3GPP TSG_CN#7 **NP-000070**

ETSI SMG3 Plenary Meeting #7,
Madrid, Spain
13th – 15th March 2000

Agenda item: **5.2.3**

Source: **TSG_N WG2**

Title: **CRs to 3G Work Item Handover**

Introduction:

This document contains **"5"** CRs on **Work Item Handover,** that have been agreed by **TSG_N WG2,** and are forwarded to **TSG_N Plenary** meeting #7 for approval.

TDoc	SPEC	CR	REV	CAT	Rel	Old vers	New vers	SUBJECT
N2B000322	29.002	095	1	C	R99	3.3.0		RANAP support on the E-interface
N2B000324	29.002	105	1	C	R99	3.3.1		Introduction of additional service parameters for inter-system handover
N2B000176	29.010	003	1	B	R99	3.2.0		UMTS/GSM interworking
N2B000338	29.010	004	1	F	R99	3.1.0		GSM/UMTS Interworking
N2B000178	29.010	005		C	R99	3.2.0		UMTS/UMTS Handover

3GPP TSG-CN 2 SWGB meeting #4
Milan, Italy, 14-16 February 2000

Document N2B000322
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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

29.002	CR	095r1	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG CN#07	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

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	X

Source: N2 **Date:** 2000-02-14

Subject: RANAP support on the E-interface

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	X
D	Editorial modification	

Release:

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

Reason for change: Additions of mechanisms in 29.002 to be able to transport RANAP messages transparently on the MAP E-interface.

Clauses affected:

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	23.121 xxx, 23.009 xxx
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:

The following changes have been introduced to this revision 1:

- Clause 7.6 has been re-edited in order to clearly show the changes that have been made
- Removal of functional requirements from ASN.1 for RelocationNumber
- Correction of conventions used in ASN.1:
  - RABId changed to RAB-Id
  - rABId changed to rab-Id
- Addition of tags at the outermost level to distinguish between v2 and v3. Tags were added to the following:
  - PrepareHO-Arg
  - PrepareHO-Res
  - PrepareSubsequentHO-Arg
- Addition of a "health warning" to indicate that the B i/f has not been updated with regards to

UMTS handover and should not be relied upon. (Added to subclauses 8.4 and 19.2.)

Please note that changes are not required to the SDL diagrams as was earlier indicated. The changes to the SDL diagrams that were requested already exist in the current version of 29.002.


help.doc

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

First Change

2 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 1999 document, references to GSM documents are for Release 1999 versions (version 3.x.y).

[1] 3G TS 21.905: "3G Vocabulary".

[2] GSM 02.01: "Digital cellular telecommunications system (Phase 2+); Principles of telecommunication services supported by a GSM Public Land Mobile Network (PLMN)".

…… ETC. ETC. ……

[116] ITU-T Q.850, May 1998: "Usage of cause and location in the Digital Subscriber Signalling System No. 1 and the Signalling System No. 7 ISDN User Part".

[117] 3G TS 25.413: "UTRAN Iu Interface RANAP Signalling ".

Next Change

4.4.7 Interface between MSCs (E-interface)

When a MS moves from one MSC area to another during a call, a handover or relocation procedure has to be performed in order to continue the communication. For that purpose the MSCs involved have to exchange data to initiate and then to realize the operation.

This interface is also used to forward short messages, to perform location for a target MS for which handover or relocation has occurred on an established call and to transfer LCS messages to and from an LMU for which handover or relocation of a signalling channel has occurred.

This interface is also used to transfer information for inter-MSC VBS/VGCS calls .

Next Change

Table 5.1/2: Priorities of Application Contexts for MSC/VLR as Responder

Responder = MSC/VLR	Initiating Entity
Priority high	
Handover	
handoverControl (prepareHandover/v2/v3), (performHandover/v1)	MSC
Mobility and Location Register Management	
locationCancel (cancelLocation)	HLR
reset (reset)	HLR
immediateTermination (istCommand/v3)	HLR
interVlrInfoRetrieval (sendIdentification/v2/v3), (sendParameters/v1)	VLR
subscriberDataMngt (insertSubscriberData), (deleteSubscriberData)	HLR
tracing (activateTraceMode), (deactivateTraceMode)	HLR
Short Message Service	
shortMsgMO-Relay (MO-ForwardSM v3) (forwardSM v1/v2)	MSC/SGSN
shortMsgMT-Relay (MT-ForwardSM v3) (forwardSM v1/v2)	MSC
shortMsgAlert (alertServiceCentre/v2), (alertServiceCentreWithoutResult/v1)	HLR
Mobile Terminating Traffic	
roamingNbEnquiry (provideRoamingNumber)	HLR
callControlTransfer (resumeCallHandling)	MSC
subscriberInfoEnquiry (provideSubscriberInformation)	HLR
reporting (remoteUserFree) (SetReportingState)	HLR
Location Services	
locationSvcEnquiry (provideSubscriberLocation v3)	GMLC
Network-Initiated USSD	
networkUnstructuredSs (unstructuredSS-Request/v2), (unstructuredSS-Notify/v2)	HLR
Priority low	

NOTE: The application context name is the last component but one of the object identifier.
Operation names are given in brackets for information with "/vn" appended to vn only operations.

Next Change

6.1.3.2 The Mobile-services Switching Centre (MSC)

There are several cases where it is necessary to address the MSC.

6.3.2.1 MSC interaction during handover or relocation

The address is derived from the target Cell id or from the target RNC id.

Next Change

7.6 Definition of parameters

Following is an alphabetic list of parameters used in the common MAP-services in subclause 7.3:

Application context name	7.3.1	Refuse reason	7.3.1
Destination address	7.3.1	Release method	7.3.2
Destination reference	7.3.1	Responding address	7.3.1
Diagnostic information	7.3.4	Result	7.3.1
Originating address	7.3.1	Source	7.3.5
Originating reference	7.3.1	Specific information	7.3.1/7.3.2/7.3.4
Problem diagnostic	7.3.6	User reason	7.3.4
Provider reason	7.3.5		

Following is an alphabetic list of parameters contained in this clause:

Extensible Call barring feature	7.6.3.21
Extensible Call barring information	7.6.3.20
Extensible Call barring information for CSE	7.6.3.79
Extensible Forwarding feature	7.6.3.16
Extensible Forwarding info	7.6.3.15
Extensible Forwarding information for CSE	7.6.3.80
Extensible Forwarding Options	7.6.3.18
Extensible No reply condition timer	7.6.3.19
Extensible QoS-Subscribed	7.6.3.74
Extensible SS-Data	7.6.3.29
Extensible SS-Info	7.6.3.14
Extensible SS-Status	7.6.3.17
Extensible Teleservice	7.6.3.4
External Signal Information	7.6.9.4
Forwarded-to number	7.6.2.22
Forwarded-to subaddress	7.6.2.23
Forwarding feature	7.6.4.16
Forwarding information	7.6.4.15
Forwarding Options	7.6.4.6
GGSN address	7.6.2.40
GGSN number	7.6.2.41
GMSC CAMEL Subscription Info	7.6.3.34
GPRS enhancements support indicator	7.6.3.73
GPRS Node Indicator	7.6.8.14
GPRS Subscription Data	7.6.3.46
GPRS Subscription Data Withdraw	7.6.3.45
GPRS Support Indicator	7.6.8.15
Group Id	7.6.2.33
GSM bearer capability	7.6.3.6
Guidance information	7.6.4.22
Handover number	7.6.2.21
High Layer Compatibility	7.6.3.43
HLR Id	7.6.2.15
HLR number	7.6.2.13
HO-Number Not Required	7.6.6.7
IMEI	7.6.2.3
IMSI	7.6.2.1
Inter CUG options	7.6.3.27
Intra CUG restrictions	7.6.3.28
SM Delivery Outcome	7.6.8.6
SM-RP-DA	7.6.8.1
SM-RP-MTI	7.6.8.16
SM-RP-OA	7.6.8.2
SM-RP-PRI	7.6.8.5
SM-RP-SMEA	7.6.8.17
SM-RP-UI	7.6.8.4
Sres	7.6.7.3
SS-Code	7.6.4.1
SS-Data	7.6.4.3
SS-Event	7.6.4.42
SS-Event-Data	7.6.4.43
SS-Info	7.6.4.24
SS-Status	7.6.4.2
Stored location area Id	7.6.2.5
Subscriber State	7.6.3.30
Subscriber Status	7.6.3.7
Super-Charger Supported in HLR	7.6.3.70
Super-Charger Supported in Serving Network Entity	7.6.3.71
Supported CAMEL Phases in VLR	7.6.3.36
Supported CAMEL Phases in SGSN	7.6.3.36A
Suppress T-CSI	7.6.3.33
Suppression of Announcement	7.6.3.32
Target cell Id	7.6.2.8
Target location area Id	7.6.2.7
Target MSC number	7.6.2.12
Target RNC Id	7.6.2.9
Teleservice	7.6.4.39
TMSI	7.6.2.2
Trace reference	7.6.10.2
Trace type	7.6.10.3
User error	7.6.1.4
USSD Data Coding Scheme	7.6.4.36
USSD String	7.6.4.37
UU Data	7.6.5.12
UUS CF Interaction	7.6.5.13
VBS Data	7.6.3.40
VGCS Data	7.6.3.39
VLR CAMEL Subscription Info	7.6.3.35
VLR number	7.6.2.14
VPLMN address allowed	7.6.3.48
Zone Code	7.6.2.28

Next Change

7.6.1.4 User error

This parameter can take values as follows:

NOTE: The values are grouped in order to improve readability; the grouping has no other significance.

a) Generic error:

- system failure, i.e. a task cannot be performed because of a problem in another entity. The type of entity or network resource may be indicated by use of the network resource parameter;
- data missing, i.e. an optional parameter required by the context is missing;
- unexpected data value, i.e. the data type is formally correct but its value or presence is unexpected in the current context;

- resource limitation;
- initiating release, i.e. the receiving entity has started the release procedure;
- facility not supported, i.e. the requested facility is not supported by the PLMN;
- incompatible terminal, i.e. the requested facility is not supported by the terminal.

b) Identification or numbering problem:

- unknown subscriber, i.e. no such subscription exists;
- number changed, i.e. the subscription does not exist for that number any more;
- unknown MSC;
- unidentified subscriber, i.e. if the subscriber is not contained in the database and it has not or cannot be established whether or not a subscription exists;
- unallocated roaming number;
- unknown equipment;
- unknown location area.

c) Subscription problem:

- roaming not allowed, i.e. a location updating attempt is made in an area not covered by the subscription;
- illegal subscriber, i.e. illegality of the access has been established by use of authentication procedure;
- bearer service not provisioned;
- teleservice not provisioned;
- illegal equipment, i.e. the IMEI check procedure has shown that the IMEI is blacklisted or not whitelisted.

d) Handover problem:

- no handover number available, i.e. the VLR cannot allocate a number for handover or cannot allocate the required amount of numbers for relocation;
- subsequent handover failure, i.e. handover to a third MSC failed for some reason.

Next Change

7.6.2.9 Target RNC Id

This parameter refers to the identity of the RNC to which a call has to be relocated.

Next Change

7.6.2.20 Relocation Number List

This parameter refers to the number(s) used for routing one call or several calls between MSCs during relocation.

Next Change

7.6.6.7 HO-Number Not Required

This parameter indicates that no handover or relocation number allocation is necessary.

Next Change

7.6.9 Access and signalling system related parameters

7.6.9.1 ~~BSS~~AN-apdu

This parameter includes one or two concatenated complete 3G TS 25.413 or GSM 08.06 messages, as described in ~~GSM~~ 3G TS ~~0~~23.~~0~~09 and ~~GSM~~3G TS ~~2~~09.~~0~~10. The access network p~~P~~rotocol ID indicates that the message or messages are according to either GSM 08.06 or 3G TS 25.413. For the coding of the messages see 3G TS 25.413, GSM 08.06 and GSM 08.08.

Next Change

8.4 Handover services

It should be noted that the handover services used on the B-interface have not been updated for Release 99. The B-interface is not fully operational specified. It is strongly recommended not to implement the B-interface as an external interface.

8.4.1 MAP_PREPARE_HANDOVER service

8.4.1.1 Definition

This service is used between MSC-A and MSC-B (E-interface) when a call is to be handed over or relocated from MSC-A to MSC-B.

The MAP_PREPARE_HANDOVER service is a confirmed service using the primitives from table 8.4/1.

8.4.1.2 Service primitives

Table 8.4/1: MAP_PREPARE_HANDOVER

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
Target Cell Id	C	C(=)		
Target RNC Id	C	C(=)		
HO-NumberNotRequired	C	C(=)		
~~BSS~~AN-APDU	C	C(=)	C	C(=)
Handover Number			C	C(=)
Relocation Number List			C	C(=)
User error			C	C(=)
Provider error				O

8.4.1.3 Parameter use

Invoke Id

For definition of this parameter see subclause 7.6.1.

Target Cell Id

For definition of this parameter see subclause 7.6.2. This parameter is only included if the service is not in an ongoing transaction. This parameter shall also be excluded if the service is a part of the Inter-MSC SRNS Relocation procedure described in 3G TS 23.009.

Target RNC Id

For definition of this parameter see subclause 7.6.2. This parameter shall be included if the service is a part of the Inter-MSC SRNS Relocation procedure described in 3G TS 23.009.

HO-Number Not Required

For definition of this parameter see subclause 7.6.6.

~~BSS~~AN-APDU

For definition of this parameter see subclause 7.6.9.

Handover Number

For definition of this parameter see subclause 7.6.2. This parameter shall be returned at handover, unless the parameter HO-NumberNotRequired is sent. If the parameter Handover Number is returned, the parameter Relocation Number List shall not be returned.

Relocation Number List

For definition of this parameter see subclause 7.6.2. This parameter shall be returned at relocation, unless the parameter HO-NumberNotRequired is sent. If the parameter Relocation Number List is returned, the parameter Handover Number shall not be returned

User error

For definition of this parameter see subclause 7.6.1. The following errors defined in subclause 7.6.1 may be used, depending on the nature of the fault:

- No handover number available;
- System failure;
- Unexpected data value;
- DataMissing.

Provider error

See definition of provider errors in subclause 7.6.1.

8.4.2 MAP_SEND_END_SIGNAL service

8.4.2.1 Definition

This service is used between MSC-B and MSC-A (E-interface) indicating that the radio path has been established by MSC-B to the MS. MSC-A retains then the main control of the call until it clears.

The response is used by MSC-A to inform MSC-B that all resources for the call can be released in MSC-B, either because the call has been released in MSC-A or because the call has been successfully handed over or relocated from MSC-B to another MSC.

The MAP_SEND_END_SIGNAL service is a confirmed service using the primitives from table 8.4/2.

8.4.2.2 Service primitives

Table 8.4/2: MAP_SEND_END_SIGNAL

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
~~BSS~~AN-APDU	M	M(=)		
Provider error				O

8.4.2.3 Parameter use

Invoke Id

For definition of this parameter see subclause 7.6.1.

~~BSS~~AN-APDU

For definition of this parameter see subclause 7.6.9.

Provider error

For definition of this parameter see subclause 7.6.1.

8.4.3 MAP_PROCESS_ACCESS_SIGNALLING service

8.4.3.1 Definition

This service is used between MSC-B and MSC-A (E-interface) to pass information received on the A-interface or Iu-interface in MSC-B to MSC-A.

The MAP_PROCESS_ACCESS_SIGNALLING service is a non-confirmed service using the primitives from table 8.4/3.

8.4.3.2 Service primitives

Table 8.4/3: MAP_PROCESS_ACCESS_SIGNALLING

Parameter name	Request	Indication
Invoke Id	M	M(=)
~~BSS~~AN-APDU	M	M(=)

8.4.3.3 Parameter use

Invoke Id

For definition of this parameter see subclause 7.6.1.

~~BSS~~AN-APDU

For definition of this parameter see subclause 7.6.9.

8.4.4 MAP_FORWARD_ACCESS_SIGNALLING service

8.4.4.1 Definition

This service is used between MSC-A and MSC-B (E-interface) to pass information to be forwarded to the A-interface or Iu-interface of MSC-B.

The MAP_FORWARD_ACCESS_SIGNALLING service is a non-confirmed service using the primitives from table 8.4/4.

8.4.4.2 Service primitives

Table 8.4/4: MAP_FORWARD_ACCESS_SIGNALLING

Parameter name	Request	Indication
Invoke Id	M	M(=)
~~BSS~~AN-APDU	M	M(=)

8.4.4.3 Parameter use

For the definition and use of all parameters and errors, see subclause 7.6.1

Invoke Id

For definition of this parameter see subclause 7.6.1.

~~BSS~~AN-APDU

For definition of this parameter see subclause 7.6.9.

8.4.5 MAP_PREPARE_SUBSEQUENT_HANDOVER service

8.4.5.1 Definition

This service is used between MSC-B and MSC-A (E-interface) to inform MSC-A that it has been decided that a handover or relocation to either MSC-A or a third MSC (MSC-B') is required.

The MAP_PREPARE_SUBSEQUENT_HANDOVER service is a confirmed service using the primitives from table 8.4/5.

8.4.5.2 Service primitives

Table 8.4/5: MAP_PREPARE_SUBSEQUENT_HANDOVER

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
Target Cell Id	C~~M~~	C~~M~~(=)		
Target RNC Id	C	C(=)		
Target MSC Number	M	M(=)		
~~BSS~~AN-APDU	M	M(=)	C	C(=)
User error			C	C(=)
Provider error				O

8.4.5.3 Parameter use

Invoke Id

For definition of this parameter see subclause 7.6.1.

Target Cell Id

For definition of this parameter see subclause 7.6.2. This parameter shall be excluded if the service is a part of the Inter-MSC SRNS Relocation procedure described in 3G TS 23.009.

Target RNC Id

For definition of this parameter see subclause 7.6.2. This parameter shall be included if the service is a part of the Inter-MSC SRNS Relocation procedure described in 3G TS 23.009.

Target MSC Number

For definition of this parameter see subclause 7.6.2.

~~BSS~~AN-APDU

For definition of this parameter see subclause 7.6.9.

User error

For definition of this parameter see subclause 7.6.1. The following error causes defined in subclause 7.6.1 may be used, depending on the nature of the fault:

- Unknown MSC;
- Subsequent handover failure;
- Unexpected data value;
- Data Missing.

Provider error

For definition of this parameter see subclause 7.6.1.

Next Change

17.1.6 Application Contexts

The following informative table lists the latest versions of the Application Contexts used in this specification, with the operations used by them and, where applicable, whether or not the operation description is exactly the same as for previous versions. Information in sections 17.6 & 17.7 relates only to the ACs in this table.

AC Name	AC Version	Operations Used	Comments *
locationCancellationContext	v3	cancelLocation	
equipmentMngtContext	v2	checkIMEI	
imsiRetrievalContext	v2	sendIMSI	
infoRetrievalContext	v3	sendAuthenticationInfo	
interVlrInfoRetrievalContext	v3	sendIdentification	
handoverControlContext	~~v2~~v3	prepareHandover forwardAccessSignalling sendEndSignal processAccessSignalling prepareSubsequentHandover	the syntax of this operation has been extended in comparison with release 98 version
mwdMngtContext	v3	readyForSM	
msPurgingContext	v3	purgeMS	
shortMsgAlertContext	v2	alertServiceCentre	
resetContext	v2	reset	
networkUnstructuredSsContext	v2	processUnstructuredSS-Request unstructuredSS-Request unstructuredSS-Notify	
tracingContext	v3	activateTraceMode deactivateTraceMode	
networkFunctionalSsContext	v2	registerSS eraseSS activateSS deactivateSS	

		registerPassword interrogateSS getPassword	
shortMsgMO-RelayContext	v3	mo-forwardSM	
shortMsgMT-RelayContext	v3	mt-forwardSM	
shortMsgGatewayContext	v3	sendRoutingInfoForSM reportSM-DeliveryStatus InformServiceCentre	the syntax of this operation has been extended in comparison with release 96 version
networkLocUpContext	v3	updateLocation forwardCheckSs-Indication restoreData insertSubscriberData activateTraceMode	the syntax is the same in v1 & v2
gprsLocationUpdateContext	v3	updateGprsLocation insertSubscriberData activateTraceMode	
subscriberDataMngtContext	v3	insertSubscriberData deleteSubscriberData	
roamingNumberEnquiryContext	v3	provideRoamingNumber	
locationInfoRetrievalContext	v3	sendRoutingInfo	
gprsNotifyContext	v3	noteMsPresentForGprs	
gprsLocationInfoRetrievalContext	v3	sendRoutingInfoForGprs	
failureReportContext	v3	failureReport	
callControlTransferContext	v4	resumeCallHandling	
subscriberInfoEnquiryContext	v3	provideSubscriberInfo	
anyTimeEnquiryContext	v3	anyTimeInterrogation	
anyTimeInfoHandlingContext	v3	anyTimeSubscriptionInterrogation anyTimeModification	
ss-InvocationNotificationContext	v3	ss-InvocationNotification	
sIWFSAllocationContext	v3	provideSIWFSNumber sIWFSSignallingModify	
groupCallControlContext	v3	prepareGroupCall processGroupCallSignalling forwardGroupCallSignalling sendGroupCallEndSignal	
reportingContext	v3	setReportingState statusReport remoteUserFree	
callCompletionContext	v3	registerCC-Entry eraseCC-Entry	
istAlertingContext	v3	istAlert	
ImmediateTerminationContext	v3	istCommand	
locationSvcEnquiryContext	v3	provideSubscriberLocation subscriberLocationReport	
locationSvcGatewayContext	v3	sendRoutingInfoForLCS	
mm-EventReportingContext	v3	noteMM-Event	
subscriberDataModificationNotificationContext	v3	noteSubscriberDataModified	

NOTE (*): The syntax of the operations is not the same as in previous versions unless explicitly stated

Next Change

17.2.2.12 Handover Control

This operation package includes the operations required for handover procedures between MSCs.

```
HandoverControlPackage-v3~~2~~ ::= OPERATION-PACKAGE
     -- Supplier is MSCB if Consumer is MSCA
     CONSUMER INVOKES {
          prepareHandover,
          forwardAccessSignalling}
     SUPPLIER INVOKES {
          sendEndSignal,
          processAccessSignalling,
          prepareSubsequentHandover}
```

The v2-equivalent package can be determined according to the rules described in subclause 17.2.1.

The v1-equivalent package is defined as follows.

```
HandoverControlPackage-v1 ::= OPERATION-PACKAGE
     -- Supplier is MSCB if Consumer is MSCA
     CONSUMER INVOKES {
          performHandover,
          forwardAccessSignalling,
          traceSubscriberActivity}
     SUPPLIER INVOKES {
          sendEndSignal,
          noteInternalHandover,
          processAccessSignalling,
          performSubsequentHandover}
```

Next Change

17.3.2.12 Handover control

This application context is used for handover procedures between MSCs.

```
handoverControlContext-v3~~2~~ APPLICATION-CONTEXT
     -- Responder is MSCB if Initiator is MSCA
     INITIATOR CONSUMER OF {
          HandoverControlPackage-v3~~2~~}
::= {map-ac handoverControl(11) version3~~2~~(3~~2~~)}
```

The following application-context-name is assigned to the v2-equivalent application-context:

```
{map-ac handoverControl(11) version2(2)}
```

The following application-context-name is assigned to the v1-equivalent application-context:

```
{map-ac handoverControl(11) version1(1)}
```

Next Change

17.3.3 ASN.1 Module for application-context-names

The following ASN.1 module summarizes the application-context-name assigned to MAP application-contexts.

```
MAP-ApplicationContexts {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ApplicationContexts (2) version6 (6)}

DEFINITIONS

::=

BEGIN
```

```
-- EXPORTS everything


IMPORTS
   gsm-NetworkId,
   ac-Id
FROM MobileDomainDefinitions {
   ccitt (0) identified-organization (4) etsi (0) mobileDomain (0)
   mobileDomainDefinitions (0) version1 (1)}
;

-- application-context-names

map-ac  OBJECT IDENTIFIER ::= {gsm-NetworkId ac-Id}

networkLocUpContext-v3  OBJECT IDENTIFIER ::=
     {map-ac networkLocUp(1) version3(3)}

locationCancellationContext-v3  OBJECT IDENTIFIER ::=
     {map-ac locationCancel(2) version3(3)}

roamingNumberEnquiryContext-v3  OBJECT IDENTIFIER ::=
     {map-ac roamingNbEnquiry(3) version3(3)}

locationInfoRetrievalContext-v3  OBJECT IDENTIFIER ::=
     {map-ac locInfoRetrieval(5) version3(3)}

resetContext-v2  OBJECT IDENTIFIER ::=
     {map-ac reset(10) version2(2)}

handoverControlContext-v32  OBJECT IDENTIFIER ::=
     {map-ac handoverControl(11) version32(32)}

equipmentMngtContext-v2  OBJECT IDENTIFIER ::=
     {map-ac equipmentMngt(13) version2(2)}

infoRetrievalContext-v3  OBJECT IDENTIFIER ::=
     {map-ac infoRetrieval(14) version3(3)}

interVlrInfoRetrievalContext-v3  OBJECT IDENTIFIER ::=
     {map-ac interVlrInfoRetrieval(15) version3(3)}

subscriberDataMngtContext-v3  OBJECT IDENTIFIER ::=
     {map-ac subscriberDataMngt(16) version3(3)}

tracingContext-v3  OBJECT IDENTIFIER ::=
     {map-ac tracing(17) version3(3)}

networkFunctionalSsContext-v2  OBJECT IDENTIFIER ::=
     {map-ac networkFunctionalSs(18) version2(2)}

networkUnstructuredSsContext-v2  OBJECT IDENTIFIER ::=
     {map-ac networkUnstructuredSs(19) version2(2)}

shortMsgGatewayContext-v3  OBJECT IDENTIFIER ::=
     {map-ac shortMsgGateway(20) version3(3)}

shortMsgMO-RelayContext-v3  OBJECT IDENTIFIER ::=
     {map-ac shortMsgMO-Relay(21) version3(3)}

shortMsgAlertContext-v2  OBJECT IDENTIFIER ::=
     {map-ac shortMsgAlert(23) version2(2)}

mwdMngtContext-v3  OBJECT IDENTIFIER ::=
     {map-ac mwdMngt(24) version3(3)}

shortMsgMT-RelayContext-v3  OBJECT IDENTIFIER ::=
     {map-ac shortMsgMT-Relay(25) version3(3)}

imsiRetrievalContext-v2  OBJECT IDENTIFIER ::=
     {map-ac imsiRetrieval(26) version2(2)}

msPurgingContext-v3  OBJECT IDENTIFIER ::=
     {map-ac msPurging(27) version3(3)}
```

```
subscriberInfoEnquiryContext-v3  OBJECT IDENTIFIER ::=
     {map-ac subscriberInfoEnquiry(28) version3(3)}

anyTimeInfoEnquiryContext-v3  OBJECT IDENTIFIER ::=
     {map-ac anyTimeInfoEnquiry(29) version3(3)}

callControlTransferContext-v4  OBJECT IDENTIFIER ::=
     {map-ac callControlTransfer(6) version4(4)}

ss-InvocationNotificationContext-v3  OBJECT IDENTIFIER ::=
     {map-ac ss-InvocationNotification(36) version3(3)}

sIWFSAllocationContext-v3  OBJECT IDENTIFIER ::=
     {map-ac sIWFSAllocation(12) version3(3)}

groupCallControlContext-v3  OBJECT IDENTIFIER ::=
     {map-ac groupCallControl(31) version3(3)}

gprsLocationUpdateContext-v3  OBJECT IDENTIFIER ::=
     {map-ac gprsLocationUpdate(32) version3(3)}

gprsLocationInfoRetrievalContext-v3  OBJECT IDENTIFIER ::=
     {map-ac gprsLocationInfoRetrieval(33) version3(3)}

failureReportContext-v3  OBJECT IDENTIFIER ::=
     {map-ac failureReport(34) version3(3)}

gprsNotifyContext-v3  OBJECT IDENTIFIER ::=
     {map-ac gprsNotify(35) version3(3)}

reportingContext-v3  OBJECT IDENTIFIER ::=
     {map-ac reporting(7) version3(3)}

callCompletionContext-v3  OBJECT IDENTIFIER ::=
     {map-ac callCompletion(8) version3(3)}

istAlertingContext-v3  OBJECT IDENTIFIER ::=
     {map-ac istAlerting(4) version3(3)}

serviceTerminationContext-v3  OBJECT IDENTIFIER ::=
     {map-ac immediateTermination(9) version3(3)}

locationSvcGatewayContext-v3  OBJECT IDENTIFIER ::=
     {map-ac locationSvcGateway(37) version3(3)}

locationSvcEnquiryContext-v3  OBJECT IDENTIFIER ::=
     {map-ac locationSvcEnquiry(38) version3(3)}


mm-EventReportingContext-v3  OBJECT IDENTIFIER ::=
     {map-ac mm-EventReporting(42) version3(3)}

anyTimeInfoHandlingContext-v3  OBJECT IDENTIFIER ::=
     {map-ac anyTimeInfoHandling(43) version3(3)}

subscriberDataModificationNotificationContext-v3  OBJECT IDENTIFIER ::=
     {map-ac subscriberDataModificationNotification(22) version3(3)}

-- The following Object Identifiers are reserved for application-
-- contexts existing in previous versions of the protocol
```

-- AC Name & Version	Object Identifier	
--		
-- networkLocUpContext-v1	map-ac networkLocUp (1)	version1 (1)
-- networkLocUpContext-v2	map-ac networkLocUp (1)	version2 (2)
-- locationCancellationContext-v1	map-ac locationCancellation (2)	version1 (1)
-- locationCancellationContext-v2	map-ac locationCancellation (2)	version2 (2)
-- roamingNumberEnquiryContext-v1	map-ac roamingNumberEnquiry (3)	version1 (1)
-- roamingNumberEnquiryContext-v2	map-ac roamingNumberEnquiry (3)	version2 (2)
-- locationInfoRetrievalContext-v1	map-ac locationInfoRetrieval (5)	version1 (1)
-- locationInfoRetrievalContext-v2	map-ac locationInfoRetrieval (5)	version2 (2)
-- resetContext-v1	map-ac reset (10)	version1 (1)
-- handoverControlContext-v1	map-ac handoverControl (11)	version1 (1)
-- handoverControlContext-v2	map-ac handoverControl (11)	version2 (2)
-- equipmentMngtContext-v1	map-ac equipmentMngt (13)	version1 (1)
-- infoRetrievalContext-v1	map-ac infoRetrieval (14)	version1 (1)
-- infoRetrievalContext-v2	map-ac infoRetrieval (14)	version2 (2)
-- interVlrInfoRetrievalContext-v2	map-ac interVlrInfoRetrieval (15)	version2 (2)
-- subscriberDataMngtContext-v1	map-ac subscriberDataMngt (16)	version1 (1)
-- subscriberDataMngtContext-v2	map-ac subscriberDataMngt (16)	version2 (2)
-- tracingContext-v1	map-ac tracing (17)	version1 (1)
-- tracingContext-v2	map-ac tracing (17)	version2 (2)
-- *networkFunctionalSsContext-v1*	*map-ac networkFunctionalSs (18)*	*version1 (1)*
-- shortMsgGatewayContext-v1	map-ac shortMsgGateway (20)	version1 (1)
-- shortMsgGatewayContext-v2	map-ac shortMsgGateway (20)	version2 (2)
-- shortMsgRelayContext-v1	map-ac shortMsgRelay (21)	version1 (1)
-- shortMsgAlertContext-v1	map-ac shortMsgAlert (23)	version1 (1)
-- *mwdMngtContext-v1*	*map-ac mwdMngt (24)*	*version1 (1)*
-- mwdMngtContext-v2	map-ac mwdMngt (24)	version2 (2)
-- shortMsgMT-RelayContext-v2	map-ac shortMsgMT-Relay (25)	version2 (2)
-- msPurgingContext-v2	map-ac msPurging (27)	version2 (2)
-- callControlTransferContext-v3	map-ac callControlTransferContext (6)	version3 (3)

END

Next Change

17.6 MAP operation and error types

17.6.1 Mobile Service Operations

```
MAP-MobileServiceOperations {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MobileServiceOperations (5)
   version6 (6)}

DEFINITIONS

::=

BEGIN

EXPORTS

   -- location registration operations
   UpdateLocation,
   CancelLocation,
   PurgeMS,
   SendIdentification,

   -- gprs location registration operations
   UpdateGprsLocation,

   -- subscriber information enquiry operations
   ProvideSubscriberInfo,

   -- any time information enquiry operations
   AnyTimeInterrogation,

   -- any time information handling operations
   AnyTimeSubscriptionInterrogation,
   AnyTimeModification,

   -- subscriber data modification notification operations
   NoteSubscriberDataModified,


   -- handover operations
   PrepareHandover,
   SendEndSignal,
   ProcessAccessSignalling,
   ForwardAccessSignalling,
   PrepareSubsequentHandover,

   -- authentication management operations
   SendAuthenticationInfo,

   -- IMEI management operations
   CheckIMEI,

   -- subscriber management operations
   InsertSubscriberData,
   DeleteSubscriberData,

   -- fault recovery operations
   Reset,
   ForwardCheckSS-Indication,
   RestoreData,

-- gprs location information retrieval operations
   SendRoutingInfoForGprs,

   -- failure reporting operations
   FailureReport,
```

```
   -- gprs notification operations
   NoteMsPresentForGprs,

   -- Mobility Management operations
   NoteMM-Event



;

IMPORTS
   OPERATION
FROM TCAPMessages {
   ccitt recommendation q 773 modules (2) messages (1) version2 (2)}

   SystemFailure,
   DataMissing,
   UnexpectedDataValue,
   UnknownSubscriber,
   UnknownMSC,
   UnidentifiedSubscriber,
   UnknownEquipment,
   RoamingNotAllowed,
   ATI-NotAllowed,
   NoHandoverNumberAvailable,
   SubsequentHandoverFailure,
   AbsentSubscriber,
   MM-EventNotSupported,
   ATSI-NotAllowed,
   ATM-NotAllowed,
   BearerServiceNotProvisioned,
   TeleserviceNotProvisioned,
   CallBarred,
   IllegalSS-Operation,
   SS-ErrorStatus,
   SS-NotAvailable,
   SS-Incompatibility,
   SS-SubscriptionViolation,
   InformationNotAvailable


FROM MAP-Errors {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-Errors (10) version6 (6)}

   UpdateLocationArg,
   UpdateLocationRes,
   CancelLocationArg,
   CancelLocationRes,
   PurgeMS-Arg,
   PurgeMS-Res,
   SendIdentificationArg,
   SendIdentificationRes,
   UpdateGprsLocationArg,
   UpdateGprsLocationRes,
   PrepareHO-Arg,
   PrepareHO-Res,
   ForwardAccessSignalling-Arg,
   ProcessAccessSignalling-Arg,
   SendEndSignalling-Arg,
   SendEndSignalling-Res,
   PrepareSubsequentHO-Res,
   PrepareSubsequentHO-Arg,
   SendAuthenticationInfoArg,
   SendAuthenticationInfoRes,
   EquipmentStatus,
   InsertSubscriberDataArg,
   InsertSubscriberDataRes,
   DeleteSubscriberDataArg,
   DeleteSubscriberDataRes,
   ResetArg,
   RestoreDataArg,
   RestoreDataRes,
   ProvideSubscriberInfoArg,
   ProvideSubscriberInfoRes,
```

```
   AnyTimeSubscriptionInterrogationArg,
   AnyTimeSubscriptionInterrogationRes,
   AnyTimeModificationArg,
   AnyTimeModificationRes,
   NoteSubscriberDataModifiedArg,
   NoteSubscriberDataModifiedRes,
   AnyTimeInterrogationArg,
   AnyTimeInterrogationRes,
   SendRoutingInfoForGprsArg,
   SendRoutingInfoForGprsRes,
   FailureReportArg,
   FailureReportRes,
   NoteMsPresentForGprsArg,
   NoteMsPresentForGprsRes,
   NoteMM-EventArg,
   NoteMM-EventRes


FROM MAP-MS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MS-DataTypes (11) version6 (6)}

   ExternalSignalInfo,
   IMEI
FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}
;


-- location registration operations

UpdateLocation ::= OPERATION                                          --Timer m
    ARGUMENT
         updateLocationArg              UpdateLocationArg
    RESULT
         updateLocationRes              UpdateLocationRes
    ERRORS {
         SystemFailure,
         DataMissing,
         UnexpectedDataValue,
         UnknownSubscriber,
         RoamingNotAllowed}

CancelLocation ::= OPERATION                                          --Timer m
    ARGUMENT
         cancelLocationArg              CancelLocationArg
    RESULT
         cancelLocationRes              CancelLocationRes
             -- optional
    ERRORS {
         DataMissing,
         UnexpectedDataValue}

PurgeMS ::= OPERATION                                                 --Timer m
    ARGUMENT
         purgeMS-Arg                    PurgeMS-Arg
    RESULT
         purgeMS-Res                    PurgeMS-Res
              -- optional
    ERRORS{
         DataMissing,
         UnexpectedDataValue,
         UnknownSubscriber}
```

```
SendIdentification ::= OPERATION                                    --Timer s
     ARGUMENT
          sendIdentificationArg               SendIdentificationArg
     RESULT
          sendIdentificationRes          SendIdentificationRes
     ERRORS {
          DataMissing,
          UnidentifiedSubscriber}
```

-- gprs location registration operations

```
UpdateGprsLocation ::= OPERATION                                    --Timer m
     ARGUMENT
          updateGprsLocationArg          UpdateGprsLocationArg
     RESULT
          updateGprsLocationRes          UpdateGprsLocationRes
     ERRORS {
          SystemFailure,
          UnexpectedDataValue,
          UnknownSubscriber,
          RoamingNotAllowed}
```

-- subscriber information enquiry operations

```
ProvideSubscriberInfo ::= OPERATION                                 --Timer m
     ARGUMENT
          provideSubscriberInfoArg       ProvideSubscriberInfoArg
     RESULT
          provideSubscriberInfoRes       ProvideSubscriberInfoRes
     ERRORS {
          DataMissing,
          UnexpectedDataValue}
```

-- any time information enquiry operations

```
AnyTimeInterrogation ::= OPERATION                                  --Timer m
     ARGUMENT
          anyTimeInterrogationArg        AnyTimeInterrogationArg
     RESULT
          anyTimeInterrogationRes        AnyTimeInterrogationRes
     ERRORS {
          SystemFailure,
          ATI-NotAllowed,
          DataMissing,
          UnexpectedDataValue,
          UnknownSubscriber}
```

-- any time information handling operations

```
AnyTimeSubscriptionInterrogation ::= OPERATION                      --Timer m
     ARGUMENT
          anyTimeSubscriptionInterrogationArg  AnyTimeSubscriptionInterrogationArg
     RESULT
          anyTimeSubscriptionInterrogationRes  AnyTimeSubscriptionInterrogationRes
     ERRORS {
          ATSI-NotAllowed,
          DataMissing,
          UnexpectedDataValue,
          UnknownSubscriber,
          BearerServiceNotProvisioned,
          TeleserviceNotProvisioned,
          CallBarred,
          IllegalSS-Operation,
          SS-NotAvailable,
          InformationNotAvailable}
```

```
AnyTimeModification ::= OPERATION                                    --Timer m
    ARGUMENT
        anyTimeModificationArg          AnyTimeModificationArg
    RESULT
        anyTimeModificationRes          AnyTimeModificationRes
    ERRORS {
        ATM-NotAllowed,
        DataMissing,
        UnexpectedDataValue,
        UnknownSubscriber,
        BearerServiceNotProvisioned,
        TeleserviceNotProvisioned,
        CallBarred,
        IllegalSS-Operation,
        SS-SubscriptionViolation,
        SS-ErrorStatus,
        SS-Incompatibility,
        InformationNotAvailable}
```

-- subscriber data modification notification operations

```
NoteSubscriberDataModified ::= OPERATION                             --Timer m
    ARGUMENT
        noteSubscriberDataModifiedArg   NoteSubscriberDataModifiedArg
    RESULT
        noteSubscriberDataModifiedRes   NoteSubscriberDataModifiedRes
            -- optional
    ERRORS {
        UnexpectedDataValue,
        UnknownSubscriber}
```

-- handover operations

```
PrepareHandover ::= OPERATION                                        --Timer m
    ARGUMENT
        prepareHO-Arg                   PrepareHO-Arg
    RESULT
        prepareHO-Res                   PrepareHO-Res
    ERRORS {
        SystemFailure,
        DataMissing,
        UnexpectedDataValue,
        NoHandoverNumberAvailable}
```

```
SendEndSignal ::= OPERATION                                          --Timer l
    ARGUMENT
        sendEndSignal-Arg               SendEndSignal-Arg~~bss-APDU          ExternalSignalInfo~~
    RESULT
        sendEndSignal-Res               SendEndSignal-Res
```

```
ProcessAccessSignalling ::= OPERATION                --Timer s
    ARGUMENT
        processAccessSignalling-Arg     ProcessAccessSignalling-Arg~~bss-APDU
    ExternalSignalInfo~~
```

```
ForwardAccessSignalling ::= OPERATION                --Timer s
    ARGUMENT
        forwardAccessSignalling-Arg     ForwardAccessSignalling-Arg~~bss-APDU
    ExternalSignalInfo~~
```

```
PrepareSubsequentHandover ::= OPERATION              --Timer m
    ARGUMENT
        prepareSubsequentHO-Arg         PrepareSubsequentHO-Arg
    RESULT
        prepareSubsequentHO-Res         PrepareSubsequentHO-Res~~bss-APDU    ExternalSignalInfo~~
    ERRORS {
        UnexpectedDataValue,
        DataMissing,
        UnknownMSC,
        SubsequentHandoverFailure}
```

Next Change

17.7 MAP constants and data types

17.7.1 Mobile Service data types

```
MAP-MS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MS-DataTypes (11) version6 (6)}

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

   -- location registration types
   UpdateLocationArg,
   UpdateLocationRes,
   CancelLocationArg,
   CancelLocationRes,
   PurgeMS-Arg,
   PurgeMS-Res,
   SendIdentificationArg,
   SendIdentificationRes,
   UpdateGprsLocationArg,
   UpdateGprsLocationRes,
   IST-SupportIndicator,


   -- handover types
   ForwardAccessSignalling-Arg,
   PrepareHO-Arg,
   PrepareHO-Res,
   PrepareSubsequentHO-Arg,
   PrepareSubsequentHO-Res,
   ProcessAccessSignalling-Arg,
   SendEndSignalling-Arg,
   SendEndSignalling-Res,


   -- authentication management types
   SendAuthenticationInfoArg,
   SendAuthenticationInfoRes,

   -- security management types
   EquipmentStatus,
   Kc,

   -- subscriber management types
   InsertSubscriberDataArg,
   InsertSubscriberDataRes,
   DeleteSubscriberDataArg,
   DeleteSubscriberDataRes,
   SubscriberData,
   ODB-Data,
   SubscriberStatus,
   ZoneCodeList,
   maxNumOfZoneCodes,
   O-CSI,
   D-CSI,
   O-BcsmCamelTDPCriteriaList,
   T-BCSM-CAMEL-TDP-CriteriaList,
   SS-CSI,
   ServiceKey,
   DefaultCallHandling,
   CamelCapabilityHandling,
   BasicServiceCriteria,
   SupportedCamelPhases,
   maxNumOfCamelTDPData,
   CUG-Index,
   CUG-Interlock,
   InterCUG-Restrictions,
```

```
   IntraCUG-Options,
   IST-AlertTimerValue,
   T-CSI,
   T-BcsmTriggerDetectionPoint,

   -- fault recovery types
   ResetArg,
   RestoreDataArg,
   RestoreDataRes,

   -- subscriber information enquiry types
   ProvideSubscriberInfoArg,
   ProvideSubscriberInfoRes,
   SubscriberInfo,
   LocationInformation,
   SubscriberState,

   -- any time information enquiry types
   AnyTimeInterrogationArg,
   AnyTimeInterrogationRes,

   -- any time information handling types
   AnyTimeSubscriptionInterrogationArg,
   AnyTimeSubscriptionInterrogationRes,
   AnyTimeModificationArg,
   AnyTimeModificationRes,

   -- subscriber data modification notification types
   NoteSubscriberDataModifiedArg,
   NoteSubscriberDataModifiedRes,

   -- gprs location information retrieval types
   SendRoutingInfoForGprsArg,
   SendRoutingInfoForGprsRes,

   -- failure reporting types
   FailureReportArg,
   FailureReportRes,

   -- gprs notification types
   NoteMsPresentForGprsArg,
   NoteMsPresentForGprsRes,

   -- Mobility Management types
   NoteMM-EventArg,
   NoteMM-EventRes



;

IMPORTS
   maxNumOfSS,
   SS-SubscriptionOption,
   SS-List,
   SS-ForBS-Code,
   Password
FROM MAP-SS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SS-DataTypes (14) version6 (6)}

   SS-Code
FROM MAP-SS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SS-Code (15) version6 (6)}

   Ext-BearerServiceCode
FROM MAP-BS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-BS-Code (20) version6 (6)}

   Ext-TeleserviceCode
FROM MAP-TS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-TS-Code (19) version6 (6)}
```

```
   AddressString,
   ISDN-AddressString,
   ISDN-SubaddressString,
   AccessNetwork~~External~~SignalInfo,
   IMSI,
   TMSI,
   HLR-List,
   LMSI,
   Identity,
   GlobalCellId,
   CellIdOrLAI,
   Ext-BasicServiceCode,
   NAEA-PreferredCI,
   EMLPP-Info,
   SubscriberIdentity,
   AgeOfLocationInformation,
   LCSClientExternalID,
   LCSClientInternalID



FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version6 (6)}

   AbsentSubscriberDiagnosticSM
FROM MAP-ER-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ER-DataTypes (17) version6 (6)}


;


-- location registration types

UpdateLocationArg ::= SEQUENCE {
    imsi                              IMSI,

    msc-Number                        [1] ISDN-AddressString,
    vlr-Number                        ISDN-AddressString,
    lmsi                              [10] LMSI OPTIONAL,
    extensionContainer                ExtensionContainer                OPTIONAL,
    ... ,
    vlr-Capability                    [6] VLR-Capability                OPTIONAL }

VLR-Capability ::= SEQUENCE{
    supportedCamelPhases              [0] SupportedCamelPhases          OPTIONAL,
    extensionContainer                ExtensionContainer                OPTIONAL,
    ... ,
    solsaSupportIndicator             [2] NULL                          OPTIONAL,
    istSupportIndicator               [1] IST-SupportIndicator          OPTIONAL,
    superChargerSupportedInServingNetworkEntity   [3] SuperChargerInfo     OPTIONAL }

SuperChargerInfo ::= CHOICE {
    sendSubscriberData                [0] NULL,
    subscriberDataStored              [1] AgeIndicator }

AgeIndicator ::= OCTET STRING (SIZE (1..6))
    -- The internal structure of this parameter is implementation specific.

IST-SupportIndicator ::=  ENUMERATED {
    basicISTSupported                 (0),
    istCommandSupported               (1), ...}
-- exception handling:
-- reception of values > 1 shall be mapped to ' istCommandSupported '
```

```
UpdateLocationRes ::= SEQUENCE {
     hlr-Number                          ISDN-AddressString,

     extensionContainer                  ExtensionContainer              OPTIONAL,
     ... }
```

```
CancelLocationArg ::= [3] SEQUENCE {
     identity                            Identity,
     cancellationType                    CancellationType                OPTIONAL,
     extensionContainer                  ExtensionContainer              OPTIONAL,
     ...}
```

```
CancellationType ::= ENUMERATED {
     updateProcedure                     (0),
     subscriptionWithdraw                (1),
     ...}
     -- The HLR shall not send values other than listed above
```

```
CancelLocationRes ::= SEQUENCE {
     extensionContainer                  ExtensionContainer              OPTIONAL,
     ...}
```

```
PurgeMS-Arg ::= [3] SEQUENCE {
     imsi                                IMSI,
     vlr-Number                          [0] ISDN-AddressString          OPTIONAL,
     sgsn-Number                         [1]  ISDN-AddressString         OPTIONAL,
     extensionContainer                  ExtensionContainer              OPTIONAL,
     ...}
```

```
PurgeMS-Res ::= SEQUENCE {
     freezeTMSI                          [0]  NULL                       OPTIONAL,
     freezeP-TMSI                        [1]  NULL                       OPTIONAL,
     extensionContainer                  ExtensionContainer              OPTIONAL,
     ...}
```

```
SendIdentificationArg ::= SEQUENCE {
     tmsi                                TMSI,
     numberOfRequestedVectors            NumberOfRequestedVectors,
     segmentationProhibited              NULL                            OPTIONAL,
     -- if segmentation is prohibited the previous VLR shall not send the result
     -- within a TC-CONTINUE message.
     extensionContainer                  ExtensionContainer              OPTIONAL,
     ...}
```

```
SendIdentificationRes ::= [3] SEQUENCE {
     imsi                                IMSI                            OPTIONAL,
     -- IMSI must be present if SendIdentificationRes is not segmented.
     -- If the TC-Continue segmentation option is taken the IMSI must be
     -- present in one segmented transmission of SendIdentificationRes.
     authenticationSetList               AuthenticationSetList           OPTIONAL,
     extensionContainer                  [2] ExtensionContainer          OPTIONAL,
     ...}
```

```
AuthenticationSetList ::= CHOICE {
     tripletList                         [0] TripletList,
     quintupletList                      [1] QuintupletList }
```

```
TripletList ::= SEQUENCE SIZE (1..5) OF
                                         AuthenticationTriplet
```

```
QuintupletList ::= SEQUENCE SIZE (1..5) OF
                                         AuthenticationQuintuplet
```

```
AuthenticationTriplet ::= SEQUENCE {
     rand                                RAND,
     sres                                SRES,
     kc                                  Kc,
     ...}
```

```
AuthenticationQuintuplet ::= SEQUENCE {
    rand                                RAND,
    xres                                XRES,
    ck                                  CK,
    ik                                  IK,
    autn                                AUTN,
    ...}
```

```
RAND ::= OCTET STRING (SIZE (16))
```

```
SRES ::= OCTET STRING (SIZE (4))
```

```
Kc ::= OCTET STRING (SIZE (8))
```

```
XRES ::= OCTET STRING (SIZE (4..16))
```

```
CK ::= OCTET STRING (SIZE (16))
```

```
IK ::= OCTET STRING (SIZE (16))
```

```
AUTN ::= OCTET STRING (SIZE (14..18))
```

```
AUTS ::= OCTET STRING (SIZE (12..16))
```

-- gprs location registration types

```
UpdateGprsLocationArg ::= SEQUENCE {
    imsi                                IMSI,
    sgsn-Number                         ISDN-AddressString,
    sgsn-Address                        GSN-Address,
    extensionContainer                  ExtensionContainer                  OPTIONAL,
    ... ,
    sgsn-Capability                     [0] SGSN-Capability                 OPTIONAL }
```

```
SGSN-Capability ::= SEQUENCE{
    solsaSupportIndicator               NULL                                OPTIONAL,
    extensionContainer                  [1] ExtensionContainer              OPTIONAL,
    ... ,
    superChargerSupportedInServingNetworkEntity   [2] SuperChargerInfo      OPTIONAL ,
    gprsEnhancementsSupportIndicator    [3] NULL                            OPTIONAL,
    supportedCamelPhases                [4] SupportedCamelPhases            OPTIONAL }
```

```
GSN-Address ::= OCTET STRING (SIZE (5..17))
    -- Octets are coded according to TS GSM 03.03
```

```
UpdateGprsLocationRes ::= SEQUENCE {
    hlr-Number                          ISDN-AddressString,
    extensionContainer                  ExtensionContainer                  OPTIONAL,
    ...}
```

-- handover types

```
ForwardAccessSignalling-Arg ::= SEQUENCE {
    an-APDU                             AccessNetworkSignalInfo,
    extensionContainer                  [0]  ExtensionContainer             OPTIONAL,
    ...}
```

```
PrepareHO-Arg ::= [3] SEQUENCE {
    targetCellId                        [0] GlobalCellId                    OPTIONAL,
    ho-NumberNotRequired                NULL                                OPTIONAL,
    targetRNCId                         [1] RNCId                           OPTIONAL,
    an-APDU                             [2] AccessNetworkSignalInfo         OPTIONAL,
    extensionContainer                  [7] ExtensionContainer              OPTIONAL,bss-APDU
    ExternalSignalInfo                  OPTIONAL,
    ...}
```

```
PrepareHO-Res ::= [3] SEQUENCE {
    handoverNumber                      [0] ISDN-AddressString              OPTIONAL,
    relocationNumberList                [1]  RelocationNumberList           OPTIONAL,
    an-APDU                             [2]  AccessNetworkSignalInfo        OPTIONAL,
    extensionContainer                  [3]  ExtensionContainer             OPTIONAL,bss-APDU
    ExternalSignalInfo                  OPTIONAL,
    ...}
```

```
PrepareSubsequentHO-Arg ::= [3] SEQUENCE {
    targetCellId                [0] GlobalCellId,
    targetMSC-Number            [1] ISDN-AddressString,
    targetRNCId                 [2] RNCId                   OPTIONAL,
    an-APDU                     [3] AccessNetworkSignalInfo OPTIONAL,
    extensionContainer          [4] ExtensionContainer      OPTIONAL,bss-APDU
    ExternalSignalInfo,
    ...}
```

```
PrepareSubsequentHO-Res ::= SEQUENCE {
    an-APDU                     AccessNetworkSignalInfo,
    extensionContainer          [0] ExtensionContainer      OPTIONAL,
    ...}
```

```
ProcessAccessSignalling-Arg ::= SEQUENCE {
    an-APDU                     AccessNetworkSignalInfo,
    extensionContainer          [0] ExtensionContainer      OPTIONAL,
    ...}
```

```
SendEndSignal-Arg ::= SEQUENCE {
    an-APDU                     AccessNetworkSignalInfo,
    extensionContainer          [0] ExtensionContainer      OPTIONAL,
    ...}
```

```
SendEndSignal-Res ::= SEQUENCE {
    extensionContainer          [0] ExtensionContainer      OPTIONAL,
    ...}
```

```
RNCId ::= OCTET STRING (SIZE (5))
    -- Refers to the Target RNC-ID in the Target ID in 3G TS 25.413.
    -- The internal structure is defined as follows:
    -- octet 1 bits 4321        Mobile Country Code 1st digit
    --         bits 8765        Mobile Country Code 2nd digit
    -- octet 2 bits 4321        Mobile Country Code 3rd digit
    --         bits 8765        Mobile Network Code 3rd digit
    --                          or filler (1111) for 2 digit MNCs
    -- octet 3 bits 4321        Mobile Network Code 1st digit
    --         bits 8765        Mobile Network Code 2nd digit
    -- octets 4 and 5           RNC ID
```

```
RelocationNumberList ::= SEQUENCE SIZE (1..maxNumOfRelocationNumber) OF
                         RelocationNumber
```

```
RelocationNumber ::= SEQUENCE {
    handoverNumber              ISDN-AddressString,
    rab-Id                      RAB-Id,
    -- RAB Identity is needed to relate the calls with the radio access bearers.
    ...}
```

```
RAB-Id ::= INTEGER (1..maxNrOfRABs)
```

```
maxNrOfRABs INTEGER ::= 256
```

```
maxNumOfRelocationNumber  INTEGER ::= 7
```

Next Change

17.7.8 Common data types

```
MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN
```

```
EXPORTS

   -- general data types and values
   AddressString,
   ISDN-AddressString,
   maxISDN-AddressLength,
   ISDN-SubaddressString,
   ExternalSignalInfo,
   Ext-ExternalSignalInfo,
   AccessNetworkSignalInfo
   SignalInfo,
   maxSignalInfoLength,
   AlertingPattern,

   -- data types for numbering and identification
   IMSI,
   TMSI,
   Identity,
   SubscriberId,
   IMEI,
   HLR-List,
   LMSI,
   GlobalCellId,
   NetworkResource,
   NAEA-PreferredCI,
   NAEA-CIC,
   ASCI-CallReference,
   SubscriberIdentity,

   -- data types for CAMEL
   CellIdOrLAI,

   -- data types for subscriber management
   BasicServiceCode,
   Ext-BasicServiceCode,
   EMLPP-Info,
   EMLPP-Priority,

   -- data types for geographic location
   AgeOfLocationInformation,
   LCSClientExternalID,
   LCSClientInternalID
;

IMPORTS
   TeleserviceCode,
   Ext-TeleserviceCode
FROM MAP-TS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-TS-Code (19) version6 (6)}

   BearerServiceCode,
   Ext-BearerServiceCode
FROM MAP-BS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-BS-Code (20) version6 (6)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version6 (6)}
;


-- general data types

TBCD-STRING ::= OCTET STRING
     -- This type (Telephony Binary Coded Decimal String) is used to
     -- represent several digits from 0 through 9, *, #, a, b, c, two
     -- digits per octet, each digit encoded 0000 to 1001 (0 to 9),
     -- 1010 (*), 1011 (#), 1100 (a), 1101 (b) or 1110 (c); 1111 used
     -- as filler when there is an odd number of digits.

     -- bits 8765 of octet n encoding digit 2n
     -- bits 4321 of octet n encoding digit 2(n-1) +1
```

```
AddressString ::= OCTET STRING (SIZE (1..maxAddressLength))
     -- This type is used to represent a number for addressing
     -- purposes. It is composed of
     --   a)   one octet for nature of address, and numbering plan
     --        indicator.
     --   b)   digits of an address encoded as TBCD-String.

     -- a)     The first octet includes a one bit extension indicator, a
     --        3 bits nature of address indicator and a 4 bits numbering
     --        plan indicator, encoded as follows:

     -- bit 8: 1  (no extension)

     -- bits 765: nature of address indicator
     --   000  unknown
     --   001  international number
     --   010  national significant number
     --   011  network specific number
     --   100  subscriber number
     --   101  reserved
     --   110  abbreviated number
     --   111  reserved for extension

     -- bits 4321: numbering plan indicator
     --   0000  unknown
     --   0001  ISDN/Telephony Numbering Plan (Rec CCITT E.164)
     --   0010  spare
     --   0011  data numbering plan (CCITT Rec X.121)
     --   0100  telex numbering plan (CCITT Rec F.69)
     --   0101  spare
     --   0110  land mobile numbering plan (CCITT Rec E.212)
     --   0111  spare
     --   1000  national numbering plan
     --   1001  private numbering plan
     --   1111  reserved for extension

     --   all other values are reserved.

     -- b)     The following octets representing digits of an address
     --        encoded as a TBCD-STRING.
```

```
maxAddressLength  INTEGER ::= 20
```

```
ISDN-AddressString ::=
               AddressString (SIZE (1..maxISDN-AddressLength))
     -- This type is used to represent ISDN numbers.
```

```
maxISDN-AddressLength  INTEGER ::= 9
```

```
ISDN-SubaddressString ::=
              OCTET STRING (SIZE (1..maxISDN-SubaddressLength))
     -- This type is used to represent ISDN subaddresses.
     -- It is composed of
     --   a)   one octet for type of subaddress and odd/even indicator.
     --   b)   20 octets for subaddress information.

     --   a)   The first octet includes a one bit extension indicator, a
     --        3 bits type of subaddress and a one bit odd/even indicator,
     --        encoded as follows:

     --   bit 8: 1  (no extension)

     --   bits 765: type of subaddress
     --        000  NSAP (X.213/ISO 8348 AD2)
     --        010  User Specified
     --        All other values are reserved

     --   bit 4: odd/even indicator
     --        0  even number of address signals
     --        1  odd number of address signals
     --        The odd/even indicator is used when the type of subaddress
     --        is "user specified" and the coding is BCD.

     --   bits 321: 000 (unused)

     --   b) Subaddress information.
     --   The NSAP X.213/ISO8348AD2 address shall be formatted as specified
     --   by octet 4 which contains the Authority and Format Identifier
     --   (AFI). The encoding is made according to the "preferred binary
     --   encoding" as defined in X.213/ISO834AD2. For the definition
     --   of this type of subaddress, see CCITT Rec I.334.

     --   For User-specific subaddress, this field is encoded according
     --   to the user specification, subject to a maximum length of 20
     --   octets. When interworking with X.25 networks BCD coding should
     --   be applied.
```

```
maxISDN-SubaddressLength  INTEGER ::= 21
```

```
ExternalSignalInfo ::= SEQUENCE {
     protocolId                          ProtocolId,
     signalInfo                          SignalInfo,
     -- Information about the internal structure is given in
     -- subclause 7.6.9.
     extensionContainer                  ExtensionContainer                OPTIONAL,
     -- extensionContainer must not be used in version 2
     ...}
```

```
SignalInfo ::= OCTET STRING (SIZE (1..maxSignalInfoLength))
```

```
maxSignalInfoLength  INTEGER ::= 200
     -- This NamedValue represents the theoretical maximum number of
     -- octets which are available to carry a single data type,
     -- without requiring segmentation to cope with the network layer
     -- service. However, the actual maximum size available for a data
     -- type may be lower, especially when other information elements
     -- have to be included in the same component.
```

```
ProtocolId ::= ENUMERATED {
     gsm-0408  (1),
     gsm-0806  (2),
     gsm-BSSMAP  (3),
     -- Value 3 is reserved and must not be used
     ets-300102-1  (4)}
```

```
Ext-ExternalSignalInfo ::= SEQUENCE {
     ext-ProtocolId                      Ext-ProtocolId,
     signalInfo                          SignalInfo,
     -- Information about the internal structure is given in
     -- subclause 7.6.9.10
     extensionContainer                  ExtensionContainer                OPTIONAL,
     ...}
```

```
Ext-ProtocolId ::= ENUMERATED {
     ets-300356  (1),
     ...
      }
-- exception handling:
-- For Ext-ExternalSignalInfo sequences containing this parameter with any
-- other value than the ones listed the receiver shall ignore the whole
-- Ext-ExternalSignalInfo sequence.
```

```
AccessNetworkSignalInfo ::= SEQUENCE {
     accessNetworkProtocolId              AccessNetworkProtocolId,
     signalInfo                           SignalInfo,
     -- Information about the internal structure is given in
     -- subclause 7.6.9.4
     extensionContainer                   ExtensionContainer                  OPTIONAL,
     ...}
```

```
AccessNetworkProtocolId ::= ENUMERATED {
     gsm-0806   (1),
     ts3G-25413 (2),
     ...}
     -- exception handling:
     -- For AccessNetworkSignalInfo sequences containing this parameter with any
     -- other value than the ones listed the receiver shall ignore the whole
     -- AccessNetworkSignalInfo sequence.
```

Next Change

19.2 Handover procedure

{Editors Note: The figures have been excluded in this subsection in order to limit the number of pages. No changes are requested to the figures.}

It should be noted that procedures related to the B-interface have not been updated for Release 99. The B-interface is not fully operational specified. It is strongly recommended not to implement the B-interface as an external interface.

19.2.1 General

The handover or relocation between different MSCs is called Inter-MSC handover. The interfaces involved for Inter-MSC handover are shown in figure 19.2/1. Following two Inter-MSC handover procedures apply:

1) Basic Inter-MSC handover:

   The call is handed over from the controlling MSC, called MSC-A to another MSC, called MSC-B (figure 19.2/1a).

   Figure 19.2/2 shows a successful handover between MSC-A and MSC-B including a request for handover number allocation by MSC-B to VLR-B.

2) Subsequent Inter-MSC handover:

   After the call has been handed over from MSC-A to MSC-B, a handover to either MSC-A (figure 19.2/1a) or to a third MSC (MSC-B') (figure 19.2/1b) is necessary in order to continue the connection.

Figure 19.2/1: Interface structure for handover

The MAP handover procedures achieve the functionality required to set up an MSC-MSC dialogue, to optionally allocate a handover number or one or several relocation numbers and to transport BSSAP or RANAP messages.

The transported BSSAP or RANAP messages are controlled and handled by the Handover Control Application in the MSCs. This information will be transparent to the MAP protocol. If the MSC receives via the MAP protocol BSSAP or RANAP messages, this information will be forwarded to the Handover Control Application (shown in the handover

SDL diagrams with the internal HO_CA signalling, it is an internal process in the MSC) and vice versa if the Handover Control Application requires the sending of BSSAP or RANAP messages via the MAP protocol.

For detailed interworking between the A-interface and MAP procedures or the Iu-interface and MAP procedures, see ~~GSM~~3G TS ~~0~~2~~0~~3.0~~0~~9 and ~~GSM~~ 3G TS 2~~0~~9.0~~1~~0.

NOTE: This can be sent at any time after the connection between MSC-A and MSC-B is established.

Figure 19.2/2: Example of a successful basic handover procedure to MSC-B

NOTE: This can be sent at any time after the connection between MSC-A and MSC-B is established.

Figure 19.2/3: Example of a handover towards a third MSC

19.2.2 Handover procedure in MSC-A

This subclause describes the handover or relocation procedure in MSC-A, including the request for a basic handover or relocation to another MSC (MSC-B), subsequent handover or relocation to a third MSC (MSC-B') or back to the controlling MSC (MSC-A).

19.2.2.1 Basic handover

When MSC-A has decided that a call has to be handed over or relocated to MSC-B, the Handover Control Application in MSC-A requests the MAP application to initiate the MAP_PREPARE_HANDOVER request to MSC-B.

MSC-A opens the dialogue to MSC-B with a MAP_OPEN request containing no user specific parameters and sends a MAP_PREPARE_HANDOVER request. This request may optionally contain an indication that a handover number allocation is not required, targetCellId, for compatibility reasons if handover, and all information required by MSC-B to allocate the necessary radio resources.

If MSC-B accepts the dialogue, it returns a MAP_PREPARE_HANDOVER confirmation containing a handover number or one or several relocation numbers, unless the request has included the HO-NumberNotRequired parameter, and BSSAP or RANAP information which is forwarded to and handled by the Handover Control Application in MSC-A.

Optionally MSC-A can receive, after a MAP_PREPARE_HANDOVER confirmation, a MAP_PROCESS_ACCESS_SIGNALLING indication containing BSSAP or RANAP information.

When the connection has been established between the MS and MSC-B, MSC-A will be informed by a MAP_SEND_END_SIGNAL indication.

When MSC-A wants to clear the connection with BSS-B, an indication from the Handover Control Application is received in the Map Application to send the MAP_SEND_END-SIGNAL response to MSC-B to close the MAP dialogue.

MSC-A may abort the handover or relocation procedure at any time (e.g. if the call is cleared).

19.2.2.2 Handling of access signalling

If required, the Handover Control Application in MSC-A requests the MAP application to invoke the MAP_FORWARD_ACCESS_SIGNALLING request containing the information to be transferred to the A-interface or the Iu-interface of MSC-B (e.g. call control information).

MAP_FORWARD_ACCESS_SIGNALLING is a non-confirmed service.

MSC-B will then forward the required information to the Handover Control Application. The MAP_FORWARD_ACCESS_SIGNALLING is composed in such a way that the information can be passed transparently to the A-interface or the Iu-interface for call control and mobility management information. Any response received in MSC-B from the A-interface or the Iu-interface that should be brought to MSC-A will require a new independent request from the Handover Control Application in MSC-B to MSC-A by invoking a MAP_PROCESS_ACCESS_SIGNALLING request.

19.2.2.3 Other procedures in stable handover situation

During a call and after handover or relocation, a number of procedures between MSC-A and BSS-B or RNS-B controlled by or reported to MSC-A may be initiated in both directions by invoking a MAP_FORWARD_ACCESS_SIGNALLING request and reception of a MAP_PROCESS_ACCESS_SIGNALLING indication.

19.2.2.4 Subsequent handover

When MSC-A receives a MAP_PREPARE_SUBSEQUENT_HANDOVER request, it will start the procedure of handing or relocate the call over to a third MSC (MSC-B'), or back to the controlling MSC (MSC-A). If the new handover or relocation procedure towards MSC-B' or MSC-A is successful, the handover control application in MSC-A will request the release of the dialogue towards MSC-B by sending the MAP_SEND_END_SIGNAL confirmation.

19.2.2.5 SDL Diagrams

The SDL diagrams on the following pages describe the user processes in MSC-A for the procedures described in this subclause.

The services used are defined in subclause 8.4.

NOTE: The message primitives HO_CA_MESSAGE used in the SDL-Diagrams are used to show the internal co-ordination between the MAP application and the Handover Control Application. For a detailed description of the co-ordination between the applications for the handover or relocation procedure, see ~~GSM~~ 3G TS ~~0~~2.0.

Note that in case of reception of errors from the MSCs (see the Handover error handling macro), the MAP user reports them to the Handover Control Application and does not take any action except in cases explicitly mentioned in the SDL diagrams.

Figure 19.2.2/1 (sheet 1 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 2 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 3 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 4 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 5 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 6 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 7 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 8 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 9 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 10 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 11 of 12): Process MSC_A_HO

Figure 19.2.2/1 (sheet 12 of 12): Process MSC_A_HO

19.2.3 Handover procedure in MSC-B

This subclause describes the handover or relocation procedure in MSC-B, including the request for a handover or relocation from another MSC (MSC-A), subsequent handover or relocation to a third MSC (MSC-B') or back to the controlling MSC (MSC-A).

19.2.3.1 Basic handover

Opening of the dialogue is described in the macro Receive_Open_Ind in subclause 25.1.

When MSC-B process receives a MAP_PREPARE_HANDOVER indication from MSC-A, MSC-B requests its associated VLR to provide a handover number, unless the parameter HO-NumberNotRequired is received in the indication.

When the connection between the MS and MSC-B is established on MSC-B, the Handover Control Application will request the MAP application to indicate this event to MSC-A by invoking the MAP_SEND_END_SIGNAL request. When a call is released, MSC-A will inform MSC-B by MAP_SEND_END_SIGNAL response and the MAP dialogue between MSC-A and MSC-B is closed.

19.2.3.2 Allocation of handover number

When a handover number is required, a MAP_ALLOCATE_HANDOVER_NUMBER request will be sent to the VLR. The handover number is received in the MAP_SEND_HANDOVER_REPORT request, and will be included in the MAP_PREPARE_HANDOVER response to MSC-A.

When relocation numbers are required, one or several MAP_ALLOCATE_HANDOVER_NUMBER requests will be sent to the VLR. Each relocation number is received in a MAP_SEND_HANDOVER_REPORT request, and the collected relocation numbers will be included in the MAP_PREPARE_HANDOVER response to MSC-A.

As soon as the call from MSC-A using the handover number arrives in MSC-B, MSC-B shall release the handover number in the VLR using the MAP_SEND_HANDOVER_REPORT response.

As soon as a call from MSC-A using a relocation number arrives in MSC-B, MSC-B shall release the relocation number in the VLR using the MAP_SEND_HANDOVER_REPORT response.

19.2.3.3 Handling of access signalling

If required by the Handover Control Application, MSC-B invokes the MAP_PROCESS_ACCESS_SIGNALLING request containing the information received on the A-interface or the Iu-interface that should be transferred to MSC-A (e.g. call control information).

MAP_PROCESS_ACCESS_SIGNALLING is a non-confirmed service and any response from MSC-A will require a MAP_FORWARD_ACCESS_SIGNALLING request.

19.2.3.4 Other procedures in stable handover situation

During a call and after handover or relocation, a number of procedures between MSC-A and BSS-B or RNS-B controlled by or reported to MSC-A may be initiated by involving access signalling transfer in both directions.

19.2.3.5 Subsequent handover

The procedure is used when the Handover Control Application in MSC-B has decided that a call is to be handed over or relocated to another MSC (either back to the controlling MSC (MSC-A) or to a third MSC (MSC-B')).

After the MAP_PREPARE_SUBSEQUENT_HANDOVER response is received from MSC-A, MSC-B will await the disconnection of the call. Once the disconnect is complete, MSC-B will inform its VLR by invoking the MAP_SEND_HANDOVER_REPORT confirmation. VLR-B will then release the allocated handover number.

The subsequent handover procedure is shown in figure 19.2/3.

19.2.3.6 SDL Diagrams

The SDL diagrams on the following pages describe the user process in MSC-B for the procedures described in this subclause.

The services used are defined in subclause 8.4.

NOTE 1: The message primitives HO_CA_MESSAGE in the SDL-diagrams are used to show the internal co-ordination between the MAP application and the Handover Control Application. For a detailed description of the co-ordination between the applications for the handover procedure, see ~~GSM~~ 3G TS ~~0~~23.009.

NOTE 2: The order in the SDL diagrams to allocate first the handover number and then the radio resources is not binding.

Figure 19.2.3/1 (sheet 1 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 2 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 3 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 4 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 5 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 6 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 7 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 8 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 9 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 10 of 11): Process MSC_B_HO

Figure 19.2.3/1 (sheet 11 of 11): Process MSC_B_HO

19.2.4 Handover error handling macro

This macro is used for the handover procedures to receive errors from the MSCs and from the Handover Control Application at any state of a handover process.

If a MAP_NOTICE indication is received, the Handover Control Application is informed and the actual situation is kept and the Handover Control Application decides how the handover or relocation process should continue. In all other cases the MSC is returned to a "NULL" state.

3GPP TSG-CN 2 SWGB meeting #4
Milan, Italy, 14-16 February 2000

Document N2B000324
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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

29.002	CR	105r1	Current Version:	3.3.1

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-CN #07	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

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 [X]

Source: N2 **Date:** 2000-02-14

Subject: Introduction of additional service parameters for inter-system handover

Work item: Handover

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Additions of necessary parameters for inter-system handover.

Clauses affected:

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	23.121 xxx, 23.009 xxx
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

Next Change

7.6 Definition of parameters

Following is an alphabetic list of parameters used in the common MAP-services in subclause 7.3:

Application context name	7.3.1	Refuse reason	7.3.1
Destination address	7.3.1	Release method	7.3.2
Destination reference	7.3.1	Responding address	7.3.1
Diagnostic information	7.3.4	Result	7.3.1
Originating address	7.3.1	Source	7.3.5
Originating reference	7.3.1	Specific information	7.3.1/7.3.2/7.3.4
Problem diagnostic	7.3.6	User reason	7.3.4
Provider reason	7.3.5		

Following is an alphabetic list of parameters contained in this clause:

Extensible Bearer service	7.6.3.3
Extensible Call barring feature	7.6.3.21
Extensible Call barring information	7.6.3.20
Extensible Call barring information for CSE	7.6.3.79
Extensible Forwarding feature	7.6.3.16
Extensible Forwarding info	7.6.3.15
Extensible Forwarding information for CSE	7.6.3.80
Extensible Forwarding Options	7.6.3.18
Extensible No reply condition timer	7.6.3.19
Extensible QoS-Subscribed	7.6.3.74
Extensible SS-Data	7.6.3.29
Extensible SS-Info	7.6.3.14
Extensible SS-Status	7.6.3.17
Extensible Teleservice	7.6.3.4
External Signal Information	7.6.9.4
Forwarded-to number	7.6.2.22
Forwarded-to subaddress	7.6.2.23
Forwarding feature	7.6.4.16
Forwarding information	7.6.4.15
Forwarding Options	7.6.4.6
GGSN address	7.6.2.40
GGSN number	7.6.2.41
GMSC CAMEL Subscription Info	7.6.3.34
GPRS enhancements support indicator	7.6.3.73
GPRS Node Indicator	7.6.8.14
GPRS Subscription Data	7.6.3.46
GPRS Subscription Data Withdraw	7.6.3.45
GPRS Support Indicator	7.6.8.15
Group Id	7.6.2.33
GSM bearer capability	7.6.3.6
Guidance information	7.6.4.22
Handover number	7.6.2.21
High Layer Compatibility	7.6.3.43
HLR Id	7.6.2.15
HLR number	7.6.2.13
HO-Number Not Required	7.6.6.7
IMEI	7.6.2.3
IMSI	7.6.2.1
Integrity Protection Information	7.6.6.4
Inter CUG options	7.6.3.27
Intra CUG restrictions	7.6.3.28
SIWF Number	7.6.2.35
SoLSA Support Indicator	7.6.3.57
SM Delivery Outcome	7.6.8.6
SM-RP-DA	7.6.8.1
SM-RP-MTI	7.6.8.16
SM-RP-OA	7.6.8.2
SM-RP-PRI	7.6.8.5
SM-RP-SMEA	7.6.8.17
SM-RP-UI	7.6.8.4
Sres	7.6.7.3
SS-Code	7.6.4.1
SS-Data	7.6.4.3
SS-Event	7.6.4.42
SS-Event-Data	7.6.4.43
SS-Info	7.6.4.24
SS-Status	7.6.4.2
Stored location area Id	7.6.2.5
Subscriber State	7.6.3.30
Subscriber Status	7.6.3.7
Super-Charger Supported in HLR	7.6.3.70
Super-Charger Supported in Serving Network Entity	7.6.3.71
Supported CAMEL Phases in VLR	7.6.3.36
Supported CAMEL Phases in SGSN	7.6.3.36A
Suppress T-CSI	7.6.3.33
Suppression of Announcement	7.6.3.32
Target cell Id	7.6.2.8
Target location area Id	7.6.2.7
Target MSC number	7.6.2.12
Teleservice	7.6.4.39
TMSI	7.6.2.2
Trace reference	7.6.10.2
Trace type	7.6.10.3
User error	7.6.1.4
USSD Data Coding Scheme	7.6.4.36
USSD String	7.6.4.37
UU Data	7.6.5.12
UUS CF Interaction	7.6.5.13
VBS Data	7.6.3.40
VGCS Data	7.6.3.39
VLR CAMEL Subscription Info	7.6.3.35
VLR number	7.6.2.14
VPLMN address allowed	7.6.3.48
Zone Code	7.6.2.28

Next Change

7.6.6 Radio parameters

7.6.6.1 - 7.6.6.3~~6~~ Void

7.6.6.4 Integrity Protection Information

This parameter refers to the Integrity Protection Information element defined in 3G TS 25.413.

7.6.6.5 Encryption Information

This parameter refers to the Encryption Information element defined in 3G TS 25.413.

7.6.6.6 Radio Resource Information

This parameter refers to the Channel Type information element defined in GSM 08.08.

Next Change

8.4 Handover services

8.4.1 MAP_PREPARE_HANDOVER service

8.4.1.1 Definition

This service is used between MSC-A and MSC-B (E-interface) when a call is to be handed over from MSC-A to MSC-B.

The MAP_PREPARE_HANDOVER service is a confirmed service using the primitives from table 8.4/1.

8.4.1.2 Service primitives

Table 8.4/1: MAP_PREPARE_HANDOVER

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
Target Cell Id	C	C(=)		
HO-NumberNotRequired	C	C(=)		
IMSI	C	C(=)		
Integrity Protection Information	C	C(=)		
Encryption Information	C	C(=)		
Radio Resource Information	C	C(=)		
BSS-APDU	C	C(=)	C	C(=)
Handover Number			C	C(=)
User error			C	C(=)
Provider error				O

8.4.1.3 Parameter use

Invoke Id

For definition of this parameter see subclause 7.6.1.

Target Cell Id

For definition of this parameter see subclause 7.6.2. This parameter is only included if the service is not in an ongoing transaction.

HO-Number Not Required

For definition of this parameter see subclause 7.6.6.

IMSI

For definition of this paramenter see subclause 7.6.2. This UMTS parameter shall be included if the access network protocol is BSSAP and there is an indication that the MS also supports UMTS.

Integrity Protection Information

For definition of this paramenter see subclause 7.6.6. This UMTS parameter shall be included if available and if the access network protocol is BSSAP.

Encryption Information

For definition of this paramenter see subclause 7.6.6. This UMTS parameter shall be included if available and if the access network protocol is BSSAP.

Radio Resource Information

For definition of this paramenter see subclause 7.6.6. This GSM parameter shall be included if the access network protocol is RANAP and there is an indication that the UE also supports GSM.

BSS-APDU

For definition of this parameter see subclause 7.6.9.

Handover Number

For definition of this parameter see subclause 7.6.2. This parameter shall be returned, unless the parameter HO-NumberNotRequired is sent.

User error

For definition of this parameter see subclause 7.6.1. The following errors defined in subclause 7.6.1 may be used, depending on the nature of the fault:

- No handover number available;
- System failure;
- Unexpected data value;
- DataMissing.

Provider error

See definition of provider errors in subclause 7.6.1.

8.4.4 MAP_FORWARD_ACCESS_SIGNALLING service

8.4.4.1 Definition

This service is used between MSC-A and MSC-B (E-interface) to pass information to be forwarded to the A-interface of MSC-B.

The MAP_FORWARD_ACCESS_SIGNALLING service is a non-confirmed service using the primitives from table 8.4/4.

8.4.4.2 Service primitives

Table 8.4/4: MAP_FORWARD_ACCESS_SIGNALLING

Parameter name	Request	Indication
Invoke Id	M	M(=)
Integrity Protection Information	C	C(=)
Encryption Information	C	C(=)
BSS-APDU	M	M(=)

8.4.4.3 Parameter use

For the definition and use of all parameters and errors, see subclause 7.6.1

Invoke Id

For definition of this parameter see subclause 7.6.1.

Integrity Protection Information

For definition of this paramenter see subclause 7.6.6. This UMTS parameter shall be included if available and if the encapsulated PDU is BSSMAP Cipher Mode Command.

Encryption Information

For definition of this paramenter see subclause 7.6.6. This UMTS parameter shall be included if available and if the encapsulated PDU is BSSMAP Cipher Mode Command.

BSS-APDU

For definition of this parameter see subclause 7.6.9.

Next Change

17.7 MAP constants and data types

17.7.1 Mobile Service data types

```
MAP-MS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MS-DataTypes (11) version6 (6)}

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

   -- location registration types
   UpdateLocationArg,
   UpdateLocationRes,
   CancelLocationArg,
   CancelLocationRes,
   PurgeMS-Arg,
```

```
    PurgeMS-Res,
    SendIdentificationArg,
    SendIdentificationRes,
    UpdateGprsLocationArg,
    UpdateGprsLocationRes,
    IST-SupportIndicator,


    -- handover types
    ForwardAccessSignalling-Arg,
    PrepareHO-Arg,
    PrepareHO-Res,
    PrepareSubsequentHO-Arg,

    -- authentication management types
    SendAuthenticationInfoArg,
    SendAuthenticationInfoRes,

    -- security management types
    EquipmentStatus,
    Kc,

    -- subscriber management types
    InsertSubscriberDataArg,
    InsertSubscriberDataRes,
    DeleteSubscriberDataArg,
    DeleteSubscriberDataRes,
    SubscriberData,
    ODB-Data,
    SubscriberStatus,
    ZoneCodeList,
    maxNumOfZoneCodes,
    O-CSI,
    D-CSI,
    O-BcsmCamelTDPCriteriaList,
    T-BCSM-CAMEL-TDP-CriteriaList,
    SS-CSI,
    ServiceKey,
    DefaultCallHandling,
    CamelCapabilityHandling,
    BasicServiceCriteria,
    SupportedCamelPhases,
    maxNumOfCamelTDPData,
    CUG-Index,
    CUG-Interlock,
    InterCUG-Restrictions,
    IntraCUG-Options,
    IST-AlertTimerValue,
    T-CSI,
    T-BcsmTriggerDetectionPoint,

    -- fault recovery types
    ResetArg,
    RestoreDataArg,
    RestoreDataRes,

    -- subscriber information enquiry types
    ProvideSubscriberInfoArg,
    ProvideSubscriberInfoRes,
    SubscriberInfo,
    LocationInformation,
    SubscriberState,

    -- any time information enquiry types
    AnyTimeInterrogationArg,
    AnyTimeInterrogationRes,

    -- any time information handling types
    AnyTimeSubscriptionInterrogationArg,
    AnyTimeSubscriptionInterrogationRes,
    AnyTimeModificationArg,
    AnyTimeModificationRes,

    -- subscriber data modification notification types
    NoteSubscriberDataModifiedArg,
    NoteSubscriberDataModifiedRes,
```

```
   -- gprs location information retrieval types
   SendRoutingInfoForGprsArg,
   SendRoutingInfoForGprsRes,

   -- failure reporting types
   FailureReportArg,
   FailureReportRes,

   -- gprs notification types
   NoteMsPresentForGprsArg,
   NoteMsPresentForGprsRes,

   -- Mobility Management types
   NoteMM-EventArg,
   NoteMM-EventRes



;

IMPORTS
   maxNumOfSS,
   SS-SubscriptionOption,
   SS-List,
   SS-ForBS-Code,
   Password
FROM MAP-SS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SS-DataTypes (14) version6 (6)}

   SS-Code
FROM MAP-SS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SS-Code (15) version6 (6)}

   Ext-BearerServiceCode
FROM MAP-BS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-BS-Code (20) version6 (6)}

   Ext-TeleserviceCode
FROM MAP-TS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-TS-Code (19) version6 (6)}


   AddressString,
   ISDN-AddressString,
   ISDN-SubaddressString,
   AccessNetworkSignalInfo,
   IMSI,
   TMSI,
   HLR-List,
   LMSI,
   Identity,
   GlobalCellId,
   CellIdOrLAI,
   Ext-BasicServiceCode,
   NAEA-PreferredCI,
   EMLPP-Info,
   SubscriberIdentity,
   AgeOfLocationInformation,
   LCSClientExternalID,
   LCSClientInternalID



FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version6 (6)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version6 (6)}

   AbsentSubscriberDiagnosticSM
```

```
FROM MAP-ER-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ER-DataTypes (17) version6 (6)}


;


-- location registration types
```

```
UpdateLocationArg ::= SEQUENCE {
    imsi                                IMSI,

    msc-Number                          [1] ISDN-AddressString,
    vlr-Number                          ISDN-AddressString,
    lmsi                                [10] LMSI OPTIONAL,
    extensionContainer                  ExtensionContainer              OPTIONAL,
    ... ,
    vlr-Capability                      [6] VLR-Capability              OPTIONAL }
```

```
VLR-Capability ::= SEQUENCE{
    supportedCamelPhases                [0] SupportedCamelPhases        OPTIONAL,
    extensionContainer                  ExtensionContainer              OPTIONAL,
    ... ,
    solsaSupportIndicator               [2] NULL                        OPTIONAL,
    istSupportIndicator                 [1] IST-SupportIndicator        OPTIONAL,
    superChargerSupportedInServingNetworkEntity   [3] SuperChargerInfo  OPTIONAL }
```

```
SuperChargerInfo ::= CHOICE {
    sendSubscriberData                  [0] NULL,
    subscriberDataStored                [1] AgeIndicator }
```

```
AgeIndicator ::= OCTET STRING (SIZE (1..6))
    -- The internal structure of this parameter is implementation specific.
```

```
IST-SupportIndicator ::=  ENUMERATED {
    basicISTSupported                   (0),
    istCommandSupported                 (1), ...}
-- exception handling:
-- reception of values > 1 shall be mapped to ' istCommandSupported '
```

```
UpdateLocationRes ::= SEQUENCE {
    hlr-Number                          ISDN-AddressString,

    extensionContainer                  ExtensionContainer              OPTIONAL,
    ... }
```

```
CancelLocationArg ::= [3] SEQUENCE {
    identity                            Identity,
    cancellationType                    CancellationType                OPTIONAL,
    extensionContainer                  ExtensionContainer              OPTIONAL,
    ...}
```

```
CancellationType ::= ENUMERATED {
    updateProcedure                     (0),
    subscriptionWithdraw                (1),
    ...}
    -- The HLR shall not send values other than listed above
```

```
CancelLocationRes ::= SEQUENCE {
    extensionContainer                  ExtensionContainer              OPTIONAL,
    ...}
```

```
PurgeMS-Arg ::= [3] SEQUENCE {
    imsi                                IMSI,
    vlr-Number                          [0] ISDN-AddressString          OPTIONAL,
    sgsn-Number                         [1]  ISDN-AddressString         OPTIONAL,
    extensionContainer                  ExtensionContainer              OPTIONAL,
    ...}
```

```
PurgeMS-Res ::= SEQUENCE {
    freezeTMSI                      [0]  NULL                       OPTIONAL,
    freezeP-TMSI                    [1]  NULL                       OPTIONAL,
    extensionContainer              ExtensionContainer              OPTIONAL,
    ...}
```

```
SendIdentificationArg ::= SEQUENCE {
    tmsi                            TMSI,
    numberOfRequestedVectors        NumberOfRequestedVectors,
    segmentationProhibited          NULL                            OPTIONAL,
    -- if segmentation is prohibited the previous VLR shall not send the result
    -- within a TC-CONTINUE message.
    extensionContainer              ExtensionContainer              OPTIONAL,
    ...}
```

```
SendIdentificationRes ::= [3] SEQUENCE {
    imsi                            IMSI                            OPTIONAL,
    -- IMSI must be present if SendIdentificationRes is not segmented.
    -- If the TC-Continue segmentation option is taken the IMSI must be
    -- present in one segmented transmission of SendIdentificationRes.
    authenticationSetList           AuthenticationSetList           OPTIONAL,
    extensionContainer              [2] ExtensionContainer          OPTIONAL,
    ...}
```

```
AuthenticationSetList ::= CHOICE {
    tripletList                     [0] TripletList,
    quintupletList                  [1] QuintupletList }
```

```
TripletList ::= SEQUENCE SIZE (1..5) OF
                                    AuthenticationTriplet
```

```
QuintupletList ::= SEQUENCE SIZE (1..5) OF
                                    AuthenticationQuintuplet
```

```
AuthenticationTriplet ::= SEQUENCE {
    rand                            RAND,
    sres                            SRES,
    kc                              Kc,
    ...}
```

```
AuthenticationQuintuplet ::= SEQUENCE {
    rand                            RAND,
    xres                            XRES,
    ck                              CK,
    ik                              IK,
    autn                            AUTN,
    ...}
```

```
RAND ::= OCTET STRING (SIZE (16))
```

```
SRES ::= OCTET STRING (SIZE (4))
```

```
Kc ::= OCTET STRING (SIZE (8))
```

```
XRES ::= OCTET STRING (SIZE (4..16))
```

```
CK ::= OCTET STRING (SIZE (16))
```

```
IK ::= OCTET STRING (SIZE (16))
```

```
AUTN ::= OCTET STRING (SIZE (14..18))
```

```
AUTS ::= OCTET STRING (SIZE (12..16))
```

-- gprs location registration types

```
UpdateGprsLocationArg ::= SEQUENCE {
    imsi                            IMSI,
    sgsn-Number                     ISDN-AddressString,
    sgsn-Address                    GSN-Address,
    extensionContainer              ExtensionContainer              OPTIONAL,
    ... ,
    sgsn-Capability                 [0] SGSN-Capability             OPTIONAL }
```

```
SGSN-Capability ::= SEQUENCE{
    solsaSupportIndicator                  NULL                                 OPTIONAL,
    extensionContainer                     [1] ExtensionContainer               OPTIONAL,
    ... ,
    superChargerSupportedInServingNetworkEntity   [2] SuperChargerInfo          OPTIONAL ,
    gprsEnhancementsSupportIndicator       [3] NULL                             OPTIONAL,
    supportedCamelPhases                   [4] SupportedCamelPhases             OPTIONAL }
```

```
GSN-Address ::= OCTET STRING (SIZE (5..17))
    -- Octets are coded according to TS GSM 03.03
```

```
UpdateGprsLocationRes ::= SEQUENCE {
    hlr-Number                             ISDN-AddressString,
    extensionContainer                     ExtensionContainer                   OPTIONAL,
    ...}
```

-- handover types

```
ForwardAccessSignalling-Arg ::= SEQUENCE {
    an-APDU                                AccessNetworkSignalInfo,
    extensionContainer                     [0]  ExtensionContainer              OPTIONAL,
    ...}
```

```
PrepareHO-Arg ::= SEQUENCE {
    targetCellId                           GlobalCellId                         OPTIONAL,
    ho-NumberNotRequired                   NULL                                 OPTIONAL,
    an-APDU                                [2] AccessNetworkSignalInfo          OPTIONAL,
    imsi                                   [3] IMSI                             OPTIONAL,
    integrityProtectionInfo                [4] IntegrityProtectionInformation   OPTIONAL,
    encryptionProtectionInfo               [5] EncryptionProtectionInformation  OPTIONAL,
    radioResourceInformation               [6] RadioResourceInformation         OPTIONAL,
    extensionContainer                     [7] ExtensionContainer               OPTIONAL,~~bss-APDU
    ExternalSignalInfo                     OPTIONAL,~~
    ...}
```

```
PrepareHO-Res ::= SEQUENCE {
    handoverNumber                         ISDN-AddressString                   OPTIONAL,
    bss-APDU                               ExternalSignalInfo                   OPTIONAL,
    ...}
```

```
PrepareSubsequentHO-Arg ::= SEQUENCE {
    targetCellId                           GlobalCellId,
    targetMSC-Number                       ISDN-AddressString,
    bss-APDU                               ExternalSignalInfo,
    ...}
```

```
RadioResourceInformation ::= OCTET STRING (SIZE (5..10))
    -- Octets are coded according the Channel Type information element in GSM 08.08
```

```
IntegrityProtectionInformation ::= OCTET STRING (SIZE (17..maxNumOfIntegrityInfo))
    -- Octets are coded according to 3G TS 25.413
```

```
maxNumOfIntegrityInfo INTEGER ::= 100
```

```
EncryptionInformation ::= OCTET STRING (SIZE (17..maxNumOfEncryptionInfo))
    -- Octets are coded according to 3G TS 25.413
```

```
maxNumOfEncryptionInfo INTEGER ::= 100
```

Next Change

19.2 Handover procedure

19.2.2 Handover procedure in MSC-A

This subclause describes the handover procedure in MSC-A, including the request for a basic handover to another MSC (MSC-B), subsequent handover to a third MSC (MSC-B') or back to the controlling MSC (MSC-A).

19.2.2.1 Basic handover

When MSC-A has decided that a call has to be handed over to MSC-B, the Handover Control Application in MSC-A requests the MAP application to initiate the MAP_PREPARE_HANDOVER request to MSC-B.

MSC-A opens the dialogue to MSC-B with a MAP_OPEN request containing no user specific parameters and sends a MAP_PREPARE_HANDOVER request. This request may optionally contain an indication that a handover number allocation is not required, targetCellId, for compatibility reasons, and all information required by MSC-B to allocate the necessary radio resources. The request may also contain IMSI, UMTS encryption information and UMTS integrity protection information that are necessary parameters for inter-system handover from GSM to UMTS. GSM radio resource information (channel type) may be included for inter-system handover from UMTS to GSM. The conditions when these parameters shall be included are described in detail in 3G TS 23.009.

If MSC-B accepts the dialogue, it returns a MAP_PREPARE_HANDOVER confirmation containing a handover number, unless the request has included the HO-NumberNotRequired parameter, and BSSAP information which is forwarded to and handled by the Handover Control Application in MSC-A.

Optionally MSC-A can receive, after a MAP_PREPARE_HANDOVER confirmation, a MAP_PROCESS_ACCESS_SIGNALLING indication containing BSSAP information.

When the connection has been established between the MS and MSC-B, MSC-A will be informed by a MAP_SEND_END_SIGNAL indication.

When MSC-A wants to clear the connection with BSS-B, an indication from the Handover Control Application is received in the Map Application to send the MAP_SEND_END-SIGNAL response to MSC-B to close the MAP dialogue.

MSC-A may abort the handover procedure at any time (e.g. if the call is cleared).

3GPP TSG-N WG2 SWGB #4
Milan, Italy, 14-16 Feb 2000

Document N2B000176
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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	003r1	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-CN#07	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

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	X	UTRAN / Radio		Core Network	X

Source: N2 **Date:** 000202

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	X
C	Functional modification of feature	
D	Editorial modification	

Release:

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

Reason for change: Updates to 29.010 by introduction of UMTS to GSM Handover

Clauses affected: 4.6.1 (changes); 4.6.2 (new chapters); 4.6.3 (new chapters)

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.

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 21 to 26 with both possible positive or negative outcomes.

Additionally figure 21b shows the possible interworking when the trace related message is transparently transferred on the E-Interface at Basic Inter-MSC Handover initiation.

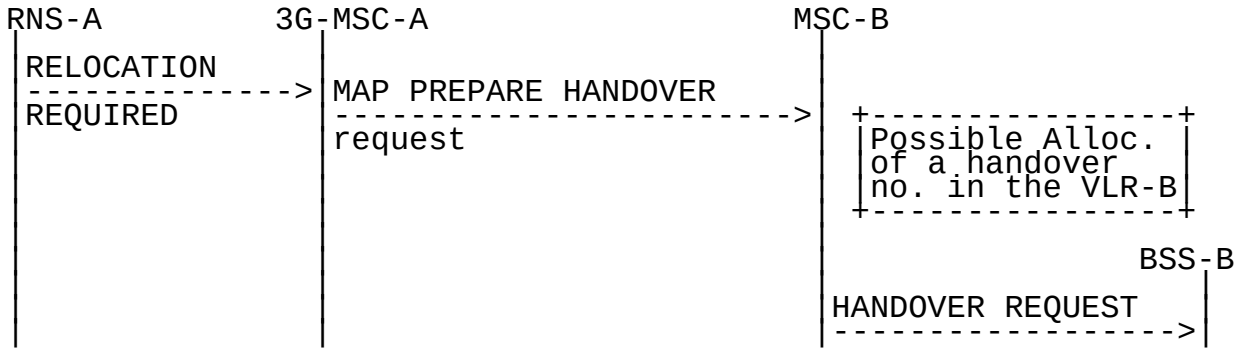


Figure 21a: Signalling for Basic Inter-MSC Handover initiation (no trace related messages transferred)

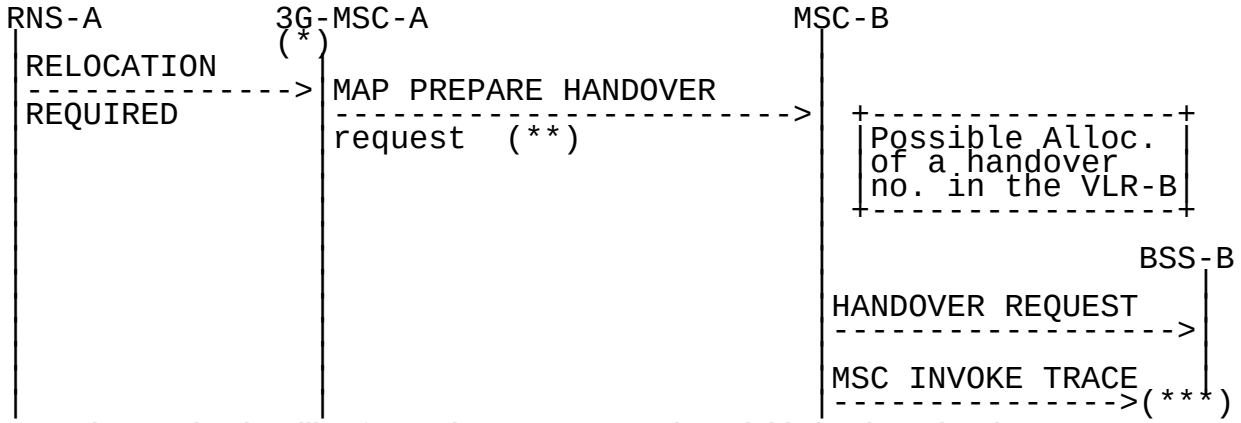


Figure 21b: Signalling for Basic Inter-MSC Handover initiation (MSC invoke trace message transferred)

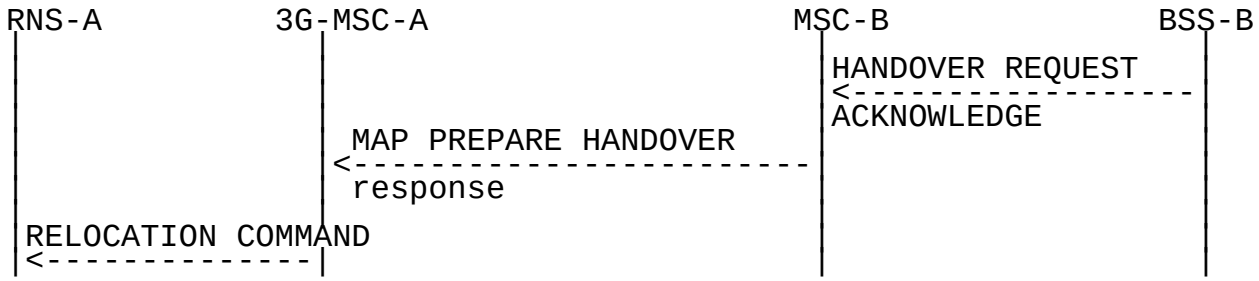
(*): Tracing invocation has been received from VLR.

(**): 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):



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

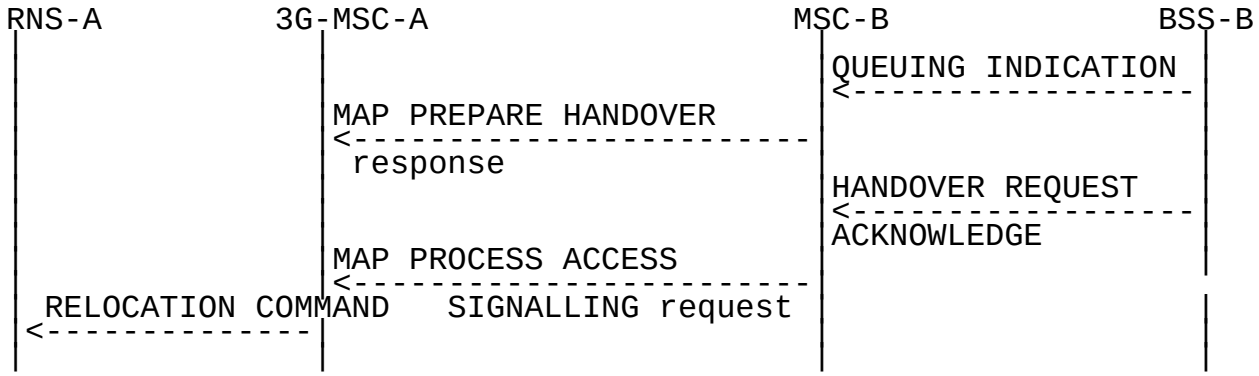
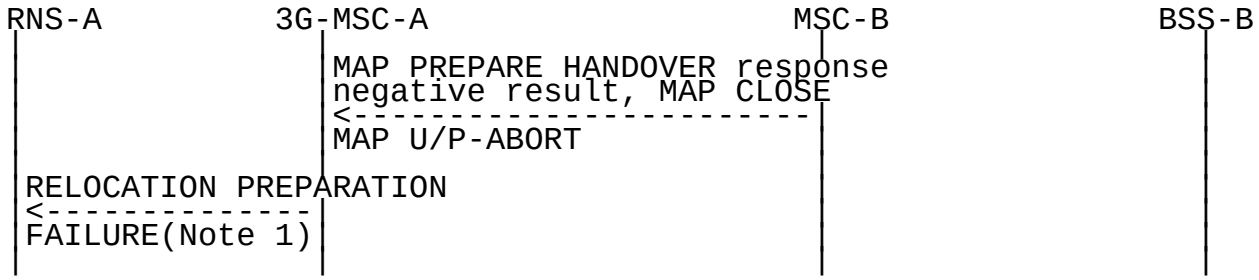


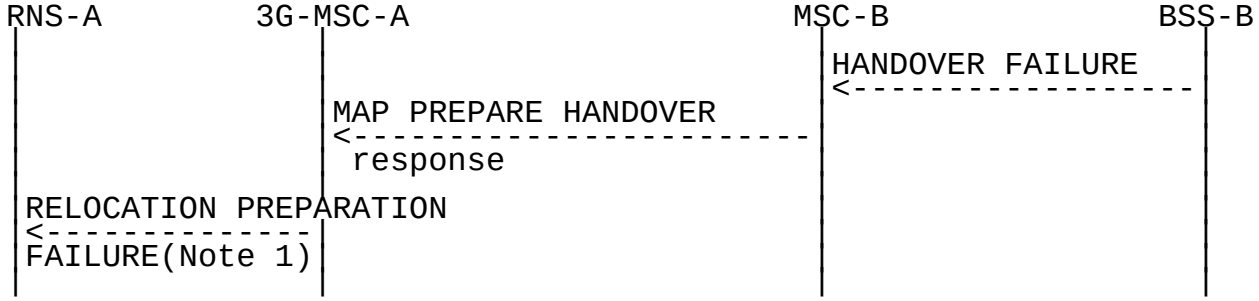
Figure 22: Signalling for Basic Inter-MSC Handover execution (Positive outcomes)

Possible Negative outcomes

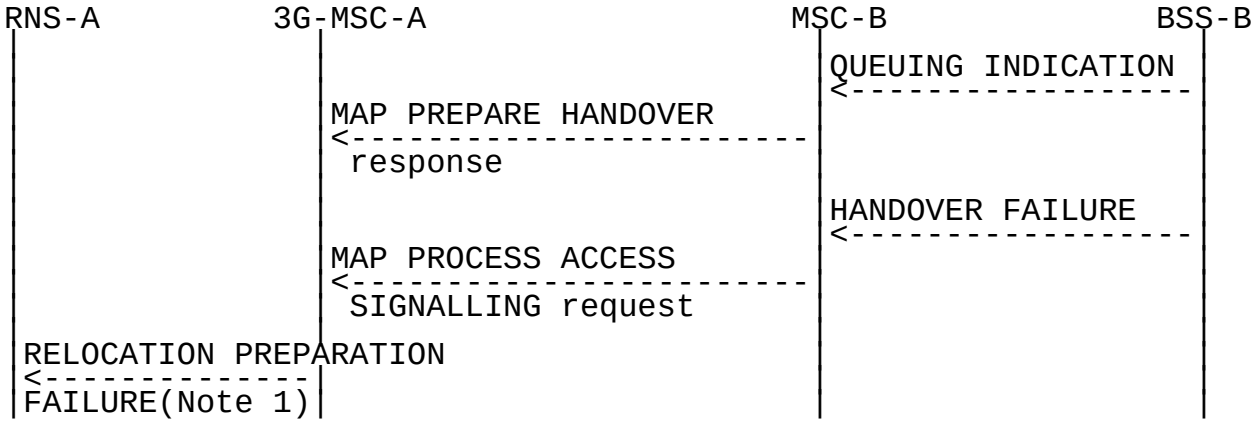
c) user error detected, or handover number allocation unsuccessful (if performed), or component rejection or dialogue abortion performed by MSC-B:



d) radio resources allocation failure:



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



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

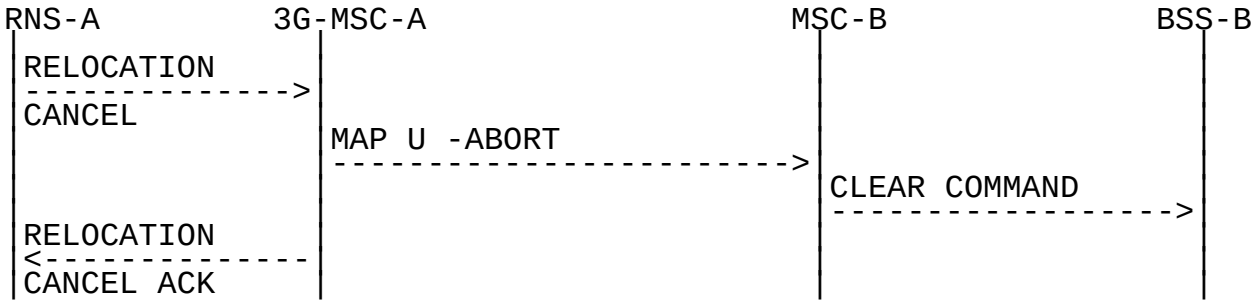


Figure 23: Signalling for Basic Inter-MSC Handover execution (Negative outcomes)

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

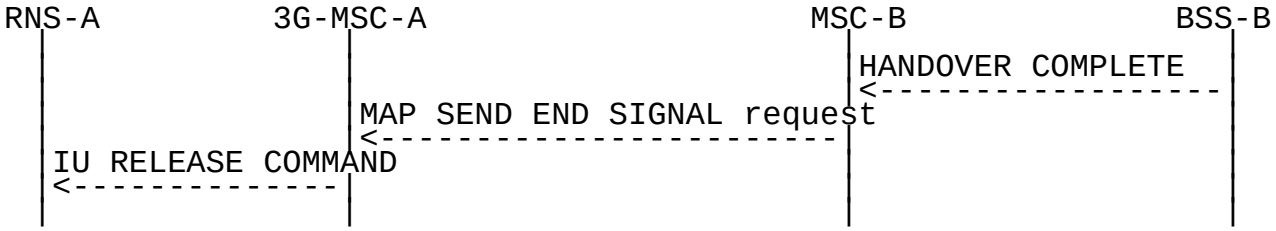


Figure 24: Signalling for Basic Inter-MSC Handover completion

Positive outcome

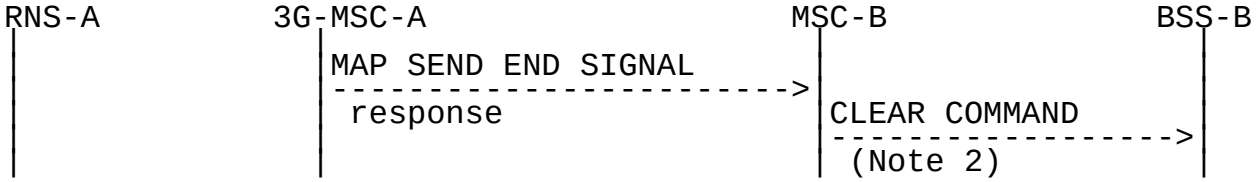


Figure 25: Signalling for Basic Inter-MSC Handover completion (Positive outcome)

Negative outcome

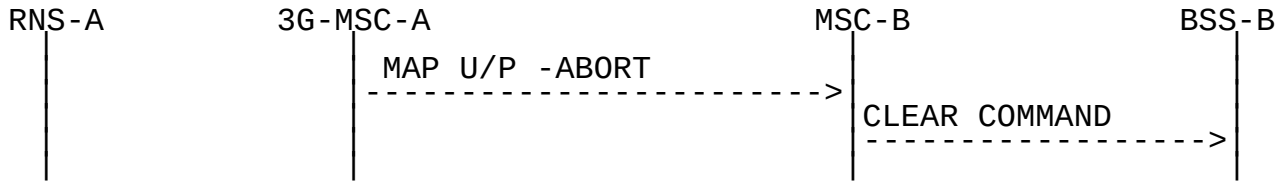


Figure 26: Signalling for Basic Inter-MSC Handover completion (Negative outcome)

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

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	2~~0~~09.002	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 -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~~ IU RELEASE COMMAND in 3G_MSC-A is as follows:

	2~~0~~09.002	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~~RELOCATION CANCEL in case of reversion to old channel of the ~~MS~~ UE and User Abort in 3G-MSC-A is as follows:

	25.413	29.002	Notes
Forward message	RELOCATION CANCEL - Reversion to old channel	MAP U -ABORT	
Positive result	RELOCATION CANCEL ACKNOWLEDGEMENT		
Negative result			

4.6.2 Subsequent Inter-MSC Handover from ~~3~~rd ~~-~~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.~~

When a Mobile Station is being handed over back to MSC-A, the procedure (described in TS 23.009) requires interworking between A-Interface, Iu-interface and E-Interface.

The signalling at initiation, execution and completion of the Subsequent Inter-MSC handover procedure is shown in figures 27 to 31.

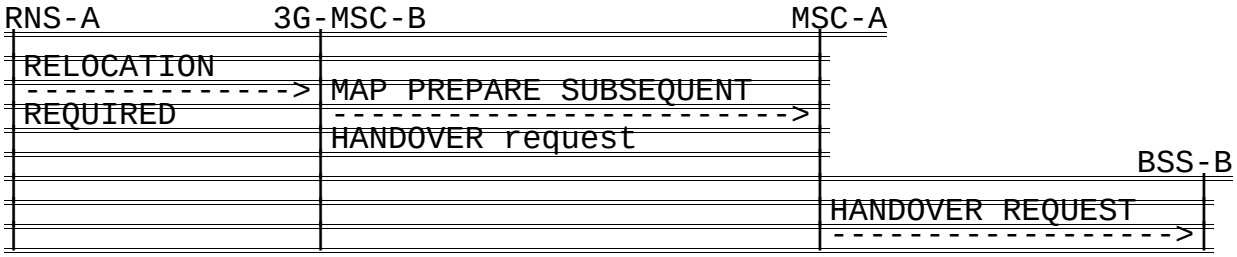
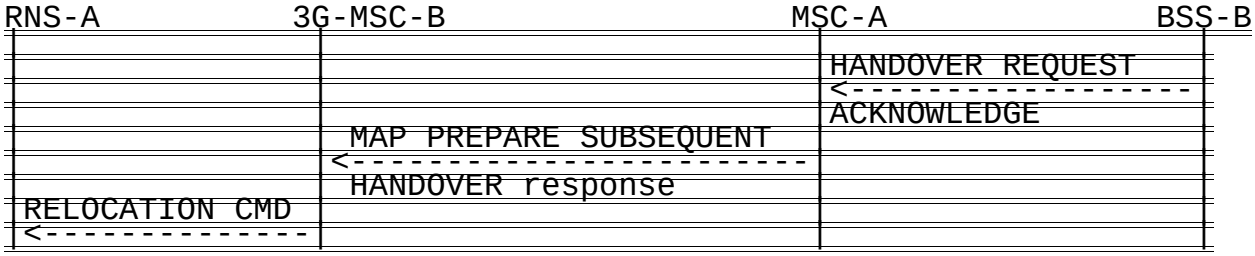


Figure 27: Signalling for Subsequent Inter-MSC Handover back to MSC-A initiation

Possible Positive outcomes

a) successful radio resources allocation:



b) radio resources allocation queued. Later successful radio resources allocation indication:

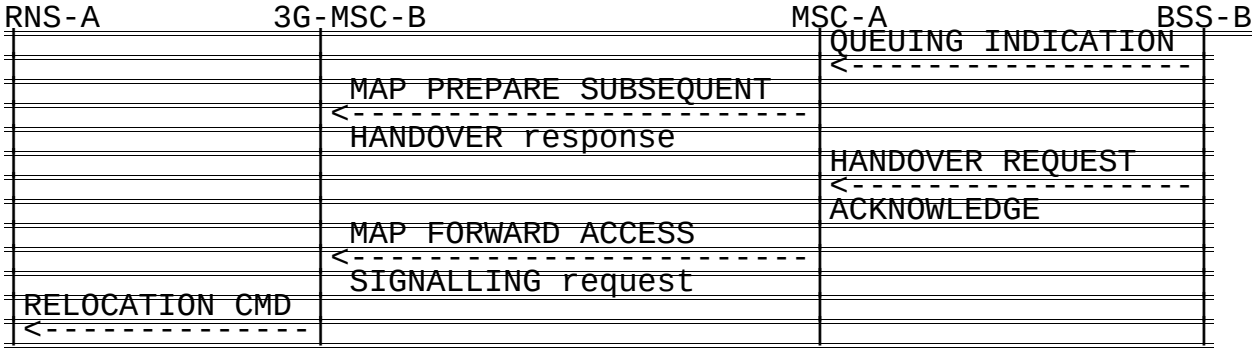
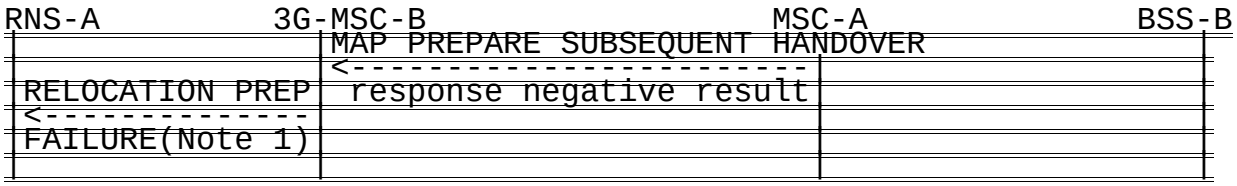


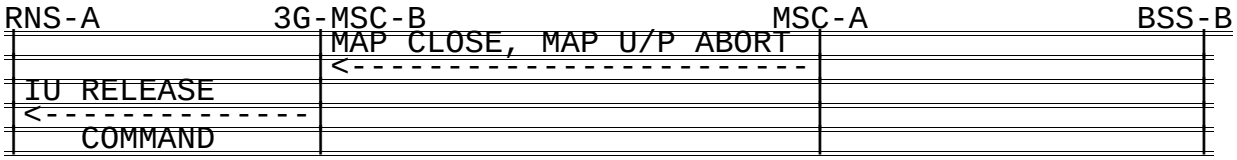
Figure 28: Signalling for Subsequent Inter-MSC Handover back to MSC-A execution (Positive outcome)

Possible Negative outcomes

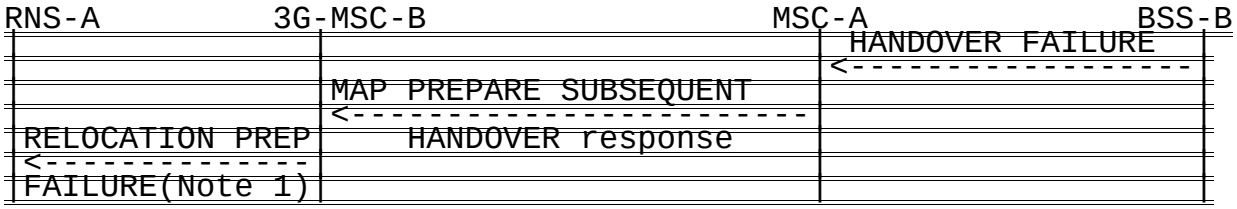
c) user error detected, or component rejection or dialogue abortion performed by MSC-A:



d) component rejection or dialogue abortion performed by MSC-A:



e) radio resources allocation failure:



f) radio resources allocation queued. Later unsuccessful radio resources allocation:

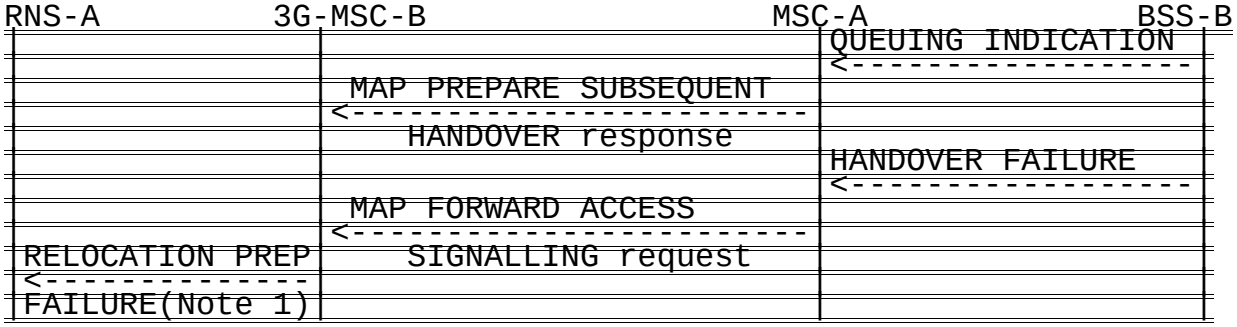


Figure 29: Signalling for Subsequent Inter-MSC Handover back to MSC-A execution (Negative outcome)

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

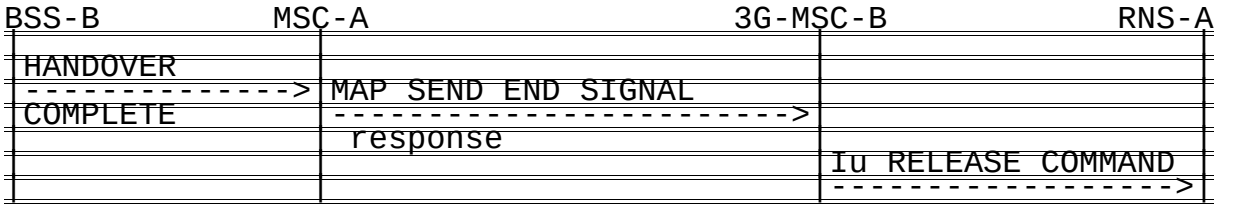


Figure 30: Signalling for Subsequent Inter-MSC Handover back to MSC-A completion (Successful completion of the procedure)

NOTE: Positive outcome case shown in figure 9.

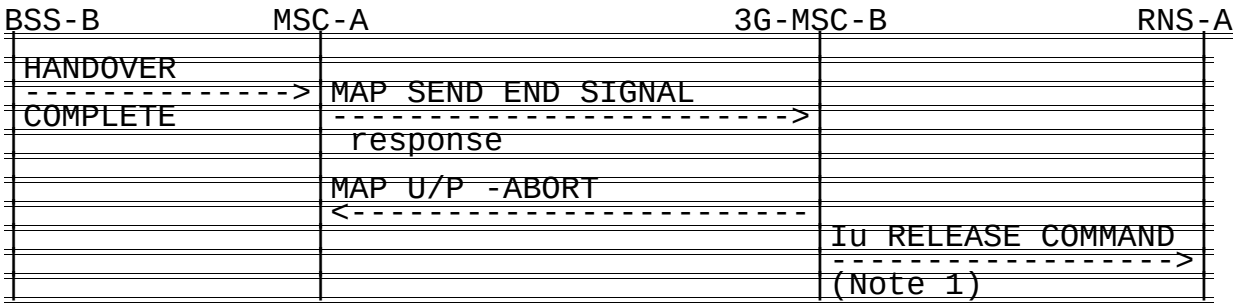


Figure 31: Signalling for Subsequent Inter-MSC Handover back to MSC-A completion (Unsuccessful completion of the procedure)

NOTE 1: Abnormal end of the procedure which triggers the clearing of all resources in 3G-MSC-B.

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

	25.413	29.002	Notes
Forward message	REL. REQUIRED	MAP PREPARE SUBSEQUENT HANDOVER request -target MSC number -targetCellId -bss-APDU(HANDOVER REQUEST)	
	RANAP information elements:	BSSMAP information elements:	
	MS Classmark 2	CM2	
	Source Id	Cell Id (serving)	
	Target Id	Cell Id (target)	
	Cause	Cause	1
	MS Classmark 3	CM3	
		info stored/generated in/by 3G-MSC-B: Message Type Channel Type Speech version Priority Interference Band to be used	
Positive result	RELOCATION CMD.	MAP PREPARE SUBSEQUENT HANDOVER response -bss-APDU(QUEUING INDICATION or HANDOVER REQUEST ACKNOWLEDGE or HANDOVER FAILURE)	2
	RANAP information elements:	BSSMAP information elements:	
	L3 information	L3 information	
Negative result	REL. PREP. FAILURE	MAP PREPARE SUBSEQUENT HANDOVER response	3
	equipment failure	Unknown MSC	
	equipment failure	Subsequent Handover Failure	
	equipment failure	UnexpectedDataValue	
	equipment failure	Data Missing	
	Iu RELEASE COMMAND		
	equipment failure	MAP CLOSE	
	equipment failure	MAP U/P -ABORT	

NOTE 1: The mapping of cause code values between BSSMAP and RANAP is FFS.

NOTE 2: The response to the Prepare-Subsequent-Handover request can include in its bss-APDU parameter, identifying the GSM-0806 protocol, a BSSMAP QUEUING INDICATION, or a BSSMAP HANDOVER REQUEST ACKNOWLEDGE or a BSSMAP HANDOVER FAILURE.

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

In the second case, the positive result triggers in 3GMSC-B the sending on Iu-Interface of the RELOCATION COMMAND.

In the third case, the positive result triggers in 3G-MSC-B the sending of the RELOCATION PREPARATION FAILURE.

NOTE 3: The possible sending of the RELOCATION PREPARATION FAILURE message is described in the 3GPP 25.413.

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

	08.08	29.002	Notes
Forward message	HANDOVER COMPLETE	MAP SEND END SIGNAL response	
Positive result			
Negative result		MAP U/P -ABORT	1

NOTE 1: The abortion of the dialogue ends the handover procedure with 3G-MSC-B.

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.~~

When a Mobile Station is being handed over to a third MSC, the procedure (described in 3GPP 23.009) does require one specific interworking case in MSC-A between E-Interface from 3G-MSC-B and E-Interface from MSC-B' other than the combination of the ones described in the subclause 4.6.1 and 4.6.2.

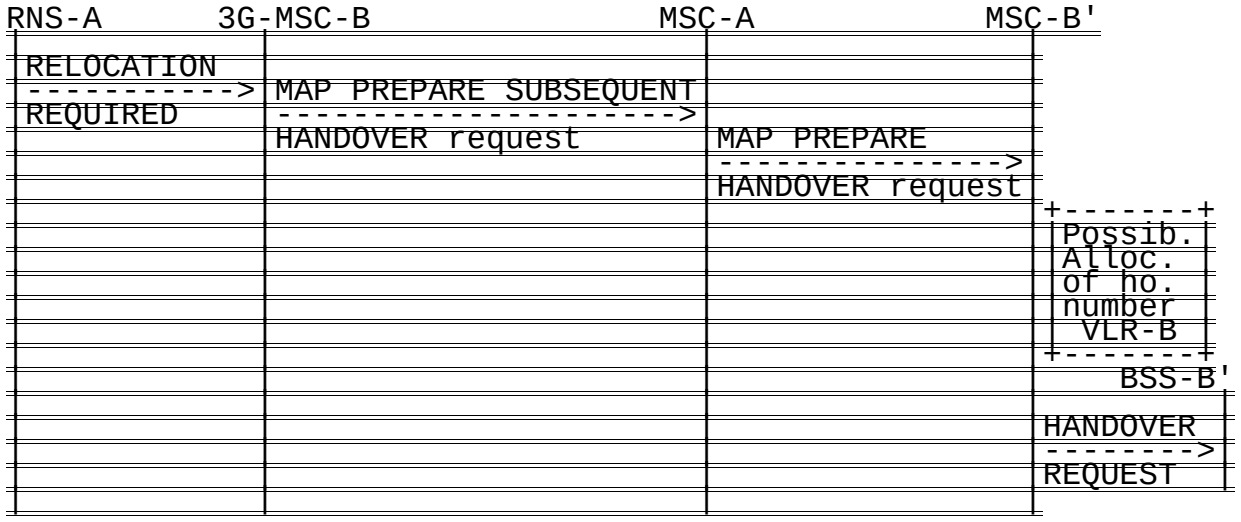
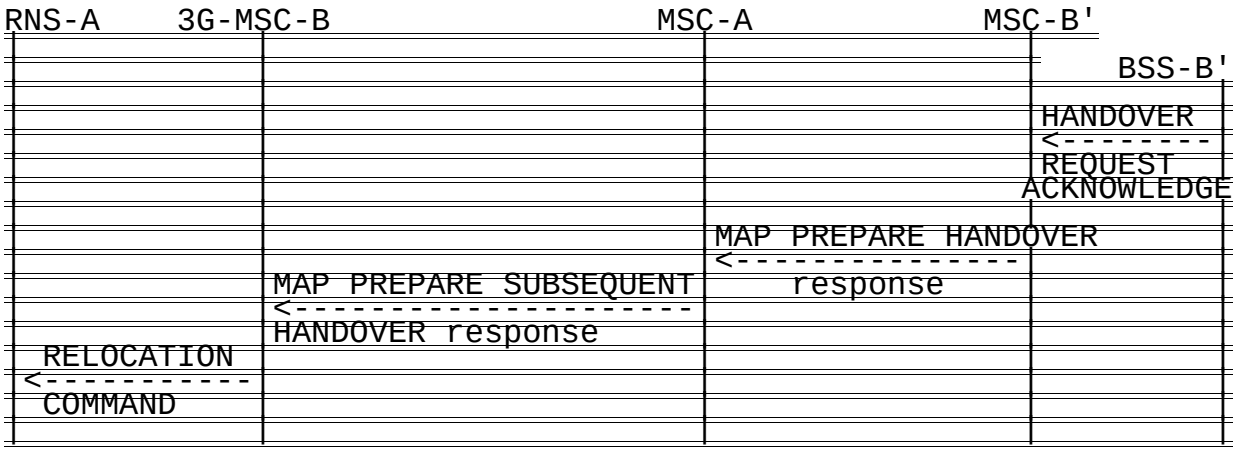


Figure 32: Signalling for Subsequent Inter-MSC Handover to third MSC (MSC-B') initiation

Possible Positive outcomes

a) successful radio resources allocation:



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

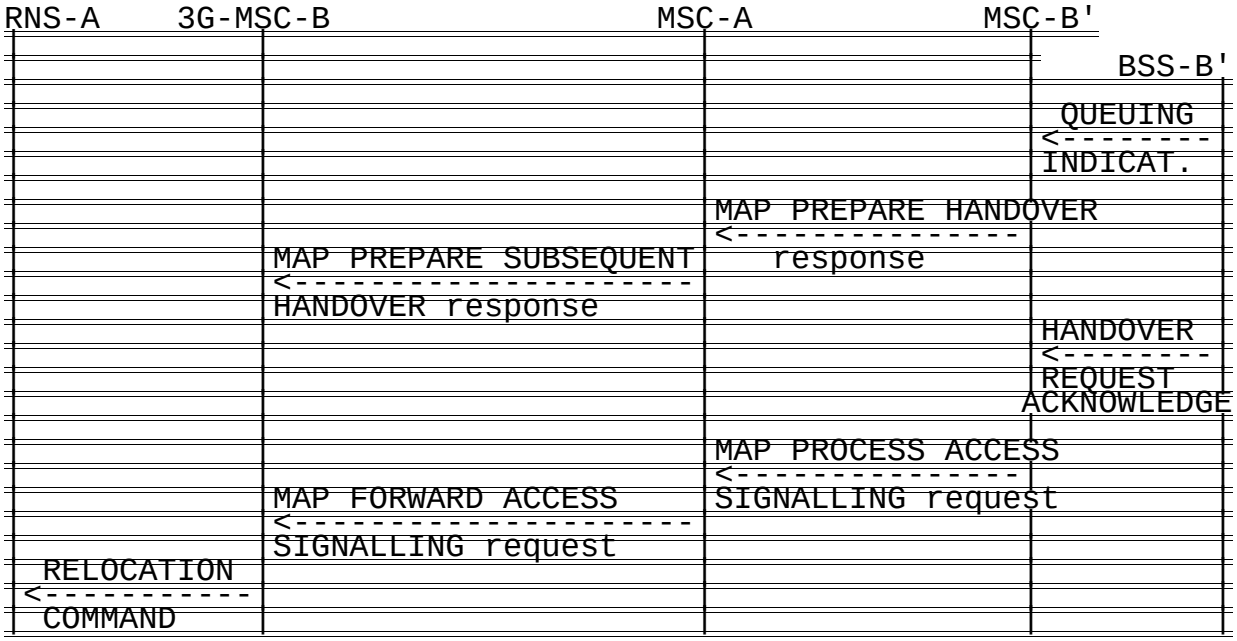
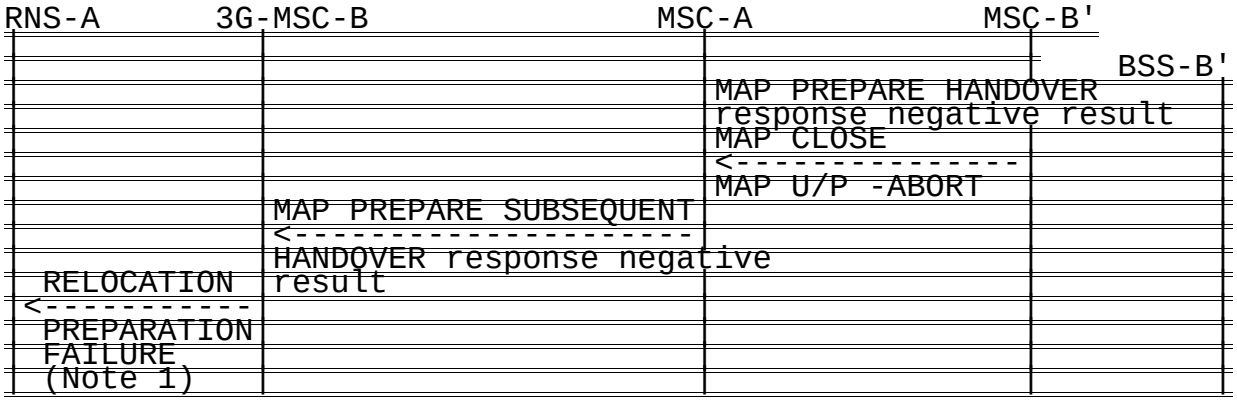


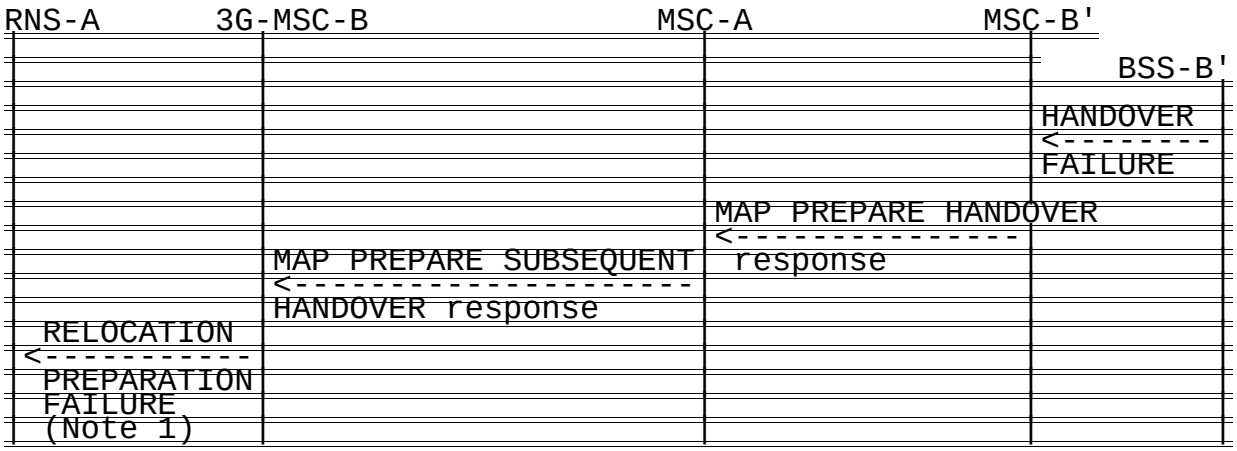
Figure 33: Signalling for Subsequent Inter-MSC Handover to third MSC (MSC-B') execution (Positive outcome)

Possible Negative outcomes

c) user error detected, or component rejection or dialogue abortion performed by MSC-B':



d) radio resources allocation failure:



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

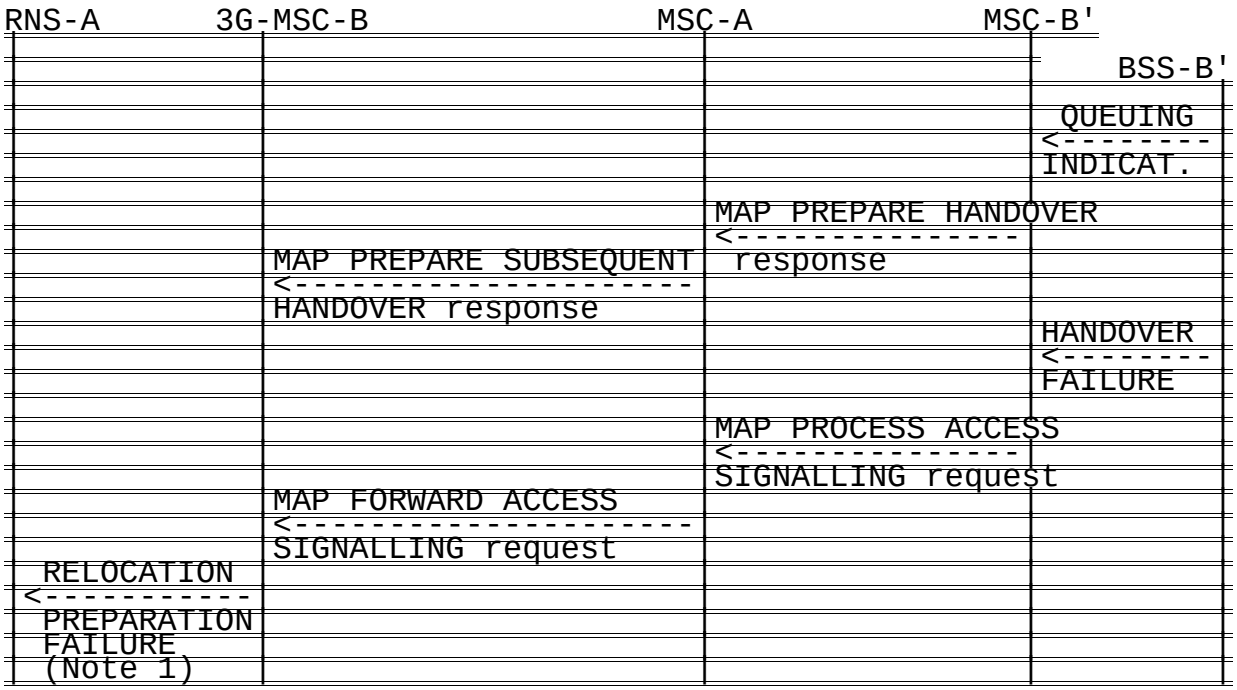


Figure 34: Signalling for Subsequent Inter-MSC Handover to third MSC (MSC-B') execution (Negative outcome)

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

Positive outcome

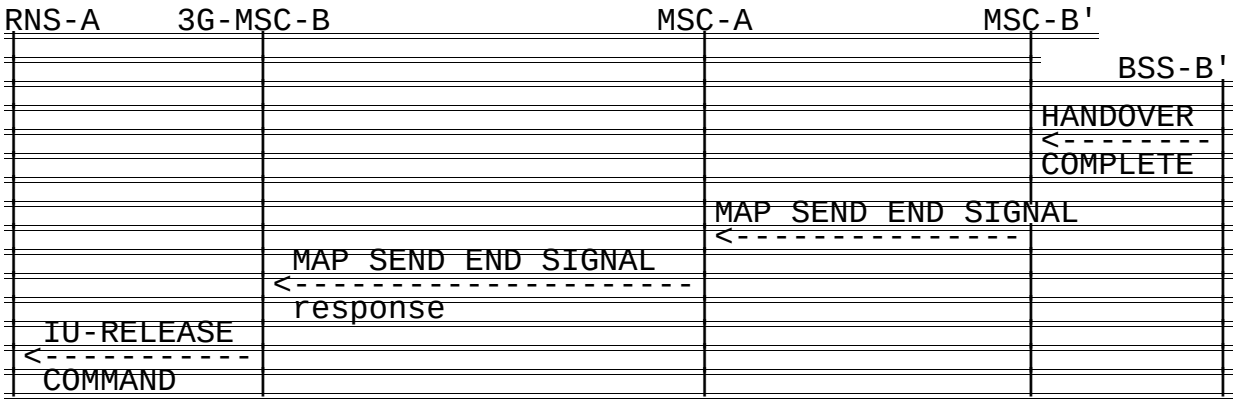


Figure 35: Signalling for Subsequent Inter-MSC Handover to third MSC (MSC-B') completion (Successful completion of the procedure)

Negative outcome

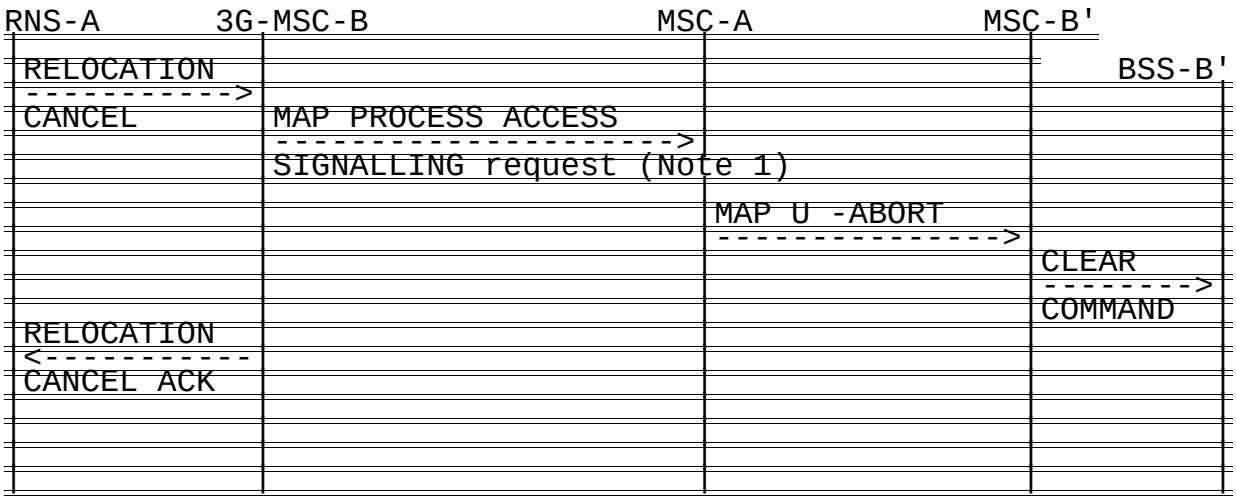


Figure 36: Signalling for Subsequent Inter-MSC Handover to third MSC (MSC-B') completion (Unsuccessful completion of the procedure)

NOTE 1: Specific interworking case detailed below.

The specific interworking case in MSC-A compared to the subclauses 4.5.1 and 4.5.2 occurs between HANDOVER FAILURE encapsulated in a Process Access Signalling from 3G-MSC-B and the abortion of the dialogue with MSC-B' in the case of a reversion to old channel of the MS:

	29.002	29.002	Notes
Forward message	MAP PROCESS-SIGNALLING request -bss-APDU(HANDOVER FAILURE)	MAP U -ABORT	1
Positive result			
Negative result		MAP U/P -ABORT	2

NOTE 1: The abortion of the dialogue triggers in MSC-B' the clearing of the circuit connection with MSC-A, if any, and of the Resources between MSC-B' and BSS-B'.The abortion of the dialogue ends the handover procedure with MSC-B'.

NOTE 2: The abortion of the dialogue ends the handover procedure with 3G-MSC-B.

3GPP TSG-CN 2 SWGB meeting #4
Milan, Italy, 14-16 February 2000

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e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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29.010	CR	004r1	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-CN#07	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

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	X	UTRAN / Radio	X	Core Network	X

Source: N2 **Date:** 2000-02-15

Subject: GSM/UMTS Interworking

Work item: Handover

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: Updates to 29.010 by introduction of GSM to UMTS Handover.

Clauses affected: 4.7 (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: All text is new (new chapter).

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4.7 Inter-MSC Handover (GSM to UMTS)

The general principles of the handover procedures are given in 3GPP TS 23.009. 3GPP TS 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 four principles apply for the Inter-MSC handover GSM to UMTS:

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

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

The RANAP parameters required for Inter-MSC handover GSM to UMTS are generated from received or stored GSM parameters.

4.7.1 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, Iu-Interface and E-Interface.

The signalling at initiation, execution and completion of the Basic Inter-MSC handover procedure is shown in figures 37 to 42 with both possible positive or negative outcomes.

Additionally figure 37b shows the possible interworking when the trace related message is transparently transferred on the E-Interface at Basic Inter-MSC Handover initiation.

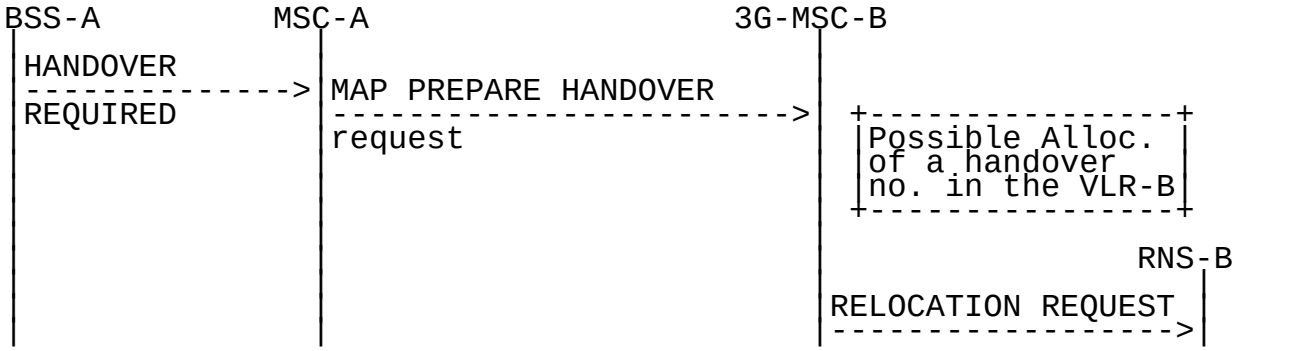


Figure 37a: Signalling for Basic Inter-MSC Handover initiation (no trace related messages transferred)

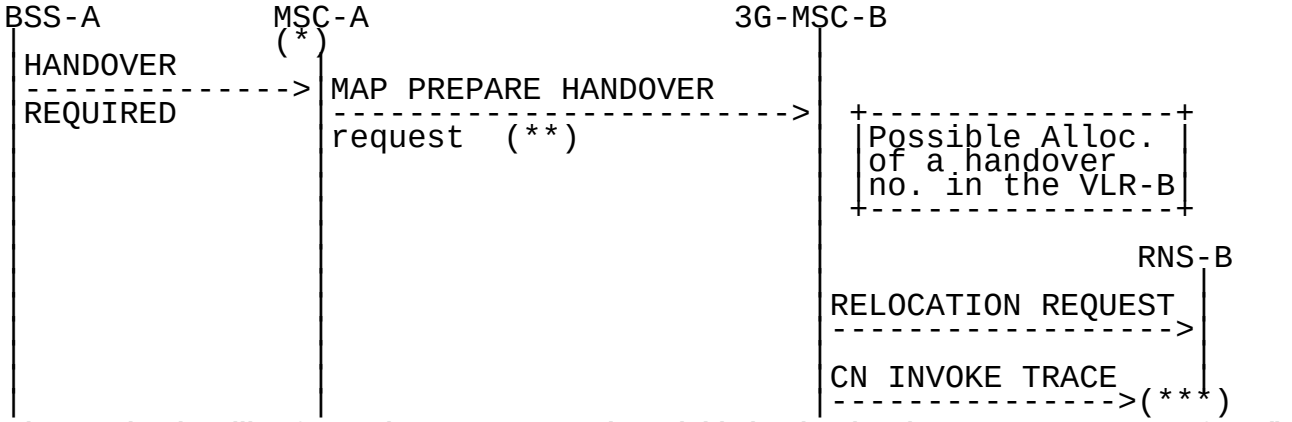


Figure 37b: Signalling for Basic Inter-MSC Handover initiation (CN invoke trace message transferred)

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

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

(***): CN INVOKE TRACE is forwarded to RNS-B if supported by 3G_MSC-B.

Possible Positive outcomes: successful radio resources allocation and handover number allocation (if performed):

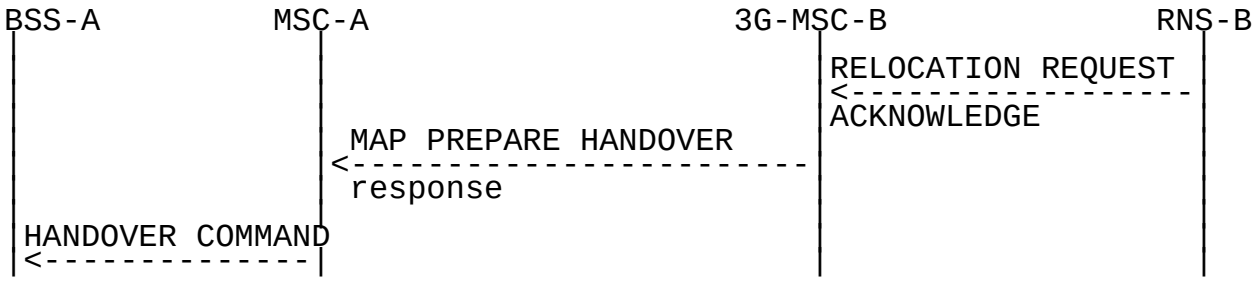
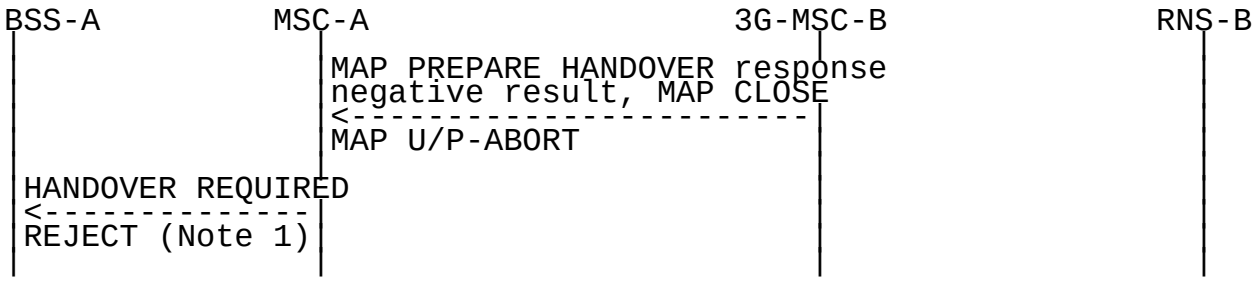


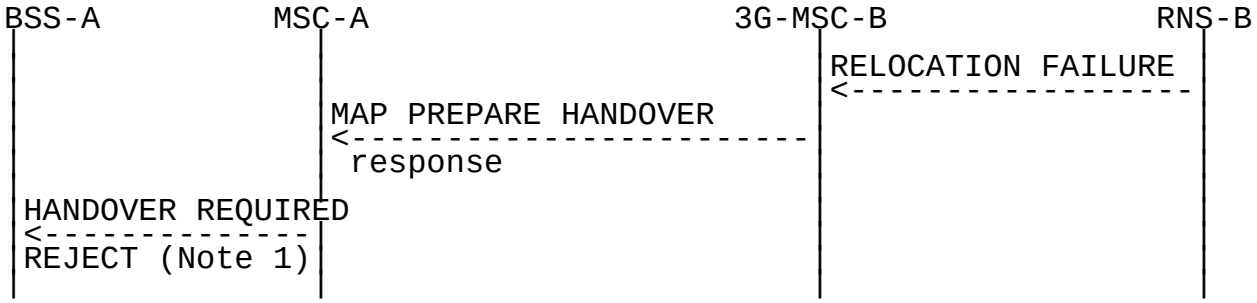
Figure 38: Signalling for Basic Inter-MSC Handover execution (Positive outcome)

Possible Negative outcomes

a) user error detected, or handover number allocation unsuccessful (if performed), or component rejection or dialogue abortion performed by 3G_MSC-B:



b) radio resources allocation failure:



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

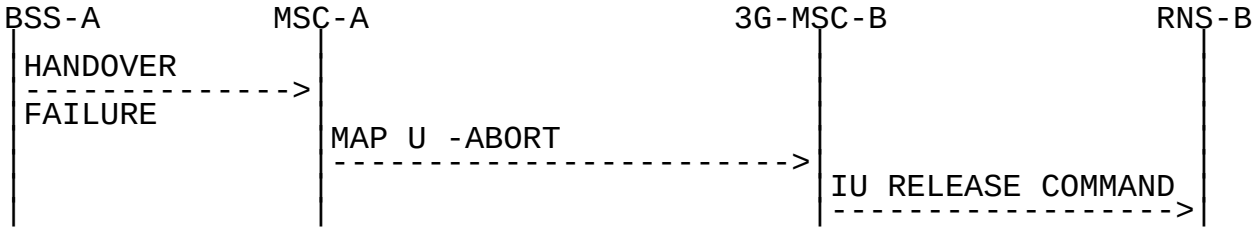


Figure 39: Signalling for Basic Inter-MSC Handover execution (Negative outcomes)

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

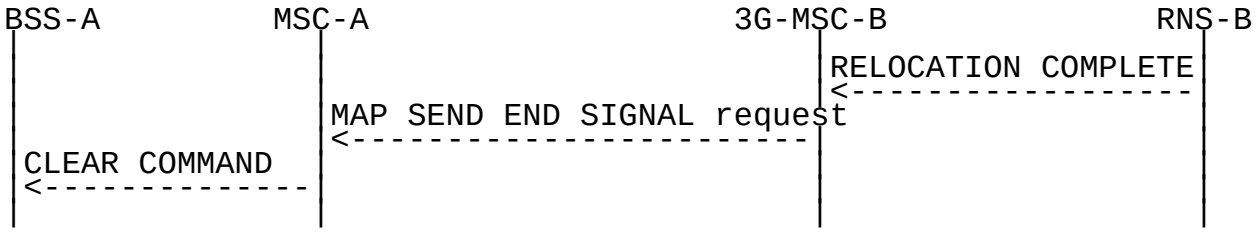


Figure 40: Signalling for Basic Inter-MSC Handover completion

Positive outcome

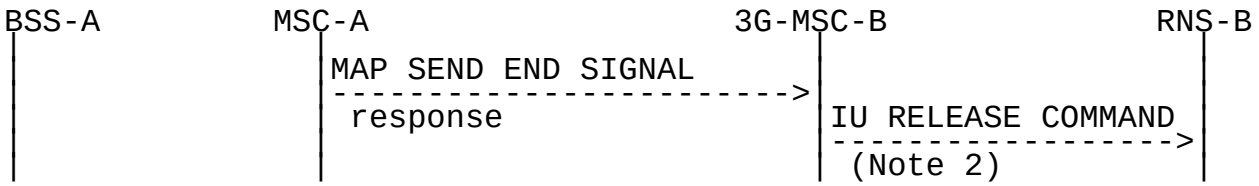


Figure 41: Signalling for Basic Inter-MSC Handover completion (Positive outcome)

Negative outcome

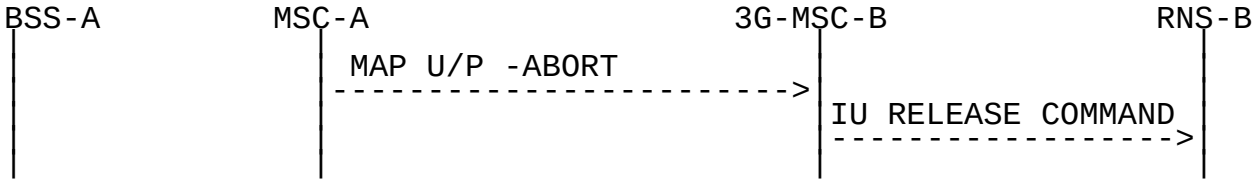


Figure 42: Signalling for Basic Inter-MSC Handover completion (Negative outcome)

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

The handover procedure is normally triggered by BSS-A by sending a HANDOVER REQUIRED message on A-Interface to MSC-A. The invocation of the Basic Inter-MSC handover procedure is performed and controlled by MSC-A. The sending of the MAP Prepare-Handover request to 3G_MSC-B is triggered in MSC-A upon receipt of the HANDOVER REQUIRED message. For compatibility reason, the cell identity of the cell where the call is to be handed over in 3G_MSC-B area, provided in the HANDOVER REQUIRED message, is mapped into targetCellId MAP parameter and the HANDOVER REQUEST message is encapsulated in the an-APDU MAP parameter of the Prepare-Handover MAP request. 3G_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 an-APDU MAP parameter of the Prepare-Handover Request. If transferred, one complete trace related message at a time shall be included in the an-APDU MAP parameter after the HANDOVER REQUEST message. Note: UMTS supports only CN initiated tracing.

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

	08.08	29.002	Notes
Forward message	HANDOVER REQUIRED BSSMAP information elements	MAP PREPARE HANDOVER request -ho-NumberNotRequired -targetCellId -IMSI -Integrity protection info -Encryption info -an-APDU(HANDOVER REQUEST, MSC INVOKE TRACE)	1 2 3
Positive result		MAP PREPARE HANDOVER response -handover number -an-APDU(HANDOVER REQUEST ACKNOWLEDGE or HANDOVER FAILURE)	4
Negative result	HANDOVER REQUIRED REJECT equipment failure equipment failure equipment failure equipment failure equipment failure equipment failure	MAP PREPARE HANDOVER System Failure No Handover Number available UnexpectedDataValue Data Missing MAP CLOSE MAP U/P -ABORT	5

NOTE 1: The ho-NumberNotRequired parameter is included by MSC-A, when MSC-A decides not to use any circuit connection with 3G_MSC-B. No handover number shall be present in the positive result. Any negative response from 3G_MSC-B shall not be due to handover number allocation problem.

NOTE 2: The process performed on the BSSMAP information elements received in the HANDOVER REQUIRED message is described in the GSM Recommendation 08.08.

NOTE 3: The process performed on the BSSMAP information elements received in the MSC INVOKE TRACE message is described in subclause 4.5.5.6.

NOTE 4: The response to the Prepare-Handover request can include in its an-APDU parameter, identifying the GSM-0806 protocol, either a BSSMAP HANDOVER REQUEST ACKNOWLEDGE or a BSSMAP HANDOVER FAILURE.

In the first case, the positive result triggers in MSC-A the sending on A-Interface of the HANDOVER COMMAND.

In the second case, the positive result triggers in MSC-A optionally the sending of the HANDOVER REQUIRED REJECT.

(The possible sending of the HANDOVER REQUIRED REJECT message upon receipt of the HANDOVER FAILURE is out of the scope of the GSM 29.010 and lies in the GSM 08.08).

NOTE 5: The possible sending of the HANDOVER REQUIRED REJECT message is described in the GSM 08.08.

The interworking between Prepare Handover and RELOCATION REQUEST in 3G_MSC-B is as follows:

	29.002	25.413	Notes
Forward message	MAP PREPARE HANDOVER request -ho-NumberNotRequired -targetCellId -IMSI -Integrity protection info -Encryption info -an-APDU(HANDOVER REQUEST, MSC INVOKE TRACE) BSSMAP information elements: Channel Type Cause sRNC to tRNC container	RELOCATION REQUEST RANAP information elements: RAB parameters Cause sRNC to tRNC container info stored/generated in/by 3G_MSC-B: CN domain indicator	
Positive result	MAP PREPARE HANDOVER response -an-APDU(HANDOVER REQUEST ACK) BSSMAP information elements: Layer 3 info	RELOCATION REQUEST ACK RANAP information elements: tRNC to sRNC container	
Negative result	MAP PREPARE HANDOVER response -an-APDU(HANDOVER FAILURE)	RELOCATION FAILURE	

The interworking between Send End Signal and RELOCATION COMPLETE in 3G_MSC-B is as follows:

	25.413	29.002	Notes
Forward message	RELOCATION COMPLETE	MAP SEND END SIGNAL request -an-APDU(HANDOVER COMPLETE)	
Positive result	IU RELEASE COMMAND -Normal release	MAP SEND END SIGNAL response	1
Negative result	IU RELEASE COMMAND -Normal release -Normal release	MAP CLOSE MAP U/P -ABORT	2

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

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

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

	29.002	08.08	Notes
Forward message	MAP SEND END SIGNAL request -an-APDU(HANDOVER COMPLETE)	CLEAR 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:

	08.08	29.002	Notes
Forward message	HANDOVER FAILURE - Reversion to old channel	MAP U -ABORT	
Positive result			
Negative result			

4.7.2 Subsequent Inter-MSC Handover from MSC-B back to 3G_MSC-A

When a Mobile Station is being handed over back to 3G_MSC-A, the procedure (described in GSM 23.009) requires interworking between A-Interface, Iu-Interface and E-Interface.

The signalling at initiation, execution and completion of the Subsequent Inter-MSC handover procedure is shown in figures 43 to 47.

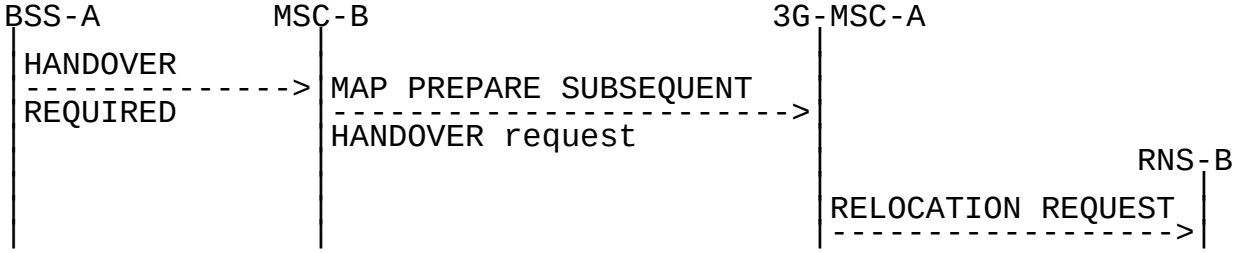


Figure 43: Signalling for Subsequent Inter-MSC Handover back to 3G_MSC-A initiation

Possible Positive outcomes: successful radio resources allocation:

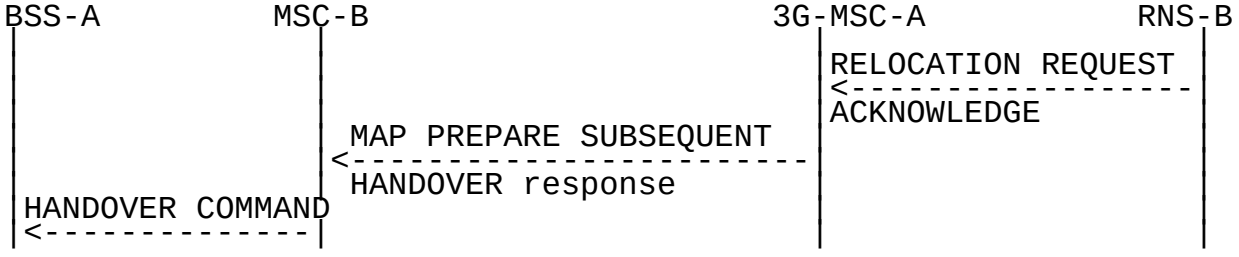
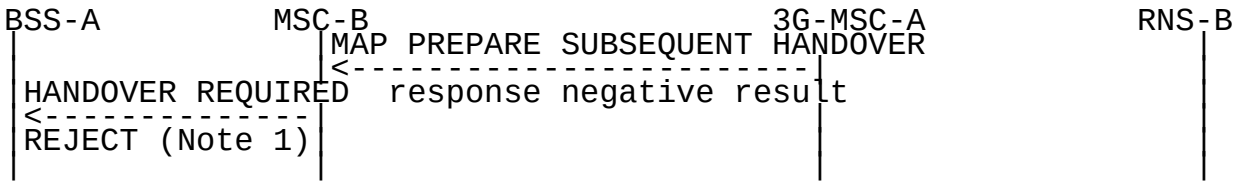


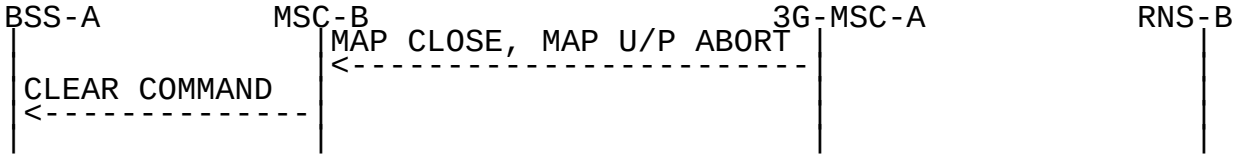
Figure 44: Signalling for Subsequent Inter-MSC Handover back to 3G_MSC-A execution (Positive outcome)

Possible Negative outcomes

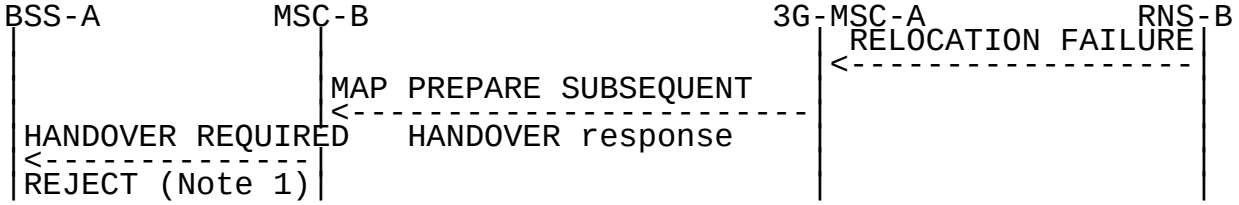
a) user error detected, or component rejection or dialogue abortion performed by 3G_MSC-A:



b) component rejection or dialogue abortion performed by 3G_MSC-A:



c) radio resources allocation failure:



d) unsuccessful relocation execution (reversion to the old radio resources):

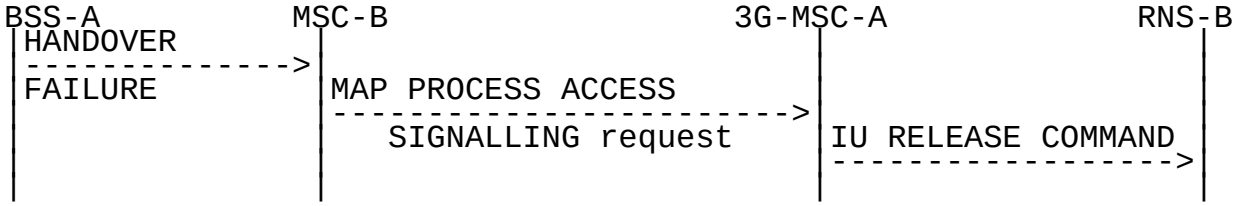


Figure 45: Signalling for Subsequent Inter-MSC Handover back to 3G_MSC-A execution (Negative outcome)

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

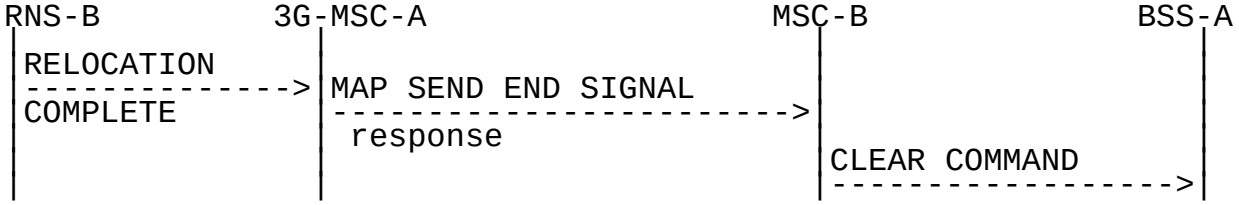


Figure 46: Signalling for Subsequent Inter-MSC Handover back to 3G_MSC-A completion (Successful completion of the procedure)

NOTE: Positive outcome case shown in figure 41.

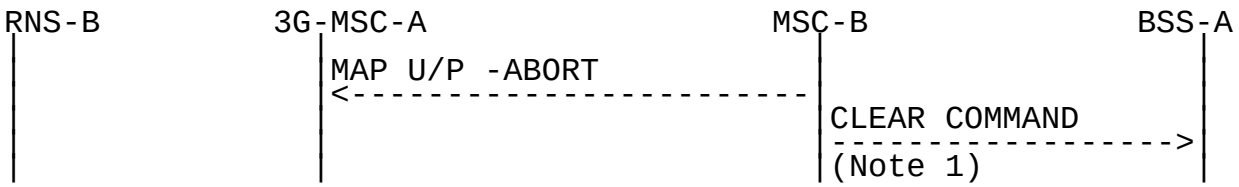


Figure 47: Signalling for Subsequent Inter-MSC Handover back to 3G_MSC-A completion (Unsuccessful completion of the procedure)

NOTE 1: Abnormal end of the procedure that triggers the clearing of all resources in MSC-B.

The interworking between Prepare Subsequent Handover and HANDOVER REQUIRED is as follows:

	08.08	29.002	Notes
Forward message	HANDOVER REQUIRED BSSMAP information elements	MAP PREPARE SUBSEQUENT HANDOVER request -target MSC number -targetCellId -an-APDU(HANDOVER REQUEST)	1
Positive result	HANDOVER REQUIRED	MAP PREPARE SUBSEQUENT HANDOVER response -an-APDU(HANDOVER REQUEST ACKNOWLEDGE or HANDOVER FAILURE)	2
Negative result	HANDOVER REQUIRED REJECT equipment failure equipment failure equipment failure equipment failure CLEAR COMMAND equipment failure equipment failure	MAP PREPARE SUBSEQUENT HANDOVER response Unknown MSC Subsequent Handover Failure UnexpectedDataValue Data Missing MAP CLOSE MAP U/P -ABORT	3

NOTE 1: The processing performed on the BSSMAP information elements received in the HANDOVER REQUIRED message is out of the scope of the present document. The target MSC number is provided to 3G_MSC-A by MSC-B based on the information received from RNS-B.

NOTE 2: The response to the Prepare-Subsequent-Handover request can include in its an-APDU parameter, identifying the GSM-0806 protocol, either a BSSMAP HANDOVER REQUEST ACKNOWLEDGE or a BSSMAP HANDOVER FAILURE.

In the first case, the positive result triggers in MSC-B the sending on A-Interface of the HANDOVER COMMAND.

In the second case, the positive result triggers in MSC-B optionally the sending of the HANDOVER REQUIRED REJECT.

(The possible sending of the HANDOVER REQUIRED REJECT message upon receipt of the HANDOVER FAILURE is out of the scope of the GSM 29.010 and lies in the GSM 08.08).

NOTE 3: The possible sending of the HANDOVER REQUIRED REJECT message is described in the GSM 08.08.

The interworking between Prepare Subsequent Handover and RELOCATION REQUEST in 3G_MSC-A is as follows:

	29.002	25.413	Notes
Forward message	MAP PREPARE SUB HANDOVER request -ho-NumberNotRequired -targetCellId -an-APDU(HANDOVER REQUEST, MSC INVOKE TRACE) BSSMAP information elements: Cause sRNC to tRNC container	RELOCATION REQUEST RANAP information elements: Cause sRNC to tRNC container info stored/generated in/by 3G_MSC-A: CN domain indicator RAB parameters Permanent NAS UE id Encryption info Integrity protection info	
Positive result	MAP PREPARE SUB HANDOVER response -an-APDU(HANDOVER REQUEST ACK) BSSMAP information elements: Layer 3 info	RELOCATION REQUEST ACK RANAP information elements: tRNC to sRNC container	
Negative result	MAP SUB PREPARE HANDOVER response -an-APDU(HANDOVER FAILURE)	RELOCATION FAILURE	

The interworking between HANDOVER FAILURE and MAP Process Signalling Request in 3G_MSC-B is as follows:

	08.08	29.002	Notes
Forward message	HANDOVER FAILURE	MAP PROCESS-SIGNALLING request -an-APDU(HANDOVER FAILURE)	
Positive result			
Negative result			

The interworking between Send End Signal Response and RELOCATION COMPLETE in 3G_MSC-A is as follows:

	25.413	29.002	Notes
Forward message	RELOCATION COMPLETE	MAP SEND END SIGNAL response	
Positive result			
Negative result		MAP U/P -ABORT	1

NOTE 1: The abortion of the dialogue ends the handover procedure with MSC-B.

4.7.3 Subsequent Inter-MSC Handover to third MSC

When a Mobile Station is being handed over to a third MSC, the procedure (described in GSM 23.009) does require one specific interworking case in MSC-A (figure 49) between E-Interface from MSC-B and E-Interface from 3G_MSC-B' other than the combination of the ones described in the subclause 4.5.1 and 4.7.2.

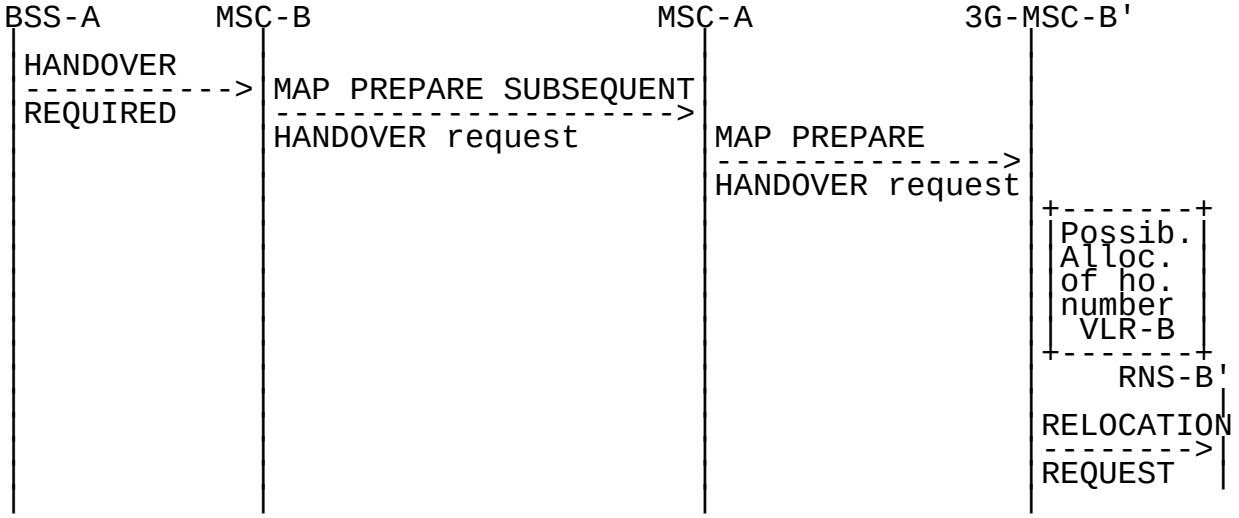


Figure 45: Signalling for Subsequent Inter-MSC Handover to third MSC (3G_MSC-B') initiation

Possible Positive outcomes: successful radio resources allocation:

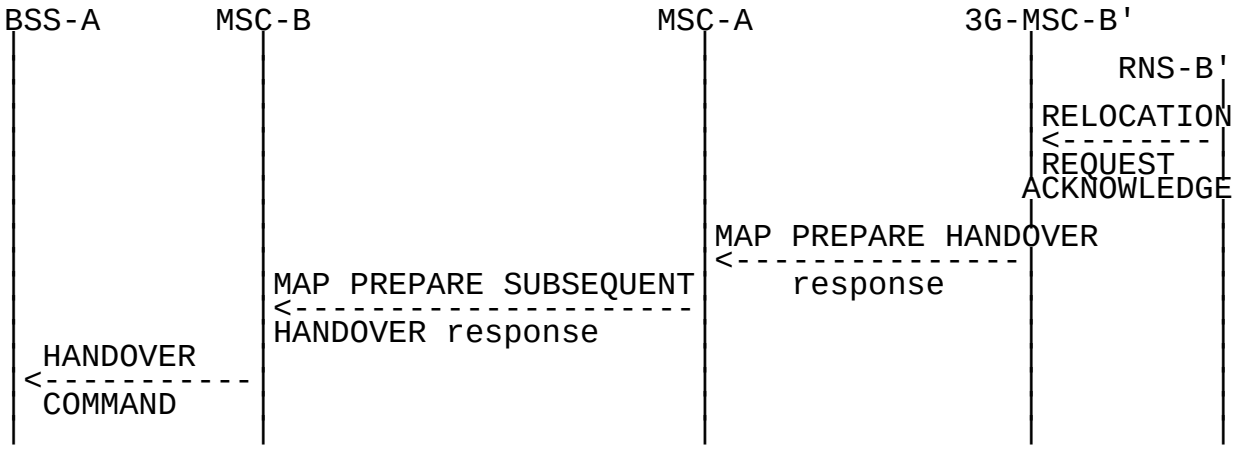
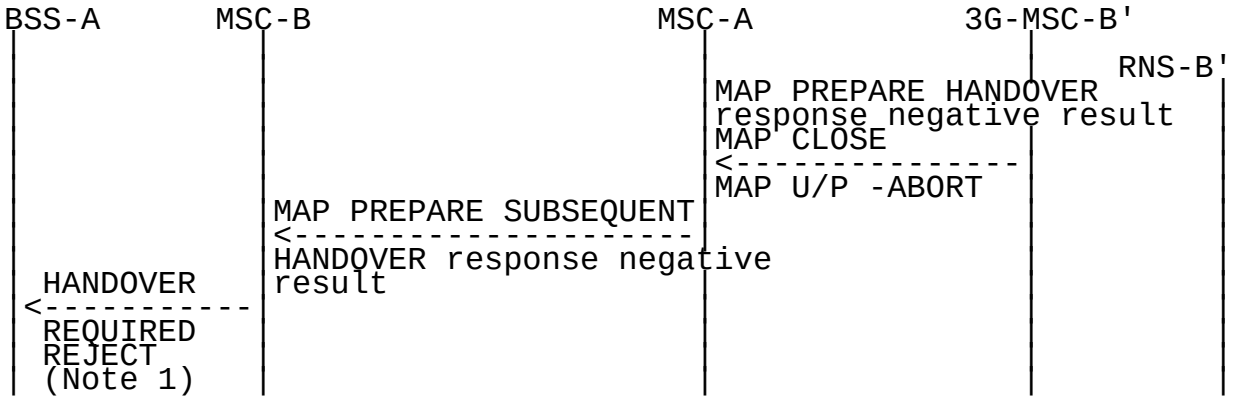


Figure 46: Signalling for Subsequent Inter-MSC Handover to third MSC (3G_MSC-B') execution (Positive outcome)

Possible Negative outcomes

a) user error detected, or component rejection or dialogue abortion performed by MSC-B':



b) radio resources allocation failure:

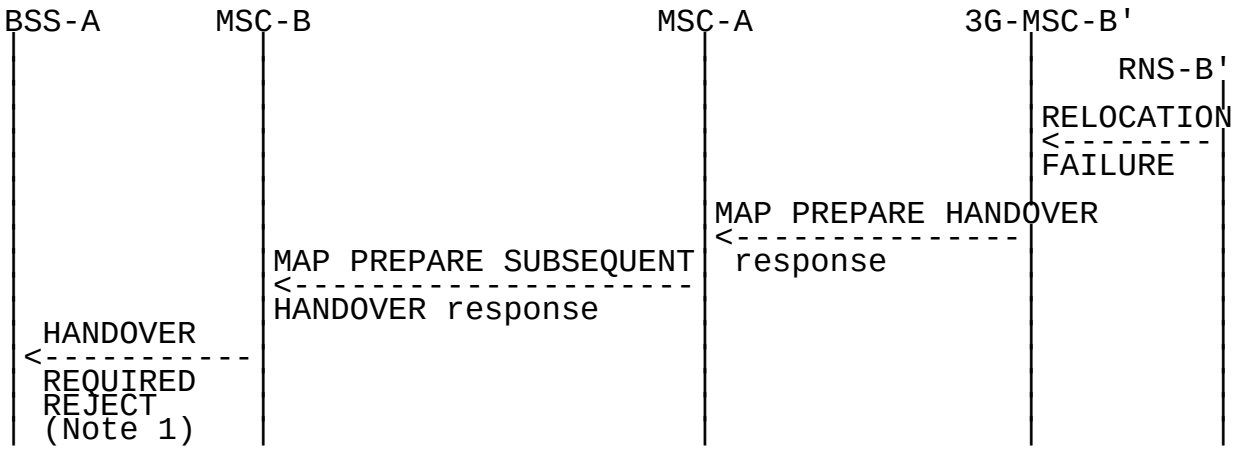


Figure 47: Signalling for Subsequent Inter-MSC Handover to third MSC (3G_MSC-B') execution (Negative outcome)

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

Positive outcome

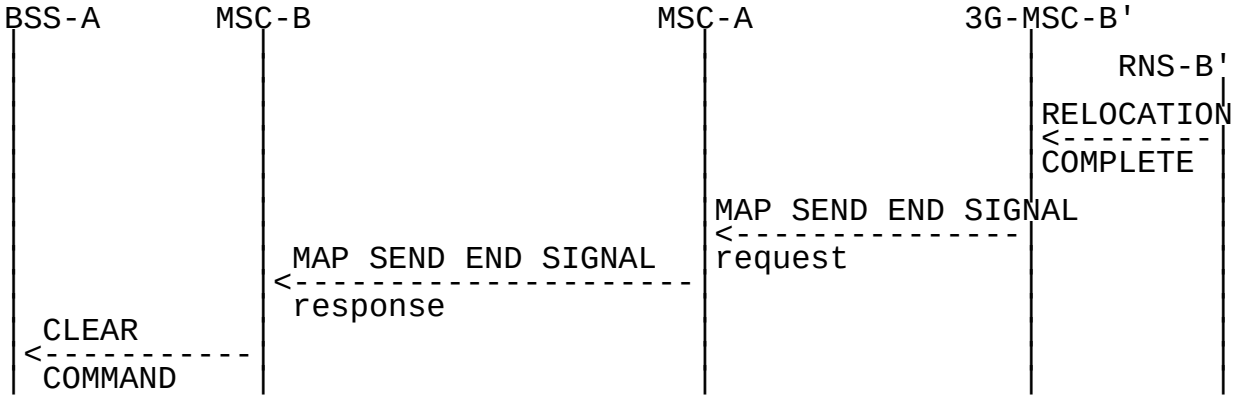


Figure 48: Signalling for Subsequent Inter-MSC Handover to third MSC (3G_MSC-B') completion (Successful completion of the procedure)

Negative outcome

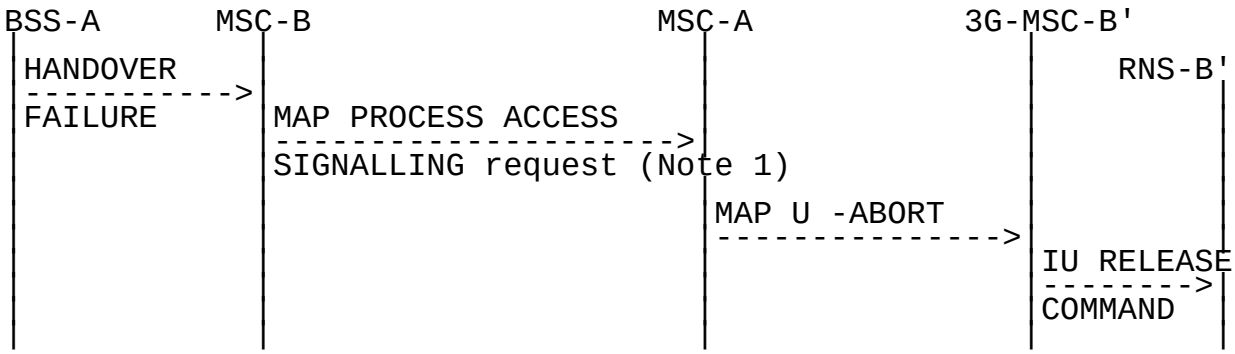


Figure 49: Signalling for Subsequent Inter-MSC Handover to third MSC (3G_MSC-B') completion (Unsuccessful completion of the procedure)

NOTE 1: Specific interworking case detailed below.

The specific interworking case in MSC-A compared to the subclauses 4.5.1 and 4.7.2 occurs between HANDOVER FAILURE encapsulated in a Process Access Signalling from MSC-B and the abortion of the dialogue with 3G_MSC-B' in the case of a reversion to old channel of the MS:

	29.002	29.002	Notes
Forward message	MAP PROCESS-SIGNALLING request -an-APDU(HANDOVER FAILURE)	MAP U -ABORT	1
Positive result			
Negative result		MAP U/P -ABORT	2

NOTE 1: The abortion of the dialogue triggers in 3G_MSC-B' the clearing of the circuit connection with MSC-A, if any, and of the Resources between 3G_MSC-B' and RNS-B'. The abortion of the dialogue ends the handover procedure with 3G_MSC-B'.

NOTE 2: The abortion of the dialogue ends the handover procedure with MSC-B.

4.7.4 BSSAP Messages transfer on E-Interface

The handling is described in chapter 4.5.4, additional cases are described in this chapter.

Note: Handling of (RANAP) Location reporting control is FFS.

Assignment

The interworking between the BSSMAP assignment messages in MAP and the RANAP RAB assignment messages is as follows:

	29.002	25.413	Notes
Forward message	MAP PREPARE HANDOVER request -an-APDU(ASSIGNMENT REQUEST) BSSMAP information elements: Channel Type	RAB ASSIGNMENT REQ RANAP information elements: RAB parameters	
Positive result	MAP PREPARE HANDOVER request -an-APDU(ASSIGNMENT COMPLETE or ASSIGNMENT FAILURE) BSSMAP information elements: Cause	RAB ASSIGNMENT RESPONSE (positive result) RAB ASSIGNMENT RESPONSE (negative result) RANAP information elements: Cause	1
Negative result		MAP U/P –ABORT	

NOTE 1: The mapping of the cause codes between BSSMAP and RANAP is for further study.

4.7.4.1 Cipher Mode Control

The interworking between the BSSMAP cipher mode messages in MAP and the RANAP security mode messages is as follows:

	29.002	25.413	Notes
Forward message	MAP FORWARD ACCESS SIGN. request -an-APDU(CIPHER MODE CMD)	SECURITY MODE CMD	
	BSSMAP information elements:	RANAP information elements:	
	Encryption information	Integrity protection info Encryption info	
Positive result	MAP PROCESS ACCESS SIGN. request -an-APDU(CIPHER MODE COMPLETE or CIPHER MODE REJECT)	SECURITY MODE COMPLETE SECURITY MODE REJECT	
	BSSMAP information elements:	RANAP information elements:	
	Encryption information	Integrity protection info Encryption info	
	Cause	Cause	1
Negative result		MAP U/P –ABORT	

NOTE 1: The mapping of the cause codes between BSSMAP and RANAP is for further study.

4.7.5 Processing in 3G_MSC-B, and information transfer on E-interface

The following parameters require processing (e.g. to store the parameter, to internally generate the parameter) in MSC-B. The relevant BSSMAP procedures are mentioned to ease the comprehension, their detailed description is the scope of the GSM 08.08. Each BSSMAP message listed in GSM 09.08 being transferred on E-interface shall use the mechanisms given in subclause 4.5.4 and is described in GSM 08.08.

Encryption Information

The list of GSM algorithms, the ciphering key and the chosen algorithm shall be stored by 3G_MSC-B and used for generating the UMTS parameters Encryption Information and Integrity Protection Information if they are not received in MAP Prepare Handover Request (the generation of the UMTS parameters from the GSM parameters is described in TS 33.102)..

Transfer of Information

If ciphering has not been performed before Inter-MSC Handover, this will be controlled by MSC-A after the completion of Inter-MSC Handover.

Ciphering control towards 3G_MSC-B:

If Ciphering has been performed before Inter-MSC Handover:

- in the Handover Request BSSMAP message (information included)

  The Handover Request Acknowledge should in this case NOT contain the indication of the chosen algorithm.

If Ciphering has NOT been performed before Inter-MSC Handover:

- in the Cipher Mode Command procedure between MSC-A and 3G_MSC-B.

Channel Type

The Channel Type shall be stored by 3G_MSC-B and used for generating RAB parameters.

Transfer of Information

Independently of the type of resource (Signalling only or traffic channel) assigned to the MS, the Channel Type Information is transferred to 3G_MSC-B in:

- the Handover Request BSSMAP message.

If a new type of resource is to be assigned after Inter-MSC Handover, this can be made with:

- the BSSMAP Assignment procedure between MSC-A and 3G_MSC-B.

Classmark

This information shall be stored by 3G_MSC-B and might be received from MSC-A.

Transfer of Information due to Classmark received from MSC-A:

This information shall be stored by 3G_MSC-B and is received:

- in the Handover Request BSSMAP message

If a new type of resource is to be assigned after Inter-MSC Handover, Classmark Information MAY be included:

- in the BSSMAP Assignment procedure

Priority

The parameter shall be stored by 3G_MSC-B and used for generating RAB parameters. It is received according to below:

Transfer of Information

Received by 3G_MSC-B from MSC-A in:

- the Handover Request BSSMAP message

If a change is needed after an Inter-MSC Handover with:

- the BSSMAP Assignment procedure.

MSC-Invoke Trace Information Elements

The process to be performed by 3G_MSC-B on the information elements of the MSC Invoke Trace BSSMAP messages is left for further study.

Note that MSC-A does not forward BSC Invoke Trace in case of GSM to UMTS handover.

3GPP TSG-CN 2 SWGB meeting #4
Milan, Italy, 14-16 February 2000

Document N2B000178
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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	005	Current Version:	3.1.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-N #7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

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	X	UTRAN / Radio	X	Core Network	X

Source: N2 **Date:** 2000-02-07

Subject: UMTS/UMTS Handover

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	X
D	Editorial modification	

Release:

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

Reason for change: Updates to 29.010 by introduction of UMTS to UMTS Handover

Clauses affected: 4.8 (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: All text is new (new chapter). Revision marks avoided for readibility reasons.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<--------- double-click here for help and instructions on how to create a CR.

4.8 Inter-MSC Relocation

The general principles of the relocation procedures are given in Technical Specification TS 23.009. TS 29.010 gives the necessary information for interworking between the TS 25.413 relocation protocol and the TS 29.002 MAP protocol.

4.8.1 Basic Inter-MSC Relocation

When a Mobile Station is relocated between two MSCs, the establishment of a connection between them (described in TS 23.009) requires interworking between Iu-Interface and E-Interface.

The signalling at initiation, execution and completion of the Basic Inter-MSC relocation procedure is shown in figures 50 to 54 with both possible positive or negative outcomes.

Additionally figure 50b shows the possible interworking when trace related messages are transparently transferred on the E-Interface at Basic Inter-MSC Relocation initiation.

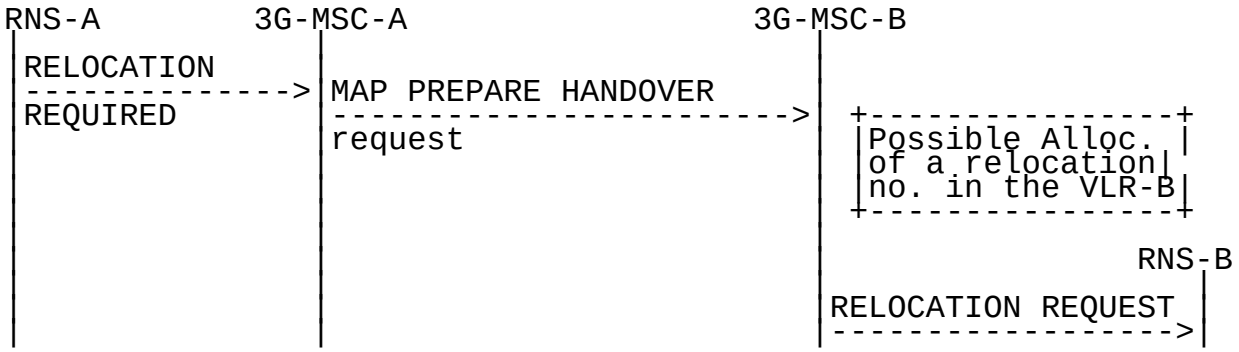


Figure 50a: Signalling for Basic Inter-MSC Relocation initiation (no trace related messages transferred)

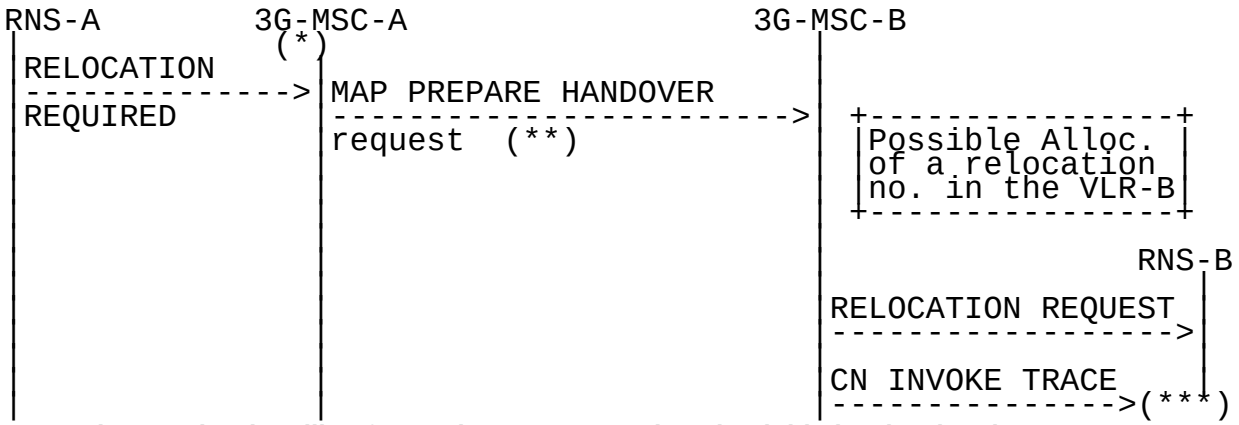


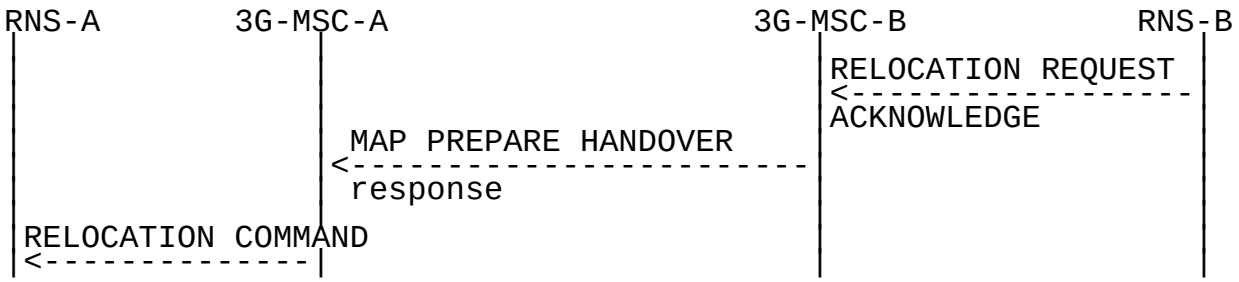
Figure 50b: Signalling for Basic Inter-MSC Relocation initiation (CN invoke trace message transferred)

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

(**): In that case, RELOCATION REQUEST and CN INVOKE TRACE messages are included within the AN-apdu parameter.

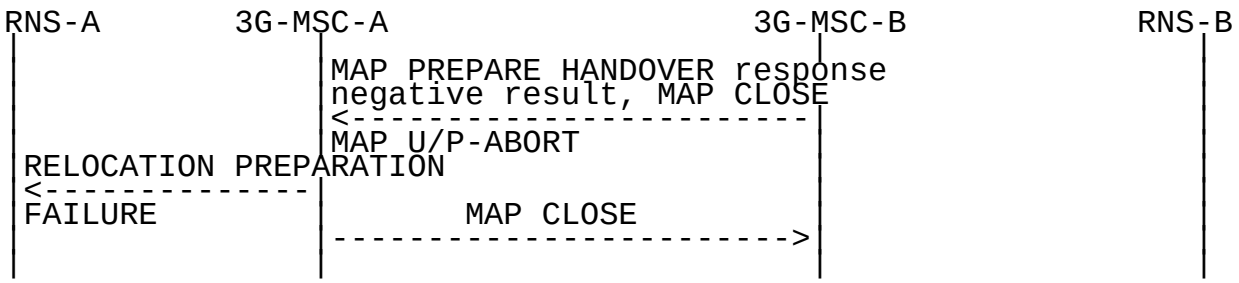
(***): CN INVOKE TRACE is forwarded to RNS-B if supported by 3G_MSC-B.

Possible Positive outcomes: successful radio resources allocation and relocation numbers allocation (if performed):

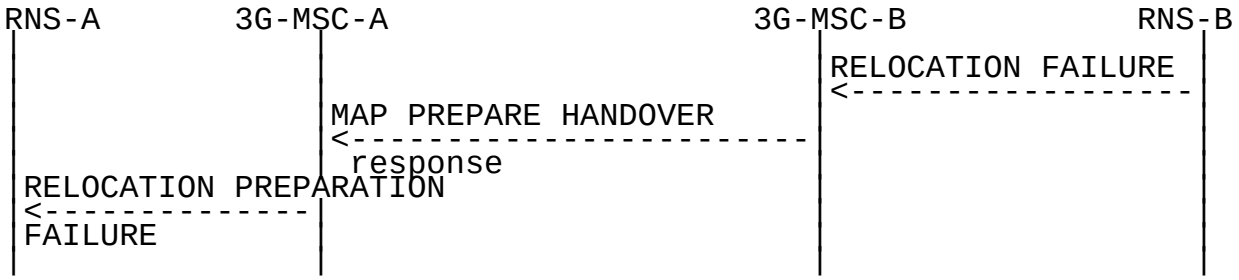


Possible Negative outcomes

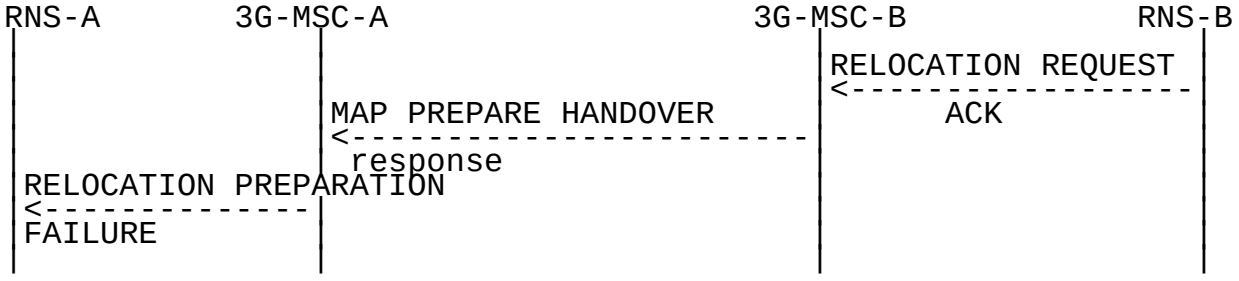
a) user error detected, or relocation numbers allocation unsuccessful (if performed), or component rejection or dialogue abortion performed by 3G_MSC-B:



b) radio resources allocation failure:



c) radio resources allocation partial failure (3G_MSC-A decides to reject the relocation):



d) unsuccessful relocation execution (relocation cancelled):

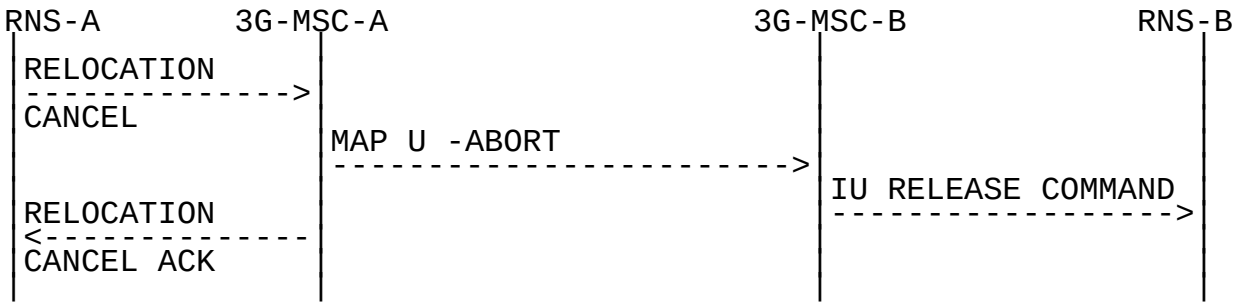


Figure 51: Signalling for Basic Inter-MSC Relocation execution (Negative outcomes)

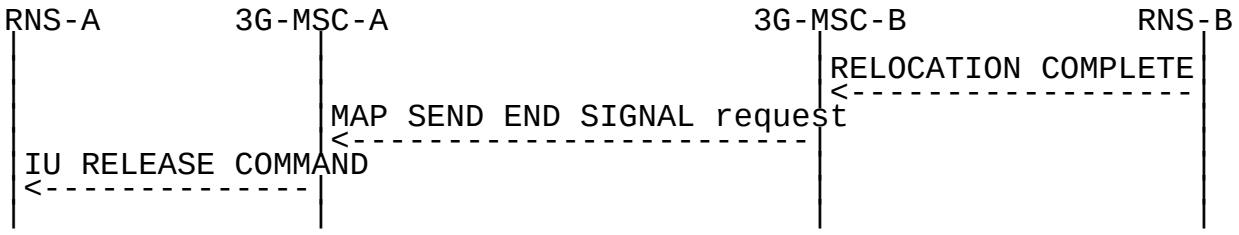


Figure 52: Signalling for Basic Inter-MSC Relocation completion

Positive outcome

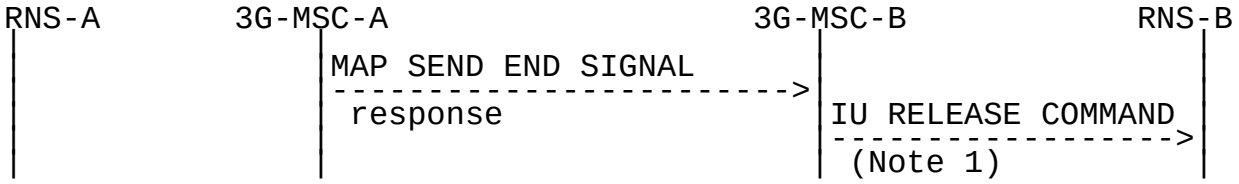


Figure 53: Signalling for Basic Inter-MSC Relocation completion (Positive outcome)

NOTE 1: From interworking between MAP and RANAP point of view.

Negative outcome

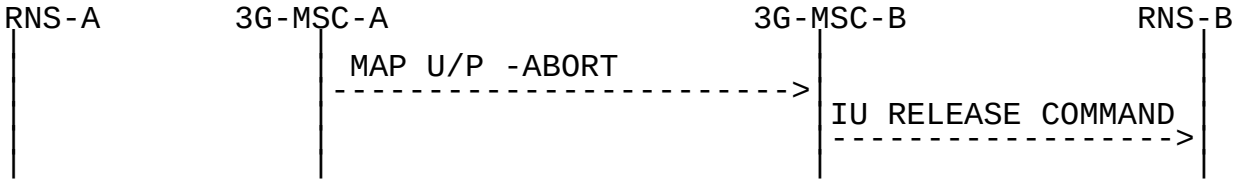


Figure 54: Signalling for Basic Inter-MSC Relocation completion (Negative outcome)

The relocation 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 relocation procedure is performed and controlled by 3G_MSC-A. The sending of the MAP Prepare-Handover request to 3G_MSC-B is triggered in 3G_MSC-A upon receipt of the RELOCATION REQUIRED message. The RELOCATION REQUEST message is encapsulated in the an-APDU

MAP parameter of the Prepare-Handover MAP request. 3G_MSC-B can invoke another operation towards the VLR-B (allocation of the relocation numbers described in GSM 29.002).

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

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

	25.413	29.002	Notes
Forward message	RELOCATION REQUIRED	MAP PREPARE HANDOVER request	
	RANAP information elements	-ho-NumberNotRequired -Channel Type -an-APDU(RELOCATION REQUEST, CN INVOKE TRACE)	1 2
Positive result		MAP PREPARE HANDOVER response	3
	RELOCATION COMMAND	-relocation numbers -an-APDU(RELOCATION REQUEST ACKNOWLEDGE or RELOCATION FAILURE)	
	RELOCATION PREP FAILURE		
Negative result	RELOCATION PREP FAILURE	MAP PREPARE HANDOVER	
	Unspecified failure	System Failure	
	Unspecified failure	No Handover Number available	
	Unspecified failure	UnexpectedDataValue	
	Unspecified failure	Data Missing	
	Unspecified failure	MAP CLOSE	
	Unspecified failure	MAP U/P -ABORT	

NOTE 1: The RANAP 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 3G_MSC-B. No relocation numbers shall be present in the positive result. Any negative response from 3G_MSC-B shall not be due to relocation number allocation problem.

NOTE 2: The process performed on the RANAP information elements received in the RELOCATION REQUIRED message is described in the TS 25.413.

NOTE 3: The response to the Prepare-Handover request can include in its an-APDU parameter, identifying the TS 25.413 protocol, either a RANAP RELOCATION REQUEST ACKNOWLEDGE or a RANAP RELOCATION FAILURE.

In the first case, the positive result triggers in 3G_MSC-A the sending on Iu-Interface of the RELOCATION CMD.

In the second case, the positive result triggers in 3G_MSC-A the sending of the RELOCATION PREP FAILURE.

The interworking between Send End Signal and RELOCATION COMPLETE in 3G_MSC-B is as follows:

	25.413	29.002	Notes
Forward message	RELOCATION COMPLETE	MAP SEND END SIGNAL request -an-APDU(RELOCATION COMPL)	
Positive result	IU RELEASE COMMAND -Normal release	MAP SEND END SIGNAL response	1
Negative result	IU RELEASE COMMAND -Normal release -Normal release	MAP CLOSE MAP U/P -ABORT	2

NOTE 1: The positive empty result triggers the clearing of the Radio Resources on the Iu-Interface and the release of the SCCP connection between 3G_MSC-B and RNS-B. If a circuit connection is used between 3G_MSC-A and 3G_MSC-B, the 'Normal release' clearing cause shall only be given to RNS-B when 3G_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 3G_MSC-B the clearing of its circuit connection with 3G_MSC-A, if any, of the Radio Resources on the Iu-Interface and the release of the SCCP connection between 3G_MSC-B and RNS-B.

The interworking between Send End Signal and IU RELEASE COMMAND in 3G_MSC-A is as follows:

	29.002	25.413	Notes
Forward message	MAP SEND END SIGNAL request -an-APDU(RELOCATION COMPLETE)	IU RELEASE COMMAND - Successful Relocation	
Positive result			
Negative result			

The interworking between RELOCATION CANCEL in case of relocation cancelled and User Abort in 3G-MSC-A is as follows:

	25.413	29.002	Notes
Forward message	RELOCATION CANCEL - Relocation cancelled	MAP U -ABORT	
Positive result	RELOCATION CANCEL ACKNOWLEDGEMENT		
Negative result			

4.8.2 Subsequent Inter-MSC Relocation back to 3G_MSC-A

When a Mobile Station is being relocated back to 3G_MSC-A, the procedure (described in TS 23.009) requires interworking between Iu-Interface and E-Interface.

The signalling at initiation, execution and completion of the Subsequent Inter-MSC relocation procedure is shown in figures 55 to 59.

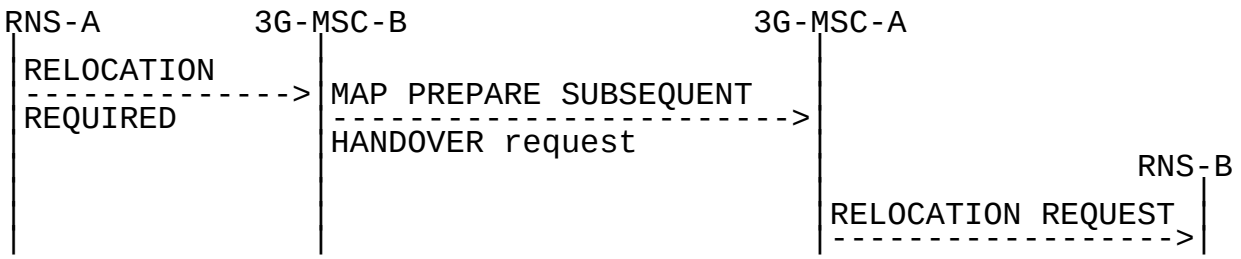


Figure 55: Signalling for Subsequent Inter-MSC Relocation back to 3G_MSC-A initiation

Possible Positive outcomes: successful radio resources allocation:

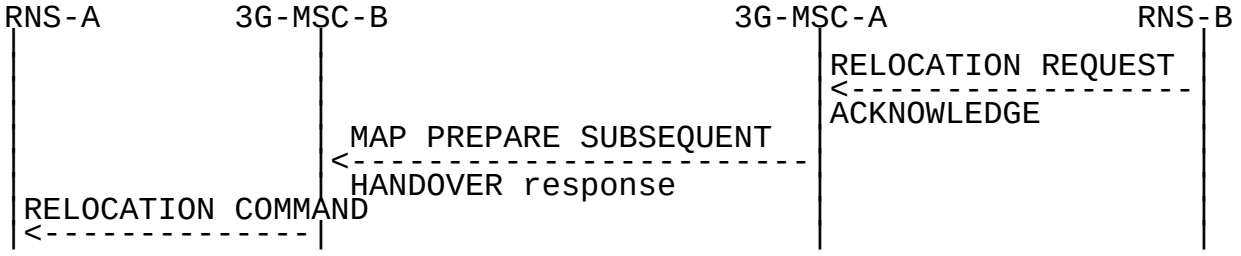
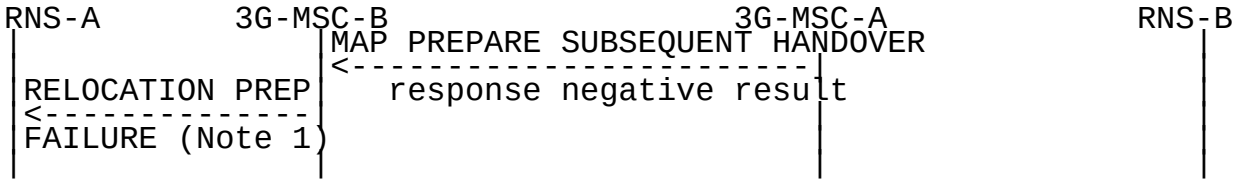


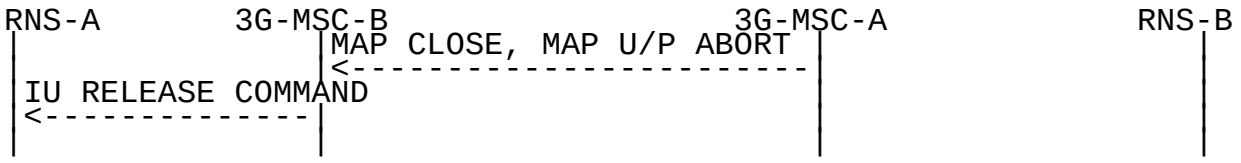
Figure 56: Signalling for Subsequent Inter-MSC Relocation back to 3G_MSC-A execution (Positive outcome)

Possible Negative outcomes

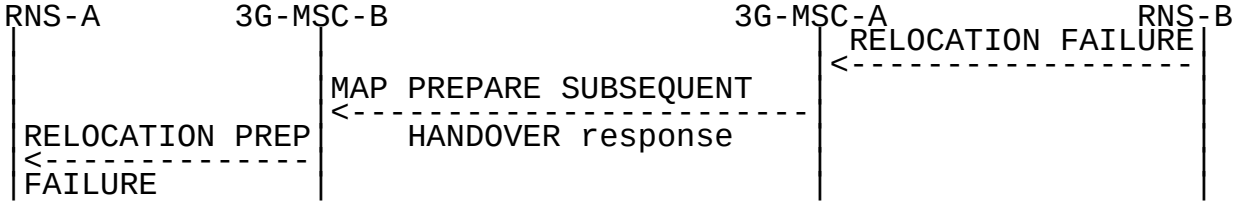
a) user error detected, or component rejection or dialogue abortion performed by 3G_MSC-A:



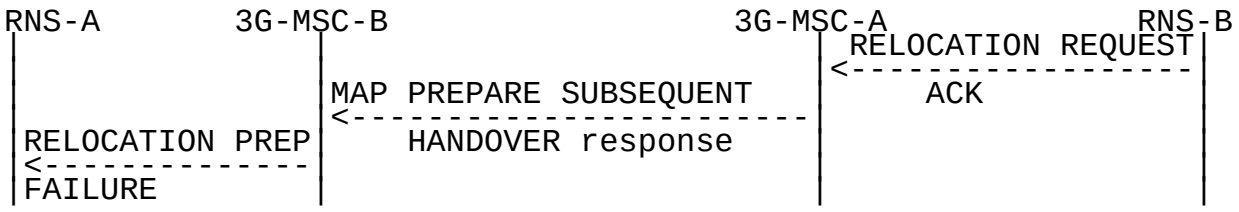
b) component rejection or dialogue abortion performed by 3G_MSC-A:



c) radio resources allocation failure:



d) radio resources allocation partial failure (3G_MSC-A decides to reject the relocation):



e) unsuccessful relocation execution (relocation cancelled):

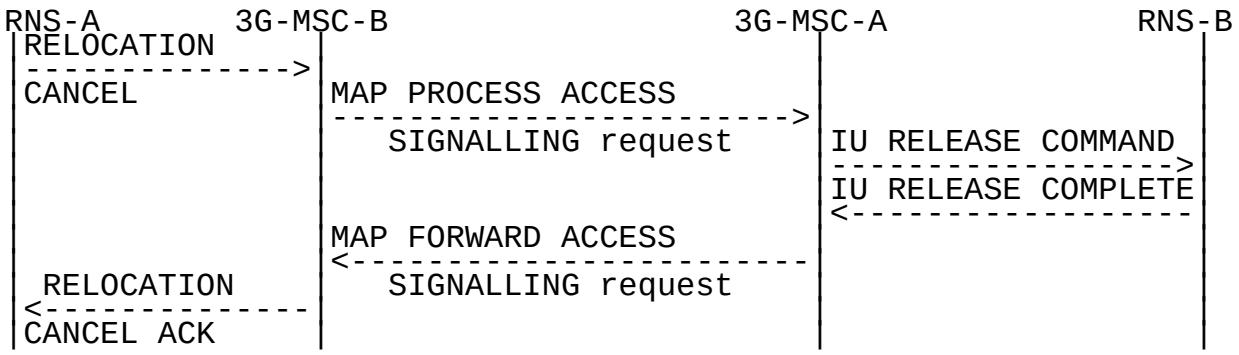


Figure 57: Signalling for Subsequent Inter-MSC Relocation back to 3G_MSC-A execution (Negative outcome)

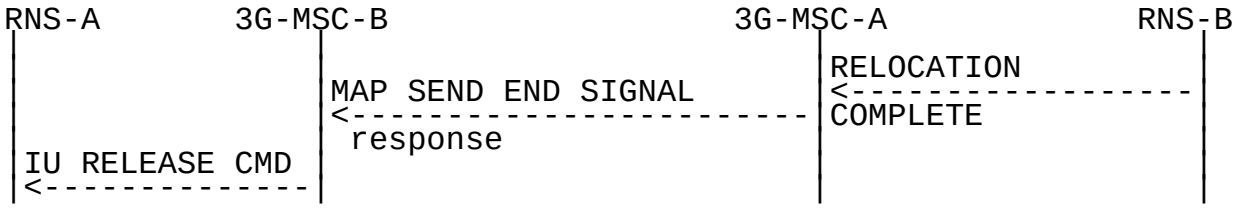


Figure 58: Signalling for Subsequent Inter-MSC Relocation back to 3G_MSC-A completion (Successful completion of the procedure)

NOTE: Positive outcome case shown in figure 53.

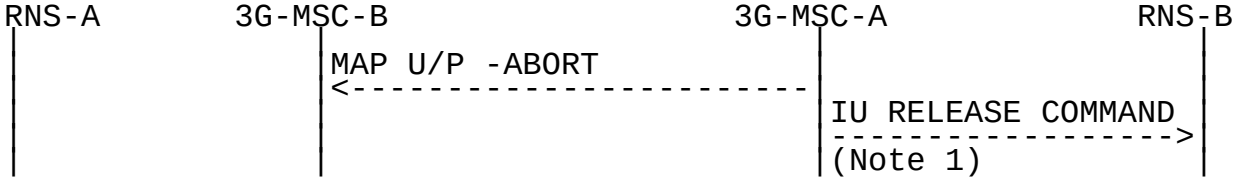


Figure 59: Signalling for Subsequent Inter-MSC Relocation back to 3G_MSC-A completion (Unsuccessful completion of the procedure)

NOTE 1: Abnormal end of the procedure that triggers the clearing of all resources in 3G_MSC-B.

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

	25.413	29.002	Notes
Forward message	REL. REQUIRED RANAP information elements	MAP PREPARE SUBSEQUENT HANDOVER request -target MSC number -an-APDU(RELOCATION REQ)	1
Positive result	RELOCATION CMD. RELOCATION PREP FAILURE	MAP PREPARE SUBSEQUENT HANDOVER response -an-APDU(RELOCATION REQUEST ACKNOWLEDGE or RELOCATION FAILURE)	2
Negative result	REL. PREP. FAILURE Unspecified failure Unspecified failure Unspecified failure Unspecified failure Iu RELEASE COMMAND Unspecified failure Unspecified failure	MAP PREPARE SUBSEQUENT HANDOVER response Unknown MSC Subsequent Handover Failure UnexpectedDataValue Data Missing MAP CLOSE MAP U/P –ABORT	

NOTE 1: The processing performed on the RANAP information elements received in the RELOCATION REQUIRED message is out of the scope of the present document. The target MSC number is provided to 3G_MSC-A by 3G_MSB-B based on the information received from RNS-B.

NOTE 2: The response to the Prepare-Subsequent-Handover request can include in its an-APDU parameter, identifying the 3GPP 25.413 protocol, a RANAP RELOCATION REQUEST ACKNOWLEDGE or a RANAP RELOCATION FAILURE.

In the first case, the positive result triggers in 3G_MSC-B the sending on Iu-Interface of the RELOCATION COMMAND.

In the second case, the positive result triggers in 3G_MSC-B the sending of the RELOCATION PREPARATION FAILURE.

The interworking between RELOCATION CANCEL and MAP Process Signalling Request in 3G_MSC-A is as follows:

	29.002	25.413	Notes
Forward message	MAP PROCESS-SIGNALLING request -an-APDU(RELOCATION CANCEL)	IU RELEASE COMMAND	
Positive result	MAP FORWARD-SIGNALLING request -an-APDU(RELOCATION CANCEL ACK)	IU RELEASE COMPLETE	
Negative result			

The interworking between RELOCATION CANCEL and MAP Process Signalling Request in 3G_MSC-B is as follows:

	25.413	29.002	Notes
Forward message	RELOCATION CANCEL	MAP PROCESS-SIGNALLING request -an-APDU(RELOCATION CANCEL)	
Positive result	RELOCATION CANCEL ACK	MAP FORWARD-SIGNALLING request -an-APDU(RELOCATION CANCEL ACK)	
Negative result			

The interworking between Send End Signal Result and RELOCATION COMPLETE in 3G_MSC-A is as follows:

	25.413	29.002	Notes
Forward message	RELOCATION COMPLETE	MAP SEND END SIGNAL response	
Positive result			
Negative result		MAP U/P -ABORT	1

NOTE 1: The abortion of the dialogue ends the relocation procedure with 3G_MSC-B.

4.8.3 Subsequent Inter-MSC Relocation to third MSC

When a Mobile Station is being relocated to a third MSC, the procedure (described in GSM 23.009) does require one specific interworking case in 3G_MSC-A (figure 64) between E-Interface from 3G_MSC-B and E-Interface from 3G_MSC-B' other than the combination of the ones described in the subclause 4.8.1 and 4.8.2.

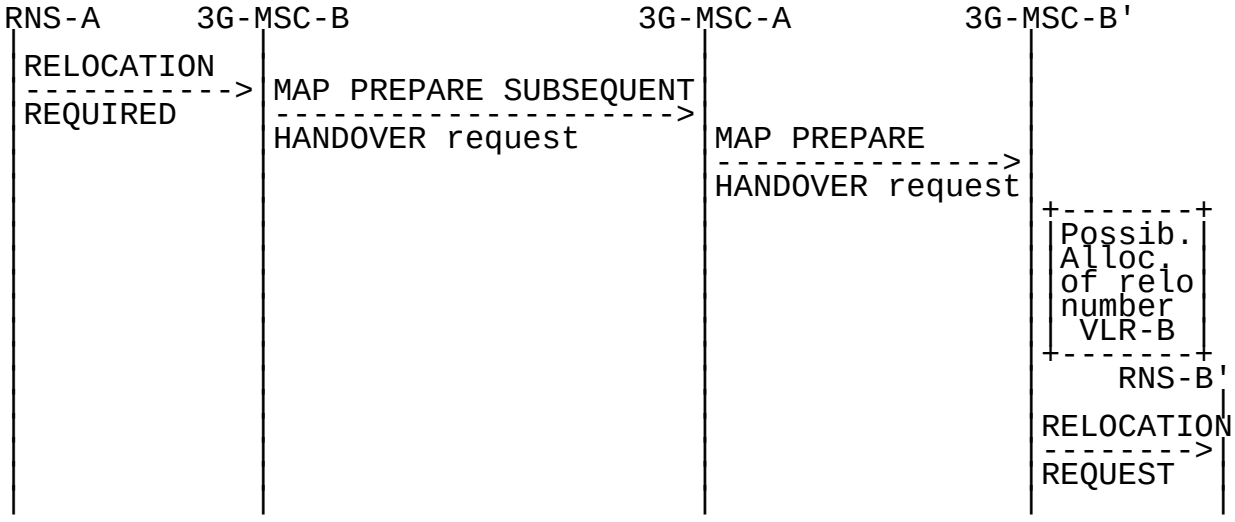


Figure 60: Signalling for Subsequent Inter-MSC Relocation to third MSC (3G_MSC-B') initiation

Possible Positive outcomes: successful radio resources allocation:

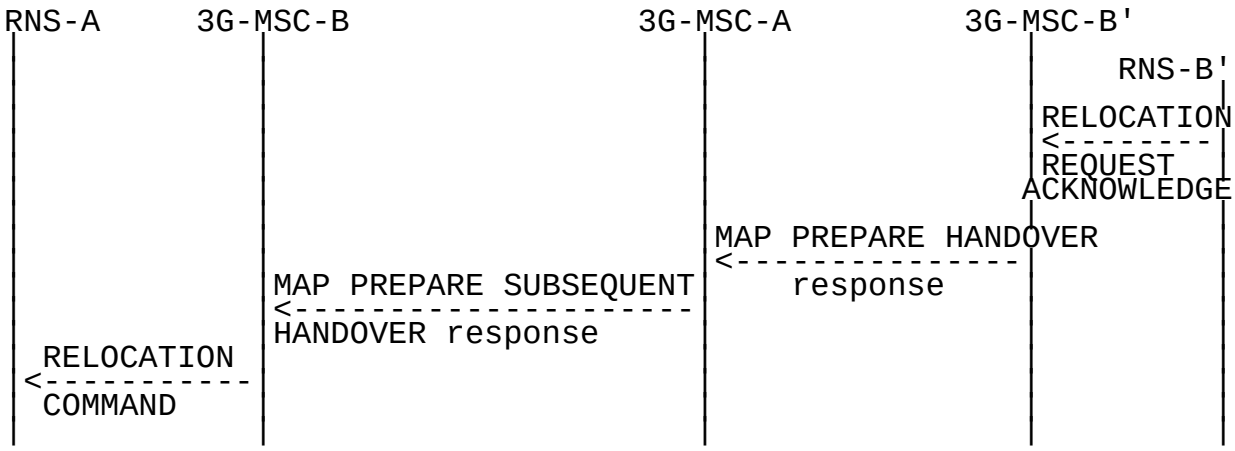
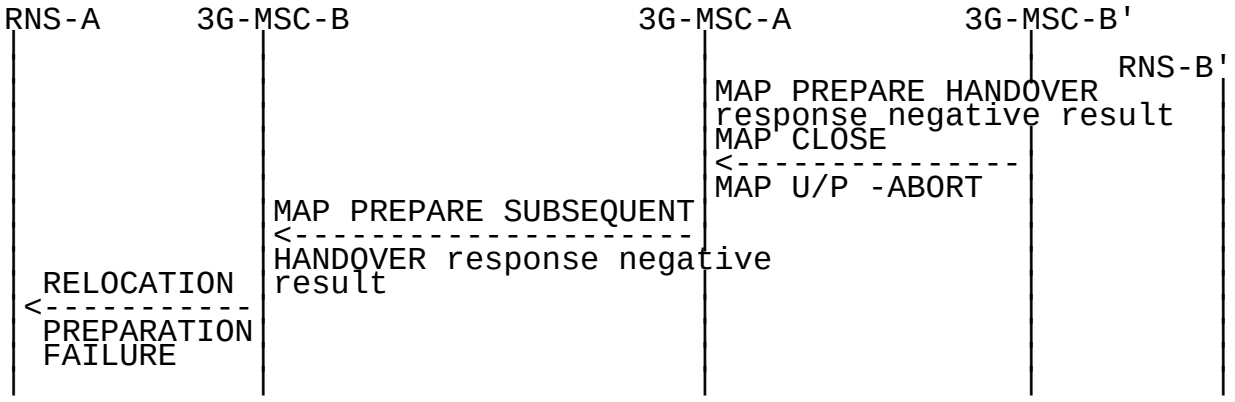


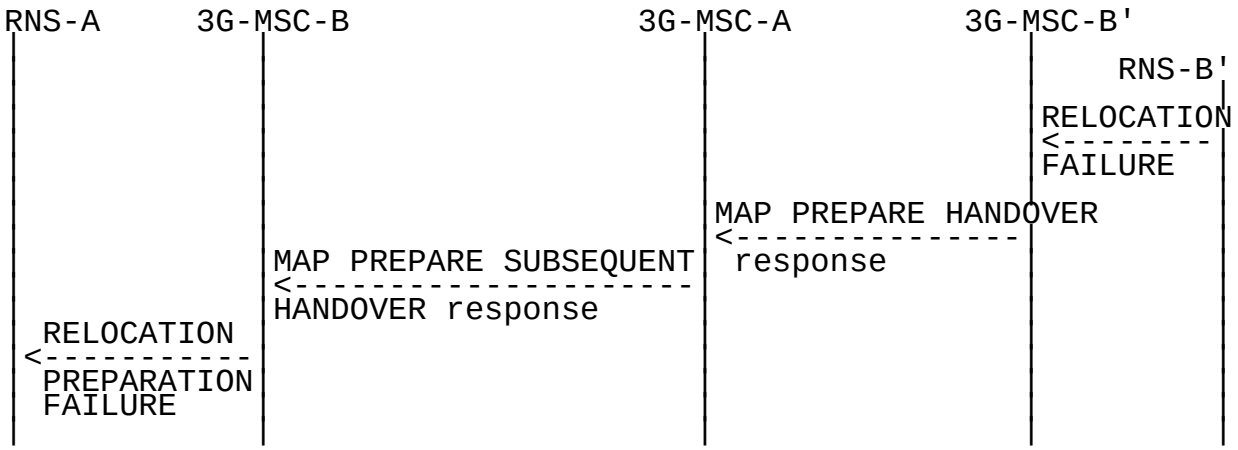
Figure 61: Signalling for Subsequent Inter-MSC Relocation to third MSC (3G_MSC-B') execution (Positive outcome)

Possible Negative outcomes

a) user error detected, or component rejection or dialogue abortion performed by 3G_MSC-B':



b) radio resources allocation failure:



c) radio resources allocation partial failure (3G_MSC-A decides to reject the relocation):

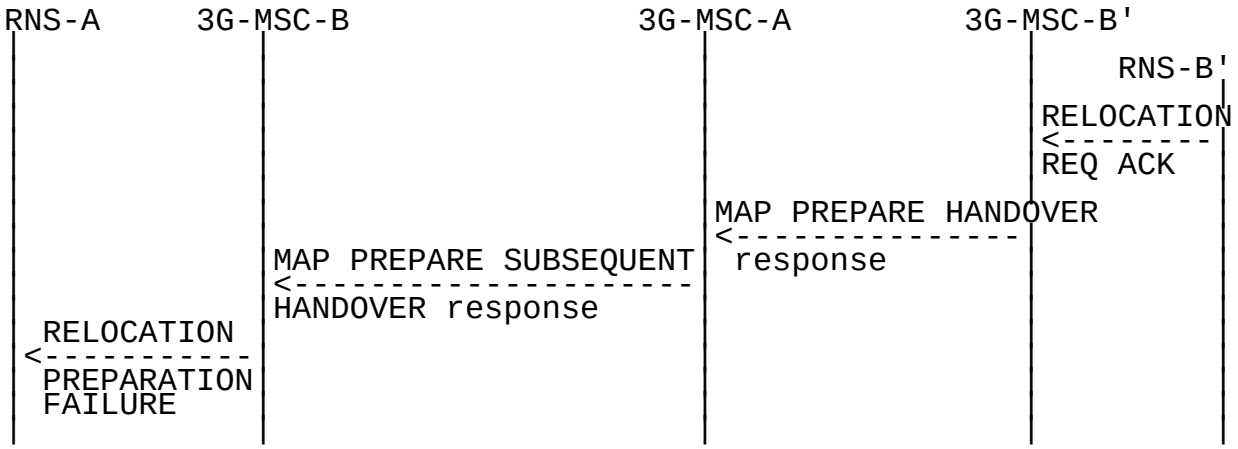


Figure 62: Signalling for Subsequent Inter-MSC Relocation to third MSC (3G_MSC-B') execution (Negative outcome)

Positive outcome

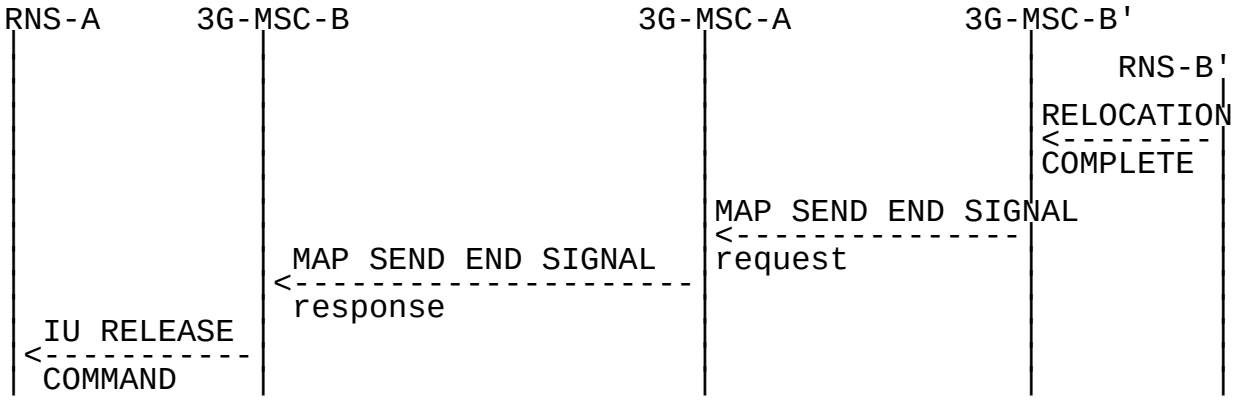


Figure 63: Signalling for Subsequent Inter-MSC Relocation to third MSC (3G_MSC-B') completion (Successful completion of the procedure)

Negative outcome

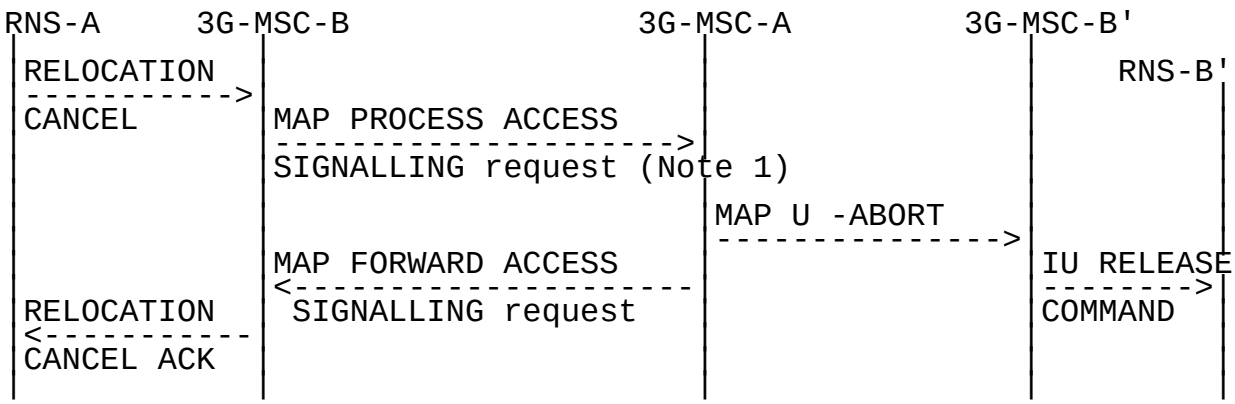


Figure 64: Signalling for Subsequent Inter-MSC Relocation to third MSC (3G_MSC-B') completion (Unsuccessful completion of the procedure)

NOTE 1: Specific interworking case detailed below.

The specific interworking case in 3G_MSC-A compared to the subclauses 4.8.1 and 4.8.2 occurs between RELOCATION FAILURE encapsulated in a Process Access Signalling from 3G_MSC-B and the abortion of the dialogue with 3G_MSC-B' in the case of relocation cancelled:

	29.002	29.002	Notes
Forward message	MAP PROCESS-SIGNALLING request -an-APDU(RELOCATION CANCEL)	MAP U -ABORT	1
Positive result	MAP FORWARD-SIGNALLING request -an-APDU(RELOCATION CANCEL ACK)		
Negative result		MAP U/P -ABORT	2

NOTE 1: The abortion of the dialogue triggers in 3G_MSC-B' the clearing of the circuit connection with 3G_MSC-A, if any, and of the Resources between 3G_MSC-B' and RNS-B'. The abortion of the dialogue ends the relocation procedure with 3G_MSC-B'.

NOTE 2: The abortion of the dialogue ends the relocation procedure with 3G_MSC-B.

4.8.4 RANAP Messages transfer on E-Interface

The following mapping applies to the encapsulation performed in 3G_MSC-A.

	25.413	29.002	Notes
Forward message	RANAP messages	MAP FORWARD ACCESS SIGNALLING request -an-APDU (RANAP messages)	1
Positive result			2
Negative result		MAP CLOSE MAP U/P -ABORT	

NOTE 1: Complete RANAP messages to be sent on 3G_MSC-B - RNS-B interface are embedded into the an-APDU parameter.

NOTE 2: The Return Result does not apply. If 3G_MSC-B returns a message, this message will arrive in an Invoke: Process Access Signalling.

The following mapping applies to the encapsulation performed in 3G_MSC-B.

	25.413	29.002	Notes
Forward message	RANAP messages	MAP PROCESS ACCESS SIGNALLING request -an-APDU (RANAP messages)	1
Positive result			2
Negative result		MAP CLOSE	
	IU RELEASE COMMAND		
	Unspecified failure	MAP U/P -ABORT	3

NOTE 1: Complete RANAP messages to be sent to 3G_MSC-A are embedded into the an-APDU parameter.

NOTE 2: The Return Result does not apply. If 3G_MSC-A returns a message, this message will arrive in an Invoke: Forward Access Signalling.

NOTE 3: The abortion of the dialogue triggers the clearing of the circuit connection with 3G_MSC-A, if any, of the Radio Resources on the Iu-Interface and the release of the SCCP connection between 3G_MSC-B and RNS-B. The clearing of the Radio Resources (the clearing indication received from RNS-B is transmitted to 3G_MSC-A) or the loss of the SCCP connection between 3G_MSC-B and RNS-B, triggers in 3G_MSC-B the abortion of the dialogue on the E-Interface and the clearing of the circuit connection with 3G_MSC-A, if any.

4.8.5 Processing in 3G_MSC-B, and information transfer on E-interface

The following parameters require processing (e.g. to store the parameter, to internally generate the parameter) in 3G_MSC-B. The relevant RANAP procedures are mentioned to ease the comprehension, their detailed description is the scope of the TS 25.413. Each RANAP message being transferred on E-interface shall use the mechanisms given in subclause 4.8.4 and is described in TS 25.413.

4.8.5.1 Integrity Protection Information

A sequence of possible integrity protection algorithms can be sent to an RNS in Security Mode Command or Relocation Request. The RNS chooses one of the listed algorithms and reports this back to the 3G_MSC in Security Mode Complete or Relocation Request Acknowledge respectively.

The list of algorithms, the integrity protection key and the chosen algorithm shall be stored by 3G_MSC-B.

Transfer of Information

If integrity protection has not been performed before Inter-MSC Relocation, this will be controlled by 3G_MSC-A after the completion of Inter-MSC Relocation.

Integrity protection control towards 3G_MSC-B:

If Integrity protection has been performed before Inter-MSC Relocation:

- in the Relocation Request RANAP message (information included)

  The Relocation Request Acknowledge should in this case contain the indication of the chosen algorithm.

If Integrity protection has NOT been performed before Inter-MSC Relocation:

- in the Security Mode Command procedure between 3G_MSC-A and 3G_MSC-B.

4.8.5.2 Encryption Information

A sequence of possible encryption algorithms can be sent to an RNS in Security Mode Command or Relocation Request. The RNS chooses one of the listed algorithms and reports this back to the 3G_MSC in Security Mode Complete or Relocation Request Acknowledge respectively.

The list of algorithms, the ciphering key and the chosen algorithm shall be stored by 3G_MSC-B, and the chosen value sent to 3G_MSC-A.

Transfer of Information

If ciphering has not been performed before Inter-MSC Relocation, this will be controlled by 3G_MSC-A after the completion of Inter-MSC Relocation.

Ciphering control towards 3G_MSC-B:

If Ciphering has been performed before Inter-MSC Relocation:

- in the Relocation Request RANAP message (information included)

  The Relocation Request Acknowledge should in this case contain the indication of the chosen algorithm.

If Ciphering has NOT been performed before Inter-MSC Relocation:

- in the Security Mode Command procedure between 3G_MSC-A and 3G_MSC-B.

4.8.5.3 RAB Parameters

The parameters shall be stored by 3G_MSC-B to be used at internal Relocation in 3G_MSC-B.

Transfer of information

Received by 3G_MSC-B from 3G_MSC-A in:

– The Relocation Request RANAP message

If a new type of resource is to be assigned after Inter-MSC Relocation, this can be made with:

– The RAB Assignment Request RANAP message

4.8.5.4 Channel Type

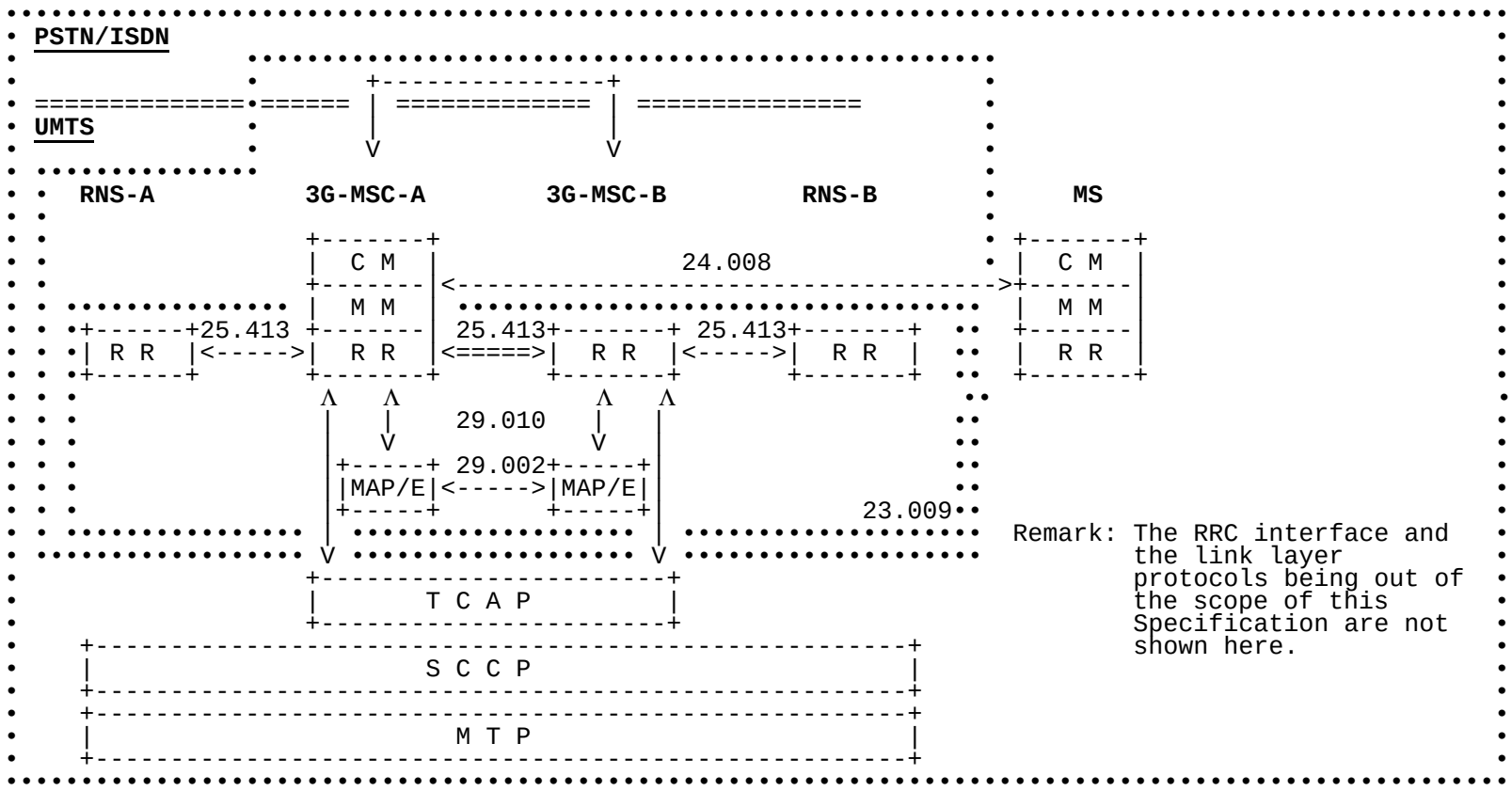
The parameter shall be stored by 3G_MSC-B and used for intra-MSC UMTS to GSM handover.

Transfer of information

Received by 3G_MSC-B from 3G_MSC-A in:

– The Prepare Handover Request MAP message

4.8.6 Overview of the Technical Specifications 3GPP interworking for the Inter-MSC Relocation


PSTN/ISDN
UMTS
RNS-A
3G-MSC-A
3G-MSC-B
RNS-B
MS
C M
M M
R R
24.008
25.413
29.010
29.002
MAP/E
23.009
T C A P
S C C P
M T P
Remark: The RRC interface and the link layer protocols being out of the scope of this Specification are not shown here.