover is finished. |
| 5.05 | **HANDOVER COMMAND** message received. This is now too late as the handover process is finished. SSM discards the **HANDOVER COMMAND** message. |
| 9.76 | **handover_recognized_period** period expires. RSS requests new handover. **HANDOVER REQUIRED** message sent to MSC. Cells are marked as **tried.bssmap_t7** started. No response from MSC. BSS continues to send **HANDOVER REQUIRED** messages to MSC at subsequent expiries of the **handover_recognized_period**, assuming a handover condition still exists. |
| 15 | MSC tears down connection with a **CLEAR COMMAND** message. |

**NOTE**

In this example the MSC refuses the second and subsequent **HANDOVER REQUIRED** messages, and tears down the connection after approximately 15 seconds.

## Recommended values

Every **handover_recognized_period** expiry, RSS updates RRSM with a **handover recognized** message which contains the latest neighbour candidate information. RRSM updates SSM with this. If **handover_recognized_period** is set greater than the **bssmap_t7** timer, SSM will not have been updated by these messages on **bssmap_t7** expiry.

It is therefore recommended that the **bssmap_t7** timer is set to greater than **handover_recognized_period** so that SSM will have an up to date set of **untried** neighbour candidates on **bssmap_t7** expiry - see **Sequence 1**.

The chosen value for **bssmap_t7** should be confirmed with MSC experts for the installation to ensure that this value allows time for the MSC to respond to the **HANDOVER REQUIRED** message for the longest possible MSC processing delays.

## Internal name

SSM_T7, T7_EXP_MSG_TYPE

## GSM name

T7 Specification: GSM 8.08.

# bssmap_t8

## Definition

In an inter-BSS handover and in an inter-BTS handover, the BTS (RRSM) timer **bssmap_t8** guards against the MS not establishing on the newly allocated target channel, and needing to revert to the old channel. It holds open the old channel in case of such a need.

This timer can be set in the BSS database by the parameter **bssmap_t8**.

## Normal operation

In normal inter-BSS operation, timer **bssmap-t8** is started on the sending of a 4.08 **HANDOVER COMMAND** message to the source channel, source cell, and stopped on receipt of a **release radio channel** message from SSM. At this point the source cell radio resources are released.

In normal inter-BTS operation, timer **bssmap-t8** is started on the sending of a 4.08 **HANDOVER COMMAND** message to the source channel, source cell, and stopped on receipt of a **blast** message from SSM. At this point the source cell radio resources are released.

## Abnormal operation

In either use, if the MS reverts to the old channel for any reason, it sends a 4.08 **HANDOVER FAILURE** message to the source RRSM. At this point the source RRSM stops the **bssmap-t8** timer, and the call continues on the source channel, source cell.

If **bssmap_t8** expires before a **blast** command (intra-BSS) or **release radio channel** message (inter-BSS) is received from SSM, it sends a **deallocate inactive dch** message to CRM to free the source channel regardless. Although the target channel is already allocated by the time a 4.08 **HANDOVER COMMAND** is sent to the MS, the MS might still not have established, in which case the call is lost.

## Recommended values

The BSS command parameter **bssmap_t8** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 28000 milliseconds.

## Related timers

Note the relationship between the timers: **bssmap_t8**, **ho_complete** and **rr_t3103**.

**bssmap_t8**, is the time allowed to retain the old channel in case the MS needs to return to it.

**ho_complete** is the time allowed to keep the new channel to allow the MS to establish on it.

**rr_t3103** is the time allowed for the BSC to wait for notification from either the source or target channel that it has acquired the MS.

**rr_t3103** should therefore be set to higher value than **bssmap_t8** and **ho_complete**.

Note also that the **bssmap_t8**, should be set to a value less than the timer **clear_command**, otherwise after a **CLEAR COMMAND** message from the MSC, the demand for the channel will be torn down before this timer has released the channel.

## Internal name

RRSM_T8

## GSM name

T8 Specification: GSM 8.08.

# bssmap_t10

## Definition

During an intra-cell handover or an initiated TCH assignment process, the internal BTS (RRSM) timer **bssmap_t10** guards against non-receipt of the 4.08 **ASSIGNMENT COMPLETE** message from the MS.

It can be set in the BSS database by the parameter **bssmap_t10**.

## Normal operation

In normal operation **bssmap_t10** is started on the sending of the 4.08 **ASSIGNMENT COMMAND** message to the MS. It is stopped on receipt of the 4.08 **ASSIGNMENT COMPLETE** message from the MS, when RRSM sends to SSM an **assignment successful** message.

## Abnormal operation

If the 4.08 **ASSIGNMENT COMPLETE** message is not received before the **bssmap_t10** timer expires, the RRSM sends a 4.08 **CHANNEL RELEASE** message to the MS and tears down the associated radio connections.

## Recommended values

The BSS command parameter **bssmap_t10** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 28000 milliseconds, which is also the default.

## Related timers

The BSS command parameter **bssmap_t10** should be set to a lower value than the **assign_successful** timer, otherwise the SSM could terminate the assignment before the RRSM has time to establish on the channel.

## Internal name

RRSM_T10

# GSM name

T10 Specification: GSM 8.08.

# bssmap_t11

## Definition

During an initiated TCH assignment process, the internal BTS (RRSM) timer **bssmap_t11** guards for CRM to make a TCH available.

It can be set in the BSS database by the parameter **bssmap_t11**.

## Normal operation

In normal operation **bssmap_t11** is started by RRSM when sending the **assignment resource request** message to CRM. If CRM has no channel available, CRM sends a **force queue** message to RRSM, which starts **bssmap_t11** to wait for a resource to be freed, and for CRM to send to RRSM an **assignment channel assigned** message. RRSM also sends an **assign queued** message in this situation to SSM. The timer **bssmap_t11** is stopped on receipt of the **assignment channel assigned** message from CRM, and RRSM continues with normal call establishment.

## Abnormal operation

If the **assignment channel assigned** message is not received before the **bssmap_t11** timer expires, the RRSM sends a **release request** message to SSM, which then sends a 4.08 **CLEAR REQUEST** message to the MSC with a cause value of:

```
No radio resource available
```

The RRSM also sends a **REMOVE FROM QUEUE** message to the CRM.

## Recommended values

The BSS command parameter **bssmap_t11** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 28000 milliseconds, which is also the default.

## Related timers

The value of **bssmap_t11** should be less than that of **assign_successful**, because this is guarding the whole RRSM assignment procedure, including queuing. If **assign_successful** expires, SSM immediately sends a **CLEAR REQUEST** regardless, and stops the assignment process.

## Internal name

RRSM_T11

## GSM name

T11 Specification: GSM 8.08.

# bssmap_t13

## Definition

The BSS (CLM) timer **bssmap_t13** is a delay timer to allow the BSS to clear all its active processes, including releasing all MSs, after receiving a **RESET** message from the MSC.

It can be set in the BSS database by the parameter **bssmap_t13**.

## Normal operation

In normal operation **bssmap_t13** is started on the receipt of a **RESET** message from the MSC. On expiry the BSS sends a **RESET ACKNOWLEDGEMENT** message to the MSC.

## Abnormal operation

As this timer is a delaying timer, it expires independently of any events.

## Recommended values

The BSS command parameter **bssmap_t13** is set as an integer in the range 0 to 1000000 milliseconds. In practice it should not be set lower than 1000 milliseconds.

The recommended value is 40000 milliseconds, which is also the default.

## Internal name

CLM_T13

## GSM name

T13 Specification: GSM 8.08.

# bssmap_t19

## Definition

The BSC (CLM) timer **bssmap_t19** specifies the interval allowed to wait for a response from the MSC to free the particular circuit for other use.

It can be set in the BSS database by the parameter **bssmap_t19**.

## Normal operation

In normal operation **bssmap_t19** is started on the sending of a **RESET CIRCUIT** message to the MSC and stopped on receipt of a **RESET CIRCUIT ACKNOWLEDGE** message from the MSC.

## Abnormal operation

If a **RESET CIRCUIT ACKNOWLEDGE** message is not received before the **bssmap_t19** timer expires, the CLM subsystem increments a count of expiries, sends the **RESET CIRCUIT** message again and restarts the timer. CLM maintains the count of expiries until a value which is set by the BSS database parameter **max_rst_ckt_timer_exps** is reached. If this value is reached, CLM generates the alarmed event report:

```
No MSC Acknowledgement for Circuit Reset.
```

**NOTE**

If the value of **max_rst_ckt_timer_exps** is set to 0, there is no limit on the number of times a **RESET CIRCUIT** message is sent and the alarmed event will not be generated.

## Recommended values

The BSS command parameter **bssmap_t19** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 30000 milliseconds.

## Related timers

The timer **bssmap_t19** controls the MSC response to a **RESET CIRCUIT** message. Compare this function to the **circuit_reset_ack** timer that controls the SM response to a local **circuit reset** message.

## Internal name

CLM_T19

## GSM name

T19 Specification: GSM 8.08.

# bssmap_t20

## Definition

The timer **bssmap_t20** guards for a **CIRCUIT GROUP BLOCKING ACK** or a **CIRCUIT GROUP UNBLOCKING ACK** acknowledgement message for all group circuits from the MSC.

It can be set in the BSS database by the parameter **bssmap_t20**.

## Normal operation

In normal operation **bssmap_t20** is started on the sending of a **CIRCUIT GROUP BLOCKING** or **CIRCUIT GROUP UNBLOCKING** message to the MSC. It is stopped on receipt of **CIRCUIT GROUP BLOCKING ACK** or **CIRCUIT GROUP UNBLOCKING ACK** acknowledgement message for all circuits in the group from the MSC.

## Abnormal operation

If either a **CIRCUIT GROUP BLOCKING ACK** or **CIRCUIT GROUP UNBLOCKING ACK** message is not received for all group circuits before the **bssmap_t20** timer expires, the CLM subsystem sends the **CIRCUIT GROUP BLOCKING** or **CIRCUIT GROUP UNBLOCKING** message again as appropriate, for the remaining unacknowledged circuits, and restarts the timer. If the relevant acknowledgement (ack) message is received before the timer expires, normal operations are resumed. If, however, the timer again expires, MSC marks the affected circuits as blocked in an internal BSS database table and generates the relevant alarmed event report:

```
No MSC Ack for Circuit Block
```

or

```
No MSC Ack for Circuit Unblock
```

**NOTE**

Not all circuits need to be acknowledged in the same message before the timer expires. They only need to have been acknowledged.

## Recommended values

The BSS command parameter **bssmap_t20** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 30000 milliseconds.

## Internal name

CLM_T20

## GSM name

T20 Specification: GSM 8.08.

# bssmap_tqho

## Definition

The BSC (SSM) timer **bssmap_tqho** is used when no free TCHs exist on the target BTS for an inter-BSS handover. If a TCH becomes available in this time, it is used.

## Normal operation

In an inter-BSS handover, the MSC sends to CRM in the target BTS, a CR message with a **HANDOVER REQUEST** message embedded in it. When no TCH is immediately available to CRM, it sends a **handover request queued** message to SSM in the BSC. SSM then starts the timer **bssmap_tqho** to guard that the channel becomes available.

In normal operation, as soon as the TCH becomes available, the target CRM sends a **handover channel assigned** message to RRSM, which activates the channel with the RSS, and sends a **handover allocation** message to SSM. SSM stops the **bssmap_tqho** timer and continues with the handover process, as if a TCH had been immediately available. (The next step is the setting up of the TDM mapping with the SM).

## Abnormal operation

If the **bssmap_tqho** timer expires before the target TCH becomes available to CRM, SSM sends a **remove from queue** message to CRM, which removes the **HANDOVER REQUEST** message from the queue, and discards it. The SSM also then sends a **blast** message to RRSM in case any resources have been allocated, and sends a **HANDOVER FAILURE** message to the MSC.

## Recommended values

The BSS command parameter **bssmap_tqho** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 30000 milliseconds.

## Internal name

SSM_TQHO

# GSM name

Tqho Specification: GSM 8.08.

# bts_audit

## Definition

For every call running on a dedicated channel, the BTS (RRSM) timer **bts_audit** is an interval timer which is designed to audit dedicated channel activity (either SDCCH or TCH) at a BSC.

This timer can be set in the BSS database by the database parameter **bts_audit**.

## Normal operation

In normal operation the **bts_audit** timer is started when a call moves to a dedicated channel. On expiry of the **bts_audit** timer, the RRSM sends an **audit call** message to SSM to check whether the state of the channel is still active. SSM replies with an **audit call response** message indicating success (still active) or failure (not active). If successful, the timer is restarted, if unsuccessful (not active) RRSM acts as if SSM had sent a **release radio channel** message, and sends a **deallocate channel** message to CRM and a 4.08 **CHANNEL RELEASE** message to the MS.

## Abnormal operation

The **bts_audit** timer does not have an abnormal operation effect. It is an interval timer which merely times the channel audit checks from RRSM in the BTS to SSM in the BTS.

## Recommended values

The BSS command parameter **bts_audit** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is the lesser of 60000 milliseconds, or one millisecond less than the setting of timer **bsc_audit** .

## Related timers

There are no directly related timers but note that the timer **bts_audit_response** is also used by RRSM to guard for the **audit call response** message from SSM. If SSM does not respond, RRSM sends another **audit call** message, and so on until a count set up by the BSS command parameter **num_audit_retries** is reached, when the call is torn down.

The timers **bts_audit** and **bts_audit_response** have no direct relationship because the interval timer **bts_audit** will not be operating if the guard timer **bts_audit_response** is operating.

The **bts_audit** timer is stopped by RRSM if an **audit call** message is received from SSM. This is an exact complement of the RRSM auditing the SSM but the other way round. The timers **bsc_audit** and **bsc_audit_response** have exactly complementary functions.

# Internal name

RRSM_MTW

# bts_audit_response

## Definition

As described for the interval timer **bts_audit**, every call on an SDCCH or a TCH is audited regularly by the RRSM sending an **audit call** message to SSM. The BTS (RRSM) timer **bts_audit_response** guards for the resulting **audit call response** message.

## Normal operation

In normal operation, the **bts_audit_response** timer is started by the RRSM whenever an **audit call** message is sent to SSM. It is stopped on receipt of the resulting **audit call response** message.

## Abnormal operation

If **bts_audit_response** expires before the **audit call response** message is received from SSM, a counter is incremented, the **audit call** message is sent again, and the **bsc_audit_response** timer is restarted. If the counter eventually reaches the value set by the BSS command parameter **num_audit_retries** , RRSM assumes the call has been lost, and sends a **deallocate channel** message to CRM, and a **CHANNEL RELEASE** message to the MS.

## Recommended values

The BSS command parameter **bts_audit_response** is set as an integer in the range 0 to 100000 milliseconds.

The recommended value is 30000 milliseconds.

## Related timers

There are no directly related timers but note that the timer **bts_audit** is also used by RRSM as the regular interval timer for sending the **audit call** messages, and starting this guard timer for the responses.

The timers **bts_audit** and **bts_audit_response** have no direct relationship because the interval timer **bts_audit** will not be operating if the guard timer **bts_audit_response** is operating.

The timers **bsc_audit** and **bsc_audit_response** have exactly complementary functions to the RRSM auditing the SSM but the other way round. The **bsc_audit_response** timer guards for the RRSM response to the SSM **audit call** message.

## Internal name

RRSM_AUDIT_TIMER

# bts_p_con_ack

## Definition

In the BTS, the RSS subsystem handover (HDPC) timer **bts_p_con_ack** specifies the maximum wait for the BTS power to change, via the measurement reporting system.

This timer can be set in the BSS database by the parameter **bts_p_con_ack**.

## Normal operation

In normal operation, at an expiry of the **bts_p_con_interval** periodicity timer, RSS sends a power change message to the DRIM to cause the BTS transmission power to change, and starts the timer **bts_p_con_ack**. After doing this, the measurement reports should show the new BTS transmission power. As soon as the power change is reported, the RSS HO subsystem stops the **bts_p_con_ack** timer, and restarts the **bts_p_con_interval** timer, to time the interval until the next possible adjustment of the transmission power.

## Abnormal operation

If the timer expires before the measurement reports advise that the transmission power has changed, another **power control** message is sent to the DRIM. Only one repeat is allowed. If the timer again expires before the acknowledgement is received, **bts_p_con_interval** is started, and the BTS power cannot be changed until the next **bts_p_con_interval** expiry.

## Recommended values

The BSS command parameter **bts_p_con_ack** is set as an integer in the range 0 to 31 pairs of SACCH mutiframes (31 represents 62 SACCH mutiframes).

The recommended value is 1 (2 mutiframes).

## Internal name

P_CON_ACK

# bts_p_con_interval

## Definition

In the BTS, the RSS subsystem handover (HDPC) timer **bts_p_con_interval** specifies the maximum wait for the BTS power change decision to be made after the last power change. This uses the measurement reporting system.

This timer can be set in the BSS database by the parameter **bts_p_con_interval**.

## Normal operation

When the **bts_p_con_interval** timer expires, the BTS determines if a downlink power adjustment is needed to keep the downlink RXLEV in the given range. If the adjustment is necessary, the RSS informs the DRIM of the new power level and starts the RSS handover interval timer **bts_p_con_ack**.

Then, the measurement reports show the new BTS transmission power. As soon as the power change is reported, the RSS HO subsystem stops the **bts_p_con_ack** timer, and restarts the **bts_p_con_timer** timer, to time the interval until the next possible adjustment of the transmission power.

## Recommended values

The BSS command parameter **bts_p_con_interval** is set as an integer in the range 0 to 31 pairs of SACCH mutiframes (31 represents 62 SACCH mutiframes).

The recommended value is 2 (4 SACCH mutiframes).

## Internal name

P_CON_INTERVAL

# carrier_disable_time

## Definition

After a mains power failure, the FTP (Fault Translation Process) timer **carrier_disable_time** specifies the time delay between putting individual carriers into battery conservation mode.

This timer can be set in the BSS database by the parameter **carrier_disable_time**.

## Normal operation

The **carrier_disable_time** timer is not used in normal operating conditions, that is, with mains power operating. The carriers are restored to normal operation as soon as mains power is restored.

## Abnormal operation

Whenever a mains power failure is reported, the FTP (Fault Translation Process) in the BTS waits for the period of this timer before putting the first carrier into battery conservation mode. It then waits for the same period of time before putting the next carrier into battery conservation mode, and so on.

## Recommended values

The BSS command parameter **carrier_disable_time** is set as integer in the range 120 to 65535 seconds.

The recommended value is 120 seconds, which is also the default.

## Internal name

None.

# carrier_free_immediate

## Definition

The BTS (CRM) timer **carrier_free_immediate** allows time for the CRM, RRSM and RSS to deallocate all time slots on the carrier, in the event of a DRIM or RCU failing or becoming locked.

This timer can be set in the BSS database by the parameter **carrier_free_immediate**.

## Normal operation

As soon as a DRIM or RCU fails or is locked, the CA (Central Authority) sends a **carrier state change** message to CRM with the change method set to **immediate**.

NOTE

The change method will only ever be set to other than immediate if the DRIM or RCU is shut down by an explicit **shutdown** command.

CRM starts the **carrier_free_immediate** timer, and sends a **CHANNEL RELEASE** message to each mobile via RRSM. When the last timeslot has been de-allocated, CRM generates an **all timeslots oos** message to itself. This causes **carrier_free_immediate** to be stopped and a **carrier state change ack** to be sent to the CA.

## Abnormal operation

Whenever **carrier_free_immediate** expires, CRM sends a **carrier_state_change_ack** message to its CA. In this situation, CRM has waited the specified time for all timeslots on the carrier to be deallocated. It can take no further action, so advises CA to take the carrier out of service anyway.

## Recommended values

The BSS command parameter **carrier_free_immediate** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 120000 milliseconds, which is also the default.

## Internal name

MTCRM_CARRIER_FREE_IMMEDIATE

# cbch_1

## Definition

In a CBCH (Cell Broadcast CHannel) channel reallocation, the BTS (CRM) delay timer **cbch_1** specifies the wait time between sending BCCH information for the newly activated CBCH channel, and deactivating the old CBCH channel.

## Normal operation

In normal operation, when a CBCH is activated, CRM checks if there was a previous CBCH. If there was, the timer **cbch_1** is started immediately after sending the **system information type 4** to RSS for the new CBCH channel, to guard the old resources for the time. On expiry, CRM sends itself a **deallocate inactive dch** message for the old CBCH (to trigger CRM to tear down the radio connections with the RSS). CRM then sends a **cbch state change** message to the CBS (to advise that the old channel has been deactivated).

## Abnormal operation

This is a delay timer and has no abnormal operation.

## Recommended values

The BSS command parameter **cbch_1** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 30000 milliseconds.

## Internal name

MTCRM_CBT1

# cbch_2

## Definition

In a CBCH (Cell Broadcast CHannel) channel reallocation, the BTS (CRM) delay timer **cbch_2** specifies the guard time for receiving the CBCH response from RSS for the new channel.

## Normal operation

In normal operation, as soon as CRM has selected a channel to be used for an activating CBCH, its sends an **update cbch request** message to the RSS. CRM also immediately starts the timer **cbch_2** to guard for the expected **update cbch response received** message. The **update cbch request** message contains the information necessary for the RSS to set up the channel, which is actually a subchannel of an SDCCH or BCCH timeslot.

As soon as CRM receives the **update cbch response received** message from RSS, CRM stops the **cbch_2** timer, and sends a **channel activation** message to RSS for the CBCH, and starts the **cbch_3** timer.

## Abnormal operation

If the **cbch_2** timer expires before the **update cbch response received** message from RSS is received, CRM sends a **deallocate inactive dch** message to itself, to cause the tear down of the radio connections with the RSS. The CRM also notifies the SWFM (Software Fault Management) subsystem, and starts the **rr_t3109** timer.

## Recommended values

The BSS command parameter **cbch_2** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 30000 milliseconds.

## Internal name

MTCRM_CBT2

# cbch_3

## Definition

In a CBCH (Cell Broadcast CHannel) channel reallocation, the BTS (CRM) timer **cbch_3** guards for the CBCH activation acknowledgement information from RSSM/RCI for the new channel.

## Normal operation

In normal operation, when RSS is ready for the CBCH to be activated, and has responded to the CRM **update cbch request** message with an **update cbch response** message, **cbch_3** is started on sending the **channel activation** message for the new channel. The timer **cbch_3** stops when it receives the **channel activation acknowledgement** message from RSSM/RCI; then the CRM sends a **cbch_activated** message to itself and a **system information type 4** message to the MS.

## Abnormal operation

If the **cbch_3** timer expires before receipt of the CBCH activation acknowledgement information from RSSM/RCI, CRM sends a **deallocate inactive dch** message to itself, to cause the tear down of the radio connections with the RSS. CRM also notifies the SWFM (Software Fault Management) subsystem, sends a **cbch_deactivated** message, and starts the **rr_t3109** timer.

## Recommended values

The BSS command parameter **cbch_3** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 35000 milliseconds.

## Internal name

MTCRM_CBT3

# ccch_load_period

## Definition

The **ccch_load_period** parameter specifies the number of TDMA multiframes between successive calculations of the RACH load during overload conditions. It is used by the BTS subsystem RRSM.

Overload conditions are customer defined.

Contrast this parameter with **rach_load_period** which serves the same purpose, but when the RACH is not overloaded.

## Normal operation

When the timer **ccch_load_period** expires, the BTS checks whether a RACH overload condition continues to exist. If so, the RSS sends a **rach overload** message to CP, and restarts the **ccch_load_period** timer. If a RACH overload condition does not still exist, the RSS starts the **rach_load_period** timer instead.

## Abnormal operation

This is a period timer and has no abnormal operation.

## Recommended values

The parameter is set as an integer in the range 1 to 1020 TDMA multiframes.

The default value is 40 TDMA multiframes.

## Related timers

The **rach_load_period** timer is also used to affect flow control.

## GSM name

CCCH_LOAD_IND_PERIOD Specification: 5.08.1.1 - 5.2.3

# channel_act

## Definition

During the connection establishment process, the BTS (RSS) timer **channel_act** sets the waiting time that RSS Abis will wait for RSS L1 and L2, the MPH (Mobile PHysical) layer channel coders, to confirm the activation of a channel. It can be set in the BSS database by the parameter **channel_act** (but see **WARNING** below).

## Normal operation

The normal assignment process is as shown below:

| Stage | Process |
|---|---|
| 1 | The RRSM sends a **channel activation** message to RSS. |
| 2 | RSS Abis sends an internal **mph activate req** message to RSS L1, and starts timer **channel_act**. |
| 3 | RSS L1 activates the CCDSP, and sends an internal **fm connect indication** message to RSS L2. |
| 4 | RSS L2 sends an internal **mph activate confirm** message to RSS Abis. |
| 5 | RSS Abis stops timer **channel_act**, and sends a **channel activation acknowledge** message to RRSM. |

## Abnormal operation

If the timer **channel_act** expires before RSS Abis receives the **mph activate confirm** message from RSS L2, RSS Abis sends a **channel activation acknowledge** message to RRSM to advise that the channel could not be activated. RRSM then sends an **channel activation failure - assignment** message to CRM, and CRM sends an **rf channel release** message to RSS. If it is an SDCCH that cannot be allocated, RSS then de-allocates any allocated resources. If it is a TCH that cannot be allocated, RSS reverts to SDCCH.

If this timer expires for a TCH, the TCH is taken OOS, and a **DRI 40-47** alarm is generated.

## Recommended values

The BSS command parameter **channel_act** is set as an integer in the range 0 to 10000 milliseconds.

The recommended value is 10000 milliseconds, which is also the default.

**WARNING**

**The default setting of 10 seconds should not be lowered. RSS L1 mailboxes can become full during heavy load times, and system problems result if channel activations cannot be performed.**

## Internal name

TM_CHANNEL_ACT

# channel_teardown

## Definition

During an inter-cell handover, the BTS (RRSM) timer **channel_teardown** specifies the time allowed for CRM to deallocate the target channel for re-use, after the handover is aborted due to any of the following events:

- Hardware failure **kill** message from SM),
- A BSSMAP **CLEAR REQUEST** message from the MSC,
- An SCCP **RLSD** message.

This timer can be set in the BSS database by the parameter **channel_teardown**.

## Normal operation

In any of the situations above, SSM sends a **blast** or **release radio channel** message to RRSM, which has already begun activation of the channel. RRSM therefore immediately starts the **channel_teardown** timer to avoid the channel being unnecessarily held. It then awaits one of the following messages:

- **channel activation acknowledge**
- **channel deallocated**
- **handover channel assigned**

On receipt of any of these messages RRSM releases any allocated target resources.

## Abnormal operation

On expiry of the **channel_teardown** timer, RRSM releases any allocated target resources immediately without waiting for any of the above messages.

## Recommended values

The BSS command parameter **channel_teardown** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 28000 milliseconds, which is also the default.

**NOTE**

There is trade-off between holding resources and ensuring call setups. If the timer is set short, resources are not being held for too long but a call could fail because the resource is still in use. If set too long, unnecessary holding of unused resources can result. Consider any change to the default 28 seconds carefully before making it.

## Internal name

RRSM_MTQ

# cipher_comp_ms

## Definition

In a ciphering command sequence, the BTS (RRSM) timer **cipher_comp_ms** guards against the non-receipt of a notification from the MS (via RSS) that the ciphering command and the encryption algorithm contained in it, have been successfully received.

This timer can be set in the BSS database by the parameter **cipher_comp_ms**.

## Normal operation

In normal ciphering specification from the MSC to an MS (via SSM and RRSM), the timer **cipher_comp_ms** is started by RRSM on the sending of a **CIPHER MODE COMMAND** message to the MS, and stopped on receipt of a **CIPHER MODE COMPLETE** message from the MS. RRSM then sends to SSM a **ciphering successful** message, and SSM sends to the MSC a **CIPHER MODE COMPLETE** message. The sequence is shown in Chapter 2.

## Abnormal operation

If the **cipher_comp_ms** timer expires before the **ciphering successful** message is received from the RSS, RRSM tears down the call by sending a **CHANNEL RELEASE** message to the MS, and a **deallocate active dch** message to CRM.

## Recommended values

The BSS command parameter **cipher_comp_ms** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 28000 milliseconds.

## Related timers

The **cipher_comp_ms** timer should be set less than the **ciphering_successful** timer to avoid the latter expiring and aborting the cipher command before RSS has completed its ciphering command sequence with the MS.

## Internal name

RRSM_MTA

# ciphering_successful

## Definition

In a ciphering command sequence, the BSC (SSM) timer **ciphering_successful** guards against the non-receipt of a notification from the RRSM that the ciphering command and the encryption algorithm contained in it, have been successfully received by the MS.

This timer can be set in the BSS database by the parameter **ciphering_successful**.

## Normal operation

In normal ciphering specification from the MSC to an MS, the timer **ciphering_successful** is started on receipt of a **CIPHER MODE COMMAND** message from the MSC, and the sending of a **ciphering request** message to RRSM. The timer **ciphering_successful**, is then stopped on receipt of a **ciphering successful** message from the RRSM, and the sending of a **CIPHER MODE COMPLETE** message to the MSC. The sequence is shown in **Chapter 2**

## Abnormal operation

If the **ciphering_successful** timer expires before the **ciphering successful** message is received from the RRSM, SSM sends a **CLEAR REQUEST** message to the MSC with a cause value of `RF Message Failure.`

## Recommended values

The BSS command parameter **ciphering_successful** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds.

## Related timers

The **ciphering_successful** timer should be set greater than the **cipher_comp_ms** timer to avoid the former expiring and aborting the cipher command before RSS has completed its ciphering command sequence with the MS.

# Internal name

SSM_MTI

# circuit_reset_ack

## Definition

The **circuit_reset_ack** timer is used by CLM to allow SM proper time to disconnect any TDM connections related to a particular CIC (Circuit Identity Code) during an MSC initiated reset circuit procedure.

This timer can be set in the BSS database by the parameter **circuit_reset_ack**.

## Normal operation

When the MSC sends a **RESET CIRCUIT** message to CLM in the BSC, CLM notifies SM to disconnect any connections involving this CIC by sending a **local circuit reset** message.

In normal operation **circuit_reset_ack** is started on the sending of a **local circuit reset** message to the SM, and stopped on receipt of a **local circuit reset acknowledge** message from the SM, when CLM sends a **RESET CIRCUIT ACKNOWLEDGE** message to the MSC.

## Abnormal operation

If a **local circuit reset acknowledge** message is not received before the **circuit_reset_ack** timer expires, the CLM subsystem sends the **local circuit reset** message to SM again and restarts the timer.

If the timer again expires before the **local circuit reset acknowledge** message is received, CLM receives a **move_state** message and moves into an idle state.

## Recommended values

The BSS command parameter **circuit_reset_ack** is set as an integer in the range 1000 to 1000000 milliseconds.

The default value is 30000 milliseconds.

## Related timers

The **bssmap_t19** timer controls the external A interface circuit reset operation, for which **circuit_reset_ack** is the internal SM/CLM interface timer. **bssmap_t19** is the BSSAP required timer; **circuit_reset_ack** is a Motorola specific enhancement to this.

# Internal name

CLM_MTA1

# clear_cmd_ext_ho

## Definition

In an external (inter-BSS) handover, the BSC (SSM) timer **clear_cmd_ext_ho** guards for the original channel being released by the MSC after a successful handover, or a lost MS during handover.

This timer can be set in the BSS database by the parameter **clear_cmd_ext_ho**.

## Normal operation

The timer starts when SSM receives a **HANDOVER COMMAND** from the MSC at the source cell. The SSM sends an **INITIATE HANDOVER** message to the RRSM, and waits for a **CLEAR COMMAND** message from the MSC.

When the SSM receives the **CLEAR COMMAND** message from the MSC, the SSM sends a **RELEASE RADIO CHANNEL** message to the RRSM.

If a terrestrial circuit is connected to the SSM, the SSM sends a **DISCONNECTION REQUEST** message to the SM, and stops the timer.

If the SSM receives an **UNSUCCESSFUL HANDOVER** message from RRSM, the SSM stops the timer.

The **clear_cmd_ext_ho** timer must be set long enough to ensure that the MS has enough time in the worst case to receive the handover command, attempt to access the target cell, and in failure, to recover back to the source cell. **clear_cmd_ext_ho** must also be set long enough to hold the original channel at the source cell such that in failure to access the target channel, the MS can recover to the old channel (longer than **bssmap_t8**.

## Abnormal operation

If a **CLEAR COMMAND** message is not received before the **clear_cmd_ext_ho** timer expires, the SSM sends a **CLEAR REQUEST** message to the MSC, with a cause value of **RF_MSG_FAIL** (radio interface message failure).

## Recommended values

The BSS command parameter **clear_cmd_ext_ho** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 30000 milliseconds.

## Related timers

**clear_cmd_ext_ho** must be set longer than **bssmap_t8**. See **Normal operation** above.

## Internal name

SSM_MTF

# clear_command

## Definition

The BSC (SSM) timer **clear_command** guards against non-receipt of a CLEAR COMMAND message from the MSC in response to its CLEAR REQUEST message.

The BSS would send such a CLEAR REQUEST message when it has determined a need to clear the call for BSS reasons, such as loss of radio link with the MS.

This timer can be set in the BSS database by the parameter **clear_command**.

## Normal operation

In normal operation SSM starts the **clear_command** timer on sending a BSSMAP **CLEAR REQUEST** message to the MSC. The timer is stopped on receipt of a BSSMAP **CLEAR COMMAND** message from the MSC.

## Abnormal operation

If a **CLEAR COMMAND** message is not received before the **clear_command** timer expires, SSM continues processing as if a **CLEAR COMMAND** message was received.

## Recommended values

The BSS command parameter **clear_command** is set as an integer in the range 1000 to 1000000 milliseconds.

The default value is 30000 milliseconds.

## Related timers

Since the introduction of the **clear_cmd_ext_ho** timer, the **clear_command** timer has no relationship with the **bssmap_t8** timer.

# Internal name

SSM_MTG

# clk_src_fail_reset_period

## Definition

The **clk_src_fail_reset_period** database element specifies the length of time for which the OOS count is kept for the MMSs at a site. At the end of the reset period, all of the MMS OOS counts are reset to zero.

The OOS counts are used by the BSC or BTS SYNC subsystem in the selection process of an MMS to be used as a reference clock for GCLK synchronization. If several MMSs have the same value assigned to the **mms_priority** database element, the MMS with the lowest OOS count is selected.

This period can be set in the BSS database by the parameter **clk_src_fail_reset_period**.

## Recommended values

The BSS command parameter **clk_src_fail_reset_period** is set as an integer in the range 1 to 255 hours.

The recommended value is 24 hours, which is also the default.

## Internal name

None.

# dealloc_inact

## Definition

In a situation in which a BTS ( RSS) has to deallocate a channel it sends a message to CRM in the BTS to process a request. Possible situations are:

- RSS sends an error indication.
- The timeslot goes OOS.

CRM then starts the de-allocation process. The **dealloc_inact** timer is used by CRM to guard against non-receipt of the response from RRSM, to indicate that it has completed its resource de-allocation procedures.

This timer can be set in the BSS database by the parameter **dealloc_inact**.

This timer is also used during an Emergency Call Preemption procedure.

## Normal operation

The timer **dealloc_inact** is started by CRM when one of the situations above occurs, as shown in the process table below:

| Stage | Process |
|---|---|
| 1 | The RSS sends a **RELEASE INDICATION** message to RRSM, then RRSM sends a **RELEASE INDICATION RECEIVED** message to CRM, or the timeslot goes OOS. |
| 2 | CRM receives an **rss error indication** message, then sends an **rss error** message (in the case of an error indication or OOS timeslot). |
| 3 | CRM starts the timer **dealloc_inact**. |
| 4 | The RRSM de-allocates its resources and sends a **radio channel released** message to the SSM, and a **deallocate inactive dch** message to CRM. |
| 5 | CRM stops the **dealloc_inact** timer. If the timer expires, the CRM starts a timer audit. |
| 6 | CRM continues de-allocating as for active channel de-allocation described for **Call Clearing** in Chapter 2. |

## Abnormal operation

If **dealloc_inact** expires before the **deallocate inactive dch** message is received from RRSM, CRM resends the **rss error** message again, and the process continues as above. If the **dealloc_inact** timer continues to expire before the **deallocate inactive dch** message is received from RRSM, the process continues indefinitely.

## Recommended values

The BSS command parameter **dealloc_inact** is set as an integer in the range 0 to 1000000 milliseconds.

There is no default value. The recommended value is 10000 milliseconds.

## Internal name

MTCRM_DEALLOC_INACT

# delay_dl_rel_dur

## Definition

The **delay_dl_rel_dur** delayed downlink TBF release duration BSS parameter sets the number of block periods (1 block period = 20 ms) for which the network delays the release of a downlink TBF.

This duration can be set in the BSS database by the parameter **delay_dl_rel_dur**.

## Normal operation

The GPRS feature must be unrestricted.

The network releases a downlink TBF for other use every time the timer expires.

## Abnormal operation

This is a periodicity timer and there is no abnormal operation.

## Recommended values

The BSS command parameter **delay_dl_rel_dur** is set as an integer in the range 15 to 600 block periods of 20 ms each.

The default value is 50 (1000 ms or 1 second).

# dynet_retry_time

## Definition

The **dynet_retry_time** parameter specifies the amount of time, measured in milliseconds, that the BTS waits for a response from the BSC when the BTS requests a terrestrial backing source. The value for the parameter depends on whether satellites are used to connect the BSC to the BTS.

- Systems that do not use satellites should use the minimum retry value of 150 milliseconds.
- Satellite systems should use a value 1.2 seconds greater, such as 1.35 seconds. Satellites introduce a one way delay of 600 milliseconds.

The retry value affects call setup and handover times. The BTS makes three requests for a terrestrial backing resource. Hence, a setting of 1.35 seconds for the retry time requires 4.05 seconds before the BTS stops attempting to allocate resources. At that point, the BTS cannot allocate a TCH due to the lack of a terrestrial backing resource.

This parameter only applies to sites that support dynamic allocation.

## Normal operation

CRM starts the **dynet_retry_time** timer when requesting terrestrial backing from the Allocation Manager. CRM stops the timer on the granting of the backing resource.

## Abnormal operation

If the **dynet_retry_time** timer expires before the backing resource is allocated, CRM sends a rejection of the resource request to RRSM.

## Recommended values

The parameter is set as an integer, in the range 150 to 3000 milliseconds.

There is no recommended value. The default value is 150 milliseconds.

# Internal name

DYNET_RETRY_TIME

# early_classmark_delay

## Definition

The **early_classmark_delay** timer controls how long the BSS delays sending the classmark update message to the MSC during early classmark sending.

This timer is unavailable if the multiband inter-cell handover feature is not enabled.

## Normal operation

The **early_classmark_delay** timer (40 millisecond timer) is started on receipt of the **initial layer 3 information, CM service request** message at the SSM, which governs the receipt of the **update classmark** message from RRSM. The timer is started if the **establishment_ind** bit contained in the **initial layer 3 information, CM service request** is set to allow early classmark update.

The timer is stopped during release of the connection while awaiting the **CONNECTION CONFIRM** message from the MSC.

## Abnormal operation

If the timer expires before the CONNECTION CONFIRM message is received by SSM from the MSC, SSM checks if the **update classmark** message is stored. If it is, and the database allows an early classmark, SSM forwards the **update classmark** message to the MSC. The timer is restarted if its value in the database is greater than 40 milliseconds. The period set for the restarted timer will then be the difference between the value in the database and 40 milliseconds.

## Recommended values

This parameter is set as an integer in the range 0 to 100000 milliseconds.

There is no recommended or default value.

## GSM name

None, although the function is GSM specified: GSM TS 8.08 Section 3.1.13.

# Internal name

SSM_EARLY_CLASSMARK_DELAY

# emerg_reserved

## Definition

The BTS (CRM) **emerg_reserved** timer specifies the length of time for which a TCH is held as reserved for emergency call access.

When an emergency immediate assignment comes in from an MS, and the database element **immediate_assign_mode** is not set (immediate assignment to a TCH is not allowed), the call is put on an SDCCH. However, a TCH must be available for this emergency call when the assignment request comes in. CRM therefore looks for an idle TCH. If found, CRM moves this TCH to the emergency reserved list, and starts timer **emerg_reserved**. If there is no idle TCH, a normal call is pre-empted, and the resulting TCH is added to the emergency reserved list, and CRM starts timer **emerg_reserved**.

No action is taken by the CRM if an emergency immediate assignment message comes in, and there are more TCHs in the emergency reserved list than there are emergency calls on SDCCHs waiting for Assignment Requests (this is done since the resource needed is already reserved).

This timer can be set in the BSS database by the parameter **emerg_reserved**.

## Normal operation

When the BSSMAP **ASSIGNMENT REQUEST** message comes in to SSM from the MSC for the emergency call, SSM sends an **initiate assignment** message to the RRSM, which sends the CRM an **assignment resource request** message. The emergency call then receives the next TCH in the emergency reserved list.

The **emerg_reserved** timer is started immediately a TCH is reserved (if necessary, after an existing call is torn down due to lack of available TCHs) at the time of the emergency call access.

**NOTE**

By enabling the emergency call pre-emption facility, traffic channels can be reserved for emergency calls while emergency calls are waiting on SDCCHs. These TCHs can be idle channels, if available. If not, existing normal calls are torn down to make TCHs available.

The timer stops when a TCH moves from the emergency list to a regular idle list.

## Abnormal operation

When the **emerg_reserved** timer expires, the reserved TCH is released for normal use.

## Recommended values

The BSS command parameter **emerg_reserved** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 120000 milliseconds, but this can be changed according to particular requirements.

## Internal name

MTCRM_EMERG_RESERVED

# ext_ho_allocation

## Definition

In an inter-BSS (external) handover the BSC (SSM) timer **ext_ho_allocation** specifies the interval allowed to wait for the BTS to set up the target radio channel.

This interval can be set in the BSS database by the parameter **ext_ho_allocation**.

## Normal operation

In normal operation, during an external handover, the MSC can send the destination BSC a separate **CR** without the handover request encapsulated within it. The CRM then allocates an SCCP number and sends an **sccp num assigned** message to SSM. The MSC then sends the SSM a BSSMAP **HANDOVER REQUEST** message, at which time the SSM sets up a call block and sends the CRM an internal **handover request** message, and starts the **ext_ho_allocation** timer. After setting up the radio resources, RRSM sends SSM a **handover allocation** message. SSM then stops the **ext_ho_allocation** timer and sends a **connection request** message to SM.

## Abnormal operation

If the **handover allocation** message is not received from the target RRSM before the **ext_ho-allocation** timer expires SSM sends a **blast** message to the target RRSM and a BSSMAP **HANDOVER FAILURE** message to the MSC. SSM then awaits any new BSSMAP **HANDOVER REQUEST** message from the MSC.

## Recommended values

The BSS command parameter **ext_ho_allocation** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

## Internal name

SSM_MTC1

# ext_rtry_cand_prd

## Definition

The **ext_rtry_cand_prd** timer sets the time between successive attempts for a given source cell to attempt an inter-BSS handover to a target cell which had previously rejected a handover attempt because of congestion.

When a handover is rejected because of congestion, the source BSS does not attempt to perform an imperative handover to that particular cell during the length of time specified by **ext_rtry_cand_prd**.

## Normal operation

The timer affects only non-imperative handover types, such as congestion relief, band reassignment, band handovers, and power budget handovers. The timer does not affect any imperative handover retries. These handovers are allowed to take place regardless of such timers, as these handovers are needed in order to keep the call active.

## Recommended values

The BSS command parameter **ext_rtry_cand_prd** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 4000 milliseconds, which is also the default.

## Internal name

EXT_RTRY_CAND_PRD_IDX

# flow_control_t1

## Definition

When an overload condition is initiated by the MSC in a situation of high TCH usage, the CRM subsystem in the BTS starts the timer **flow_control_t1**. This timer is used in conjunction with timer **flow_control_t2** to control the barring and unbarring of access classes.

The BTS (CRM) timer **flow_control_t1** specifies the interval that must elapse before new overload messages of a particular access class are considered by the flow control mechanism.

This timer can be set in the BSS database by the parameter **flow_control_t1**.

## Normal operation

NOTE

It is not possible to describe the operation of the **flow_control_t1** and **flow_control_t2** timers in isolation. The following description covers the operation of both timers.

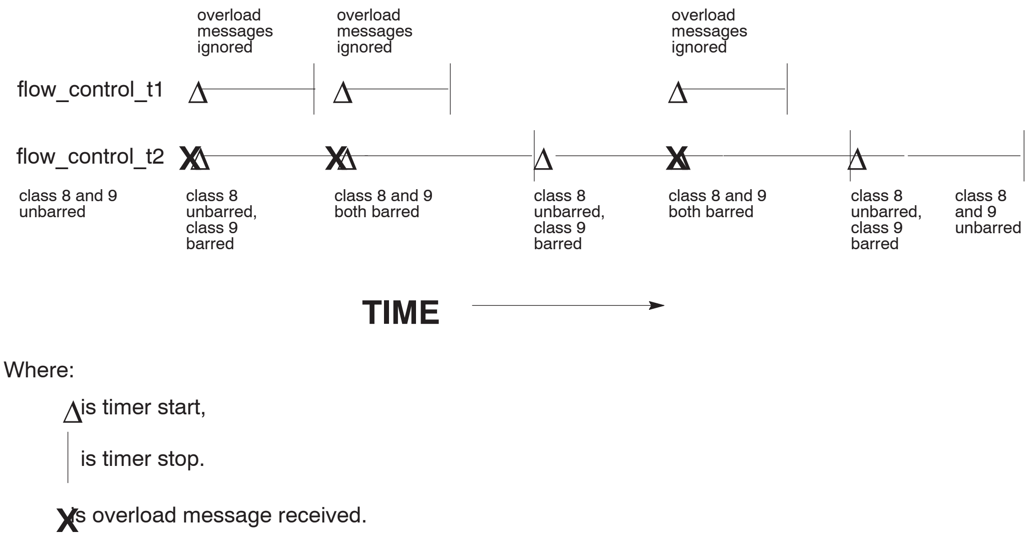
As soon as an overload condition is initiated by the MSC, CRM bars an access class and generates the **flow control procedure has started barring normal calls from access classes 0-9** alarm. CRM starts timers **flow_control_t1** and **flow_control_t2**. While **flow_control_t1** is running, CRM ignores all further overload messages.

If, after expiry of **flow_control_t1** with **flow_control_t2** still running, another overload message is received, another access class is barred, and both timers are restarted.

If, however, timer **flow_control_t2** expires without any further overload messages having been received, an access class is unbarred, and only **flow_control_t2** is restarted. This continues, as long as no further overload messages are received until all classes are unbarred, at which time the **flow control procedure has started barring normal calls from access classes 0-9** alarm is cleared. Of course, if during this process another overload message is received, another access class is barred, and both timers are restarted.

Figure 3-1 shows the operation of the two timers. The example assumes that **flow_control_t1** is set to less than **flow_control_t2**, and uses access classes 8 and 9.

**Figure 3-1** Operation of flow_control_t1




## Abnormal operation

This timer only operates normally for the abnormal condition of overload. The timer itself has no abnormal operation.

## Recommended values

The BSS command parameter **flow_control_t1** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 20000 milliseconds, which is also the default.

## Related timers

The BSS command parameter **flow_control_t1** must be set to at least 1000 milliseconds less than the **flow_control_t2** timer.

## Internal name

MTCRM_FC_T1

# GSM name

FC_T1 Specification 8.58.

# flow_control_t2

## Definition

When an overload condition is initiated by the MSC in a situation of high TCH usage, the CRM subsystem in the BTS starts the timer **flow_control_t1**. This timer is used in conjunction with timer **flow_control_t2** to control the barring and unbarring of access classes.

The BTS (CRM) timer **flow_control_t2** specifies the interval that must elapse before an access class on which a bar on new overload messages has previously been set, can be brought back into service.

This timer can be set in the BSS database by the parameter **flow_control_t2**.

## Normal operation

NOTE

It is not possible to describe the operation of the **flow_control_t1** and **flow_control_t2** timers in isolation. The following description covers the operation of both timers.

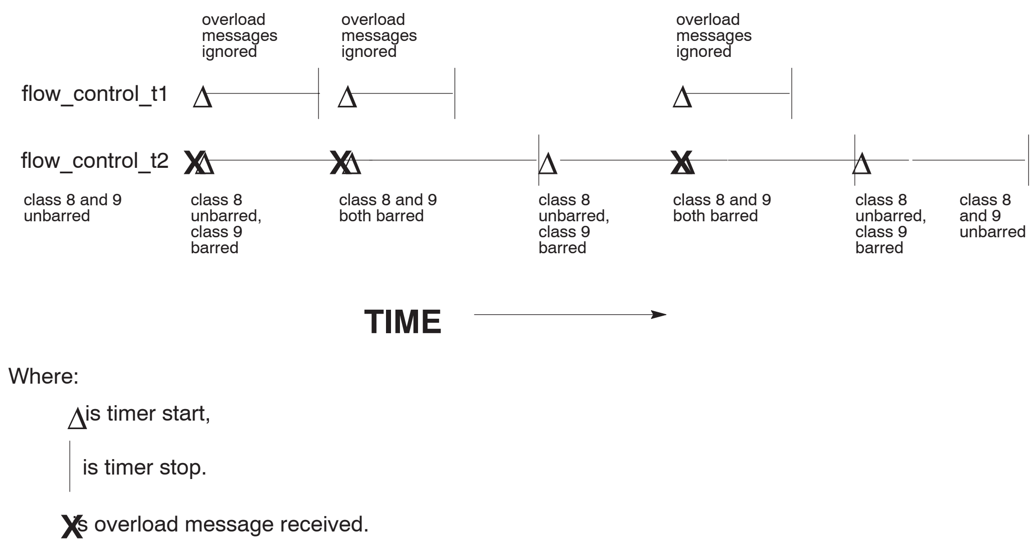
As soon as an overload condition is initiated by the MSC, CRM bars an access class and generates the **flow control procedure has started barring normal calls from access classes 0-9** alarm. CRM starts timers **flow_control_t1** and **flow_control_t2**. While **flow_control_t1** is running, CRM ignores all further overload messages.

If, after expiry of **flow_control_t1** with **flow_control_t2** still running, another overload message is received, another access class is barred, and both timers are restarted.

If, however, timer **flow_control_t2** expires without any further overload messages having been received, an access class is unbarred, and only **flow_control_t2** is restarted. This continues, as long as no further overload messages are received until all classes are unbarred, at which time the **flow control procedure has started barring normal calls from access classes 0-9** alarm is cleared. Of course, if during this process another overload message is received, another access class is barred, and both timers are restarted.

Figure 3-2 shows the operation of the two timers. The example assumes that **flow_control_t1** is set to less than **flow_control_t2**, and uses access classes 8 and 9.

**Figure 3-2** Operation of flow_control_t1




# Recommended values

The BSS command parameter **flow_control_t2** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

# Related timers

The BSS command parameter **flow_control_t2** must be set to at least 1000 milliseconds greater than the **flow_control_t1** timer.

# Internal name

MTCRM_FC_T2

# GSM name

FC_T2 Specification 8.58.

# gbl_thrput_period

## Definition

The timer **gbl_thrput_period** specifies the time period used to compute the statistics gbl_data_thrput and gbl_dl_data_thrput. These statistics indicate the throughput of a GBL uplink and downlink.

This timer can be set in the BSS database by the parameter **gbl_thrput_period**.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **gbl_thrput_period** is set as an integer in the range 1 to 255 milliseconds.

The default value is 50 milliseconds.

# gprs_penalty_time

{3723}

## Definition

This period timer specifies the duration for which **gprs_temporary_offset** stays active, on a per cell basis.

This timer can be set in the BSS database by the parameter **gprs_penalty_time**.

## Normal operation

The timer is set to the value specified by the operator between 0 (10 seconds) to 31 (320 seconds) - each increment represents 10 seconds.

## Abnormal operation

This is a period timer only and there is no abnormal operation.

## Recommended values

The parameter is set by default to 0 (10 seconds).

## Internal name

None.

# gprs_smg30_t3192

## Definition

The timer **gprs_smg30_t3192** specifies the MS timer used by the BTS on the BCCH blocks. The **t3192** parameter specifies the time that the MS continues the assigned PDCHs after receiving its last data block and before it returns to monitoring its paging groups.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **gprs_smg30_t3192** is set as one of the following:
500, 1000, 2000, and 4000 milliseconds.

The default value is 500 milliseconds.

# gprs_t3168

## Definition

The timer **gprs_t3168** specifies the MS timer used by the BTS on the BCCH blocks. This timer specifies how long the MS waits to get a Packet Uplink Assignment after sending a Packet Resource Request.

This timer can be set in the BSS database by the parameter **gprs_t3168**.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **gprs_t3168** is set as one of the following: 500, 1000, 2000, and 4000 milliseconds.

The default value is 4000 milliseconds.

# gprs_t3192

## Definition

The timer **gprs_t3192** specifies the MS timer used by the BTS on the BCCH blocks. This timer specifies how long the MS continues the assigned PDCHs after its last data block and before it returns to monitoring its paging groups.

This timer can be set in the BSS database by the parameter **gprs_t3192**.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **gprs_t3192** is set as one of the following: 0, 80, 120, 160, 200, 500, 1000 and 1500 milliseconds.

The default value is 500 milliseconds.

# handover_recognized_period

## Definition

In an inter-BSS (external) handover, this per cell periodicity timer gives the minimum period between handover attempts for a BTS queuing for handover. It sets the minimum period between internal BTS and BSC handover messages being generated, that result in a **HANDOVER REQUIRED** message being sent from the BSS to the MSC.

In order to set this threshold, call queuing must be enabled and the following equation must be true: **h_interval** less than **T_hand_rqd**. **h_interval** is an MSC parameter that specifies how long a handover request message will remain queued by the MSC. **T_hand_rqd** is an MSC timer with the same function as **handover_recognized_period**.

It can be set in the BSS database by the parameter **handover_recognized_period**.

## Normal operation

In normal operation a handover process takes place before this periodicity parameter expires. It sets the minimum per cell periodicity between handover attempts for a BTS queuing for handover.

**NOTE**

This timer should not be confused with **bssmap_t7** which is an internal control timer that guards against non-receipt of a response from the MSC. The relationship between the settings of these timers is critical to abnormal operation.

## Abnormal operation

Each time this timer expires, another **handover recognized** message is sent by the queuing RSS to RRSM. This continues until one of the following events occurs:

- The need for handover ceases,
- The call is torn down,

- A handover command is received.

# Recommended values

The value of **handover_recognized_period** is set as an integer SACCH multiframes (even only) in the range 2 to 64.

The recommended value is 2, which is also the default.

# GSM name

T_HAND_RQD Specification: 5.08, 8.08

# ho_ack

## Definition

In an intra-cell handover the BTS (CRM) timer **ho_ack** specifies the interval allowed to wait for the RRSM and SSM to assign the target handover channel.

It can be set in the BSS database by the parameter **ho_ack**.

## Normal operation

In normal operation the **ho_ack** timer is started on receipt of an **internal handover assign ack** message from RRSM, when SSM has assigned the target handover channel.

The process is as follows, as shown in the intra-cell handover internal system diagram in Chapter 2 Figure 2-27:

1. When RSS detects the need for a handover, it sends SSM a **handover recognized received** message to SSM.
2. SSM analyses this message, and determines that it is an intra-cell handover.
3. An **initiate intra-cell handover** message is sent from SSM to the CRM.
4. The CRM allocates a channel and sends an **internal handover channel assigned** message to the RRSM. The CRM starts timer **ho_ack** to guard for the **internal handover assign ack** message.
5. When the RRSM receives the **internal handover channel assigned** message, it notifies the SSM that the BTS has begun handover procedures by an **internal handover initiated** message.
6. SSM sends a **transfer request** message to SM update the TDM mapping.
7. SM returns a **switch response** message to SSM.
8. SSM notifies RRSM of completion by sending an **internal handover initiated ack** message.
9. RRSM sends CRM an **internal handover assign ack** message, which stops the **ho_ack** timer. CRM also starts the SD/TCH audit timer (which periodically makes sure the channel is still in use).
10. RRSM begins the radio procedures associated with moving the MS to the new channel.

## Abnormal operation

If the **internal handover assign ack** message is not received before the **ho_ack** timer expires, the handover attempt has failed, the newly allocated channel is freed, and a new handover procedure has to start.

## Recommended values

The BSS command parameter **ho_ack** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 5000 milliseconds.

## Internal name

MTCRM_HANDOVER_ACK

# ho_allocation

## Definition

In an inter-cell handover, the BSC (SSM) timer **ho_allocation** specifies the time allowed to wait for the BTS to set up the target radio channel.

It can be set in the BSS database by the parameter **ho_allocation**.

## Normal operation

In normal operation the **ho_allocation** timer is started on receipt of a **handover recognized received** message from RRSM, after determining if the handover is inter-cell.

### Inter-cell handover

SSM sends an **internal handover request** message to the RRSM serving the target cell. The timer is stopped on receipt of a **handover allocation** message from the target RRSM, when the radio channel has been set up.

SSM then sends the **initiate handover** message to the source RRSM.

## Abnormal operation

### Inter-cell handover

If the **handover allocation** message is not received before the **ho_allocation** timer expires, SSM sends a **blast** message to the target RRSM and then evaluates the next candidate cell.

## Recommended values

The BSS command parameter **ho_allocation** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

## Internal name

SSM_MTK

# ho_complete

## Definition

In an inter-BSS, intra-BSS, inter-BTS, or inter-cell handover, the BTS (RRSM) timer **ho_complete** guards against the non-receipt by the target RRSM of confirmation of acquisition of the MS.

It can be set in the BSS database by the parameter **ho_complete**.

## Normal operation

The target RRSM receives a **handover channel assigned** message from the CRM and sends a **channel activation** message to the target RSS. RSS confirms activation of the channel by means of a **channel activation acknowledge** message, a **MS POWER CONTROL** message is sent to the MS, and RRSM starts the **ho_complete** timer. The timer is stopped on receipt of a 4.08 message: **HANDOVER COMPLETE** from the RSS.

In an inter-BSS handover, on receipt of these messages, RRSM sends a **handover successful** message to SSM which sends a 4.08 **HANDOVER COMPLETE** message to the MSC.

In an inter-BTS or inter-cell handover, on receipt of these messages, RRSM sends a **handover successful** message to SSM.

## Abnormal operation

### Inter-BSS handover

If both of the above messages are not received by RRSM before expiry of **ho_complete**, the handover process is terminated and all allocated resources are released. The target BSC sends a BSSMAP **CLEAR REQUEST** message to the MSC with a cause value of:
`RF Message Fail.`

RRSM sends a **deallocate inactive dch** message to the target CRM and releases any allocated resources.

## Recommended values

The BSS command parameter **ho_complete** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 28000 milliseconds, which is also the default.

# Related timers

## Inter-BSS handover

The value of the **ho_complete** timer should be smaller than the value of the **ho_successful** timer. In abnormal operation it will then expire before **ho_successful** and the radio channel will be released by RRSM. If it is larger than **ho_successful**, this expires first and causes a **CLEAR REQUEST** message to be sent to the MSC. The MSC then returns a **CLEAR COMMAND** message to SSM which must tear down its resources with a **release radio channel** message to RRSM.

## Inter-cell handover

The value of the **ho_complete** timer should be smaller than the value of the **rr_t3103** timer. In abnormal operation it will then expire before **rr_t3103** and the radio channel will be released by RRSM. If it is larger than **rr_t3103**, this expires first and SSM sends a **CLEAR REQUEST** message to the MSC. The MSC then returns a **CLEAR COMMAND** message to SSM which must tear down its resources with a **release radio channel** message to RRSM.

# Internal name

RRSM_MTD

# ho_request

## Definition

The BSS (SSM) timer **ho_request** guards for the MSC to send a BSSMAP **HANDOVER REQUEST** message, when it did not send one encapsulated in a **CONNECTION REQUEST** (SCCP **CR**) message.

It can be set in the BSS database by the parameter **ho_request**.

## Normal operation

When the **Tqho** expires, the **ho_request** message starts while waiting for a **HANDOVER REQUEST** message.

If handover failed due to a switch failure, then the SSM sends a blast message to the RRSM, and a **HANDOVER FAIL** message to MTPL3. Then, the SSM starts the **HANDOVER REQUEST** timer and waits for a **HANDOVER REQUEST** message.

## Abnormal operation

If the **ho_request** timer expires before receipt of the **HANDOVER REQUEST** message from the MSC, SSM proceeds no further with the handover, and sends an **SCCP RLSD** message to the MSC to tear down the SCCP connection.

## Recommended values

The BSS command parameter **ho_request** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

## Internal name

SSM_MTB1

# ho_successful

## Definition

In an inter-BSS (external) handover, the BSS (SSM) timer **ho_successful** is used in the target BSS to guard for the BTS to acquire the MS.

It can be set in the BSS database by the parameter **ho_successful**.

## Normal operation

In normal operation SSM sends a **connection request** to SM on receipt of a **handover allocation** message from the target RRSM. On receipt of a **switch response** message reply from SM, SSM sends a BSSMAP **HANDOVER REQUEST ACKNOWLEDGE** message to the MSC (embedded in an SCCP **CC** or **DT1** message, depending on if the SSM has already sent a **CC** or not) and starts the **ho_successful** timer. After receipt of **handover detect received** message and then a **handover successful** message from RRSM, SSM stops the **ho_successful** timer and sends a BSSMAP **HANDOVER COMPLETE** message to the MSC.

## Abnormal operation

If the **ho_successful** timer expires before receipt of the **handover successful** message from RRSM, SSM sends a BSSMAP **CLEAR REQUEST** message to the MSC which incorporates the cause:
`RF message failure`

## Recommended values

The BSS command parameter **ho_successful** is set as an integer in the range of 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

The value of the **ho_successful** timer should be larger than the value of the **ho_complete** timer. In abnormal operation **ho_complete** will then expire before **ho_successful** and the radio channel will be released by RRSM. If the value of **ho_successful** is smaller than the value of **ho_complete**, **ho_successful** expires first and causes a BSSMAP **CLEAR REQUEST** message to be sent to the MSC. The MSC then returns a BSSMAP **CLEAR COMMAND** message to SSM which must tear down its resources with a **release radio channel** message to RRSM.

# Internal name

SSM_MTJ

# hop_count_timer

## Definition

In the BTS, the RSS subsystem handover (HDPC) timer **hop_count_timer** sets the number of SACCH periods for which intra-cell handovers are counted. This timer works with both the **hop_count** and the {22064} **hr_fr_hop_count** parameters.

## Normal operation

When the **hop_count_timer** expires, the **hop_count** and the {22064} **hr_fr_hop_count** parameters are set to a value from the database, then the timer is restarted.

If the number of handovers defined by the **hop_count** parameter occur within the time set by **hop_count_timer**, the system escalates the handover to a RXQUAL handover to another cell.

If the number of quality/interference handovers from HR (half rate) to FR (full rate) defined by the {22064} **hr_fr_hop_count** parameter occur within the time set by **hop_count_timer**, the system will keep the mobile on the FR channel if it is a candidate for FR to HR reconfiguration due to congestion.

## Abnormal operation

None.

## Recommended values

The BSS command parameter **hop_count_timer** is set as an integer in the range of 0 to 255 SACCH periods.

A value of 0 disables this feature.

## Internal name

None.

# initial_sync_timer

## Definition

During initial radio synchronization, this timer sets the duration for a Channel Coder Unit (CCU) to wait to receive the initial downlink Transcoding and Rate Adaption Unit (TRAU) frame, before generating an error indication.

The **initial_sync_timer** parameter is not allowed at a stand-alone BSC or RXCDR. It can be used at a BTS.

## Recommended values

The BSS command parameter **initial_sync_timer** is set as an integer in the range of 1500 to 7000 milliseconds.

The default value is 4000 milliseconds (4 seconds).

## Internal name

None.

# lb_int_bssmap_t4

## Definition

The Lb-interface BSSMAP T4 timer guards the time allowed for the BSS-based SMLC to respond to a RESET message with a RESET ACKNOWLEDGE message.

## Normal operation

When the BSC (CLM) has initiated a global reset, it sends a BSSMAP **RESET** message to the BSS-based SMLC, and starts the timer **lb_int_bssmap_t4** to guard for a BSSMAP **RESET ACKNOWLEDGE** acknowledgement message from the BSS-based SMLC. On receipt of this, CLM stops the timer and starts call processing backup.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If a BSSMAP **RESET ACKNOWLEDGE** message is not received before the **lb_int_bssmap_t4** timer expires, the CLM subsystem sends the BSSMAP **RESET** message again and restarts the timer, and so on. If on any retry, a **RESET ACKNOWLEDGE** message is received before the timer expires, normal operations are resumed. A counter is incremented for each of these retries until it reaches the value set by the BSS command parameter **global_reset_repetitions**. On this count, if the timer again expires, BSS-based SMLC marks the affected channel as blocked in an internal BSS database table, and generates the alarmed event report:
`No SMLC Acknowledgement for Global Reset`

CLM then waits for either a BSSMAP **RESET** or BSSMAP **RESET ACKNOWLEDGE** from the BSS-based SMLC. If BSSMAP **RESET** is received, CLM restarts the reset process. If BSSMAP **RESET ACKNOWLEDGE** is received, CLM resumes call processing.

**NOTE**

If the BSS parameter **global_reset_repetitions** is set to 0, CLM continues to send the BSSMAP **RESET** message indefinitely.

# Recommended values

The BSS command parameter **lb_int_bssmap_t4** is set as an integer in the range 0 to 1000000 milliseconds. Although the range starts at 0, in practice it should start at 1000.

The default value is 50000 milliseconds.

# Internal name

LB_INT_CLM_T4

# GSM name

T4 Specification: GSM 8.08

# lb_int_bssmap_t13

## Definition

The Lb-interface BSSMAP T13 timer is the **reset guard** timer (GSM 8.08-3.2.3: BSSMAP timers). The system starts this timer when the reset message from the SMLC is received at the BSS.

## Normal operation

In normal operation **lb_int_bssmap_t13** is started on the receipt of a **RESET** message from the BSS-based SMLC. On expiry the BSS sends a **RESET ACKNOWLEDGEMENT** message to the BSS-based SMLC.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

As this timer is a delaying timer, it expires independently of any events.

## Recommended values

The BSS command parameter **lb_int_bssmap_t13** is set as an integer in the range 0 to 1000000 milliseconds. In practice it should not be set lower than 1000 milliseconds.

The recommended value is 40000 milliseconds, which is also the default.

## Internal name

LB_INT_CLM_T13

## GSM name

T13 Specification: GSM 8.08

# lb_int_clear_command

## Definition

The Lb-interface clear command timer is the **wait for clear command from the BSS-based SMLC** timer. It times the interval between initialization and the issue of the Lb-interface clear command.

## Normal operation

In normal operation SSM starts the **lb_int_clear_command** timer on sending a BSSMAP **CLEAR REQUEST** message to the BSS-based SMLC. The timer is stopped on receipt of a BSSMAP **CLEAR COMMAND** message from the BSS-based SMLC.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If a **CLEAR COMMAND** message is not received before the **lb_int_clear_command** timer expires, SSM continues processing as if a **CLEAR COMMAND** message was received.

## Recommended values

The BSS command parameter **lb_int_clear_command** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 30000 milliseconds.

## Related timers

Since the introduction of the **clear_cmd_ext_ho** timer, the **lb_int_clear_command** timer has no relationship with the **bssmap_t8** timer.

## Internal name

LB_INT_SSM_MTG

# lb_int_sccp_released

## Definition

The Lb-interface SCCP released timer is the **wait for SCCP released message from SMLC** timer.

## Normal operation

In normal tear down operation SSM sends a BSSMAP **CLEAR COMPLETE** message to the BSS-based SMLC, and starts the timer **lb_int_sccp_released**. The **lb_int_sccp_released** timer is stopped on receipt of the **RLSD** acknowledgement from the BSS-based SMLC, which asks the BSS to release the SCCP number and SCCP connection, or by receipt of a **release_done** or **sccp_disconnected** message. SSM then sends the SM a **disconnection request** message to disconnect the TDM timeslots involved.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If the **lb_int_sccp_released** timer expires before receipt of the **RLSD** message from the BSS-based SMLC, SSM treats the expiry exactly as if the **RLSD** message had been received from the BSS-based SMLC.

## Recommended values

The BSS command parameter **lb_int_sccp_released** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

## Internal name

LB_INT_SSM_MTL

# lb_int_sccp_tconn_est

## Definition

The Lb-interface SCCP connection confirmation timer specifies the amount of time to wait for the SCCP connection confirmation from the BSS-based SMLC.

## Normal operation

During call establishment, SSM receives information via RRSM from the MS as follows:

- CM service request.
- Paging response.
- Location update request.
- IMSI detach indication.

SSM then forwards this to the BSS-based SMLC embedded in a **CONNECTION REQUEST** message. The BSS-based SMLC should respond to the **CONNECTION REQUEST** message with an SCCP **CONNECTION CONFIRM (CC)** message.

SSM then starts timer **lb_int_sccp_tconn_est** to guard for the expected SCCP **CC** response. When this is received, SSM stops **lb_int_sccp_tconn_est** and moves the call to the SDCCH.

The message sequence that includes the SCCP **lb_int_sccp_tconn_est** timer for a MS originated call (MS sends a **CM SERVICE REQUEST** message) is shown in **Connection establishment** in Chapter 2.

**NOTE**

The **CONNECTION REQUEST** message sequence is the same, whichever initial layer message is incorporated.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If, instead, of the **CC** message, the BSS-based SMLC returns a BSSMAP **CONNECTION REFUSED (CREF)** message, or timer **lb_int_sccp_tconn_est** expires, SSM initiates tear down of the call by sending a **release radio channel** message to the RRSM.

## Recommended values

GSM 04.08 specifies the following values for MS timers T3210, T3220, T3230 and T3240:

| | |
|---|---|
| T3210 | 20 seconds |
| T3220 | 5 seconds |
| T3230 | 15 seconds |
| T3240 | 10 seconds |

To minimize the amount of channel time lost in situations where **lb_int_sccp_tconn_est** expires, but still to ensure that this timer expires after any MS timers, it is recommended to set **lb_int_sccp_tconn_est** to a value of 30000 milliseconds. This value should be checked with the MSC system administrator to ensure that the BSS-based SMLC will respond within this time limit to an SCCP **CONNECTION REQUEST** message.

## Internal name

LB_INT_TCONN_EST

# lb_int_sccp_tiar

## Definition

The Lb-interface SCCP receive inactivity control timer is the **receive inactivity control** timer (GSM 8.08-3.23: all BSSMAP timers, TIAR) for the Lb-interface.

## Normal operation

Upon initially establishing an SCCP connection, **lb_int_sccp_tiar** is started. Each time an SCCP (or higher layer) message is received from the BSS-based SMLC for this SCCP connection, **lb_int_sccp_tiar** is restarted.

The following dependencies exist for this element:

- This parameter cannot be modified if the location services feature is restricted.
- The value of this parameter must be greater than the **lb_int_sccp_tias** parameter value.
- The value of this parameter must be greater than the value of the sccp_tiar at the SMLC.

## Abnormal operation

If **lb_int_sccp_tiar** expires, the call is deemed dead, and SSM sends an **SCCP RLSD** message to the BSS-based SMLC. The timer **lb_int_sccp_trel** also starts.

## Recommended values

The BSS command parameter **lb_int_sccp_tiar** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

## Related timers

The **lb_int_sccp_tiar** timer must be greater in value than the BSS-based SMLC send timer, to allow the BSS-based SMLC time to receive the SCCP still active message.

## Internal name

LB_INT_SSM_TIAR

# lb_int_sccp_tias

## Definition

The Lb-interface SCCP send activity control timer is the **send activity control** timer (GSM 8.08-3.23: all BSSMAP timers, TIAS) for the Lb-interface.

## Normal operation

Upon initially establishing an SCCP connection, **lb_int_sccp_tias** is started. Each time an SCCP (or higher layer) message is sent to the BSS-based SMLC for this SCCP connection, **lb_int_sccp_tias** is restarted.

This parameter cannot be modified if the location services feature is restricted. The value of this parameter must be less than the **lb_int_sccp_tiar** parameter value.

## Abnormal operation

If **lb_int_sccp_tias** ever expires, an **INACTIVITY TEST** message is sent to the BSS-based SMLC, to advise that this SCCP connection is still in use.

## Recommended values

The BSS command parameter **lb_int_sccp_tias** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

## Related timers

The **lb_int_sccp_tias** timer must be less in value than the BSS-based SMLC receive timer, to allow the BSS-based SMLC time to receive the SCCP still active message.

## Internal name

LB_INT_SSM_TIAS

# lb_int_sccp_trel

## Definition

The Lb-interface SCCP release complete timer is the **wait for SCCP release complete** timer for the Lb-interface.

## Normal operation

SSM sends to the BSS-based SMLC an SCCP **RLSD** message when the particular SCCP connection is no longer needed. SSM starts the timer **lb_int_sccp_trel** to guard for the expected SCCP **RLC** response from the BSS-based SMLC.

As soon as the BSS-based SMLC has cleared up its resources associated with the SCCP connection, it sends an SCCP **RLC** message to SSM. On receipt, SSM stops timer **lb_int_sccp_trel** and clears up its resources.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If **lb_int_sccp_trel** expires, SSM resends the SCCP **RLSD** message and restarts **lb_int_sccp_trel**. This can continue for up to 60 seconds, at which point SSM clears up its resources anyway.

## Recommended values

The BSS command parameter **lb_int_sccp_trel** is set as an integer in the range 4000 to 15000 milliseconds.

The recommended value is 10000 milliseconds, which is also the default.

## Internal name

LB_INT_TREL

# lb_int_spi

## Definition

The Lb-interface SPI timer specifies the amount of time the BSS must wait before initiating an internal reset after either Subsystem Prohibited (SSP) or SPI has occurred over the Lb-interface.

## Normal operation

The timer **lb_int_spi** is started by CLM if any of the following events occur:

- Last MTL goes OOS.
- BSSAP **SSP** (SubSystem Prohibited) message received by BSS-based SMLC.
- SCCP **UPU** (User Part Unavailable) message received for BSSAP by BSS-based SMLC.
- BSS BSSAP subsystem goes down, that is the last cell goes out of service.

If all of the events are cleared within the **lb_int_spi** timer duration, the timer **lb_int_spi** is stopped, and the BSS continues normal operation.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If there are any of the above events uncleared before expiry of the timer **lb_int_spi**, CLM begins the Global Reset Procedure as soon as the last event is cleared.

## Recommended values

The BSS command parameter **lb_int_spi** is set as an integer in the range 10000 to 1000000 milliseconds.

The recommended value is 60000 milliseconds, which is also the default.

NOTE

The **spi** timer should be set large enough to prevent unnecessary resetting of the BSS but short enough not to hang the system by having an inoperative BSS.

## Internal name

LB_INT_CLM_SPI

# lb_int_ss7_l2_t1

## Definition

The Lb-interface MTP Layer 2 T1 timer is the **alignment ready** timer (ITU Q.703) associated with the Lb-interface.

## Normal operation

In normal operation, MTPL2 begins a proving period as soon as the first attempt is made to bring the link into service, by exchanging status interchange messages with the BSS-based SMLC, and keeping a count of signalling errors.

As soon as this test is passed, MTPL2 starts the timer **ss7_l2_t1** , and sends a **FISU** (**Fill In Signal Unit**) message to the BSS-based SMLC. When the expected **FISU** or **MSU** (**Message Signal Unit**) response message from the BSS-based SMLC is received, MTPL2 stops the timer **ss7_l2_t1**, and confirms the link as in service by sending a **dl connect confirm (OK)** message to MPL3.

This parameter cannot be modified if the location services feature is restricted. This parameter is automatically changed to the appropriate default value if the ss7_mode element is changed.

## Abnormal operation

If timer **lb_int_ss7_l2_t1** expires before the expected **FISU** or **MSU** message is received from the BSS-based SMLC, MTPL2 sends MTPL3 a **dl connect confirm (failure)** message to MTPL3, and the whole alignment process begins again.

## Recommended values

The BSS command parameter **lb_int_ss7_l2_t1** is set as an integer in milliseconds. The valid ranges, shown below, depend on the value of the **ss7_mode** parameter:

| Range: | ss7_mode setting: |
|---|---|
| 40000 to 50000 | 0 (CCITT) |
| 13000 to 30000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value: | ss7_mode setting: |
|---|---|
| 50000 | 0 (CCITT) |
| 13000 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default when the **ss7_mode** parameter value is changed. The valid ranges for this element are dependent upon the value of the ss7_mode.

## Related timers

There are no related timers but see above for dependency on the **ss7_mode** BSS command parameter setting.

## Internal name

T1_TIMER_ID (Lb interface)

# lb_int_ss7_l2_t2

## Definition

The Lb-interface MTP layer 2 T2 timer is the **not aligned** timer (ITU Q.703) associated with the Lb-interface.

## Normal operation

In normal operation, MTPL2 sends an **SIO** (**Status Indication Out of Alignment**) message to the BSS-based SMLC, and starts timer **lb_int_ss7_l2_t2**, guarding for an expected status indication response. MTPL2 stops **lb_int_ss7_l2_t2** when the BSS-based SMLC responds either with an **SIO**, or with a **SIN** (**Status Indication Normal Alignment**), or **SIE** (**Status Indication Emergency Alignment**), which declare the link as aligned. MTPL2 then starts timer **lb_int_ss7_l2_t3** and sends a **SIN** or **SIE** (depending on the need), and waits for a **SIN** or **SIE** from the BSS-based SMLC.

This parameter cannot be modified if the location services feature is restricted. This parameter is automatically changed to the appropriate default value if the ss7_mode element is changed.

## Abnormal operation

If the **lb_int_ss7_l2_t2** timer expires before the expected BSS-based SMLC response, the whole alignment process is restarted.

## Recommended values

The BSS command parameter **lb_int_ss7_l2_t2** is set as an integer in milliseconds. The valid ranges, shown below, depend on the value of the **ss7_mode** parameter:

| Range: | ss7_mode setting: |
|---|---|
| 5000 to 150000 | 0 (CCITT) |
| 5000 to 30000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend the value of the **ss7_mode** parameter:

| Value: | ss7_mode setting: |
|---|---|
| 25000 | 0 (CCITT) |
| 23000 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default value when the **ss7_mode** parameter value is changed.
The valid ranges for this element are dependent upon the value of the ss7_mode.

## Related timers

There are no related timers but see above for dependency on the **ss7_mode** BSS command parameter setting.

## Internal name

T2_TIMER_ID (Lb interface)

# lb_int_ss7_l2_t3

## Definition

The Lb-interface MTP layer 2 T3 timer is the **aligned** timer (ITU Q.703) associated with the Lb-interface.

## Normal operation

In normal operation, MTPL2 stops **lb_int_ss7_l2_t2** when the BSS-based SMLC confirms receipt of the alignment status request and sends an **SIE** or a **SIN**, and starts the timer **ss7_l2_t3**. MTPL2 waits for either an **SIN** or **SIE** message from the MSC, confirming alignment. Once either of these is received, MTPL2 stops **lb_int_ss7_l2_t3**, starts **lb_int_ss7_l2_t4**, and begins the proving period.

This parameter cannot be modified if the location services feature is restricted. This parameter is automatically changed to the appropriate default value if the ss7_mode element is changed.

## Abnormal operation

If the **lb_int_ss7_l2_t3** timer expires before the expected response from the BSS-based SMLC, the whole alignment procedure is restarted.

## Recommended values

The BSS command parameter **lb_int_ss7_l2_t3** is set as an integer in milliseconds. The valid ranges, shown below, depend on the value of the **ss7_mode** parameter:

| Range: | ss7_mode setting: |
|---|---|
| 1000 to 1500 | 0 (CCITT) |
| 5000 to 14000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value: | ss7_mode setting: |
|---|---|
| 1400 | 0 (CCITT) |
| 11500 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default value when the **ss7_mode** parameter value is changed.
The valid ranges for this element are dependent upon the value of the ss7_mode.

## Internal name

T3_TIMER_ID (Lb interface)

# lb_int_ss7_l2_t4

## Definition

The Lb-interface MTP layer 2 T4 timer is the **emergency proving period** timer (ITU Q.703) associated with the Lb-interface.

## Normal operation

In normal operation, after MTPL2 stops **lb_int_ss7_l2_t3** when the BSS-related SMLC confirms alignment, the timer **lb_int_ss7_l2_t4** is started. MTPL2 begins the proving period.

During this proving period, signalling units are analysed for their correctness. When **lb_int_ss7_l2_t4** expires, MTPL2 determines if the number of correct signalling units is acceptable. If it is, the LMTL is declared as in service. If it is not, the whole alignment procedure is restarted.

This parameter cannot be modified if the location services support feature is restricted.

## Abnormal operation

As this timer is a period timer, there is no abnormal operation. It always expires.

## Recommended values

The BSS command parameter **lb_int_ss7_l2_t4** is set as an integer in multiples of 5 milliseconds, in the range 400 to 600 milliseconds.

The recommended value is 600 milliseconds which is also the default.

## Internal name

T4_TIMER_ID (Lb interface)

# lb_int_ss7_l2_t5

## Definition

The Lb-interface MTP layer 2 T5 timer is the **sending SIB** timer (ITU Q.703) associated with the Lb-interface.

## Normal operation

In normal operation, when MTPL2 mailboxes get congested (MTPL2 cannot process the BSS-based SMLC L2 messages as fast as they are being received), MTPL2 sends an **SIB** (Status Indication Busy) message to the MSC, and starts timer **lb_int_ss7_l2_t5**. If the congestion ceases, **lb_int_ss7_l2_t5** is stopped and normal MTL operation resumes.

This parameter cannot be modified if the locations services feature is restricted.

## Abnormal operation

While the congestion situation lasts, on every expiry of **lb_int_ss7_l2_t5**, the **SIB** is sent again to the MSC, and **lb_int_ss7_l2_t5** is restarted. This can continue indefinitely until the congestion ceases.

## Recommended values

The BSS command parameter **lb_int_ss7_l2_t5** is set as an integer in multiples of 5 milliseconds, in the range 80 to 120 milliseconds.

The recommended value is 100 milliseconds which is also the default.

## Internal name

T5_TIMER_ID (Lb interface)

# lb_int_ss7_l2_t6

## Definition

The Lb-interface MTP layer 2 T6 timer is the **remote congestion** timer (ITU Q.703) associated with the Lb-interface.

## Normal operation

In normal operation, when MTPL2 receives a **SIB** from the BSS-based SMLC, it starts **lb_int_ss7_l2_t6** and inhibits acknowledgement of BSS-based SMLCs. As soon as any MSU in the retransmission buffer is acknowledged (positively or negatively), **lb_int_ss7_l2_t6** is stopped, and normal operation resumes.

This parameter cannot be modified if the location services feature is restricted. This parameter is automatically changed to the appropriate default value if the ss7_mode element is changed.

## Abnormal operation

If **lb_int_ss7_l2_t6** expires before any MSU in the retransmission buffer is acknowledged, the LMTL is taken out of service.

## Recommended values

The BSS command parameter **lb_int_ss7_l2_t6** is set as an integer in milliseconds. The valid ranges, shown below, depend on the value of the **ss7_mode** parameter:

| Range: | ss7_mode setting: |
|---|---|
| 3000 to 6000 | 0 (CCITT) |
| 1000 to 6000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value: | ss7_mode setting: |
|---|---|
| 5000 | 0 (CCITT) |
| 5000 | 1 (ANSI) |

NOTE

The valid ranges for this element are dependent upon the value of the ss7_mode.

## Internal name

T6_TIMER_ID (Lb interface)

# lb_int_ss7_l2_t7

## Definition

The Lb-interface MTP layer 2 T7 timer is the **excessive delay of acknowledgement** timer (ITU Q.703) associated with the Lb-interface.

## Normal operation

In normal operation, when MTPL2 receives a **SIB** from the BSS-based SMLC, it starts **lb_int_ss7_l2_t7** simultaneously with **lb_int_ss7_l2_t6**, and inhibits the sending of **MSU** messages. On expiry of **lb_int_ss7_l2_t7**, the sending of **MSU** messages resumes.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

As this is a period timer, there is no abnormal operation. It always expires.

## Recommended values

The BSS command parameter **lb_int_ss7_l2_t7** is set as an integer in milliseconds, in the range 500 to 2000.

The recommended value is 1000 milliseconds, which is also the default.

## Related timers

The timer **lb_int_ss7_l2_t6** is started by MTPL2 simultaneously with **lb_int_ss7_l2_t7**. Timer **lb_int_ss7_l2_t6** is a longer supervisory timer to be sure the LMTL does not need to be taken out of service.

## Internal name

T7_TIMER_ID (Lb interface)

# lb_int_ss7_l3_t1

## Definition

The Lb-interface MTP layer 3 T1 timer is the **delay to avoid mis-sequencing on changeover** timer (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation When an LMTL fails, and a changeover must occur, MTPL3 starts delay timer **lb_int_ss7_l3_t1**. While this timer is running, signalling traffic not yet sent down the unavailable LMTL is held. As soon as **lb_int_ss7_t3_t1** expires, the traffic is sent down the new LMTL assigned by the changeover.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

As this is a period timer, there is no abnormal operation. It always expires.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t1** is set as an integer in multiples of 5 milliseconds, in the range 500 to 1200 milliseconds.

The recommended value is 850 milliseconds which is also the default.

## Internal name

T1_TIMER (Lb interface)

# lb_int_ss7_l3_t2

## Definition

The Lb-interface MTP layer 3 T2 timer is the **waiting for changeover acknowledgement** timer (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation, when MTPL3 initiates a changeover, it sends a **CHANGEOVER ORDER** message to the BSS-based SMLC and starts timer **lb_int_ss7_l3_t2** to guard for the expected **CHANGEOVER ACK** message from the BSS-based SMLC.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If **lb_int_ss7_l3_t2** expires, MTPL3 sends buffered messages on the new LMTL and disconnects L2 on the old LMTL.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t2** is set as an integer in multiples of 5 milliseconds, in the range 700 to 2000 milliseconds.

The recommended value is 1400 milliseconds which is also the default.

## Internal name

T2_TIMER (Lb interface)

# lb_int_ss7_l3_t4

## Definition

The Lb-interface MTP layer 3 T4 timer is the **waiting for changeback acknowledgement (first attempt)** timer (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation, when the failed MTL becomes available after a changeover, and the BSS-based SMLC signalling point is accessible from the LMTL initiating the changeback, the usual mechanism of sending a changeback message is used. MTPL3 sends a **CHANGEBACK ORDER** message to the BSS-based SMLC, and starts **lb_int_ss7_l3_t4** to guard for the receipt of a **CHANGEBACK ACKNOWLEDGE** message. Once this is received, MTPL3 stops **lb_int_ss7_l3_t4**, and sends buffered messages on the new LMTL. MTPL3 then restores normal messaging with the new LMTL.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If **lb_int_ss7_l3_t4** expires before receipt of the **CHANGEBACK ACKNOWLEDGE** message, MTPL3 resends the changeback order, and starts timer **lb_int_ss7_l3_t5** to guard for the expected **CHANGEBACK ACKNOWLEDGE** response.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t4** is set as an integer in multiples of 5 milliseconds, in the range 500 to 1200 milliseconds.

The recommended value is 850 milliseconds which is also the default.

## Related timers

The timer **lb_int_ss7_l3_t5** is used to guard for expected **CHANGEBACK ACKNOWLEDGE** response from the BSS-based SMLC after timer **lb_int_ss7_l3_t4** has expired waiting for the initial **CHANGEBACK ACKNOWLEDGE** response.

## Internal name

T4_TIMER (Lb interface)

# lb_int_ss7_l3_t5

## Definition

The Lb-interface MTP layer 3 T5 timer is the **waiting for changeback acknowledgement (second attempt)** timer (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation, when the failed LMTL becomes available after a changeover, and the BSS-based SMLC signalling point is accessible from the LMTL initiating the changeback, the usual mechanism of sending a changeback message is used. MTPL3 sends a **CHANGEBACK ORDER** message to the MTPL2, and starts **lb_int_ss7_l3_t4** to guard for the receipt of a **CHANGEBACK ACKNOWLEDGE** message.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If timer **lb_int_ss7_l3_t5** again expires before receipt of the **CHANGEBACK ACKNOWLEDGE** message, MTPL3 restores normal messaging with the new LMTL, and sends an indication message to FM.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t5** is set as an integer in multiples of 5 milliseconds, in the range 500 to 1200 milliseconds.

The recommended value is 850 milliseconds which is also the default.

## Related timers

The timer **lb_int_ss7_l3_t5** is used to guard for expected **CHANGEBACK ACKNOWLEDGE** response from the BSS-based SMLC after timer **lb_int_ss7_l3_t4** has expired waiting for the initial **CHANGEBACK ACKNOWLEDGE** response.

# Internal name

T5_TIMER (Lb interface)

# lb_int_ss7_l3_t12

## Definition

The Lb-interface MTP layer 3 T12 timer is the **waiting for uninhibit acknowledgement** timer (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation, when an LMTL no longer needs to be inhibited, CA sends to MTPL3 an **uninhibit request** message. MTPL3 then sends an **UNINHIBIT** message to the BSS-based SMLC and starts the timer **lb_int_ss7_l3_t12** to guard for the expected **UNINHIBIT ACKNOWLEDGEMENT** response. As soon as MTPL3 receives the **UNINHIBIT RESPONSE** message from the BSS-based SMLC, it stops **lb_int_ss7_l3_t12** and makes the LMTL available.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If timer **lb_int_ss7_l3_t12** expires before the expected **UNINHIBIT ACKNOWLEDGEMENT** response from the BSS-based SMLC, MTPL3 stops the timer. If this is the first timer expiry, MTPL3 sends an **UNINHIBIT ACKNOWLEDGEMENT TIMEOUT** message to FM. If **lb_int_ss7_l3_t12** expires a second time before the expected **UNINHIBIT ACKNOWLEDGEMENT** response from the BSS-based SMLC, MTPL3 sends an **UNINHIBIT DENIED** message to FM.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t12** is set as an integer in multiples of 5 milliseconds, in the range 800 to 1500 milliseconds.

The recommended value is 1150 milliseconds which is also the default.

## Internal name

T12_TIMER (Lb interface)

# lb_int_ss7_l3_t13

## Definition

The Lb-interface MTP layer 3 T13 timer is the **waiting for force uninhibit** timer (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation, when a locked inhibited LMTL is unlocked, CA sends to MTPL3 a **force uninhibit** message. MTPL3 sends the BSS-based SMLC a **FORCE UNINHIBIT SIGNALLING LINK** message, and starts timer **lb_int_ss7_l3_t13** to guard for the expected **UNINHIBIT SIGNALLING LINK** message. As soon as MTPL3 receives the **UNINHIBIT SIGNALLING LINK** message, it stops **lb_int_ss7_l3_t13** and restores the LMTL to active service.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If timer **lb_int_ss7_l3_t13** expires before the expected **UNINHIBIT SIGNALLING LINK** message is received from the BSS-based SMLC, MTPL3 sends an indication message to FM.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t13** is set as an integer in multiples of 5 milliseconds, in the range 800 to 1500 milliseconds.

The recommended value is 1150 milliseconds which is also the default.

## Internal name

T13_TIMER (Lb interface)

# lb_int_ss7_l3_t14

## Definition

The Lb-interface MTP Layer 3 T14 timer is the **waiting for inhibition acknowledgement** timer (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation, when the shutdown command is used on an LMTL, CA locally inhibits the LMTL. CA sends MTPL3 an **inhibit** message. MTPL3 sends an **INHIBIT** message to the BSS-based SMLC and starts timer **lb_int_ss7_l3_t14**. On receipt of the **INHIBIT ACKNOWLEDGE** message from the BSS-based SMLC, MTPL3 stops the timer **lb_int_ss7_l3_t14**.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

When an **INHIBIT ACKNOWLEDGE** message first fails from a remote MTPL3 (that is, the timer **lb_int_ss7_l3_t14** expires), the **INHIBIT ACKNOWLEDGE TIMEOUT** message is sent to the FM. The second time the **INHIBIT ACKNOWLEDGE** message fails, the **INHIBIT DENIED** message is sent to the FM.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t14** is set as an integer in multiples of 5 milliseconds, in the range 2000 to 3000 milliseconds.

The recommended value is 2500 milliseconds which is also the default.

## Internal name

T14_TIMER (Lb interface)

# lb_int_ss7_l3_t17

## Definition

The Lb-interface MTP layer 3 T17 timer is the **delay to avoid oscillation of initial alignment failure and link restart** timer (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation, when an initial alignment fails at MTPL2, MTPL2 sends to MTPL3 a **connect confirm fail** message, a **disconnect confirmation** message, or a **disconnect indication** message. MTPL3 starts timer **lb_int_ss7_l3_t17** to avoid oscillation of trying to activate the LMTL. At expiry of **lb_int_ss7_l3_t17**, MTPL3 again tries to bring the LMTL into service.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

The timer **lb_int_ss7_l3_t17** is a period timer. It always expires.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t17** is set as an integer in multiples of 5 milliseconds, in the range 800 to 1500 milliseconds.

The recommended value is 1150 milliseconds which is also the default.

## Related timers

The timers **lb_int_ss7_l2_t1**, **lb_int_ss7_l2_t2**, and **lb_int_ss7_l2_t3** are used to time stages during alignment.

## Internal name

T17_TIMER (Lb interface)

# lb_int_ss7_l3_t22

## Definition

The Lb-interface MTP layer 3 T22 timer is the **local inhibit test timer** (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation, during local inhibiting of an LMTL, MTPL3 sends an **INHIBIT** message to the BSS-based SMLC. When the BSS-based SMLC responds with the **INHIBIT ACK** message, MTPL3 starts timer **lb_int_ss7_l3_t22**, to be used to time intervals at which MTPL3 tests whether the BSS-based SMLC requires to force the uninhibiting of the LMTL.

When **lb_int_ss7_l3_t22** expires, if the LMTL is currently available, no action is taken. If the LMTL is still locally inhibited, a **LOCAL INHIBIT TEST** message is sent to the BSS-based SMLC, and timer **lb_int_ss7_l3_t22** is restarted. The BSS-based SMLC either responds with a force uninhibit procedure, if at the BSS-based SMLC the LMTL is uninhibited, or sends nothing, if at the BSS-based SMLC, the LMTL is inhibited by the BSS. If MTPL3 receives a **FORCE UNINHIBIT** message, **lb_int_ss7_l3_t22** is stopped, and the LMTL is brought out of its inhibited state.

This parameter cannot be modified if the location services feature is restricted. This parameter is automatically changed to the appropriate default value if the **ss7_mode** element is changed.

## Abnormal operation

The timer **lb_int_ss7_l3_t22** is an interval timer and always expires.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t22** is set as an integer in 5 millisecond increments. The ranges shown below depend on the value of the **ss7_mode** parameter:

| Range: | ss7_mode setting: |
|---|---|
| 180000 to 360000 | 0 (CCITT) |
| 90000 to 120000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value: | ss7_mode setting: |
|---|---|
| 270000 | 0 (CCITT) |
| 90000 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default value when the **ss7_mode** parameter value is changed.
The valid ranges for this element are dependent upon the value of the ss7_mode element.

## Related timers

There are no related timers but see above for dependency on the **ss7_mode** BSS command parameter setting.

Note that this timer has similar functionality to the remote inhibit timer **lb_int_ss7_l3_t23**.

## Internal name

T22_TIMER (Lb interface)

# lb_int_ss7_l3_t23

## Definition

The Lb-interface MTP layer 3 T23 timer is the **remote inhibit test timer** (ITU Q.704) associated with the Lb-interface.

## Normal operation

In normal operation, during remote inhibiting of an LMTL, the BSS-based SMLC sends an **INHIBIT** message to MTPL3. MTPL3 responds with an **INHIBIT ACK** message, and starts timer **lb_int_ss7_l3_t23**, to be used to time intervals at which MTPL3 tests whether the BSS-based SMLC still requires the inhibiting of the LMTL.

When **lb_int_ss7_l3_t23** expires, if the LMTL is currently available, no action is taken. If the LMTL is still remotely inhibited, MTPL3 sends a **REMOTE INHIBIT TEST** message to the BSS-based SMLC, and timer **lb_int_ss7_l3_t23** is restarted. When the BSS-based SMLC receives the **REMOTE INHIBIT TEST** message, it either does nothing, if the LMTL is marked as locally inhibited at the BSS-based SMLC, or it invokes the uninhibit procedure.

This parameter cannot be modified if the location services feature is restricted. This parameter is automatically changed to the appropriate default value if the **ss7_mode** element is changed.

## Abnormal operation

The timer **lb_int_ss7_l3_t23** is an interval timer and always expires.

## Recommended values

The BSS command parameter **lb_int_ss7_l3_t23** is set as integer in 5 millisecond increments. The ranges shown below depend on the value of the **ss7_mode** parameter:

| Range: | ss7_mode setting: |
|---|---|
| 180000 to 360000 | 0 (CCITT) |
| 90000 to 120000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value: | ss7_mode setting: |
|---|---|
| 270000 | 0 (CCITT) |
| 90000 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default value when the **ss7_mode** parameter value is changed.
The valid ranges for this element are dependent upon the value of the ss7_mode element.

# Related timers

There are no related timers but see above for dependency on the **ss7_mode** BSS command parameter setting.

Note that this timer has similar functionality to the local inhibit timer **lb_int_ss7_l3_t22**.

# Internal name

T23_TIMER (Lb interface)

# lb_int_ss7_slt_t1

## Definition

The-Lb-interface SS7 signalling link test T1 timer is the **supervision timer for signalling link test acknowledgement message** (ITU Q.707) associated with the Lb-interface.

## Normal operation

In normal operation, MTPL3 sends to the BSS-based SMLC an **SLTM** message (**Signalling Link Test Message**). MTPL3 also starts timer **lb_int_ss7_slt_t1**, to guard for the expected **SLTA** (**Signalling Link Test Acknowledge**) message. When MTPL3 receives the **SLTA** message, it stops **ss7_slt_t1** and sends an INS indication to CA, which brings the LMTL device into service.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If timer **lb_int_ss7_slt_t1** expires before the expected **SLTA** message, is received, MTPL3 sends the **SLTM** again, and restarts **lb_int_ss7_slt_t1**. If the timer expires a second time, the test has failed, and the entire initial alignment procedure begins again.

## Recommended values

The BSS command parameter **lb_int_ss7_slt_t1** is set as an integer in multiples of 5 milliseconds, in the range 4000 to 12000 milliseconds.

The recommended value is 8000 milliseconds which is also the default.

## Internal name

SLT_T1_TIMER (Lb interface)

# lb_int_t_stat_info

## Definition

The Lb-interface subsystem status test timer specifies the amount of time between sending Subsystem Status Test (SST) messages to the BSS-based SMLC.

## Normal operation

The timer starts when the BSS-based SMLC sends a **SUBSYSTEM PROHIBITED** message to the CLM for the BSSAP Subsystem. When the subsystem starts, the BSS-based SMLC sends a **SUBSYSTEM ALLOWED** (SSA) message to the CLM, and stops the **lb_int_t_stat_info** timer.

This parameter cannot be modified if the location services feature is restricted.

## Abnormal operation

If the timer expires before receiving an SSA message, the CLM sends a **SUBSYSTEM TEST** message to the BSS-based SMLC, and restarts the **lb_int_t_stat_info** timer. The timer stops when the CLM receives an SSA message.

## Recommended values

The BSS command parameter **lb_int_t_stat_info** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 90000 milliseconds.

## Related timers

There are no related timers.

## Internal name

LB_INT_CLM_T_STAT_INFO

# lcs_perf_location

## Definition

The location services perform location timer guards the receipt of a **BSSMAP-LE perform location response** from a BSS-based SMLC.

## Normal operation

The location services perform location timer guards the receipt of a **BSSMAP-LE perform location response** from a BSS-based SMLC.

This parameter cannot be modified if the location services feature is restricted.

## Recommended values

The valid range of values for this element are:

| Minimum (ms) | Maximum (ms) | Default (ms) |
|---|---|---|
| 0 | 1000000 | 300000 |

## Internal name

PERF_LOC_TIMER

## GSM name

This timer is a Motorola-defined timer.

# lcs_segmentation

## Definition

The location services segmentation timer is used for supervising a location services segmentation operation.

## Normal operation

The location services segmentation timer is used for supervising a location services segmentation operation.

This parameter cannot be modified if the location services feature is restricted. The value of this parameter should be less than the value of the location services supervision timer.

## Recommended values

The valid range of values for this element are:

| Minimum (ms) | Maximum (ms) | Default (ms) |
|---|---|---|
| 0 | 1000000 | 10000 |

## Internal name

LCS_SEG_TIMER

## GSM name

This timer is a Motorola-defined timer.

# lcs_supervision

## Definition

The location services supervision timer is the timer used for supervising the overall operation of a location request.

## Normal operation

The location services supervision timer is the timer used for supervising the overall operation of a location request.

This parameter cannot be modified if the location services feature is restricted. The value of this parameter should be less than the value of the location services perform location timer.

## Recommended values

The valid range of values for this element are:

| Minimum (ms) | Maximum (ms) | Default (ms) |
|---|---|---|
| 0 | 1000000 | 30000 |

## Internal name

LCS_SUPV_TIMER

## GSM name

This timer is a Motorola-defined timer.

# mode_modify

## Definition

In a TCH assignment operation, the BTS (RSS) internal timer **mode_modify** sets the waiting time that RSS Abis waits for a response to a **mode modify** request from RSS L1, after L1 has informed the DRIM.

It can be set in the BSS database by the parameter **mode_modify**.

## Normal operation

When an **initiate assignment** message is received from SSM, RRSM compares the requested channel to the current channel for the call. If the modes are different (speech/data or data rates), RRSM sends a **modify request** message to RSS Abis. In normal operation the timer **mode_modify** is started by RSS Abis when it sends a **mode modify** message to RSS L1, and stopped on receipt of the **mode modify acknowledge** response from RSS L1 (after L1 has informed the DRIM). RSS Abis then sends a **rss mode modify info** message to RSS HO, and a **mode modify acknowledge** message to RRSM.

## Abnormal operation

If the timer **mode_modify** expires before RSS Abis receives the **mode modify acknowledge** message from RSS L1, RSS Abis sends a **mode modify negative acknowledge** message back to RRSM to advise that the mode change could not be made.

RRSM then sends an **unsuccessful assignment** message back to SSM.

## Recommended values

The BSS command parameter **mode_modify** is set as an integer in the range 0 to 10000 milliseconds.

The recommended value is 10000 milliseconds, which is also the default.

## Related timers

The BTS (RSS) timer **mode_modify** must be set less than or equal to the **mode_rr_modify_ack** timer (10 milliseconds).

# Internal name

TM_MODE_MODIFY

# mode_rr_modify_ack

## Definition

In a TCH Assignment operation, the BTS (RRSM) timer **mode_rr_modify_ack** sets the waiting time that RRSM waits for the MS response, to a mode modify request, after a request from CP (Call Processing) to modify the mode.

It can be set in the BSS database by the parameter **mode_rr_modify_ack**.

## Normal operation

When an **initiate assignment** message is received from SSM, RRSM compares the requested channel to the current channel for the call. If the modes are different (speech/data or data rates), RRSM sends a **modify request** message to RSS. When RSS responds with the **mode modify acknowledge** message (see the timer **mode_modify** in this chapter), RRSM starts the timer **mode_rr_modify_ack** and sends a **CHANNEL MODE MODIFY** message to the MS. RRSM then stops the timer on receipt of the **CHANNEL MODE MODIFY ACKNOWLEDGE** response from the MS.

RRSM then sends an **assignment successful** message back to SSM, and a **channel mode update** message to CRM to indicate the new channel type.

## Abnormal operation

If the timer **mode_rr_modify_ack** expires before RRSM receives the **CHANNEL MODE MODIFY ACKNOWLEDGE** message from the MS, or a **CHANNEL MODE MODIFY NEGATIVE ACKNOWLEDGE** message is received from the MS, RRSM sends an **unsuccessful assignment** message back to SSM.

## Recommended values

The BSS command parameter **mode_rr_modify_ack** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 28000 milliseconds, which is also the default.

The timer **mode_rr_modify_ack** must be set greater than or equal to the BTS (RSS) timer **mode_modify** +10 milliseconds.

## Internal name

RRSM_MTY

# ms_p_con_ack

## Definition

The BSS (HDPC) timer **ms_p_con_ack** ensures that the MS has responded to a power change message. The timer guards for the **RF POWER CHANGE ACKNOWLEDGEMENT** message to be received from the MS, after a power change request has been sent to the MS.

It can be set in the BSS database by the parameter **ms_p_con_ack**.

## Normal operation

After the BTS sends a power change message, ordering the mobile to change the power level, it starts the timer **ms_p_con_ack**. The timer gives the mobile enough time to change its power level. If the mobile reaches the ordered power level before the **ms_p_con_ack** timer expires, the **ms_p_con_interval** timer starts.

## Abnormal operation

If the mobile does not reach the ordered power level when the timer expires, the BTS sends another power change message.

## Recommended values

The **ms_p_con_ack** interval timer is set as an integer in the range 0 to 31 pairs of SACCH mutiframes (31 represents 62 SACCH mutiframes).

The recommended value is 1 (2 mutiframes).

## Related timers

The **ms_p_con_interval** interval timer sets the period between HDPC evaluating whether a MS power change is necessary. It therefore never runs concurrently with **ms_p_con_ack**. This timer is only used if the **decision_alg_num** BSS database parameter is set to 1.

## Internal name

P_CON_ACK

# ms_p_con_interval

## Definition

The BSC (HDPC) interval timer **ms_p_con_interval** specifies the interval between HDPC evaluating whether a MS power change is necessary. If it is, RSS sends a message to the MS instructing it to change its power.

It can be set in the BSS database by the parameter **ms_p_con_interval**.

## Normal operation

In normal operation, every time **ms_p_con_interval** expires, HDPC decides whether or not a MS power adjustment is necessary. If it is deemed necessary, RSS sends the MS a **POWER CHANGE** message, and expects a **POWER CHANGE ACKNOWLEDGEMENT** response. As soon as this is received, **ms_p_con_interval** is restarted.

## Recommended values

The BSS command parameter **ms_p_con_interval** is set as an integer in the range 0 to 31 pairs of SACCH mutiframes (31 represents 62 SACCH mutiframes).

The formula for calculation of the value of the minimum value of this timer is given in the *Technical Description: BSS Command Reference (6802901W23)* manual.

The recommended value is 2 (4 SACCH mutiframes).

## Internal name

P_CON_INTERVAL

# ms_sapi3_est

## Definition

In a MS terminated (downlink) short message process, the BTS (RRSM) timer **ms_sapi3_est** guards against the non-receipt of a confirmation from RSS that a SAPI3 connection has been established.

This timer can be set in the BSS database by the parameter **ms_sapi3_est**.

## Normal operation

In normal operation, a **SAPI3 DTAP** message comes in from the MSC to SSM. SSM forwards this to RRSM. RRSM needs to set up a SAPI3 connection with RSS, starts timer **ms_sapi3_est**, and sends an **establish request** message to RSS. Timer **ms_sapi3_est** is stopped on receipt of an **establish confirm** message, which means that RSS has prepared the SACCH or FACCH for SAPI3 format ready to transmit the short message. RRSM then moves to a steady state where SMS messages can be transferred.

## Abnormal operation

If timer **ms_sapi3_est** expires before the **establish confirm** message is received from the RSS, RRSM sends a **reject sapi3** message to SSM, and the DTAP short message from the MSC is discarded. SSM sends a BSSMAP **SAPI3 REJECT** message to the MSC.

## Recommended values

The BSS command parameter **ms_sapi3_est** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 28000 milliseconds, which is also the default. Optimization of this timer gives no system benefit, as the resources used by SAPI3 are the same as those used by the correlated SAPI0, which must already be in use.

## Internal name

RRSM_MTE1

# nc_non_drx_period

## Definition

The **nc_non_drx_period** parameter specifies the time interval that the BSS allows for the MS to read the paging channel (CCCH) for a Packet Cell Change Order (PCCO) control message.

It can be set in the BSS database by the parameter **nc_non_drx_period** .

## Normal operation

The GPRS feature must be unrestricted. The time set by this parameter is sent down to the GPRS MS in the downlink Packet Cell Change Order or Packet Measurement Order.

At expiry of the timer, a new PCCO is sent.

## Abnormal operation

This is a period timer and there is no abnormal operation.

## Recommended values

The BSS command parameter **nc_non_drx_period** is set as an integer in the range 0 to 7 where:

| | |
|---|---|
| 0 | No non_drx_period set |
| 1 | 0.24 seconds |
| 2 | 0.48 seconds |
| 3 | 0.72 seconds |
| 4 | 0.96 seconds |
| 5 | 1.20 seconds |
| 6 | 1.44 seconds |
| 7 | 1.96 seconds |

The default value is 2 (0.48 seconds).

# nc_reporting_period_i

## Definition

The **nc_reporting_period_i** parameter specifies the time interval between successive measurement reports from a GPRS MS in idle mode.

It can be set in the BSS database by the parameter **nc_reporting_period_i** .

## Normal operation

The GPRS feature must be unrestricted. The time set by this parameter is sent down to the GPRS MS in the downlink Packet Cell Change Order or Packet Measurement Order.

A GPRS MS makes a measurement report every time the timer expires.

## Abnormal operation

This is a periodicity timer and there is no abnormal operation.

## Recommended values

The BSS command parameter **nc_reporting_period_i** is set as an integer in the range 4 to 6 where:

| | |
|---|---|
| 4 | 15.36 seconds |
| 5 | 30.72 seconds |
| 6 | 61.44 seconds |

The default value is 6 (61.44 seconds).

# nc_reporting_period_t

## Definition

The **nc_reporting_period_t** parameter specifies the time interval between successive measurement reports from a GPRS MS while transferring packet data.

It can be set in the BSS database by the parameter **nc_reporting_period_t** .

## Normal operation

The GPRS feature must be unrestricted. The time set by this parameter is sent down to the GPRS MS in the downlink Packet Cell Change Order or Packet Measurement Order.

A GPRS MS makes a measurement report every time the timer expires.

## Abnormal operation

This is a periodicity timer and there is no abnormal operation.

## Recommended values

The BSS command parameter **nc_reporting_period_t** is set as an integer in the range 0 to 6 where:

| | |
|---|---|
| 0 | 0.96 seconds |
| 1 | 1.92 seconds |
| 2 | 3.84 seconds |
| 3 | 7.68 seconds |
| 4 | 15.36 seconds |
| 5 | 30.72 seconds |
| 6 | 61.44 seconds |

The default value is 2 (3.84 seconds).

# neighbor_report_timer

## Definition

The **neighbor_report_timer** timer defines a handover delay allowed for the MS to decode the BSIC and report on potentially interfering neighbours. This timer is only valid if the Concentric Cells option is enabled, and the inner zone algorithm type is set to 2.

## Normal operation

The interference based concentric cell algorithm is based on neighbour information reported by the mobile. The mobile must be allowed enough time to report on interfering neighbours before attempting to move the MS to an inner zone. The RSS subsystem handover (HDPC) waits for a number of SACCH periods, defined by the **neighbor_report_timer**, before attempting to move the MS to an inner zone.

## Recommended values

The BSS command parameter **neighbor_report_timer** is set as an integer (SACCH periods) in the range 0 to 255.

The default value is 10.

# ns_alive_timer

## Definition

The **ns_alive_timer** guards the NS Test Procedure between the BSS and the SGSN.

This timer is set when the BSS sends an NS-ALIVE-ACK PDU to the SGSN. This timer is cleared when the NS-ALIVE-ACK is received by the BSS from the SGSN. If the timer expires before the ACK is received, the NS Test Procedure is repeated a maximum of **ns_alive_retries** attempts. After the maximum number of attempts fail, the NS Test Procedure is stopped and the NSVC is marked dead and blocked.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **ns_alive_timer** is set as an integer in the range 1 to 30 seconds.

The default value is 3 seconds.

# ns_block_timer

## Definition

The **ns_block_timer** guards the NS Blocking and Unblocking Procedures between the BSS and SGSN.

This timer is set when the BSS sends an NS-BLOCK or NS-UNBLOCK PDU to the SGSN. This timer is cleared when the NS-BLOCK-ACK or NS-UNBLOCK-ACK PDU is received by the BSS from the SGSN. If the timer expires before an ACK is received, the NS Blocking or Unblocking procedure is repeated a maximum of **ns_block_retries** attempts. After the maximum attempts fail, the NSVC remains unblocked.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **ns_block_timer** is set as an integer in the range 1 to 30 seconds.

The default value is 3 seconds.

# ns_reset_period

## Definition

The **ns_reset_period** timer specifies the period for which the BSS attempts to reset an NSVC using the NS Reset Procedure.

This timer is set when the BSS initiates the NS Reset Procedure. If the NS-RESET-ACK is not returned before **ns_reset_timer** expires, then the NS Reset Procedure is repeated for the **ns_reset_period**. If the NS Reset Procedure is not successful before the **ns_reseet_period** expires, the NSVC remains unblocked.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **ns_reset_period** is set as an integer in the range 1 to 250 seconds.

The default value is 125 seconds.

# ns_reset_timer

## Definition

The **ns_reset_timer** guards the NS Reset Procedure between the BSS and the SGSN.

This timer is set when the BSS sends an NS-RESET to the SGSN. This timer is cleared when the NS-RESET-ACK is received by the BSS from the SGSN. If the timer expires before the ACK is received, the NS Reset Procedure is repeated until the **ns_reset_period** expires. If the NS Reset Procedure is not successful before the **ns_reset_period** expires, the NSVC remains blocked.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **ns_reset_timer** is set as an integer in the range 1 to 60 seconds.

The default value is 3 seconds.

# ns_test_timer

## Definition

The **ns_test_timer** specifies the periodicity for the NSVC Test Procedure. The NSVC is tested every **ns_test_timer** seconds

This timer is set upon successful completion of the NS Test Procedure. Upon expiry of the timer, the BSS initiates the NS Test Procedure. Upon successful completion of the NS Test Procedure, the timer is started again. The procedure is repeated each time the timer expires.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **ns_test_timer** is set as an integer in the range 1 to 60 seconds.

The default value is 10 seconds.

# pccch_drx_timer_max

{3723}

## Definition

The **pccch_drx_timer_max** timer is the duration of the transfer non-DRX (non-Discontinuous Reception) mode period on the Packet Common Control Channel (PCCCH).

This timer can be set in the BSS database by the parameter **pccch_drx_timer_max**.

## Normal operation

The value of this timer parameter is the binary representation of the standard parameter DRX_TIMER_MAX. It is given as two taken to the power of the binary value minus one ($2_{(bv-1)}$) in units of one second.

## Abnormal operation

This is a period timer only and there is no abnormal operation.

## Recommended values

The timer can be set by parameter to between 0 and 7, where

| | |
|---|---|
| 0 | 0 seconds |
| 1 | 1 second |
| 2 | 2 seconds |
| 3 | 4 seconds |
| 4 | 8 seconds |
| 5 | 16 seconds |
| 6 | 32 seconds |
| 7 | 64 seconds |

The parameter is set by default to 3 (4 seconds).

## Internal name

None.

# penalty_time

## Definition

The timer **penalty_time** specifies to the MS the interval during which a cell that is placed by an MS on the list of strongest cells for selection is given a negative C2 parameter value to prevent fast moving MSs from selecting it. During this period the **temporary_offset** field is active.

It can be set in the BSS database by the parameter **penalty_time**.

## Normal operation

In normal operation the **penalty_time** value is sent to the MS in **SYSTEM INFORMATION** messages.

## Recommended values

The BSS command parameter **penalty_time** is set as an integer in the range 0 to 31 steps, where one step is 20 seconds.

The default value is 0 steps (0 seconds). There is no recommended value as this will depend upon the situation.

## Internal name

PENALTY_TIME

## GSM name

PENALTY_TIME Specifications: TSGSM 4.08, 5.08, 3.22.

# phase_lock_duration

## Definition

This timer extends the minimum length of time a GCLK should hold synchronization with an MMS before the GCLK is considered synchronized.

NOTE

The **phase_lock_duration** database element for this timer is set by default on equipping an MMS (automatic on equip MSI). The value can be altered only by use of the modify_value command. Refer to the manual *Technical Description: BSS Command Reference (68P02901W23)*.

## Recommended values

The **phase_lock_duration** parameter is set as an integer within the range 0 to 3600 seconds.

There is no default or recommended value.

# psi1_repeat_period

{3723}

## Definition

This period timer specifies the time interval between consecutive PSI1 messages in 52-frame multiframes.

This timer can be set in the BSS database by the parameter **psi1_repeat_period**.

## Normal operation

The timer is set to the value specified by the operator either between 1 and 16. If the timer is set to 0, the BSS uses an internal algorithm based on the value of the **bs_pbcch_blks parameter** and the number of PSI instances in the low repetition rate group.

## Abnormal operation

This is a period timer only and there is no abnormal operation.

## Recommended values

The BSS command parameter **psi1_repeat_period** is set as an integer in the range 1 to 16. If set to 0, it is calculated by the BSS using an internal algorithm based on the value of the **bs_pbcch_blks** parameter and the number of PSI instances in the low repetition rate group.

This timer value is set by default to 5 (five PSI1s in a 52-frame multiframe).

Table 3-1 shows the combinations of **psi1_repeat_period** and **bs_pbcch_blks** that are not permitted.

**Table 3-1** Impermissible combinations of **psi1_repeat_period** and **bs_pbcch_blks**

| bs_pbcch_blks | psi1_repeat_period | Allowed |
|---|---|---|
| 1 | 1 | No |
| 2 | 1 | No |

## Internal name

None.

# rach_load_period

## Definition

The BTS (RSS) interval timer **rach_load_period** specifies the number of TDMA multiframes between successive calculations of the RACH load during non-overload conditions, by the L1 subsystem of RSS. Overload conditions are customer defined.

It can be set in the BSS database by the parameter **rach_load_period**.

Contrast this database element with **ccch_load_period** which serves the same purpose but when the RACH load is overloaded.

## Normal operation

When the timer **rach_load_period** expires, the BTS checks for a RACH overload condition. If a arch overload condition is detected, the RSS sends a arch overload message **cach_load_indication** message to call processing. This starts the **cach_load_period** timer. If no overload condition is detected, the RSS restarts the **rach_load_period** timer.

## Recommended values

The BSS command parameter **rach_load_period** is set as an integer in the range 1 to 1,020 TDMA multiframes.

The recommended value is 16 multiframes, which is also the default.

## Related timers

The BSS command parameter **ccch_load_period** also affects flow control.

## Internal name

RACH_MEAS_PERIOD

# radio_chan_released

## Definition

In a release of radio resources, the BSC (SSM) timer **radio_chan_released** ensures that radio resources are actually released for re-use.

This timer can be set in the BSS database by the parameter **radio_chan_released**.

## Normal operation

In normal operation the timer **radio_chan_released** is started on the sending of a **release radio channel** message to the RRSM. It is stopped on receipt of a **radio channel released** message from the RRSM (after RRSM has de-allocated its resources). The SSM then sends an **SCCP RLSD** message to the MSC.

## Abnormal operation

If the timer **radio_chan_released** expires before a **radio channel released** message is received from the source RRSM, the SSM still sends an SCCP **RLSD** message to the MSC.

NOTE

In handover situations, this timer is used for both source and target radio resource release. The timer should be set to cover both of these. Note that on expiry, the resources will in any case be released by the immediate **SCCP RLSD** message to the MSC.

## Recommended values

The BSS command parameter **radio_chan_released** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds.

## Internal name

SSM_MTH

# radio_link_timeout

## Definition

The BSS parameter **radio_link_timeout** specifies the threshold (limit) for radio downlink failure on the SACCH (Slow Associated Control CHannel). The channel is held only for as long as a user could reasonably be expected to hold while experiencing loss of audio. After this, the user would assume the call had dropped, and hang up.

It can be set in the BSS database by the parameter **radio_link_timeout**.

## Normal operation

For **SYSTEM INFORMATION** messages that require a Cell Options (BCCH) field, a **RADIO-LINK-TIMEOUT** must be provided. CRM uses the BSS database element **radio_link_timeout** for this purpose. The MS uses this parameter whenever DX is lost on the SACCH. If DX is lost for longer than **radio_link_timeout**, the MS tears down the call (probably through a DISC).

## Recommended values

The BSS command parameter **radio_link_timeout** is set as an integer in the range 0 to 15 multiples of four SACCH frames, where 0 is 4 SACCH frames, 1 is 8 SACCH frames, and so on.

The recommended value is 4 (20 SACCH frames), which is also the default.

## Internal name

RADIO_LINK_TIMEOUT(MS)

## GSM name

RADIO-LINK-TIMEOUT(MS) Specification: 4.08

# red_loss_restore

## Definition

The CA (Central Authority) period timer **red_loss_restore** specifies the threshold (time limit) for restoring into service after synchronization loss on 1.544 Mbit/s (T1 circuit), due to the number of synchronization loss alarms exceeding the limit set by the BSS alarm **red_loss_oos** .

It can be set in the BSS database by the parameter **red_loss_restore**.

## Normal operation

If the number of alarms exceed **red_loss_oos**, the 1.544 Mbit/s circuit (T1 MMS device) is taken out of service, and the **red_loss_restore** timer is started.

If no synchronization loss error occurs within this interval, the 1.544 Mbit/s circuit is brought back into service.

## Abnormal operation

This is a period timer only and there is no abnormal operation.

## Recommended values

The BSS command parameter **red_loss_restore** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

The recommended value is 6000 (600000 milliseconds), which is also the default.

## Related timers

The synchronization loss is controlled by the value assigned to the **red_loss_oos** alarm count threshold.

See also the timer **red_time_restore**, which is similar, but based on the **red_time_oos** timer threshold.

## Internal name

None.

# red_psp_audit_tmr

{22064}

## Definition

The timer **red_psp_audit_tmr** specifies the audit interval for checking the health of the redundant PSP (MPROC).

This timer is set in the BSS database by the parameter **red_psp_audit_tmr**.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **red_psp_audit_tmr** is set as an integer in the range 0 to 24.

The default value is 24

## Internal name

None.

# red_time_oos

## Definition

The CA (Central Authority) interval timer **red_time_oos** specifies the threshold (time limit) for a 1.544 Mbit/s circuit (T1 link) circuit to be out of synchronization, before it is taken out of service.

It can be set in the BSS database by the parameter **red_time_oos**.

## Recommended values

The BSS command parameter **red_time_oos** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

The recommended value is 25 (2500 milliseconds), which is also the default.

## Related timers

The time limit for restoration of the circuit into service if no synchronization loss error occurs is set by the value assigned to the **red_time_restore** timer.

## Internal name

None.

# red_time_restore

## Definition

The CA (Central Authority) timer **red_time_restore** specifies the threshold (time limit) for restoring into service after synchronization loss on a 1.544 Mbit/s (T1) circuit, due to the timer **red_time_oos** being exceeded.

It can be set in the BSS database by the parameter **red_time_restore**.

## Normal operation

If the synchronization loss time exceeds **red_time_oos** , the 1.544 Mbit/s (T1) circuit is taken out of service, and the **red_time_restore** timer is started.

If no synchronization loss error occurs within this interval, the 1.544 Mbit/s (T1) circuit is brought back into service.

## Recommended values

The BSS command parameter **red_time_restore** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

The recommended value is 150 (15000 milliseconds), which is also the default.

## Related timers

The synchronization loss is controlled by the value assigned to the **red_time_oos** timer.

See also the timer **red_loss_restore**, which is similar but based on the **red_loss_oos** alarm count threshold.

## Internal name

None.

# register_exp

## Definition

A newly created CRM in a BTS needs to enquire whether a reset is already in progress because it handles the barring of cells. The timer **register_exp** is used by the new CRM to guard for the response from the CLM to its request to register.

This timer can be set in the BSS database by the parameter **register_exp**.

## Normal operation

In normal operation, the CRM sends a **register** message to CLM and starts timer **register_exp** to guard for a response. CLM sends either a **register ack** message if there is a reset in progress, or a **start bss** message if not. In either case CRM stops the timer on receipt. If CRM receives a **register ack** message, CLM follows this up with a **start bss** message as soon as the reset is finished. As soon as CRM receives a **start bss** message, it continues normal operation.

## Abnormal operation

If the **register_exp** timer expires before receipt of a response from CLM, the CRM restarts the timer and sends a further **register** message to CLM. The process continues indefinitely until the CLM responds.

## Recommended values

The BSS command parameter **register_exp** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 120000 milliseconds, which is also the default.

## Internal name

MTCRM_REGISTER_EXP

# remote_loss_restore

## Definition

The CA (Central Authority) period timer **remote_loss_restore** specifies the threshold (time limit) for restoring a 2 Mbit/s circuit into service after the remote synch loss alarm count threshold on a 2 Mbit/s circuit is exceeded. This count threshold is set by the BSS parameter **remote_loss_oos**.

It can be set in the BSS database by the parameter **remote_loss_restore**.

## Normal operation

If the number of alarms exceeds **remote_loss_oos**, the MMS is taken out of service, and timer **remote_loss_restore** is started.

If a remote synch loss alarm indication error is not detected from the remote location within this interval, the 2 Mbit/s circuit is brought back into service.

## Recommended values

The BSS command parameter **remote_loss_restore** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

The recommended value is 6000 (600000 milliseconds), which is also the default.

## Related timers

The synchronization loss is controlled by the value assigned to the **remote_loss_oos** alarm count.

See also the timer **remote_time_restore**, which is similar but based on the **remote_time_oos** time threshold.

## Internal name

None.

# remote_time_oos

## Definition

The CA (Central Authority) timer **remote_time_oos** specifies the remote alarm threshold (time limit) for a 2 Mbit/s circuit, before it is taken out of service.

It can be set in the BSS database by the parameter **remote_time_oos**.

## Recommended values

The BSS command parameter **remote_time_oos** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

There is no default, or recommendation. The setting will depend on the installation requirements.

## Related timers

The time limit for restoration of the circuit into service if the alarm ceases is set by the value assigned to the **remote_time_restore** timer.

## Internal name

None.

# remote_time_restore

## Definition

The CA (Central Authority) timer **remote_time_restore** specifies the threshold (time limit) for restoring into service after a remote alarm condition (caused by the timer **remote_time_oos** being exceeded) ceases on a 2 Mbit/s circuit.

It can be set in the BSS database by the parameter **remote_time_restore**.

## Normal operation

If the synchronization loss time exceeds **remote_time_oos**, the 2 Mbit/s (MMS configured as an E1 link) is taken out of service, and timer **remote_time_restore** is started.

If a remote synch loss alarm indication error is not detected from the remote location within this interval, the 2 Mbit/s circuit is brought back into service.

## Recommended values

The BSS command parameter **remote_time_restore** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

The recommended value is 5 (500 milliseconds), which is also the default.

## Related timers

The limit for remote alarm taken out of service is controlled by the value assigned to the **remote_time_oos** timer.

See also timer **remote_loss_restore**, which is similar but based on the **remote_loss_oos** alarm count threshold.

## Internal name

None.

# rf_chan_rel_ack

## Definition

In call clearing operations, the BTS (CRM) timer **rf_chan_rel_ack** ensures that the RSS and RRSM deallocate the radio resources for re-use. The last resource to be de-allocated for CRM is the radio channel.

The timer **rf_chan_rel_ack** can be set in the BSS database by the parameter **rf_chan_rel_ack**.

## Normal operation

The CRM in the BTS performing the call clearing operation starts the timer **rf_chan_rel_ack** on sending the **rf channel release** message to the RSS. RSS then sends an **rf channel release acknowledge** message to RRSM. CRM then stops the timer on receipt of the resulting **rf channel release ack received** message from RRSM, and tears down the radio resources freed.

## Abnormal operation

If the **rf_chan_rel_ack** message expires before receipt of the **rf channel release ack received** from the RRSM, it tears down the radio resources anyway, exactly as if it had received the message.

## Recommended values

**rf_chan_rel_ack** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 5000 ms.

## Internal name

MTCRM_RF_CHAN_REL_ACK

# rf_res_ind_period

## Definition

The RSS (HDPC) database element **rf_res_ind_period** sets the periodicity for an RSS to notify CRM via its RRSM of interference on its idle channels. CRM uses this data for channel selection at handovers and assignments.

It can be set in the BSS database by the parameter **rf_res_ind_period**.

## Normal operation

While channels are idle, the associated radio is constantly collecting interference measurements. These are calculated as rolling averages, just as measurement statistics are. Each radio RSS categorizes channels into interference bands, and sends the information (grouping channels into these band categories) to CRM at every expiry of the period specified by **rf_res_ind_period**.

NOTE

This database element **rf_res_ind_period** does not control the averaging of the interference measurements. This is specified by the BSS command parameter **interfer_alg**.

## Abnormal operation

This database element only specifies a period of time. There is therefore no abnormal operation.

## Recommended values

**rf_res_ind_period** is set as an integer SACCH multiframes in the range 1 to 127.

The recommended value is 10, which is also the default.

## Internal name

RF_RES_IND_PERIOD

# rpd_period

## Definition

The **rpd_period** specifies the number of SAACH frames used to calculate a rolling average of uplink rxlev values.

Detected MS power levels are averaged over the number of SAACH periods specified by the **rpd_period** parameter. This average is compared to the value specified for the **rpd_trigger** value. The rapid power down procedure is initiated when the calculated value is greater than the value specified for the **rpd_trigger** parameter value.

It can be set in the BSS database by the parameter **rpd_period**.

## Normal operation

During every measurement report period, the RSS computes a rolling average of the downlink rxlev values. If the average is greater than the value specified for **rpd_trigger** value, the rapid power down procedures begin.

## Recommended values

The BSS command parameter **rpd_period** is set as an integer in the range 1 to 32 SAACH periods.

The recommended value is 2 SAACH periods, which is also the default.

## Related timers

There are no related timers, but see the references to the **rpd_trigger** BSS command parameter above.

## Internal name

None.

# rr_ny1_rep

## Definition

In an assignment to TCH or inter-cell handover, the BTS (RSS) threshold BSS command parameter **rr_ny1_rep** specifies the maximum number of times the DRI can retransmit the **PHYSICAL INFORMATION** message. This parameter is used by the RSS Layer 1 process.

This parameter can be set in the BSS database by the parameter **rr_ny1_rep**.

## Recommended values

The BSS command parameter **rr_ny1_rep** is set as an integer in the range 0 to 100 repetitions.

The recommended value is 20 repetitions, which is also the default.

## Related timers

This parameter is related to the **rr_t3105** timer, which sets the interval between repetitions of the **PHYSICAL INFORMATION** message.

## Internal name

TM_HO_NY1_REP

# rr_t3101

## Definition

In a connection establishment sequence the BTS (RRSM) timer **rr_t3101** guards that the MS successfully accesses the SDCCH.

This timer can be set in the BSS database by the parameter **rr_t3101**.

## Normal operation

In normal intra-BSS operation timer **rr_t3101** is started on the sending of a 4.08 **IMMEDIATE ASSIGN COMMAND (AGCH)** message to the source RRSM. It is stopped on receipt of a **SABM** from the MS with any of the following initial DTAP messages piggy-backed (encapsulated):

- **CM SERVICE REQUEST**
- **CM REESTABLISH REQUEST**
- **PAGE RESPONSE**
- **LOCATION UPDATE**
- **IMSI DETACH**

Receipt of this message triggers the **MS POWER CONTROL** message back to the MS and the DTAP is forwarded to SSM.

## Abnormal operation

If the timer **rr_t3101** expires before the SABM from the MS, RRSM sends **deallocate inactive dch** and **deallocate sccp reference number** messages to CRM, and de-allocates its own radio resources.

## Recommended values

The BSS command parameter **rr_t3101** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 5000 milliseconds, which is also the default.

**NOTE**

This timer should always be set larger than the maximum time taken for a Layer 2 establishment attempt at the MS, otherwise the connection will never be possible.

## GSM name

T3101 Specification 4.08.

# rr_t3103

## Definition

In an inter-cell handover, the BTS (SSM) timer **rr_t3103** guards that the MS accesses the new channel or returns to the old channel.

This timer can be set in the BSS database by the parameter **rr_t3103**.

## Normal operation

### If MS arrives on new channel

SSM starts the timer **rr_t3103** on sending an **initiate handover** message to the source RRSM. SSM stops it on receipt of a **handover successful** message from the target RRSM, and at this time SSM sends a **blast** message to the source RRSM to free the old channel for use by another MS. SSM sends a **HANDOVER PERFORMED** message to the MSC. SSM also sends a transfer complete message to SM.

### If MS reverts to old channel

SSM starts the timer **rr_t3103** on sending an **initiate handover** message to the source RRSM. SSM stops it on receipt of an **unsuccessful handover** message from the source RRSM, and at this time SSM sends a **blast** message to the target RRSM to free any allocated resources for use by another MS. SSM also almost always sends a transfer complete message to SM.

## Abnormal operation

If the timer **rr_t3103** expires before the **handover successful** message is received from the target RRSM and before an **unsuccessful handover** message from the source RRSM, SSM sends a **CLEAR REQUEST** message to the MSC that contains the cause value:
`RF message failure`

## Recommended values

The BSS command parameter **rr_t3103** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

NOTE

This timer should always be set larger than the **ho_complete** and **bssmap_t8** timers to give the target RRSM time to establish the MS before **rr_t3103** expires and stops the handover.

## GSM name

T3103 Specification 4.08.

# rr_t3105

## Definition

In an assignment to TCH process or an inter-cell handover the BTS (RSS) timer **rr_t3105** specifies the delay between retransmissions of the **PHYSICAL INFORMATION** message. The RSS uses this value to calculate the number of 20 millisecond blocks to skip, which is sent to the DRIM.

This timer can be set in the BSS database by the parameter **rr_t3105**.

## Recommended values

The BSS command parameter **rr_t3105** is set as an integer in the range 0 to 200 increments of 20 milliseconds.

The recommended value is 60 increments of 20 milliseconds (1200 milliseconds), which is also the default.

## Related timers

The BSS command parameter **rr_ny1_rep** sets the threshold for the number of repetitions of the **PHYSICAL INFORMATION** message.

## Internal name

TM_HO_T3105

## GSM name

T3105 Specification 4.08.

# rr_t3109

## Definition

In any RF channel release the BTS (CRM) timer **rr_t3109** guards that the SACCH is actually released.

This timer can be set in the BSS database by the parameter **rr_t3109**.

## Normal operation

In a normal channel release operation, CRM starts the timer **rr_t3109** on sending a **deactivate sacch** message to the RSS. It is stopped on receipt of a **release indication received** message (active channel) or **release confirm received** message (inactive channel) from the associated RRSM.

The process is:

1. In any release situation, CRM sends a **deactivate sacch** message to RSS, and starts the timer **rr_t3109**.
2. As soon as RSS has deactivated the SACCH, it sends a **release indication** message to RRSM, if the channel is active, or a **release confirm** message to RRSM, if the channel is inactive.
3. RRSM forwards either a **release indication received** or a **release confirm received** message, as appropriate, to CRM.
4. CRM stops the timer **rr_t3109**.
5. CRM sends an **rf channel release** message to RSS.

## Abnormal operation

If the timer **rr_t3109** expires before a **release indication received** or **release confirm received** message is received from the RRSM, CRM continues with the deactivation procedure exactly as if the messages had been received.

## Recommended values

The BSS command parameter **rr_t3109** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 14400 milliseconds, which is also the default.

# GSM name

T3109 Specification: 4.08.

# rr_t3111_sd

## Definition

In a call clearing operation the BTS (CRM) timer **rr_t3111_sd** delays the actual deactivation of the SDCCH being released to allow for the possibility of a repetition of the disconnection procedure of the main signalling link. It prevents the BSS (CRM) from reallocating the SDCCH before its expiry, that is, two MSs trying to access the SDCCH at the same time.

## Normal operation

In a normal channel release operation, CRM sends a **deactivate sacch** message to RSS. RSS then sends RRSM a **release indication** message, and RRSM forwards this to CRM as a **release indication received** message. CRM starts the timer **rr_t3111_sd** on receiving this **release indication received** message. On expiry of the timer, CRM sends an **rf channel release** message to RSS.

## Abnormal operation

As the **rr_t3111_sd** timer is a delaying timer, it always expires and has no abnormal operation.

## Related timers

The **rr_t3111_sd** parameter value must be less than the **rr_t3109** parameter value, and must be equal to the **rr_t3110** parameter value.

## Recommended values

The BSS command parameter **rr_t3111_sd** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 1500 milliseconds, which is also the default.

## GSM name

T3111 Specification: 4.08.

# rr_t3111_tch

## Definition

In a call clearing operation the BTS (CRM) timer **rr_t3111_tch** delays the actual deactivation of the TCH being released to allow for the possibility of a repetition of the disconnection procedure of the main signalling link. It prevents the BSS (CRM) from reallocating the TCH before its expiry, that is, two MSs trying to access the TCH at the same time.

## Normal operation

In a normal channel release operation, CRM sends a **deactivate sacch** message to RSS. RSS then sends RRSM a **release indication** message, and RRSM forwards this to CRM as a **release indication received** message. CRM starts the timer **rr_t3111_tch** on receiving this **release indication received** message. On expiry of the timer, CRM sends an **rf channel release** message to RSS.

## Abnormal operation

As the **rr_t3111_tch** timer is a delaying timer, it always expires and has no abnormal operation.

## Related timers

The **rr_t3111_tch** parameter value must be less than the **rr_t3109** parameter value, and must be equal to the **rr_t3110** parameter value.

## Recommended values

The BSS command parameter **rr_t3111_tch** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 1500 milliseconds, which is also the default.

## GSM name

T3111 Specification: 4.08.

# rr_t3212

## Definition

As part of the control channel description information parameter in a **SYSTEM INFORMATION, type 3** message, the CRM includes the **rr_t3212** element from the database. This timer specifies the amount of time of inactivity necessary to trigger a location update.

This timer can be set in the BSS database by the parameter **rr_t3212**.

## Normal operation

The timer **rr_t3212** is started by the MS upon termination of mobility management service or mobility management signalling, and stopped on initiation of mobility management service or mobility management signalling.

## Abnormal operation

If the **rr_t3212** timer expires, the MS performs a location update.

## Recommended values

The BSS command parameter **rr_t3212** is set as an integer in the range 0 to 255 increments of 10 hours. A value of 0 hours indicates an infinite timeout period.

The recommended value is 10 increments of 10 hours each (100 hours), which is also the default.

## GSM name

T3212 Specification: 4.08.

# rsl_congestion_alarm_timer

{24660, 24661}

## Definition

The timer **rsl_congestion_alarm_timer** defines the minimum interval between reporting and clearing RSL congestion alarms to the OMC-R. The RSL congestion alarms are reported to the OMC-R on a per RSL-LCF basis.

This timer can be set in the BSS database by the parameter **rsl_congestion_alarm_timer**.

## Normal operation

This timer is set to the value specified by the operator.

## Abnormal operation

This is a period timer only and there is no abnormal operation.

## Recommended values

The BSS command parameter **rsl_congestion_alarm_timer** is set as an integer in the range 1000 to 600000 milliseconds

The default is 600000 milliseconds.

## Internal name

None.

# rtry_cand_prd

## Definition

The **rtry_cand_prd** intra-bss timer controls the time for which a cell is marked as congested, and will not accept incoming non-imperative handovers.

This timer only affects non-imperative types of handovers, such as Congestion Relief, Band Reassignment, and Band Handovers.

This timer does not affect any imperative handover retries. These handovers are allowed to take place regardless of such timers, as these handovers are needed in order to keep the call active.

When a handover resource is not available, the value of **rtry_cand_prd** for the target cell is used (default 4 seconds). This allows different timer values for different neighbours, which could vary in congestion levels. Using the source cell value for all its neighbours would not give this flexibility. This applies only to internal neighbours.

The timer will operate only if the Congestion Relief feature is unrestricted (**ho_exist_congest** element must be enabled). If the Congestion Relief feature is restricted, the parameter can be set; however, it will have no effect on the system.

## Normal operation

The timer is started if either:

- the congestion relief procedure is started in this cell,
- the cell rejects an incoming handover due to congestion.

When the timer expires, and the cell is no longer congested, non-imperative handovers can resume to the cell.

## Abnormal operation

As this is a period timer, there is no abnormal operation.

## Recommended values

The BSS command parameter **rtry_cand_prd** is set as an integer in the range 0 to 1000000 milliseconds.

The default is 4000 milliseconds. There is no recommended value.

## Internal name

RETRY_CAND_PERIOD

# sacch_info

## Definition

The CP subsystem provides RSS with 5, 5bis, 5ter, or 6 **SYSTEM INFORMATION** messages to be broadcast on the SACCH. The BTS (RSS) timer **sacch_info** sets the period for which RSS waits for the **SYSTEM INFORMATION** messages to be received as a set before broadcasting on the SACCH.

This timer can be set in the BSS database by the database parameter **sacch_info**.

## Normal operation

In normal operation, when RSS receives the first **SYSTEM INFORMATION** message, it starts timer **sacch_info** to ensure that it receives both **SYSTEM INFORMATION** messages in the specified set period. As soon as both the **SYSTEM INFORMATION** messages have been received from CP, RSS stops timer **sacch_info**, and sends them to the channel coders to be broadcast on the SACCH.

The information is sent immediately if both necessary SACCH system information messages have been received, and the **sacch_info** timer is stopped.

As soon as the first **SYSTEM INFORMATION** message of the next set arrives, the procedure begins again.

## Abnormal operation

If the **sacch_info** timer expires before the **SYSTEM INFORMATION** messages in a set have been received, the stored **SYSTEM INFORMATION** messages are sent out, and a SWFM is generated to say that an incomplete list has been sent out. On receipt of the next **SYSTEM INFORMATION** message, for the next set, the **sacch_info** timer is started again.

## Recommended values

The BSS command parameter **sacch_info** is set as an integer in the range 0 to 10000 milliseconds.

The recommended value is 2000 milliseconds.

## Internal name

TM_SACCH_INFO

# sap_end_time

## Definition

When scheduling a device audit at a site, the **sap_end_time** specifies the **end_time_hour** and **end_time_min** arguments.

This parameter can be set in the BSS database by the database parameter **sap_end_time**.

When scheduling device audits, the following syntax is used:

**chg_audit_sched**

There are three types of scheduling:

| | |
|---|---|
| Continuous Scheduling | If start_time and end_time have a value of 00:00 and interval is not zero. |
| Range Scheduling | If end_time is > start_time and interval ! = 0 && ≤ (end - start). |
| Once-Per-Day Scheduling | If start_time = end_time and interval has a value of 00:00. start_time and end_time must not have a value of 00:00. |

However, displaying the components of this is different. Component display is by use of the **disp_el** commands. For example, **disp_el sap_end_time** shows the **end_time_hour** and **end_time_min** from the **chg_audit_sched** command.

The **sap_end_time** parameter is applicable for range scheduling and once-per-day scheduling.

## Recommended values

The BSS command parameter **sap_end_time** is set as an integer in the range:

Hours 00 to 23.

Minutes 00 to 59.

There is no default value.

## Internal name

None.

# sap_interval

## Definition

When scheduling a device audit at a site, the **sap_interval** specifies the interval between device audits.

This parameter can be set in the BSS database by the database parameter **sap_interval**.

When scheduling device audits, the following syntax is used:

**chg_audit_sched**

There are three types of scheduling:

| | |
|---|---|
| Continuous Scheduling | If start_time and end_time have a value of 00:00 and interval is not zero. |
| Range Scheduling | If end_time is > start_time and interval ! = 0 && ≤ (end - start). |
| Once-Per-Day Scheduling | If start_time = end_time and interval has a value of 00:00. start_time and end_time must not have a value of 00:00. |

However, displaying the components of this is a bit different. Component display is by use of the **disp_el** commands. For example, **disp_el sap_interval** shows the **interval_hour** and **interval_min** from the **chg_audit_sched** command.

The **sap_interval** parameter is applicable for range scheduling.

## Recommended values

The BSS command parameter **sap_interval** is set as an integer in the range:

Hours 00 to 23.

Minutes 00 to 59.

There is no default value.

## Internal name

None.

# sap_start_time

## Definition

When scheduling a device audit at a site, the **sap_start_time** specifies the **start_time_hour** and **start_time_min** arguments.

This parameter can be set in the BSS database by the database parameter **sap_start_time**.

When scheduling device audits, the following syntax is used:

**chg_audit_sched**

There are three types of scheduling:

| | |
|---|---|
| Continuous Scheduling | If start_time and end_time have a value of 00:00 and interval is not zero. |
| Range Scheduling | If end_time is > start_time and interval ! = 0 && ≤ (end - start). |
| Once-Per-Day Scheduling | If start_time = end_time and interval has a value of 00:00. start_time and end_time must not have a value of 00:00. |

However, displaying the components of this is a bit different. Component display is by use of the **disp_el** commands. For example, **disp_el sap_start_time** shows the **start_time_hour** and **start_time_min** from the **chg_audit_sched** command.

The **sap_start_time** parameter is applicable for range scheduling and once-per-day scheduling.

## Recommended values

The BSS command parameter **sap_end_time** is set as an integer in the range:

Hours 00 to 23.

Minutes 00 to 59.

There is no default value.

## Internal name

None.

# sccp_released

## Definition

During release situations, the BSS (SSM) timer **sccp_released** is used in the channel release procedure after SSM has sent a BSSMAP **CLEAR COMPLETE** message to the MSC. The **CLEAR COMPLETE** message releases the BSSMAP layer. This timer guards for the actual release of the SCCP layer.

This timer can be set in the BSS database by the parameter **sccp_released**.

## Normal operation

In normal tear down operation SSM sends a BSSMAP **CLEAR COMPLETE** message to the MSC, and the starts the timer **sccp_released**. The **sccp_released** timer is stopped on receipt of the **RLSD** acknowledgement from the MSC, which asks the BSS to release the SCCP number and SCCP connection, or by receipt of a **release_done** or **sccp_disconnected** message. SSM then sends the SM a **disconnection request** message to disconnect the TDM timeslots involved.

## Abnormal operation

If the **sccp_released** timer expires before receipt of the **RLSD** message from the MSC, SSM treats the expiry exactly as if the **RLSD** message had been received from the MSC.

## Recommended values

The BSS command parameter **sccp_released** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

## Internal name

SSM_MTL

# sccp_tconn_est

## Definition

During the connection establishment process the BSC SSM timer **sccp_tconn_est** guards against the BSS failing to receive a response from the MSC to an SCCP **CONNECTION REQUEST** message.

This timer can be set in the BSS database by the parameter **sccp_tconn_est**.

## Normal operation

During call establishment, SSM receives information via RRSM from the MS as follows:

- CM service request.
- Paging response.
- Location update request.
- IMSI detach indication.

SSM then forwards this to the MSC embedded in a **CONNECTION REQUEST** message. The MSC should respond to the **CONNECTION REQUEST** message with an SCCP **CONNECTION CONFIRM (CC)** message.

SSM then starts timer **sccp_tconn_est** to guard for the expected SCCP **CC** response. When this is received, SSM stops **sccp_tconn_est** and moves the call to the SDCCH.

The message sequence that includes the SCCP **sccp_tconn_est** timer for a MS originated call (MS sends a **CM SERVICE REQUEST** message) is shown in **Connection establishment** in Chapter 2.

**NOTE**

The **CONNECTION REQUEST** message sequence is the same, whichever initial layer message is incorporated.

## Abnormal operation

If instead of the **CC** message, the MSC returns a BSSMAP **CONNECTION REFUSED (CREF)** message, or timer **sccp_tconn_est** expires, SSM initiates tear down of the call by sending a **release radio channel** message to the RRSM.

# Recommended values

GSM 04.08 specifies the following values for MS timers T3210, T3220, T3230, and T3240:

T3210 = 20 seconds

T3220 = 5 seconds

T3230 = 15 seconds

T3240 = 10 seconds

To minimize the amount of channel time lost in situations where **sccp_tconn_est** expires, but still to ensure that this timer expires after any MS timers, it is recommended to set **sccp_tconn_est** to a value of 30000 milliseconds. This value should be checked with the MSC system administrator to ensure that the MSC responds within this time limit to an SCCP **CONNECTION REQUEST** message.

# Internal name

TCONN_EST

# sccp_tiar

## Definition

In a connection establishment process, as soon as the BSC has established an SCCP (or higher layer) connection with the MSC for a given call, an inactivity test continuously occurs to ensure that the connection is still in use. The BSC(SSM) timer, **sccp_tiar**, times the unused period for the SCCP receive connection from the MSC before tearing down the connection.

This timer can be set in the BSS database by the parameter **sccp_tiar**.

## Normal operation

Upon initially establishing an SCCP connection, **sccp_tiar** is started. Each time an SCCP (or higher layer) message is received from the MSC for this SCCP connection, **sccp_tiar** is restarted.

## Abnormal operation

If **sccp_tiar** expires, the call is deemed dead, and SSM sends an **SCCP RLSD** message to the MSC. The timer **sccp_trel** also starts.

## Recommended values

The BSS command parameter **sccp_tiar** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

## Related timers

The **sccp_tiar** timer must be greater in value than the MSC send timer to allow the MSC time to receive the SCCP still active message.

## Internal name

SSM_TIAR

# sccp_tias

## Definition

In a connection establishment process, as soon as the BSC has established an SCCP (or higher layer) connection with the MSC for a given call, an inactivity test continuously occurs to ensure that the connection is still in use. The BSC(SSM) timer, **sccp_tias**, times the unused period for the SCCP send connection to the MSC, and, if necessary, triggers a message to keep the connection up, if it expires.

This timer can be set in the BSS database by the parameter **sccp_tias**.

## Normal operation

Upon initially establishing an SCCP connection, **sccp_tias** is started. Each time an SCCP (or higher layer) message is sent to the MSC for this SCCP connection, **sccp_tias** is restarted.

## Abnormal operation

If **sccp_tias** ever expires, an **INACTIVITY TEST** message is sent to the MSC, to advise that this SCCP connection is still in use.

## Recommended values

The BSS command parameter **sccp_tias** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds, which is also the default.

## Related timers

The **sccp_tias** timer must be less in value than the MSC receive timer, to allow the MSC time to receive the SCCP still active message.

## Internal name

SSM_TIAS

# sccp_trel

## Definition

In any connection release, the BSC (SSM) timer **sccp_trel** guards for the SCCP release confirmation from the MSC.

This timer can be set in the BSS database by the parameter **sccp_trel**.

## Normal operation

SSM sends to the MSC an SCCP **RLSD** message when the particular SCCP connection is no longer needed. SSM starts the timer **sccp_trel** to guard for the expected SCCP **RLC** response from the MSC.

As soon as the MSC has cleared up its resources associated with the SCCP connection, it sends an SCCP **RLC** message to SSM. On receipt, SSM stops timer **sccp_trel** and clears up its resources.

## Abnormal operation

If **sccp_trel** expires, SSM resends the SCCP **RLSD** message and restarts **sccp_trel**. This can continue for up to 60 seconds, at which point SSM clears up its resources anyway.

## Recommended values

The BSS command parameter **sccp_trel** is set as an integer in the range 4000 to 15000 milliseconds.

The recommended value is 10000 milliseconds, which is also the default.

## Internal name

TREL

# sdcch_timer_ho

## Definition

The BTS (HDPC) timer **sdcch_timer_ho** specifies the interval before a handover on the SDCCH (Stand-alone Dedicated Control CHannel) may occur. It ensures that the target channel is not lost during call setup by a handover. (This discourages stand-alone to stand-alone handovers; it is better to have them on a TCH.)

This timer can be set in the BSS database by the parameter **sdcch_timer_ho**.

## Recommended values

The BSS command parameter **sdcch_timer_ho** is set as an integer in the range 1 to 31 pairs of SACCH mutiframes.

The recommended value is 1 (two SACCH multiframes), which is also the default.

## Related timers

The BSS command parameter **sdcch_ho** must be set to 1 for a handover to occur on the SDCCH. There is no system software verification of this.

## Internal name

T_SDCCH_HO_ALLOWED

# slip_loss_restore

## Definition

The CA (Central Authority) period timer **slip_loss_restore** specifies the threshold (time limit) for restoring into service after a frame slip alarm condition has occurred due to the BSS parameter setting **slip_loss_oos** being exceeded.

This timer can be set in the BSS database by the parameter **slip_loss_restore**.

## Normal operation

The **slip_loss_oos** alarm is currently blocked by the alarms processing process FTP and by CA. No action is taken by Fault Management on the occurrence of this alarm.

## Recommended values

The BSS command parameter **slip_loss_restore** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

The recommended value is 6000 (600000 milliseconds), which is also the default.

## Related timers

There are no directly related timers, but the limit for remote alarm taken out of service is affected by the settings of the BSS parameters **slip_loss_hourly** and **slip_loss_daily**.

## Internal name

None.

# sm_audit_response

## Definition

During any call running on a dedicated channel, if the SM ever responds to a connection request, disconnection request, or transfer request from the SSM with a **switch failure** message instead of a **switch success** message, SSM audits the particular Circuit Identity Code (CIC) to ensure that the SSM CIC data is in alignment with the SM CIC data. Because the SM action has not been successfully performed, the call and all associated resources must be released. The BSC (SSM) timer **sm_audit_response** guards for the expected **audit response** message from the SM to as its last action, before SSM frees up the resources.

This timer can be set in the BSS database by the database parameter **sm_audit_response**.

## Normal operation

SSM sends the SM an **audit** message and starts the timer **sm_audit_response** to guard for the expected **audit response** message from SM. When the **sm_audit_response** message is received, or when the SSM receives information from a CM re-establishment request, the SSM stops timer **sm_audit_response**. The SSM then sends the necessary messages to clear up the call. For example, SSM may send a **reset circuit** message to CLM, an **RLC** message to the MSC, and a **deallocate sccp reference number** to CRM.

## Abnormal operation

If the timer **sm_audit_response** expires, actions are taken as if the **audit response** message had been received.

## Recommended values

The BSS command parameter **sm_audit_response** is set as an integer in the range 0 to 1000000 milliseconds.

The recommended value is 30000 milliseconds.

## Internal name

SSM_MTX

# spi

## Definition

In a Signalling Point Inaccessible (SPI) situation, the BSC (CLM) interval timer **spi** specifies the wait interval before initiating an internal reset of the BSS after the BSC has lost communication with another signalling point, if the condition has not ceased. For the MSC connection, it is a failure of the link, the SCCP layer, or the BSSAP layer. For the MS connection, it is all cells being barred (no MSs available). If the MSC connection is lost, the system maintains all calls for the period of this timer.

This timer can be set in the BSS database by the parameter **spi**.

## Normal operation

The timer **spi** is started by CLM if any of the following events occur:

- Last MTL goes OOS.
- BSSAP **SSP** (SubSystem Prohibited) message received by MSC.
- SCCP **UPU** (User Part Unavailable) message received for BSSAP by MSC.
- BSS BSSAP subsystem goes down, that is the last cell goes out of service.

If all of the events are cleared within the **spi** timer duration, the timer **spi** is stopped, and the BSS continues normal operation.

## Abnormal operation

If there are any of the above events uncleared before expiry of the timer **spi**, CLM begins the Global Reset Procedure as soon as the last event is cleared.

## Recommended values

The BSS command parameter **spi** is set as an integer in the range 10000 to 1000000 milliseconds.

The recommended value is 60000 milliseconds, which is also the default.

NOTE

The **spi** timer should be set large enough to prevent unnecessary resetting of the BSS but short enough not to hang the system by having an inoperative BSS.

## Internal name

CLM_SPI_TIMER

## GSM name

SPI Specification: 8.08.

# ss7_l2_t1

## Definition

During the process of bringing an MTL link into service, the BSC (MTPL2) timer **ss7_l2_t1**, known as the **alignment ready** timer, guards for the MSC response to a message confirming that the link is acceptable.

This timer can be set in the BSS database by the parameter **ss7_l2_t1**.

## Normal operation

In normal operation, MTPL2 begins a proving period as soon as the first attempt is made to bring the link into service, by exchanging status interchange messages with the MSC, and keeping a count of signalling errors.

As soon as this test is passed, MTPL2 starts the timer **ss7_l2_t1** , and sends a **FISU** (**Fill In Signal Unit**) message to the MSC. When the expected **FISU** or **MSU** (**Message Signal Unit**) response message from the MSC is received, MTPL2 stops the timer **ss7_l2_t1** and confirms the link as in service by sending a **dl connect confirm (OK)** message to MPL3.

## Abnormal operation

If timer **ss7_l2_t1** expires before the expected **FISU** or **MSU** message is received from the MSC, MTPL2 sends MTPL3 a **dl connect confirm (failure)** message to MTPL3, and the whole alignment process begins again.

## Recommended values

The BSS command parameter **ss7_l2_t1** is set as an integer in milliseconds. The valid ranges, shown below, depend on the value of the **ss7_mode** parameter:

| Range | ss7_mode setting |
|---|---|
| 40000 to 50000 | 0 (ITU) |
| 13000 to 30000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value | ss7_mode setting |
|---|---|
| 50000 | 0 (ITU) |
| 13000 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default when the **ss7_mode** parameter value is changed.

## Related timers

There are no related timers but see above for dependency on the **ss7_mode** BSS command parameter setting.

## Internal name

T1 (ITU)

## GSM name

T1 Specification: ITU Blue book Q703.

# ss7_l2_t2

## Definition

During the process of bringing an MTL link into service, the BSC (MTPL2) timer **ss7_l2_t2**, known as the **not aligned** timer, guards for the MSC response to a message requesting alignment status.

This timer can be set in the BSS database by the parameter **ss7_l2_t2**.

## Normal operation

In normal operation, MTPL2 sends an **SIO** (**Status Indication Out of Alignment**) message to the MSC and starts timer **ss7_l2_t2**, which guards for an expected status indication response. MTPL2 stops **ss7_l2_t2** when the MSC responds either with an **SIO**, with a **SIN** (**Status Indication Normal Alignment**), or with **SIE** (**Status Indication Emergency Alignment**), which declare the link as aligned. MTPL2 then starts timer **ss7_l2_t3** and sends a **SIN** or **SIE** (depending on the need) and waits for a **SIN** or **SIE** from the MSC.

## Abnormal operation

If the **ss7_l2_t2** timer expires before the expected MSC response, the whole alignment process is restarted.

## Recommended values

The BSS command parameter **ss7_l2_t2** is set as an integer in milliseconds. The valid ranges, shown below, depend on the value of the **ss7_mode** parameter:

| Range | ss7_mode setting |
|---|---|
| 5000 to 150000 | 0 (ITU) |
| 5000 to 30000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend the value of the **ss7_mode** parameter:

| Value | ss7_mode setting |
|---|---|
| 25000 | 0 (ITU) |
| 23000 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default value when the **ss7_mode** parameter value is changed.

# Related timers

There are no related timers but see above for dependency on the **ss7_mode** BSS command parameter setting.

# Internal name

T2 (ITU)

# GSM name

T2 Specification: ITU Blue book Q703.

# ss7_l2_t3

## Definition

During the process of bringing an MTL link into service, the BSC (MTPL2) timer **ss7_l2_t3**, known as the **aligned** timer, guards for the MSC to confirm alignment (see **ss7_l2_t2**. in this chapter).

This timer can be set in the BSS database by the parameter **ss7_l2_t3**.

## Normal operation

In normal operation, MTPL2 stops **ss7_l2_t2** when the MSC confirms receipt of the alignment status request and sends an **SIE** or a **SIN**, and starts the timer **ss7_l2_t3**. MTPL2 waits for either an **SIN** or **SIE** message from the MSC, confirming alignment. Once either of these is received, MTPL2 stops **ss7_l2_t3**, starts **ss7_l2_t4** and begins the proving period.

## Abnormal operation

If the **ss7_l2_t3** timer expires before the expected response from the MSC, the whole alignment procedure is restarted.

## Recommended values

The BSS command parameter **ss7_l2_t3** is set as an integer in milliseconds. The valid ranges, shown below, depend on the value of the **ss7_mode** parameter:

| Range | ss7_mode setting |
|---|---|
| 1000 to 1500 | 0 (ITU) |
| 5000 to 14000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value | ss7_mode setting |
|---|---|
| 1400 | 0 (ITU) |
| 11500 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default value when the **ss7_mode** parameter value is changed.

## Related timers

There are no related timers but see above for dependency on the **ss7_mode** BSS command parameter setting.

## Internal name

T3 (ITU)

## GSM name

T3 Specification: ITU Blue book Q703.

# ss7_l2_t4

## Definition

During the process of bringing an MTL link into service, the BSC (MTPL2) timer **ss7_l2_t4**, known as the **emergency proving period** timer, is used to time the proving period for the link after the MSC has confirmed alignment (see **ss7_l2_t3**. in this chapter).

This timer can be set in the BSS database by the parameter **ss7_l2_t4**.

## Normal operation

In normal operation, after MTPL2 stops **ss7_l2_t3** when the MSC confirms alignment, the timer **ss7_l2_t4** is started. MTPL2 begins the proving period.

During this proving period, signalling units are analyzed for their correctness. When **ss7_l2_t4** expires, MTPL2 determines if the number of correct signalling units is acceptable. If it is, the MTL is declared as in service. If it is not, the whole alignment procedure is restarted.

## Abnormal operation

As this timer is a period timer, there is no abnormal operation. It always expires.

## Recommended values

The BSS command parameter **ss7_l2_t4** is set as an integer in multiples of 5 milliseconds, in the range 400 to 600 milliseconds.

The recommended value is 600 milliseconds which is also the default.

## Internal name

T4 (ITU)

# GSM name

T4 Specification: ITU Blue book Q703.

# ss7_l2_t5

## Definition

During use of an MTL link, the BSC (MTPL2) timer **ss7_l2_t5**, known as the **sending SIB** timer, is used to time the resending of the **SIB** (**Status Indication Busy**) message to the MSC, in congestion situations. This timer is used to repeat the SIB message to the MSC as often as is necessary, while the congestion lasts.

This timer can be set in the BSS database by the parameter **ss7_l2_t5**.

## Normal operation

In normal operation, when MTPL2 mailboxes get congested (MTPL2 cannot process the MSC L2 messages as fast as they are being received), MTPL2 sends an **SIB** (Status Indication Busy) message to the MSC, and starts timer **ss7_l2_t5**. If the congestion ceases, **ss7_l2_t5** is stopped and normal MTL operation resumes.

## Abnormal operation

While the congestion situation lasts, on every expiry of **ss7_l2_t5**, the **SIB** is sent again to the MSC, and **ss7_l2_t5** is restarted. This can continue indefinitely until the congestion ceases.

## Recommended values

The BSS command parameter **ss7_l2_t5** is set as an integer in multiples of 5 milliseconds, in the range 80 to 120 milliseconds.

The recommended value is 100 milliseconds which is also the default.

## Internal name

T5 (ITU)

## GSM name

T5 Specification: ITU Blue book Q703.

# ss7_l2_t6

## Definition

During use of an MTL link, the BSC (MTPL2) timer **ss7_l2_t6**, known as the **remote congestion** timer, is used to time the period of inhibition of acknowledgement of unacknowledged MSUs in the retransmission buffer.

This timer can be set in the BSS database by the parameter **ss7_l2_t5**.

## Normal operation

In normal operation, when MTPL2 receives a **SIB** from the MSC, it starts **ss7_l2_t6** and inhibits acknowledgement of MSUs. As soon as any MSU in the retransmission buffer is acknowledged (positively or negatively), **ss7_l2_t6** is stopped, and normal operation resumes.

## Abnormal operation

If **ss7_l2_t6** expires before any MSU in the retransmission buffer is acknowledged, the MTL is taken out of service.

## Recommended values

The BSS command parameter **ss7_l2_t6** is set as an integer in milliseconds. The valid ranges, shown below, depend on the value of the **ss7_mode** parameter:

| Range | ss7_mode setting |
|---|---|
| 3000 to 6000 | 0 (ITU) |
| 1000 to 6000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value | ss7_mode setting |
|---|---|
| 5000 | 0 (ITU) |
| 5000 | 1 (ANSI) |

# Internal name

T6 (ITU)

# GSM name

T6 Specification: ITU Blue book Q703.

# ss7_l2_t7

## Definition

During use of an MTL link, the BSC (MTPL2) timer **ss7_l2_t7**, known as the **excessive delay of acknowledgement** timer, is used to time the period of inhibition of sending of **MSU**s, every time a **SIB** message is received from the MSC.

This timer can be set in the BSS database by the parameter **ss7_l2_t7**.

## Normal operation

In normal operation, when MTPL2 receives a **SIB** from the MSC, it starts **ss7_l2_t7** simultaneously with **ss7_l2_t6**, and inhibits the sending of **MSU** messages. On expiry of **ss7_l2_t7**, the sending of **MSU** messages resumes.

## Abnormal operation

As this is a period timer, there is no abnormal operation. It always expires.

## Recommended values

The BSS command parameter **ss7_l2_t7** is set as an integer in milliseconds, in the range 500 to 2000.

The recommended value is 1000 milliseconds, which is also the default.

## Related timers

The timer **ss7_l2_t6** is started by MTPL2 simultaneously with **ss7_l2_t7**. Timer **ss7_l2_t6** is a longer supervisory timer to be sure the MTL does not need to be taken out of service.

## Internal name

T7 (ITU)

# GSM name

T7 Specification: ITU Blue book Q703.

# ss7_l3_t1

## Definition

During use of an MTL link, the BSC (MTPL3) timer **ss7_l3_t1**, known as the **delay to avoid mis-sequencing on changeover** timer, delays signalling traffic during changeover to a new MTL.

The purpose of this delay is to avoid mis-sequencing. This gives the MSC time to be ready for messages for the old MTL over the new MTL.

This timer can be set in the BSS database by the parameter **ss7_l3_t1**.

## Normal operation

In normal operation when an MTL fails and a changeover must occur, MTPL3 starts delay timer **ss7_l3_t1**. While this timer is running, signalling traffic not yet sent down the unavailable MTL is held. As soon as **ss7_t3_t1** expires, the traffic is sent down the new MTL assigned by the changeover.

## Abnormal operation

As this is a period timer, there is no abnormal operation. It always expires.

## Recommended values

The BSS command parameter **ss7_l3_t1** is set as an integer in multiples of 5 milliseconds, in the range 500 to 1200 milliseconds.

The recommended value is 850 milliseconds which is also the default.

## Internal name

T1_TIMER

# GSM name

T1 Specification: ITU Blue book Q704.

# ss7_l3_t2

## Definition

During use of an MTL link, the BSC (MTPL3) timer **ss7_l3_t2**, known as the **time to wait for changeover acknowledgement** timer, is used to guard for the acknowledgement from the MSC to the order to change over to a new MTL.

This timer can be set in the BSS database by the parameter **ss7_l3_t2**.

## Normal operation

In normal operation, when MTPL3 initiates a changeover, it sends a **CHANGEOVER ORDER** message to the MSC and starts timer **ss7_l3_t2** to guard for the expected **CHANGEOVER ACK** message from the MSC.

## Abnormal operation

If **ss7_l3_t2** expires, MTPL3 sends buffered messages on the new MTL and disconnects L2 on the old MTL.

## Recommended values

The BSS command parameter **ss7_l3_t1** is set as an integer in multiples of 5 milliseconds, in the range 700 to 2000 milliseconds.

The recommended value is 1400 milliseconds which is also the default.

## Internal name

T2_TIMER

## GSM name

T2 Specification: ITU Blue book Q704.

# ss7_l3_t4

## Definition

During use of an MTL link, after a changeover, the BSC(MTPL3) timer **ss7_l3_t4** guards for receipt of a **CHANGEBACK ACKNOWLEDGE** message from the FM, after the BSS has sent a **CHANGEBACK ORDER** message to it. The timer is known as the **waiting for changeback acknowledgement (first attempt)** timer.

This timer can be set in the BSS database by the parameter **ss7_l3_t4**.

## Normal operation

In normal operation, when the failed MTL becomes available after a changeover, and the MSC signalling point is accessible from the MTL initiating the changeback, the usual mechanism of sending a changeback message is used. MTPL3 sends a **CHANGEBACK ORDER** message to the MSC, and starts **ss7_l3_t4** to guard for the receipt of a **CHANGEBACK ACKNOWLEDGE** message. Once this is received, MTPL3 stops **ss7_l3_t4**, and sends buffered messages on the new MTL. MTPL3 then restores normal messaging with the new MTL.

## Abnormal operation

If **ss7_l3_t4** expires before receipt of the **CHANGEBACK ACKNOWLEDGE** message, MTPL3 resends the changeback order and starts timer **ss7_l3_t5** to guard for the expected **CHANGEBACK ACKNOWLEDGE** response.

## Recommended values

The BSS command parameter **ss7_l3_t4** is set as an integer in multiples of 5 milliseconds, in the range 500 to 1200 milliseconds.

The recommended value is 850 milliseconds which is also the default.

## Related timers

The timer **ss7_l3_t5** guards for expected **CHANGEBACK ACKNOWLEDGE** response from the MSC after timer **ss7_l3_t4** has expired waiting for the initial **CHANGEBACK ACKNOWLEDGE** response.

## Internal name

T4_TIMER

## GSM name

T4 Specification: ITU Blue book Q704.

# ss7_l3_t5

## Definition

During use of an MTL link, after a changeover, the BSC(MTPL3) timer **ss7_l3_t4** guards for a changeback acknowledgement from the MSC, after the BSS has sent a second changeback order to it. The timer is known as the **waiting for changeback acknowledgement (second attempt)** timer.

This timer can be set in the BSS database by the parameter **ss7_l3_t4**.

## Normal operation

In normal operation, when the failed MTL becomes available after a changeover, and the MSC signalling point is accessible from the MTL initiating the changeback, the usual mechanism of sending a changeback message is used. MTPL3 sends a **CHANGEBACK ORDER** message to the MTPL2 and starts **ss7_l3_t4** to guard for the receipt of a **CHANGEBACK ACKNOWLEDGE** message.

## Abnormal operation

If timer **ss7_l3_t5** again expires before receipt of the **CHANGEBACK ACKNOWLEDGE** message, MTPL3 restores normal messaging with the new MTL, and sends an indication message to FM.

## Recommended values

The BSS command parameter **ss7_l3_t5** is set as an integer in multiples of 5 milliseconds, in the range 500 to 1200 milliseconds.

The recommended value is 850 milliseconds which is also the default.

## Related timers

The timer **ss7_l3_t5** is used to guard for expected **CHANGEBACK ACKNOWLEDGE** response from the MSC after timer **ss7_l3_t4** has expired waiting for the initial **CHANGEBACK ACKNOWLEDGE** response.

## Internal name

T5_TIMER

## GSM name

T5 Specification: ITU Blue book Q704.

# ss7_l3_t12

## Definition

When an MTL no longer needs to be inhibited, CA sends via MTPL3 to the MSC, a request to uninhibit the MTL. The BSC(MTPL3) timer **ss7_l3_t12** guards for the expected MSC acknowledgement. This timer is known as the **time to wait for uninhibit acknowledgement** timer.

This timer can be set in the BSS database by the parameter **ss7_l3_t12**.

## Normal operation

In normal operation, when an MTL no longer needs to be inhibited, CA sends to MTPL3 an **uninhibit request** message. MTPL3 then sends an **UNINHIBIT** message to the MSC and starts the timer **ss7_l3_t12** to guard for the expected **UNINHIBIT ACKNOWLEDGEMENT** response. As soon as MTPL3 receives the **UNINHIBIT RESPONSE** message from the MSC, it stops **ss7_l3_t12** and makes the MTL available.

## Abnormal operation

If timer **ss7_l3_t12** expires before the expected **UNINHIBIT ACKNOWLEDGEMENT** response from the MSC, MTPL3 stops the timer. If this is the first timer expiry, MTPL3 sends an **UNINHIBIT ACKNOWLEDGEMENT TIMEOUT** message to FM. If **ss7_l3_t12** expires a second time before the expected **UNINHIBIT ACKNOWLEDGEMENT** response from the MSC, MTPL3 sends an **UNINHIBIT DENIED** message to FM.

## Recommended values

The BSS command parameter **ss7_l3_t12** is set as an integer in multiples of 5 milliseconds, in the range 800 to 1500 milliseconds.

The recommended value is 1150 milliseconds which is also the default.

## Internal name

T12_TIMER

# GSM name

T12 Specification: ITU Blue book Q704.

# ss7_l3_t13

## Definition

During restoration of a shutdown MTL link, the BSC(MTPL3) timer times the MSC response to a force uninhibit request. When a locked, inhibited MTL is unlocked, CA sends via MTPL3 to the MSC, a request to force uninhibit the MTL. The timer **ss7_l3_t13** guards for the expected MSC acknowledgement. The timer is known as the **time to wait for force uninhibit** timer.

This timer can be set in the BSS database by the parameter **ss7_l3_t12**.

## Normal operation

In normal operation, when a locked inhibited MTL is unlocked, CA sends to MTPL3 a **force uninhibit** message. MTPL3 sends the MSC a **FORCE UNINHIBIT SIGNALLING LINK** message, and starts timer **ss7_l3_t13** to guard for the expected **UNINHIBIT SIGNALLING LINK** message. As soon as MTPL3 receives the **UNINHIBIT SIGNALLING LINK** message, it stops **ss7_l3_t13** and restores the MTL to active service.

## Abnormal operation

If timer **ss7_l3_t13** expires before the expected **UNINHIBIT SIGNALLING LINK** message is received from the MSC, MTPL3 sends an indication message to FM.

## Recommended values

The BSS command parameter **ss7_l3_t13** is set as an integer in multiples of 5 milliseconds, in the range 800 to 1500 milliseconds.

The recommended value is 1150 milliseconds which is also the default.

## Internal name

T13_TIMER

## GSM name

T13 Specification: ITU Blue book Q704.

# ss7_l3_t14

## Definition

During shutdown of an MTL link, the BSC(MTPL3) timer **ss7_l3_t14** times the response from the MSC to an inhibit request. This is done by CA sending via MTPL3 to the MSC a request to locally inhibit the MTL. The timer **ss7_l3_t14** guards for the expected MSC acknowledgement. The timer is known as the **time to wait for inhibition acknowledgement** timer.

This timer can be set in the BSS database by the parameter **ss7_l3_t14**.

## Normal operation

In normal operation, when the shutdown command is used on an MTL, CA locally inhibits the MTL. CA sends MTPL3 an **inhibit** message. MTPL3 sends an **INHIBIT** message to the MSC and starts timer **ss7_l3_t14**. On receipt of the **INHIBIT ACKNOWLEDGE** message from the MSC, MTPL3 stops the timer **ss7_l3_t14**.

## Abnormal operation

When an **INHIBIT ACKNOWLEDGE** message first fails from a remote MTPL3 (that is, the timer **ss7_l3_t14** expires), the **INHIBIT ACKNOWLEDGE TIMEOUT** message is sent to the FM. The second time the **INHIBIT ACKNOWLEDGE** message fails, the **INHIBIT DENIED** message is sent to the FM.

## Recommended values

The BSS command parameter **ss7_l3_t14** is set as an integer in multiples of 5 milliseconds, in the range 2000 to 3000 milliseconds.

The recommended value is 2500 milliseconds which is also the default.

## Internal name

T14_TIMER

## GSM name

T14 Specification: ITU Blue book Q704.

# ss7_l3_t17

## Definition

**ss7_l3_t17** delays attempts to bring the MTL into service after an initial alignment failure. This avoids the oscillation of trying to activate the MTL. The timer is known as the **time to wait to avoid oscillation of initial alignment failure and link restart** timer.

This timer can be set in the BSS database by the parameter **ss7_l3_t17**.

## Normal operation

In normal operation, when an initial alignment fails at MTPL2, MTPL2 sends to MTPL3 a **connect confirm fail** message, a **disconnect confirmation** message, or a **disconnect indication** message. MTPL3 starts timer **ss7_l3_t17** to avoid oscillation of trying to activate the MTL. At expiry of **ss7_l3_t17**, MTPL3 again tries to bring the MTL into service.

## Abnormal operation

The timer **ss7_l3_t17** is a period timer. It always expires.

## Recommended values

The BSS command parameter **ss7_l3_t17** is set as an integer in multiples of 5 milliseconds, in the range 800 to 1500 milliseconds.

The recommended value is 1150 milliseconds which is also the default.

## Related timers

The timers **ss7_l2_t1**, **ss7_l2_t2** and **ss7_l2_t3** are used to time stages during alignment.

## Internal name

T17_TIMER

## GSM name

T17 Specification: ITU Blue book Q704.

# ss7_l3_t22

## Definition

During use of an MTL link, it can be locally inhibited. This is done by CA sending via MTPL3 to the MSC a request to locally inhibit the MTL. The BSC(MTPL3) timer **ss7_l3_t22** is an interval timer that tests to ensure that the MSC does not need to force uninhibiting of the MTL. The timer is known as the **local inhibit test timer** timer.

This timer can be set in the BSS database by the parameter **ss7_l3_t22**.

## Normal operation

In normal operation, during local inhibiting of an MTL, MTPL3 sends an **INHIBIT** message to the MSC. When the MSC responds with the **INHIBIT ACK** message, MTPL3 starts timer **ss7_l3_t22**, to be used to time intervals at which MTPL3 tests whether the MSC requires to force the uninhibiting of the MTL.

When **ss7_l3_t22** expires, if the MTL is currently available, no action is taken. If the MTL is still locally inhibited, a **LOCAL INHIBIT TEST** message is sent to the MSC, and timer **ss7_l3_t22** is restarted. The MSC either responds with a force uninhibit procedure, if at the MSC the MTL is uninhibited, or sends nothing, if at the MSC, the MTL is inhibited by the BSS. If MTPL3 receives a **FORCE UNINHIBIT** message, **ss7_l3_t22** is stopped and the MTL is brought out of its inhibited state.

## Abnormal operation

The timer **ss7_l3_t22** is an interval timer and always expires.

## Recommended values

The BSS command parameter **ss7_l3_t22** is set as an integer in 5 millisecond increments. The ranges shown below depend on the value of the **ss7_mode** parameter:

| Range | ss7_mode setting |
|---|---|
| 180000 to 360000 | 0 (ITU) |
| 90000 to 120000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value | ss7_mode setting |
|---|---|
| 270000 | 0 (ITU) |
| 90000 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default value when the **ss7_mode** parameter value is changed.

## Related timers

There are no related timers but see above for dependency on the **ss7_mode** BSS command parameter setting.

Note that this timer has similar functionality to the remote inhibit timer **ss7_l3_t23**.

## Internal name

T22_TIMER

## GSM name

T22 Specification: ITU Blue book Q704.

# ss7_l3_t23

## Definition

During use of an MTL link, it can be remotely inhibited. This is done by the MSC sending to MTPL3 a request to inhibit the MTL. The BSC(MTPL3) timer **ss7_l3_t23** is an interval timer that tests to ensure that the MSC still needs to inhibit the MTL. The timer is known as the **remote inhibit test timer** timer.

This timer can be set in the BSS database by the parameter **ss7_l3_t23**.

## Normal operation

In normal operation, during remote inhibiting of an MTL, the MSC sends an **INHIBIT** message to MTPL3. MTPL3 responds with an **INHIBIT ACK** message, and starts timer **ss7_l3_t23**, to be used to time intervals at which MTPL3 tests whether the MSC still requires the inhibiting of the MTL.

When **ss7_l3_t23** expires, if the MTL is currently available, no action is taken. If the MTL is still remotely inhibited, MTPL3 sends a **REMOTE INHIBIT TEST** message to the MSC, and timer **ss7_l3_t23** is restarted. When the MSC receives the **REMOTE INHIBIT TEST** message, it either does nothing, if the MTL is marked as locally inhibited at the MSC, or it invokes the uninhibit procedure.

## Abnormal operation

The timer **ss7_l3_t23** is an interval timer and always expires.

## Recommended values

The BSS command parameter **ss7_l3_t23** is set as an integer in 5 millisecond increments. The ranges shown below depend on the value of the **ss7_mode** parameter:

| Range | ss7_mode setting |
|---|---|
| 180000 to 360000 | 0 (ITU) |
| 90000 to 120000 | 1 (ANSI) |

The recommended values, which are also the defaults, depend on the value of the **ss7_mode** parameter:

| Value | ss7_mode setting |
|---|---|
| 270000 | 0 (ITU) |
| 90000 | 1 (ANSI) |

NOTE

The parameter is set to the appropriate default value when the **ss7_mode** parameter value is changed.

## Related timers

There are no related timers but see above for dependency on the **ss7_mode** BSS command parameter setting.

Note that this timer has similar functionality to the local inhibit timer **ss7_l3_t22**.

## Internal name

T23_TIMER

## GSM name

T23 Specification: ITU Blue book Q704.

# ss7_slt_t1

## Definition

During the process of bringing an MTL link into service, the BSC (MTPL2) timer **ss7_slt_t1**, known as the **supervision timer for signalling link test acknowledgement** timer, guards for the MSC response to a message confirming that the link is acceptable on signalling link test.

This timer is also known as a local processor outage timer. It can be set in the BSS database by the parameter **ss7_slt_t1**.

## Normal operation

In normal operation, MTPL3 sends to the MSC an **SLTM** message (**Signalling Link Test Message**). MTPl3 also starts timer **ss7_slt_t1**, to guard for the expected **SLTA** (**Signalling Link Test Acknowledge**) message. When MTPL3 receives the **SLTA** message, it stops **ss7_slt_t1** and sends an INS indication to CA, which brings the MTL device into service.

## Abnormal operation

If timer **ss7_slt_t1** expires before the expected **SLTA** message, is received, MTPL3 sends the **SLTM** again, and restarts **ss7_slt_t1**. If the timer expires a second time, the test has failed, and the entire initial alignment procedure begins again.

## Recommended values

The BSS command parameter **ss7_slt_t1** is set as an integer in multiples of 5 milliseconds, in the range 4000 to 12000 milliseconds.

The recommended value is 8000 milliseconds which is also the default.

## Internal name

SLT_T1_TIMER

# GSM name

T1 Specification: ITU (Blue book) Q707.

# ssp_burst_delay

## Definition

The **ssp_burst_delay** timer specifies the amount of time to wait between bursts of statistics data messages from remote BTSs to the BSC. This timer provides flow control of statistic messages being sent over RSL devices from remote sites.

This timer can be set in the BSS database by the parameter **ssp_burst_delay**.

## Normal operation

For every statistics interval period specified by the BSS database parameter **stats_interval**, data is collected from the remote BTS sites for the statistics file built at the BSC. Each remote site sends a burst of statistic data messages (up to **ssp_burst_limit**) and starts timer **ssp_burst_delay**. At expiry of **ssp_burst_delay**, the remote site sends more messages. The **ssp_burst_delay** timer helps provide flow control of statistic data messages over the RSL devices in the BSS.

## Recommended values

The BSS command parameter **ssp_burst_delay** is set as an integer in milliseconds, in the range 0 to 2500.

The recommended value is 200 milliseconds, which is also the default.

## Related timers

There are no related timers to **ssp_burst_delay** but the BSS command parameter **ssp_burst_limit** sets the number of messages in each burst.

## Internal name

None.

# start_ack

## Definition

During a global reset, after the MSC and the BSS have cleared up all resources and the Reset has been acknowledged, the BSC (CLM) timer **start_ack** specifies the interval allowed to wait for the starting acknowledgement for every BTS (CRM).

This timer can be set in the BSS database by the parameter **start_ack**.

## Normal operation

In normal operation CLM sends CRM in each BTS a **start bss** message to resume call processing and starts the **start_ack** timer individually for each CRM. Each time a CRM sends a **start ack** message, the CLM stops the **start_ack** timer associated with that CRM. When all CRMs have responded, CLM ends the reset procedure (and may also need to send **block** messages for blocked circuits if the reset was BSS initiated).

## Abnormal operation

If **start_ack** expires for any BTS (CRM), CLM sends another **start bss** message to that CRM, and restarts **start_ack**. If this timer expires again, CLM acts as if the **start ack** message had been received from that CRM.

## Recommended values

The BSS command parameter **start_ack** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 30000 milliseconds.

**NOTE**

The value allocated must allow enough time for the CRM to answer the request from the CLM when the system is coming out of reset. In practice, the value must not be less than 1000 milliseconds.

## Internal name

CLM_MTJ1

# stat_interval

## Definition

The BSC (CSP) **stat_interval** timer specifies the length of the time interval between sending the raw statistics up to the OMC-R. Although the range is 5 to 60 minutes at the BSS, this value must be set to match the OMC-R value of how often it expects the statistics file. This must be either 30 or 60 minutes, otherwise Key Statistics and Health Indicators will not be calculated correctly by the OMC-R.

This timer can be set in the BSS database by the parameter **stat_interval**.

## Normal operation

Every **stat_interval** period, CSP sends up the stats file to the OMC-R.

## Recommended values

The BSS command parameter **stat_interval** is set as an integer in the range 5 to 60 minutes.

The recommended value is 30 minutes, which is also the default.

**NOTE**

This BSS command parameter must be set to 30 or 60 minutes to align with the OMC-R calculation interval.

## Internal name

None.

# static_sync_timer

## Definition

The timer **static_sync_timer** specifies the maximum amount of time that is allowed for the channel coder to transition from initial time alignment to static time alignment. Static time alignment is necessary before the channel coder can process data.

It can be set in the BSS database by the parameter **static_sync_timer**.

## Normal operation

The GPRS feature must be unrestricted.

## Recommended values

The BSS command parameter **static_sync_timer** is set as an integer in the range 1 to 65535 milliseconds.

The default value is 12000 milliseconds.

# sync_loss_restore

## Definition

The CA (Central Authority) interval timer **sync_loss_restore** specifies the threshold (limit) for restore time after synchronization loss on a 2 Mbit/s circuit (E1 link), due to the number of synchronization loss alarms exceeding the limit set by the BSS parameter **sync_loss_oos**.

This timer can be set in the BSS database by the parameter **sync_loss_restore**.

## Normal operation

If the number of alarm hits exceed the **sync_loss_oos** threshold, the 2 Mbit/s circuit is taken out of service, and the **sync_loss_restore** timer is started.

If no synchronization loss error occurs within this interval, the 2 Mbit/s circuit is brought back into service.

## Recommended values

The BSS command parameter **sync_loss_restore** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

The recommended value is 6000 (600000 milliseconds), which is also the default.

## Related timers

The synchronization loss is controlled by the value assigned to the **sync_loss_oos** BSS parameter. See also the timer **sync_time_restore** which has a similar function but for synchronization loss due to exceeding a time limit.

## Internal name

None.

# sync_time_oos

## Definition

The CA (Central Authority) interval timer **sync_time_oos** specifies the threshold time (limit) for a 2 Mbit/s circuit (E1 link) to lose synchronization, before it is taken out of service.

This timer can be set in the BSS database by the parameter **sync_time_oos**.

## Recommended values

The BSS command parameter **sync_time_oos** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

The recommended value is 25 (2500 milliseconds), which is also the default.

## Related timers

The time limit for restoration of the circuit into service if no synchronization loss error occurs is set by the value assigned to the **sync_time_restore** timer.

## Internal name

None.

# sync_time_restore

## Definition

The CA (Central Authority) interval timer **sync_time_restore** specifies the threshold (limit) for restore time after synchronization loss on a 2 Mbit/s circuit (E1 link). If synchronization loss due to exceeding the limit set by **sync_time_oos**, does not occur within this interval, the 2 Mbit/s circuit is brought back into service.

This timer can be set in the BSS database by the parameter **sync_time_restore**.

## Normal operation

If a synchronization loss due to exceeding the limit set by **sync_time_oos** occurs, the 2 Mbit/s circuit is taken out of service, and the **sync_time_restore** timer is started.

If a synchronization loss error due to exceeding the limit set by **sync_time_oos**, does not occur within this interval, the 2 Mbit/s circuit is brought back into service.

## Abnormal operation

If a further synchronization loss error due to the timer **sync_time_oos** being exceeded, does occur within this interval, the 2 Mbit/s circuit is kept Out Of Service. The timer **sync_time_restore** is restarted. This continues until the 2 Mbit/s circuit is brought back in service.

## Recommended values

The BSS command parameter **sync_time_restore** is set as an integer in the range 0 to 65535 multiples of 100 milliseconds.

The recommended value is 150 (15000 milliseconds), which is also the default.

## Related timers

The synchronization loss is controlled by the value assigned to the **sync_time_oos** timer. See also the timer **sync_loss_restore** which has a similar function but for synchronization loss due to exceeding an alarm number limit.

## Internal name

None.

# t_stat_info

## Definition

The **t_stat_info** timer sets the interval between Subsystem Status Test (SST) messages to the MSC.

## Normal operation

This timer starts when the MSC sends a **SUBSYSTEM PROHIBITED** message to the CLM for the BSSAP Subsystem. When the subsystem starts, the MSC sends a **SUBSYSTEM ALLOWED** (SSA) message to the CLM, and stops the **t_stat_info** timer.

## Abnormal operation

If this timer expires before receiving an SSA message, the CLM sends a **SUBSYSTEM TEST** message to the MSC, and restarts the **t_stat_info** timer. The timer stops when the CLM receives an SSA message.

## Recommended values

The BSS command parameter **t_stat_info** is set as an integer in the range 0 to 1000000 milliseconds.

The default value is 90000 milliseconds.

## Related timers

There are no related timers.

## Internal name

CLM_T_STAT_INFO

# timing_advance_period

## Definition

The BTS RSS (handover or HDPC) timer **timing_advance_period** specifies the interval between timing advance changes. RSS HO may only change the timing advance of an MS once in every **timing_advance_period**. The formula is:

timing_advance_period >= (n8 - p8) x hreqavex/2

| Where: | is: | |
|---|---|---|
| x | | 1 (lower threshold of RXLEV). |
| | or | 2 (upper threshold of RXLEV). |
| | or | 3 (lower threshold of RXQUAL). |
| | or | 4 (upper threshold of RXQUAL). |
| n | | values assigned for decision_1_ny (y is a value from 1 to 4). |
| p | | values assigned for decision_1_py (y is a value from 1 to 4). |
| hreqave | | number of measurements from the MS that are used in calculating one average. |

This timer can be set in the BSS database by the parameter **timing_advance_period**.

## Normal operation

When the **timing_advance_period** timer expires, the system checks if the time advance of the mobile must change. Then, the timer restarts.

## Recommended values

The BSS command parameter **timing_advance_period** is set as an integer in the range 0 to 31 pairs of SACCH mutiframes (31 represents 62 SACCH mutiframes).

The formula for calculation of the value of the minimum value of this timer is given in the *Technical Description: BSS Command Reference (68P02901W23)* manual.

The recommended value is 2 (4 SACCH mutiframes).

## Internal name

None.

# uplink_sync_timer

## Definition

During a call, **uplink_sync_timer** defines in the uplink, the duration a Channel Coder Unit (CCU) allows for the urgent alarm pattern to be received before generating an error indication.

The **uplink_sync_timer** is also the time duration allowed for an uplink frame error (UFE) bit of the downlink transcoding and rate adaption unit (TRAU) frame to remain reset during a call, before generating an error indication.

This parameter is not allowed at a stand-alone BSC or RXCDR. It can be used at a BTS.

## Recommended values

The BSS command parameter **uplink_sync_timer** is set as an integer in the range of 1000 to 3000 milliseconds.

The default value is 1000 milliseconds (1 second).

## Internal name

None.

# valid_candidate_period

## Definition

The BTS (RRSM) timer **valid_candidate_period** specifies the duration for which candidate channels for handover due to congestion are kept before querying again for new ones.

NOTE

This setting is preserved if the **copy_cell** command is used.

This timer can be set in the BSS database by the parameter **valid_candidate_period**.

## Normal operation

In a congestion relief situation, RRSM sends RSS Abis a **candidate list query** message to obtain a list of current active TCHs which are candidates for handover. RSS Abis responds back with a **candidate list response** message. RRSM stores all the candidates and starts the **valid_candidate_period** timer.

RRSM then initiates congestion handovers depending on the type of congestion requested by CRM (TCHs queued, as many as possible). The candidates are valid until CRM sends a **congestion indication** message so that RRSM halts congestion relief procedures and stops the **valid_candidate_period** timer, or **valid_candidate_period** expires (see below).

## Abnormal operation

If the **valid_candidate_period** timer expires before a **congestion indication** message is received, RRSM stops any congestion relief processing and deletes all congestion relief handover candidates.

## Recommended values

The BSS command parameter **valid_candidate_period** is set as an integer in the range 1 to 1000000 milliseconds.

The recommended value is 4000 milliseconds, which is also the default value.

## Related timers

There are no related timers but the BSS command parameter **ho_exist_congest** must be enabled for **valid_candidate_period** to take effect.

## Internal name

RRSM_MT_CAND_VALID

# wait_for_reselection

## Definition

The FTP timer **wait_for_reselection** specifies the interval before FTP can choose another MMS (the 2 Mbit/s multiple serial interface link) to provide the clock source after a GCLK has encountered a GCLK reference failure alarm. If the MMS that is providing clock extraction is INS (IN Service) after this interval has expired, it is kept as the clock source.

This timer can be set in the BSS database by the parameter **wait_for_reselection**.

## Recommended values

The BSS command parameter **wait_for_reselection** is set as an integer in the range 0 to 255 seconds.

The recommended value is 10 seconds, which is also the default value.

## Internal name

None.

# wait_indication_parameters

## Definition

This BSS parameter **wait_indication_parameters** sets the value, in seconds, that the MS uses to set the MS timer (T3122).

In an MS origination with no channel available, the BTS (CRM) sends an IMMEDIATE ASSIGNMENT REJECT message (GSM 4.08) in an unacknowledged mode on the CCCH. The message contains the request reference and a wait indication. The MS does not make a new request in the same cell until the timer expires.

## Recommended values

The parameter **wait_indication_parameters** is set as an integer in seconds in the range 0 to 255.

There is no recommended or default value.

## GSM name

T3122 Specification 4.08 - 11.1.1.

The function is also GSM specified as follows:

- 4.08 - 3.3.1.2.2: assignment rejection.
- 4.08, - 10.5.2.24, figure 10.43, and table 10.37.
- 12.20 - 5.2.7.7 - Wait Indication.

# zone_pingpong_disable_win

## Definition

The timer **zone_pingpong_disable_win** is an interzone timer that sets the time window in which ping-pong handovers between zones are not allowed.

This timer can be set in the BSS database by the BSS command parameter **zone_pingpong_disable_win**.

## Recommended Values

The BSS command parameter **zone_pingpong_disable_win** is set as an integer in the range 0 to 225 seconds.

The recommended value is 30 seconds, which is also the default value.

## Related timers

See interzone timer "zone_pingpong_enable_win" on page 3-266.

## Internal name

None.

# zone_pingpong_enable_win

## Definition

The timer **zone_pingpong_enable_win** is an interzone timer that sets the time window in which ping-pong handovers between zones are continuously allowed as regulated by the **zone_pingpong_count** BSS command parameter.

This timer can be set in the BSS database by the BSS command parameter **zone_pingpong_enable_win**.

## Recommended Values

The BSS command parameter **zone_pingpong_enable_win** is set as an integer in the range 0 to 225 seconds.

The recommended value is 30 seconds, which is also the default value.

## Related timers

See interzone timer "zone_pingpong_disable_win" on page 3-265

## Internal name

None.

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