

**3GPP TSG\_CN#6**

**NP-99488**

**Nice, France**

**13<sup>th</sup> – 15<sup>th</sup> December 1999**

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**Agenda item:**

**Source: TSG\_N WG2**

**Title: CR to 3G TS 29.010 (Work Item: 2G-3G Handover)**

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**Introduction:**

This document contains 1 CRs on **Work Item 2G-3G Handover** agreed by **TSG\_N WG2** and forwarded to **TSG\_N Plenary** meeting #6 for approval.

TDoc	Spec	CR	Rev	Ph.	Cat	Old v.	New v.	Subject
N2-99H37	29.010	001		R99	B	3.0.0	3.1.0	UMTS / GSM Interworking

# CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

**29.010 CR 001**

Current Version: **3.0.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **CN# 06**  
list expected approval meeting # here ↑

for approval   
for information

strategic   
non-strategic  (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

**Proposed change affects:**  
(at least one should be marked with an X)

(U)SIM  ME  UTRAN / Radio  Core Network

**Source:** TSG N2 **Date:** 991107

**Subject:** UMTS / GSM Interworking

**Work item:** Handover

**Category:**

(only one category shall be marked with an X)

F Correction   
A Corresponds to a correction in an earlier release   
B Addition of feature   
C Functional modification of feature   
D Editorial modification

**Release:**

Phase 2   
Release 96   
Release 97   
Release 98   
Release 99   
Release 00

**Reason for change:**

Updates to 29.010 by introduction of UMTS to GSM Handover

**Clauses affected:** 1.1; 4.6 (new chapter)

**Other specs affected:**

Other 3G core specifications  → List of CRs:  
Other GSM core specifications  → List of CRs:  
MS test specifications  → List of CRs:  
BSS test specifications  → List of CRs:  
O&M specifications  → List of CRs:

**Other comments:**



help.doc

<----- double-click here for help and instructions on how to create a CR.

## 1.1 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.
- For this Release 1998 document, references to GSM documents are for Release 1998 versions (version 7.x.y).

- [1] GSM 01.04: "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".
- [2] ~~GSM 3GPP 0323.009~~: "Digital cellular telecommunications system (Phase 2+); Handover procedures".
- [3] GSM 03.40: "Digital cellular telecommunications system (Phase 2+); Technical realization of the Short Message Service (SMS) Point to Point (PP)".
- [4] ~~GSM 3GPP 0424.008~~: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification".
- [5] ~~GSM 3GPP 0424.010~~: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 Supplementary services specification General aspects".
- [6] GSM 04.11: "Digital cellular telecommunications system (Phase 2+); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".
- [7] GSM 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile Switching Centre - Base Station System (MSC - BSS) interface Layer 3 specification".
- [8] 3GPP 25.413: "Iu interface RANAP signalling"
- [98] ~~GSM 3GPP 0929.002~~: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification".
- [109] GSM 09.03: "Digital cellular telecommunications system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".
- [110] ~~GSM 3GPP 0929.007~~: "Digital cellular telecommunications system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".
- [124] GSM 09.08: "Digital cellular telecommunications system (Phase 2+); Application of the Base Station System Application Part (BSSAP) on the E-interface".
- [132] ~~GSM 3GPP 0929.011~~: "Digital cellular telecommunications system (Phase 2+); Signalling interworking for supplementary services".

## 4.6 Inter-MSC Handover (UMTS to GSM)

The general principles of the handover procedures are given in 3GPP Technical Specification 23.009. 3GPP Technical Specification 29.010 gives the necessary information for interworking between the 3GPP 25.413 RANAP protocol.

GSM handover procedures and the 3GPP 29.002 MAP protocol. The RANAP protocol is used between the RNS and the 3G-MSC.

The following three principle apply for the Inter-MSC handover UMTS to GSM:

The BSSMAP parameters required for Inter-MSC handover UMTS to GSM are generated as in GSM.

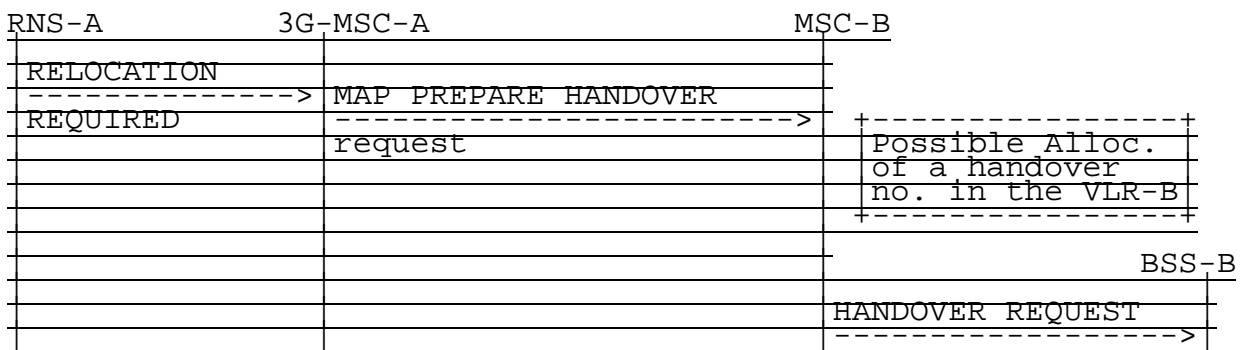
Received BSSMAP parameters, e.g. cause code or Handover command, are mapped to the appropriate RANAP parameters, e.g. cause code transparent container to source RNS.

### 4.6.1 Basic Inter-MSC Handover

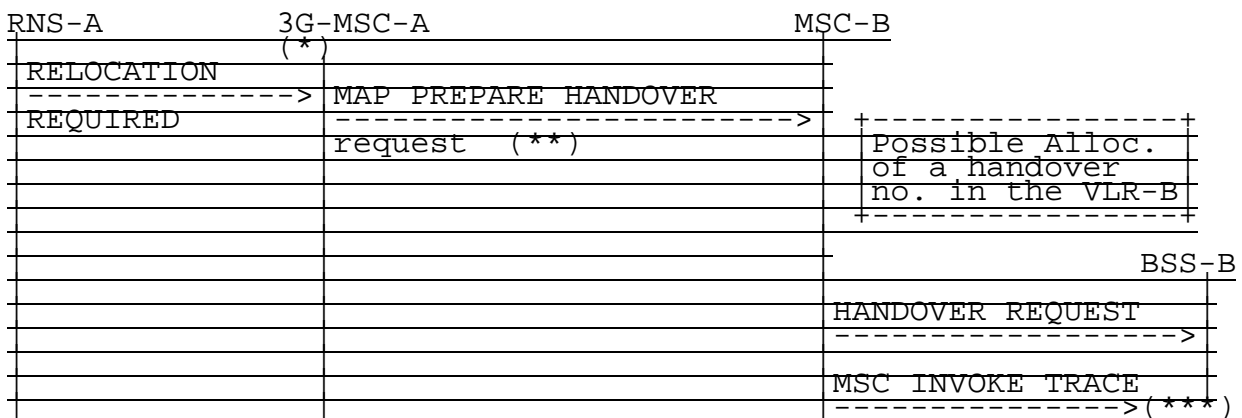
When a Mobile Station is handed over between two MSCs, the establishment of a connection between them (described in 3GPP 23.009) requires interworking between A-Interface and E-Interface.

The signalling at initiation, execution, completion of the Basic Inter-MSC handover procedure is shown in figures 5 to 10 with both possible positive or negative outcomes.

Additionally figure 5b shows the possible interworking when the trace related message is transparently transferred on the E-Interface at Basic Inter-MSC Handover initiation.



**Figure 5a: Signalling for Basic Inter-MSC Handover initiation (no trace related messages transferred)**



**Figure 5b: Signalling for Basic Inter-MSC Handover initiation (MSC invoke trace message transferred)**

(\*): Tracing invocation has been received from VLR.

(\*\*): In that case, HANDOVER REQUEST and MSC INVOKE TRACE messages are included within the BSS-apdu parameter.

(\*\*\*): MSC INVOKE TRACE is forwarded to BSS-B if supported by MSC-B.

#### Possible Positive outcomes

a) successful radio resources allocation and handover number allocation (if performed):

RNS-A	3G-MSC-A	MSC-B	BSS-B
		HANDOVER REQUEST	
		<-----	
		ACKNOWLEDGE	
	MAP PREPARE HANDOVER		
	<-----		
	response		
RELOCATION COMMAND			
<-----			

b) radio resources allocation queued and successful handover number allocation (if performed). Later successful radio resources allocation indication:

RNS-A	3G-MSC-A	MSC-B	BSS-B
		QUEUING INDICATION	
		<-----	
	MAP PREPARE HANDOVER		
	<-----		
	response		
		HANDOVER REQUEST	
		<-----	
		ACKNOWLEDGE	
	MAP PROCESS ACCESS		
	<-----		
RELOCATION COMMAND	SIGNALLING request		
<-----			

**Figure 6: Signalling for Basic Inter-MSC Handover execution (Positive outcomes)**

Possible Negative outcomes

c) user error detected, or handover number allocation unsuccessful (if performed), or component rejection or dialogue abortion performed by MSC-B:

RNS-A	3G-MSC-A	MSC-B	BSS-B
	MAP PREPARE HANDOVER response		
	negative result, MAP CLOSE		
	<-----		
	MAP U/P-ABORT		
RELOCATION PREPARATION			
<-----			
FAILURE(Note 1)			

d) radio resources allocation failure:

RNS-A	3G-MSC-A	MSC-B	BSS-B
		HANDOVER FAILURE	
		<-----	
	MAP PREPARE HANDOVER		
	<-----		
	response		
RELOCATION PREPARATION			
<-----			
FAILURE(Note 1)			

e) radio resources allocation queued and successful handover number allocation (if performed). Later unsuccessful radio resources allocation:

RNS-A	3G-MSC-A	MSC-B	BSS-B
		QUEUING INDICATION	
		<-----	
	MAP PREPARE HANDOVER		
	<-----		
	response		
		HANDOVER FAILURE	
		<-----	
	MAP PROCESS ACCESS		
	<-----		
	SIGNALLING request		
	RELOCATION PREPARATION		
	<-----		
	FAILURE (Note 1)		

f) unsuccessful handover execution (Reversion to the old radio resources):

RNS-A	3G-MSC-A	MSC-B	BSS-B
RELOCATION			
----->			
CANCEL			
	MAP U -ABORT		
	----->		
		CLEAR COMMAND	
		----->	
RELOCATION			
-----			
CANCEL ACK			

**Figure 7: Signalling for Basic Inter-MSC Handover execution (Negative outcomes)**

NOTE 1: Possible rejection of the handover because of the negative outcome of MAP or RANAP procedure.

RNS-A	3G-MSC-A	MSC-B	BSS-B
		HANDOVER COMPLETE	
		<-----	
	MAP SEND END SIGNAL request		
	<-----		
IU RELEASE COMMAND			
<-----			

**Figure 8: Signalling for Basic Inter-MSC Handover completion**

Positive outcome

RNS-A	3G-MSC-A	MSC-B	BSS-B
	MAP SEND END SIGNAL		
	----->		
	response		
		CLEAR COMMAND	
		----->	
		(Note 2)	

**Figure 9: Signalling for Basic Inter-MSC Handover completion (Positive outcome)**

Negative outcome

RNS-A	3G-MSC-A	MSC-B	BSS-B
	MAP U/P -ABORT		
	----->		
		CLEAR COMMAND	
		----->	

**Figure 10: Signalling for Basic Inter-MSC Handover completion (Negative outcome)**

NOTE 2: From interworking between MAP and BSSMAP point of view, when the call is released.

The handover procedure is normally triggered by RNS-A by sending a RELOCATION REQUIRED message on Iu-Interface to 3G-MSC-A. The invocation of the Basic Inter-MSC handover procedure is performed and controlled by 3G-MSC-A. The sending of the MAP Prepare-Handover request to MSC-B is triggered in 3G-MSC-A upon receipt of the RELOCATION REQUIRED message. For compatibility reason, the cell identity of the cell where the call is to be handed over in MSC-B area, provided in the RELOCATION REQUIRED message, is mapped into targetCellId MAP parameter and the HANDOVER REQUEST message is encapsulated in the bss-APDU MAP parameter of the Prepare-Handover MAP request. MSC-B can invoke another operation towards the VLR-B (allocation of the handover number described in 3GPP 29.002).

Additionally, if tracing activity has been invoked, the trace related message can be transferred on the E-Interface encapsulated in the bss-APDU MAP parameter of the Prepare-Handover Request. If transferred, one complete trace related message at a time shall be included in the bss-APDU MAP parameter after the HANDOVER REQUEST message.

The interworking between Prepare Handover and RELOCATION REQUIRED is as follows:

	25.413	09.02	Notes
Forward message	RELOCATION REQUIRED MAP PREPARE HANDOVER request		
	BSSMAP information elements	-ho-NumberNotRequired -targetCellId -bss-APDU( HANDOVER REQUEST, BSC INVOKE TRACE or MSC INVOKE TRACE)	1 2
Positive result	RELOCATION CMD	MAP PREPARE HANDOVER response	3
		-handover number -bss-APDU( QUEUING INDICATION or HANDOVER REQUEST ACKNOWLEDGE)	
Negative result	RELOCATION PREP FAILURE	MAP PREPARE HANDOVER	4
	equipment failure	System Failure	
	equipment failure	No Handover Number available	
	equipment failure	UnexpectedDataValue	
	equipment failure	Data Missing	
	equipment failure	MAP CLOSE	
	equipment failure	MAP U/P -ABORT	

NOTE 1: The BSSMAP information elements are already stored in 3G-MSC

The ho-NumberNotRequired parameter is included by 3G-MSC-A, when 3G-MSC-A decides not to use any circuit connection with MSC-B. No handover number shall be present in the positive result. Any negative response from MSC-B shall not be due to handover number allocation problem.

NOTE 2: The process performed on the RANPAP information elements received in the RELOCATION REQUIRED message is described in the 3GPP 25.413.

NOTE 3: The response to the Prepare-Handover request can include in its bss-APDU parameter, identifying the GSM-0806 protocol, either a BSSMAP QUEUING INDICATION, or a BSSMAP HANDOVER REQUEST ACKNOWLEDGE.

In the first case, 3G-MSC-A shall wait for the radio resources allocation response from MSC-B, transmitted to 3G-MSC-A as described in subclause 4.5.4.

In the second case, the positive result triggers in 3G-MSC-A the sending on Iu-Interface of the RELOCATION CMD.

In the third case, the positive result triggers in 3G-MSC-A one of the following:

- optionally the sending of the RELOCATION PREP FAILURE.

NOTE 4: The possible sending of the RELOCATION PREP FAILURE message is described in the 3G 25.413.

(The possible sending of the RELOCATION PREP FAILURE message upon receipt of the HANDOVER FAILURE is out of the scope of the 3GPP 29.010 and lies in the 3G 25.413).

The interworking between Send End Signal and HANDOVER COMPLETE in MSC-B is as follows:

	08.08	09.02	Notes
Forward message	HANDOVER COMPLETE	MAP SEND END SIGNAL request -bss-APDU(HANDOVER COMPLETE)	
Positive result	CLEAR COMMAND -Call Control release	MAP SEND END SIGNAL response	1
Negative result	CLEAR COMMAND -Call Control release	MAP CLOSE MAP U/P -ABORT	2

NOTE 1: The positive empty result triggers the clearing of the Radio Resources on the A-Interface and the release of the SCCP connection between MSC-B and BSS-B. If a circuit connection is used between 3G MSC-A and MSC-B, the 'Call Control release' clearing cause shall only be given to BSS-B when MSC-B has received a clearing indication on its circuit connection with 3G MSC-A.

NOTE 2: The abortion of the dialogue or the rejection of the component triggers in MSC-B the clearing of its circuit connection with 3G MSC-A, if any, of the Radio Resources on the A-Interface and the release of the SCCP connection between MSC-B and BSS-B.

The interworking between Send End Signal and CLEAR COMMAND in 3G MSC-A is as follows:

	09.02	25.413	Notes
Forward message	MAP SEND END SIGNAL response -bss-APDU(HANDOVER COMPLETE)	IU RELEASE COMMAND - Handover Successful	
Positive result			
Negative result			

The interworking between HANDOVER FAILURE in case of reversion to old channel of the MS and User Abort in MSC-A is as follows:



	25.413	09.02	Notes
Forward message	RELOCATION CANCEL	MAP U -ABORT	
	- Reversion to old channel		
Positive result	RELOCATION CANCEL ACKNOWLEDGEMENT		
Negative result			

#### 4.6.2 Subsequent Inter-MSC Handover from 3<sup>rd</sup> 3G-MSC-B back to MSC-A

This function is left for further study and should be contributed to, when GSM to UMTS handover is included.

#### 4.6.3 Subsequent Inter-MSC Handover to third MSC

This function is left for further study and should be contributed to, when GSM to UMTS handover is included.

#### 4.6.4 BSSAP Messages transfer on E-Interface

The handling is described in chapter 4.5.4.