3GPP TSG CN Plenary Meeting #17 **NP-020458**
4th – 6th September 2002 Biarritz, FRANCE.

Source: TSG CN WG4

Title: TEI5

Agenda item: 8.8

Document for: APPROVAL

GERAN Iu mode CRs.

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
29.010	060		N4-020934	Rel5	Introduction of GERAN Iu-mode	F	5.0.0
23.205	026	4	N4-021086	Rel5	Introduction of GERAN Iu-mode	F	5.2.0
23.153	031	4	N4-021087	Rel5	Introduction of GERAN Iu-mode	F	5.1.0
29.002	462	1	N4-021088	Rel5	Introduction of GERAN classmark	F	5.2.0

3GPP TSG CN WG4 Meeting #15 ***N4-021087***
Helsinki, Finland, 29th July – 2nd August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.153** **CR** **031** ⌘ **rev** **4** ⌘ Current version: **5.1.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☒

Title:	⌘	Introduction of GERAN Iu-mode		
Source:	⌘	CN4		
Work item code:	⌘	TEI5	***Date:*** ⌘	01/08/2002
Category:	⌘	**F**	***Release:*** ⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘

GERAN does not provide a generic mechanism for the transmission of speech frames via the air interface. Within GERAN speech frames originated by a certain codec type will be transmitted at the air interface using a corresponding channel coding.
As the support of transceivers with limited capabilities (i.e. GERAN does not support all possible codec types due to restrictions inside the RAN) has to be assured, the CN has to take the GERAN capabilities into account during call set-up and handover.
During call set-up the MSC Server has to take the GERAN capabilities into account when the codec negotiation procedure is executed. Otherwise the RAB Assignment procedure will possibly fail as the selected codec type is not supported in GERAN.
During handover the capabilities of the target cell have to be taken into account, which might result in a mid-call Codec Negotiation.
Additionally GERAN has to be aware of the selected codec type to be able to setup an appropriate radio bearer. Therefor the MSC Server has to indicate the selected codec type to the GERAN during the RAB Assignment procedure and during the Relocation procedure.

Summary of change: ⌘

Description is added to section 5.6.
Clause 6.9 is introduced describing the required modifications for call set-up.
- how the MSC Server has to take the GERAN capabilities into account during call set-up.
- that the GERAN has to be informed about the selected codec type during RAB ASSIGNMENT procedure and for handover.

Clause 6.10 is introduced describing the required modification for Relocation.
- how the MSC Server has to take the GERAN capabilities into account during

		handover. - that the GERAN has to be informed about the selected codec type during RAB ASSIGNMENT procedure and in case of handover.
Consequences if not approved:	⌘	GERAN Iu-mode not supported for TrFO.

Clauses affected:	⌘					
		Y	**N**			
Other specs	⌘	**X**		Other core specifications	⌘	3GPP TS 48.008 039, 3GPP TS 25.413, 3GPP TS 23.153 031, 3GPP TS 43.051 036, 3GPP TS 29.002 462, 3GPP TS 29.010 060
affected:			**X**	Test specifications		
			X	O&M Specifications		
Other comments:	⌘					

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3)With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause c

* * * * * * * * * * * * * F I R S T M O D I F I C A T I O N *

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 23.107: "QoS Concept and Architecture".

[2] 3GPP TS 24.008: "Mobile radio interface layer 3 specification Core Network Protocols –Stage 3".

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

[4] 3GPP TS 25.415: "UTRAN Iu Interface User Plane Protocols".

[5] 3GPP TS 26.103: "Speech codec list for GSM and UMTS".

[6] 3GPP TS 29.205: "3rd Generation Partnership Project; Technical Specification Group CoreNetwork; Application of Q.1900 series to Bearer Independent circuit-switched core Network architecture; Stage 3".

[7] ITU-T Reccomendation Q.765.5: "Signalling system No. 7; Application transport mechanism: Bearer Independent Call Control (BICC)".

[8] 3GPP TS 23.205: "Bearer-independent CS Core Network.".

[9] 3GPP TS 33.106: "3GPP Security; Lawful Interception Requirements".

[10] 3GPP TS 28.062: "Inband Tandem Free Operation (TFO) of Speech Codecs; Service Description; Stage 3".

[11] 3GPP TS 23.009: "Handover Procedures".

[12] 3GPP TS 29.232: "Media Gateway Controller (MGC) – Media Gateway (MGW) interface; Stage 3".

[13] ITU-T H.248: "Gateway Control Protocol".

[14] 3GPP TS 29.415: "Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3; CAMEL Application Part (CAP) specification".

[15] 3GPP TS 48.008: “Mobile-services Switching Centre – Base Station System (MSC – BSS) interface; layer 3 specification”

[16] 3GPP TS 43.051: “Technical Specification Group GSM/EDGE; Radio Access Network; Overall description - Stage 2;”

* * * * * * * * * * * * * NEXT MODIFICATION *

5.6 CN Node handling of Codec Types & Codec Modes

The supported codec list received by the MSC in DTAP protocol [2] has no priority, whereas the list sent in the OoBTC procedures is sent with a level of preference.

The default Codec Type for “R99 UMTS only” terminals is UMTS_AMR, the default Codec Type for all terminals supporting GSM and UMTS radio access is UMTS_AMR_2, see [5] for the detailed description. The UMTS_AMR_2 is a superset of the UMTS_AMR. It behaves as a FR_AMR codec in the UL and as a UMTS_AMR codec in the DL. This allows UMTS terminals to operate in TFO with GSM terminals. The UMTS_AMR_2 is fully compatible with UMTS_AMR in TFO and TrFO and fully compatible with R99 CN nodes (TC in MGW).

If the UE supports both Codec Types (UMTS_AMR and UMTS_AMR_2), then the MSC shall indicate only the UMTS_AMR_2 in the OoBTC codec negotiation. If no Codec List IE is received and the UE is“UMTS only”, then the MSC shall assume UMTS_AMR as supported Codec Type. If no Codec List IE is received, but the UE is “dual system”, then the MSC shall assume UMTS_AMR_2 as the supported codec type. The MSC shall assume “dual system” support only if the UE indicates at least one GSM speech version in Octet 3a etc. of the Bearer Capability.

In order to support interworking with 2G systems it is recommended that MGWs support 2G EFR codecs (GSM_EFR, PDC_EFR, TDMA_EFR). In order to avoid modifications during handover between 2G and 3G systems the MSC nodes may give preference to a suitable 2G codec.

For GERAN Iu-mode the MSC Server receives a list of codec types (for definition see [15]) as well as the supported codec modes (for an adaptive multi-rate codec type) within the RANAP INITIAL UE MESSAGE, indicating the GERAN capabilities, which will be available at the RAB establishment procedure. With this information the MSC Server shall puncture out (i.e. delete) those codec types and codec modes (for an adaptive multi-rate codec type) from the supported codec list (for definition see [5]) taking into account the GERAN classmark and the MS capabilities~~,~~ which are not supported by the GERAN. This possibly reduced list shall be used by the MSC Server during the negotiation procedure as described in clause 5.1. The value of the maximum number of supported codec modes shall be set to "four" (see [10]).

The originating CN node, while performing speech service negotiation with a terminating CN node, shall indicate the maximum number of codec modes that shall be selected during speech codec negotiation. This maximum number of supported codec modes may depend on optimisation strategies applied by the originating CN node. The recommended value is “four” (see [10]).

The terminating CN node receiving this information compares the maximum number of codec modes received by the originating CN with its own one and shall decide on the minimum of both numbers to be applied as result of the negotiation.

The decision about the actual codec modes to be selected as the Active Codec Set (ACS) shall be left to the terminating CN node. In order to provide harmonisation of out of band codec negotiation (TrFO) and inband codec negotiation (TFO) very similar codec selection mechanisms as those being defined for TFO shall be applied for TrFO, see [10]. These rules shall be taken into account when forwarding a codec list from the originating node to proceeding node, both for TrFO and TFO.

Whenever one or several TrFO links have been already established and initialised, the CN node (e.g. the serving CN in case of Call Hold scenarios, the visited CN node in case of Call Forwarding scenarios, etc.) initiating a subsequent codec negotiation, shall give the already negotiated codec type, including its ACS, highest preference to reduce the possibility of performing bearer re-establishment or UP re-initialisation of the already established and initialised TrFO links.

When the MSC node requests a RAB assignment the Subflow Combinations provided shall either all be initialised by the RNC or all rejected with appropriate cause code.

The MSC shall always assume "Discontinuous Transmission (DTX)" as mandatory and shall define “SID” SDUs in addition to the negotiated speech codec modes. This is because for TrFO the RAB requested by one RNC must match that requested by the peer RNC – they are effectively the same RAB. If one MSC requires DTX support then the RAB requested by the far end MSC must also support DTX (even if it is not desired by that MSC). As no Out Of Band negotiation for DTX is supported nor DTX control to the UE, DTX shall be mandatory for TrFO connections.

**********NEW SECTIONS**********

6.9 Mobile to Mobile TrFO Call Establishment for GERAN Iu-mode

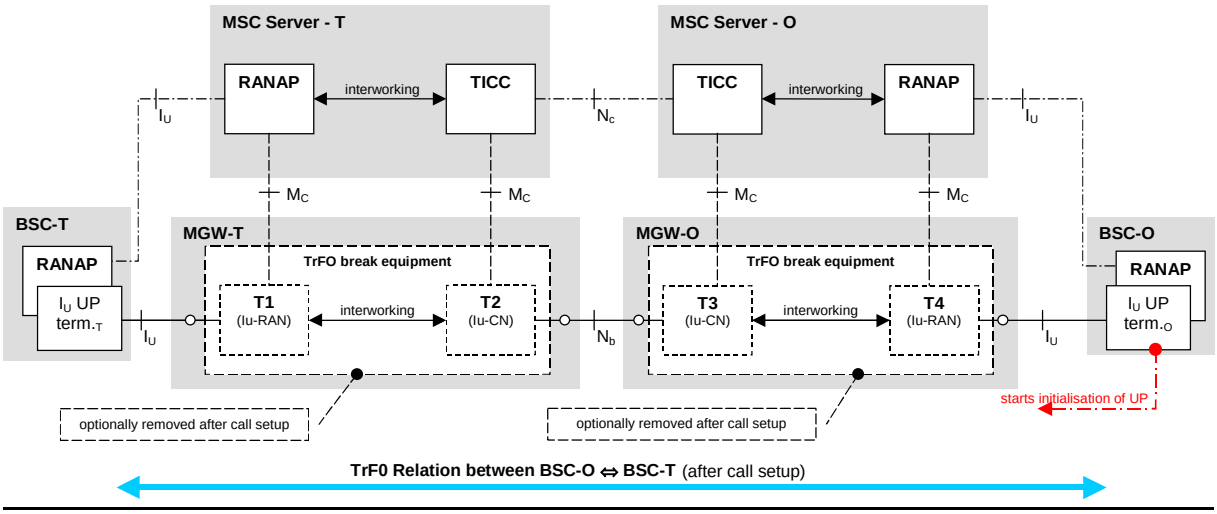

Figure 6.9/1: Configuration during Call Setup of a Mobile to Mobile Call for GERAN Iu-mode

The description of Figure 6.1/1 (Configuration during Call Setup of a Mobile to Mobile Call) within clause 6.1 applies for the network and protocol entities involved in the Mobile to Mobile Call for GERAN Iu-mode scenario with following modifications:

BSC-T acts as a RNC-T.

BSC-O acts as a RNC-O.

Therefore Figures 6.1/2 to 6.1/4. (the respective message flows for mobile to mobile call setup) apply as well with the appropriate modifications outlined below:

Codec negotiation

Step 1. until 6., that give the codec negotiation phase in Figure 6.1/2, shall be applied with following modifications:

Before step 1 (BSC-O to MSC-S-O) and step 4 (BSC-T to MSC-S-T) the RANAP Initial UE message will be sent indicating the GERAN capabilities, which will be available at the RAB establishment procedure. The IE describing the GERAN capabilities contains a list of codec types as well as the supported codec modes (for an adaptive multi-rate codec type), which will be available at the RAB establishment procedure. With this information the MSC Server shall puncture out (i.e. delete) those codec types and codec modes (for an adaptive multi-rate codec type) from the supported codec list taking into account the GERAN classmark and the MS capabilities~~,~~ which are not supported by the GERAN. This possibly reduced list shall be used by the MSC Server during the negotiation procedure (step 2 and step 6). For definition of list of supported codec types see [15].

The MSC-Server performs codec negotiation according to clause 5.6 with the following modifications:

The value of the maximum number of supported codec modes shall be set to "four" (see [10]).

RAB Assignment

RAB Assignment shall be performed as described in clause 6.1 with following modifications:

Additionally, the MSC Server shall include the selected codec type within RAB Assignment.

6.10 Relocation during TrFO towards GERAN Iu-mode

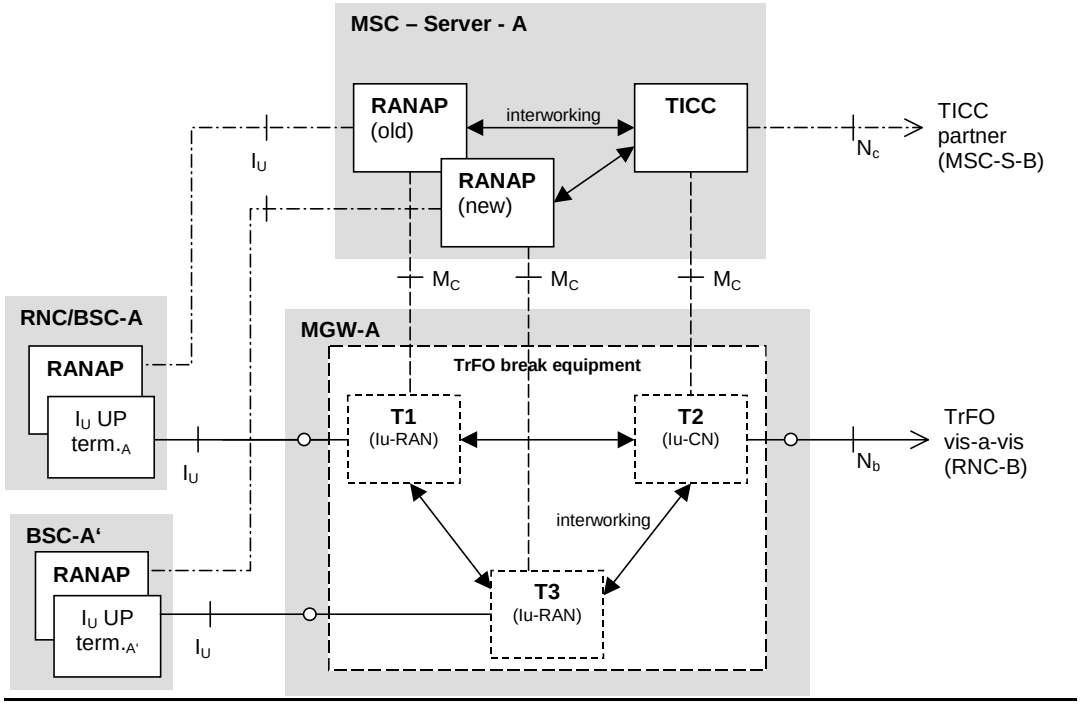

Figure 6.10/1: Configuration during Relocation towards GERAN Iu-mode

The description of Figure 6.2/1 (Configuration during SRNS Relocation) within clause 6.2 applies for the network and protocol entities involved in the Relocation towards GERAN Iu-mode scenario with following modifications:

RAN node A either is a RNC or a BSC. In the latter case BSC-A acts as a RNC-A.

BSC-A' acts as a RNC-A'.

Therefore Figures 6.2/2 to 6.2/3. (the respective message flows for SRNS Relocation and TrFO) apply as well with the appropriate modifications outlined below:

Relocation Initiation

If the MSC-Server-A received the GERAN capabilities of the target cell within the RANAP Relocation Required message (for details when the capabilities are included see [16]), MSC-Server-A shall~~,~~ compare ~~depending on~~ these capabilities~~, either~~with the current Selected Codec and the Available Codec List, taking into account Supported Codec Set and Active Codec Set for adaptive multimode codecs. If the GERAN capabilities in terms of codec types and modes for adaptive multimode codecs do not include all codes types and modes in the Available Codec List and all modes and the type of the Selected Codec, MSC Server A shall invoke the appropriate of the modification procedures in Section 5.8. Criteria for the selection of the appropriate procedure are given in Section 5.8. Upon completion of this procedure, of if no modification procedure is required, MSC server A shall proceed with the Relocation procedure as described in Figure 6.2/2 to 6.2/3 (Step 2. to 17.).

RAB Assignment on the new Iu leg:

RAB Assignment on the new Iu leg shall be performed as described in clause 6.2 with following modifications:

The Relocation Request (Step 3.) contains possibly new RAB parameters depending on the actions executed as outlined above during the Relocation Initiation phase according to the decision on the selected codec as well as on the selected codec modes (for an adaptive multi-rate codec type). In addition, the MSC-Server-A shall include the selected codec type within Relocation Request message. For definition of list of supported codec type see [15].

3GPP TSG CN WG4 Meeting #15 **N4-021086**
Helsinki, Finland, 29th July – 2nd August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **23.205** **CR** **026** ⌘ **rev** **4** ⌘ Current version: **5.2.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Introduction of GERAN Iu-mode
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	02.08.2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	GERAN does not provide a generic mechanism for the transmission of frames via the air interface. Within GERAN frames will be transmitted at the air interface using a service specific channel coding. As the support of transceivers with limited capabilities (e.g. GERAN does not support all possible codec types due to restrictions inside the RAN) has to be assured, the CN has to take the GERAN capabilities into account during call set-up and handover. Additionally GERAN has to be aware of the selected service to be able to setup an appropriate radio bearer. Therefore the MSC Server has to indicate the selected service to the GERAN during the RAB Assignment procedure and during the Relocation procedure.
Summary of change:	⌘	Description is added : - how the MSC Server has to take the GERAN capabilities into account during call set-up. - that the GERAN has to be informed about the selected codec type during RAB ASSIGNMENT procedure and for handover.
Consequences if not approved:	⌘	GERAN Feature not complete

Clauses affected:	⌘	6.1.1, 6.1.2, 6.2.1.2, 6.2.2.2; 8.1.1, 8.1.2.1, 8.1.3.1, 8.1.3.2, 8.3.2.1, 8.3.2.2, 8.3.3.1, 8.3.3.2				
Other specs	⌘	**Y**	**N**	Other core specifications	⌘	3GPP TS 48.008 039, 3GPP TS 25.413, 3GPP TS 23.153 031, 3GPP TS 43.051 036, 3GPP TS 29.002 462, 3GPP TS
		X				

affected:			29.010 060
		X	Test specifications
		X	O&M Specifications
Other comments:	⌘		

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

* * * * * * * * * * * * * FIRST MODIFICATION *

6.1.1 Forward bearer establishment

The mobile originating call shall be established in accordance with 3GPP TS 23.108 [17]. The following paragraphs describe the additional requirements for the bearer independent CS core network. If out-of-band transcoder control is applied for a speech call, it shall be performed in accordance with 3GPP TS 23.153 [3].

MGW selection

The MSC server shall select an MGW for the bearer connection before it performs the access bearer assignment or the network side bearer establishment. This may happen either before sending the IAM or after receiving the Bearer Information message. In the latter case, the MGW selection may be based on a possibly received MGW-id from the succeeding node (bullet 1 or bullet 2 in figure 6.2).

Initial addressing

The MSC server shall indicate in the IAM that forward bearer establishment is to be used. If access bearer assignment has not been completed, the MSC server shall indicate that the Continuity message will follow. However, if late access bearer assignment (assignment after alerting or answer) is used the MSC server shall not indicate that the Continuity message will follow. The MSC server provides the bearer characteristics to the succeeding node in the IAM. If the MGW is selected at an earlier stage the MGW-id may also be provided in the IAM (bullet 1 in figure 6.2).

Network side bearer establishment

The MSC server shall either select bearer characteristics or requests the MGW to select and provide the bearer characteristics for the network side bearer connection before sending the IAM. In the latter case the MSC server uses the Prepare Bearer procedure to request the MGW to select the bearer characteristics. After the succeeding node has provided a bearer address and a binding reference in the Bearer Information message the MSC server uses the Establish Bearer procedure to request the MGW to establish a bearer towards the destination MGW. The MSC server provides the MGW with the bearer address, the binding reference and the bearer characteristics (bullet 2 in figure 6.2).

Access bearer assignment

The MSC server shall select bearer characteristics for the access bearer.

For UTRAN, before the MSC server starts the access bearer assignment, the MSC server requests the MGW to prepare for the access bearer establishment using the Prepare Bearer procedure. The MSC server requests the MGW to provide a bearer address and a binding reference, provides the MGW with the bearer characteristics and requests notification that the bearer can be modified. For speech calls, the MSC server shall provide the MGW with the speech coding information for the bearer. For a non-speech call the MSC server also provides the MGW with a PLMN Bearer Capability [4]. After the MGW has replied with the bearer address and the binding reference the MSC server requests access bearer assignment using the provided bearer address and binding reference (bullet 3 in figure 6.2) in accordance with 3GPP TS 25.413 [26]. The MSC shall only be notified by the MGW using Bearer Modification Support procedure if the existing link characteristics of the access bearer can be modified at a later stage, see subclause 13.18.1.

For GERAN Iu mode the MSC Server receives the GERAN capabilities within the RANAP INITIAL UE MESSAGE, indicating the services (e.g. for CS speech services the supported codec types and, for an adaptive codec type, the supported codec modes (for definition see [27])), which will be available at the RAB establishment procedure. The MSC server shall take the indicated GERAN capabilities into account as well as the received MS capabilities when negotiating a service. Additionally, when requesting the access bearer assignment the MSC server shall indicate to the GERAN the selected service (e.g. selected codec type). The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container~~is not applicable to GERAN Iu mode~~.

For GERAN, before the MSC server starts the access bearer assignment, the MSC server uses the Reserve Circuit procedure to seize a TDM circuit. For a non-speech call the MSC server also provides the MGW with a PLMN Bearer Capability [4] and a GSM channel coding. After the MGW has replied to the TDM circuit seizure, the MSC server requests access bearer assignment (bullet 4 in figure 6.2) in accordance with 3GPP TS 48.008 [27].

Framing protocol initialisation

In 3GPP CS CN speech and data shall be carried using the Iu/Nb User Plane Protocol. The specification for the Iu UP protocol is defined in [20] and the Nb UP Protocol in [7] and [21]. The Iu/Nb UP Protocol is established through the CN in a forward direction. This is established independently of the bearer establishment direction. The MGW derives the forward direction from information sent by the MSC server within the Establish Bearer and Prepare Bearer procedures [6].

Confirmation of bearer establishment

If the IAM which was sent to the succeeding node indicated that the Continuity message will follow, the MSC server sends the Continuity message when the access bearer assignment has been completed (bullet 5 in figure 6.2).

Through-Connection

During any one of the Prepare Bearer, Reserve Circuit and Establish Bearer procedures, the MSC server will use the Change Through-Connection procedure to request the MGW to through-connect the bearer terminations so that the bearer will be backward through-connected (bullet 2, and bullet 3 or 4 in figure 6.2).

When the MSC server receives the answer indication, it requests the MGW to both-way through-connect the bearer using the Change Through-Connection procedure (bullet 6 in figure 6.2).

Interworking function

The MGW may use an interworking function that is based on the PLMN Bearer Capability [4] of the bearer termination. The activation of the possible interworking function in both bearer terminations will be requested by the MSC server at reception of the answer indication using the Activate Interworking Function procedure (bullet 6 in figure 6.2).

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

A voice processing function located on the MGW may be used to achieve desired acoustic quality on the bearer terminations. The MSC server shall request the activation of voice processing functions in the bearer terminations. For non-speech calls, the MSC server has the ability to instruct the MGW to disable the voice processing functions (bullet 6 in figure 6.2).

Failure handling in MSC server

If any procedure between the MSC server and the MGW has not completed successfully or the MSC server receives a Bearer Released procedure from the MGW, the call shall be cleared as described in clause 7.3, (G)MSC server initiated call clearing or in clause 7.4, MGW initiated call clearing. Alternatively, the MSC server may only release the resources in the MGW that caused the failure, possibly select a new MGW for the bearer connection and continue the call establishment using new resources in the selected MGW.

Example

Figure 6.1 shows the network model for the mobile originating call. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in A-interface) and the bearer. The

MSC server seizes one context with two bearer terminations in the MGW. The bearer termination T1 is used for the bearer towards the RNC/BSC and the bearer termination T2 is used for the bearer towards the succeeding MGW.

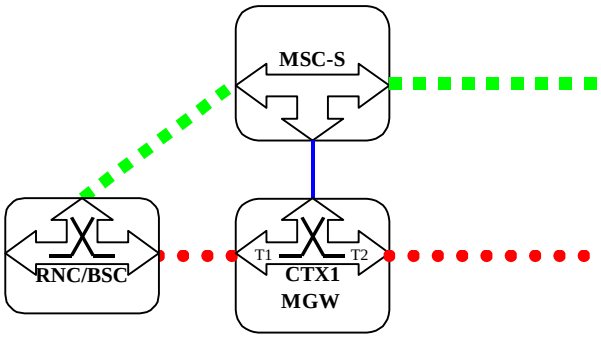


Figure 6.1 Basic Mobile Originating Call, Forward Bearer Establishment (network model)

Figure 6.2 shows the message sequence chart example for the mobile originating call. In the example the MSC server requests seizure of the network side bearer termination and establishment of the bearer when the Bearer Information message is received from the succeeding node. After the network side bearer termination is seized the MSC server requests seizure of the access side bearer termination. When the MSC server receives an answer indication, it shall requests the MGW to both-way through-connect the bearer terminations. The MSC shall also request the possible activation of the interworking function in both terminations and the possible activation of the voice processing functions for the bearer terminations.

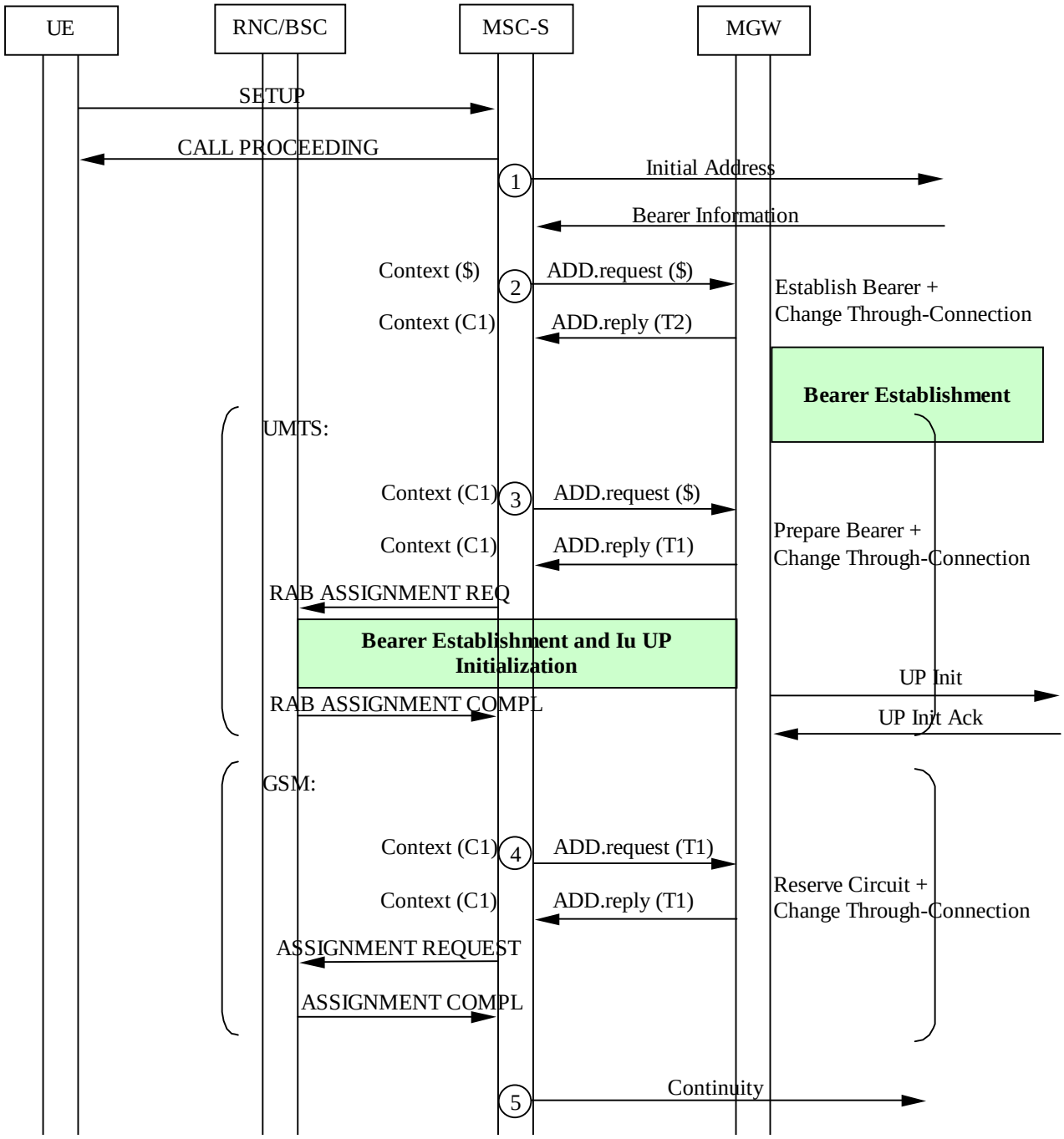


Figure 6.2/1 Basic Mobile Originating Call, Forward Bearer Establishment (message sequence chart)

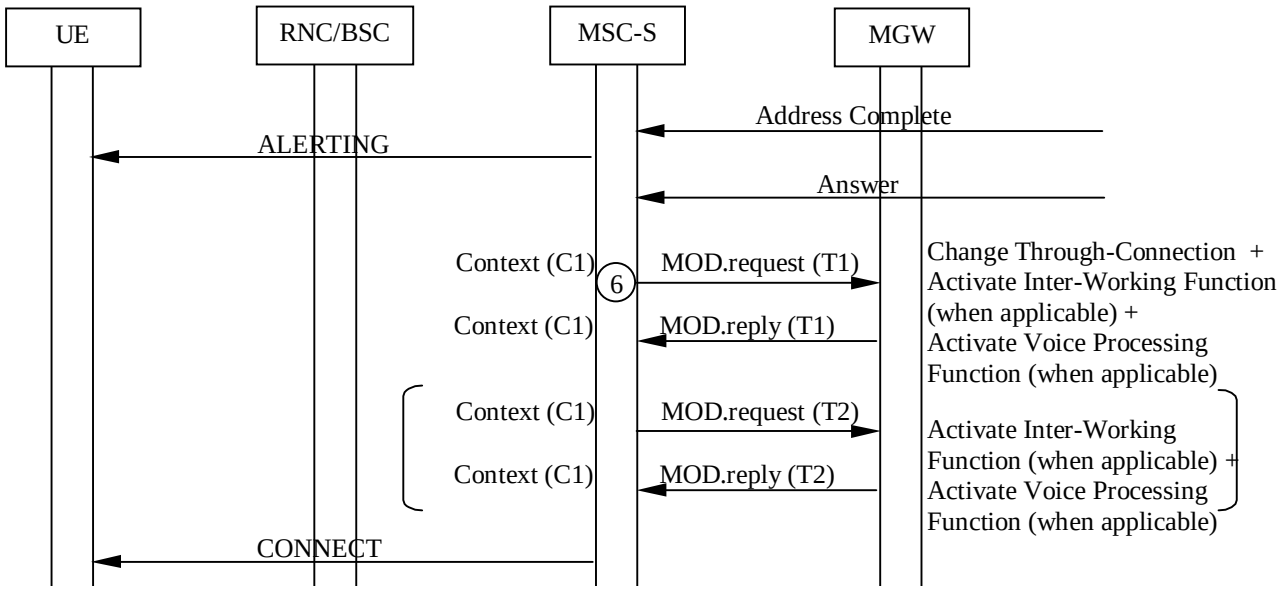


Figure 6.2/2 Basic Mobile Originating Call, Forward Bearer Establishment (message sequence chart continue)

**********NEXT MODIFICATION**********

6.1.2 Backward bearer establishment

The basic mobile originating call shall be established in accordance with 3GPP TS 23.108 [17]. The following paragraphs describe the additional requirements for the bearer independent CS core network. If out-of-band transcoder control is applied for a speech call, it shall be performed in accordance with 3GPP TS 23.153 [3].

MGW selection

The MSC server shall select an MGW for the bearer connection before it performs the access bearer assignment or the network side bearer establishment. This happens before sending the IAM (bullet 1 or 2 in figure 6.4).

Network side bearer establishment

The MSC server shall either select preferred bearer characteristics or requests the MGW to select and provide the bearer characteristics for the network side bearer connection before sending the IAM. The MSC server requests the MGW to prepare for the network side bearer establishment using the Prepare Bearer procedure. The MSC server requests the MGW to provide a bearer address and a binding reference, and provides the MGW with the preferred bearer characteristics or requests the MGW to select and provide the bearer characteristics (bullet 3 in figure 6.4). After the MGW has replied with the bearer address, the binding reference and the bearer characteristics (if requested), the MSC server sends the IAM to the succeeding node.

Initial addressing

The MSC server shall indicate in the IAM that backward bearer establishment is to be used. If access bearer assignment has not been completed, the MSC server shall indicate that the Continuity message will follow. However, if late access bearer assignment (assignment after alerting or answer) is used the MSC server shall not indicate that the Continuity message will follow. The MSC server provides the bearer characteristics, the bearer address and the binding reference to the succeeding node in the IAM. The MSC server may also provide the MGW-id in the IAM (bullet 4 in figure 6.4).

Access bearer assignment

The MSC server shall select bearer characteristics for the access bearer.

For UTRAN, before the MSC server starts the access bearer assignment, the MSC server requests the MGW to prepare for the access bearer establishment using the Prepare Bearer procedure. The MSC server requests the MGW to provide a bearer address and a binding reference, provides the MGW with the bearer characteristics and requests notification that the bearer can be modified. For speech calls, the MSC server shall provide the MGW with the speech coding information for the bearer. For a non-speech call the MSC server also provides the MGW with a PLMN Bearer Capability [4]. After the MGW has replied with the bearer address and the binding reference the MSC server requests access bearer assignment using the provided bearer address and binding reference (bullet 1 in figure 6.4) in accordance with 3GPP TS 25.413 [26]. The MSC shall only be notified by the MGW using the Bearer Modification Support procedure if the existing link characteristics of the access bearer can be modified at a later stage, see subclause 13.18.1.

For GERAN Iu mode the MSC Server receives the GERAN capabilities within the RANAP INITIAL UE MESSAGE, indicating the services (e.g. for CS speech services the supported codec types and, for an adaptive codec type, the supported codec modes (for definition see [27])), which will be available at the RAB establishment procedure. The MSC server shall take the indicated GERAN capabilities into account as well as the received MS capabilities when negotiating a service. Additionally, when requesting the access bearer assignment the MSC server shall indicate to the GERAN the selected service (e.g. selected codec type). The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container..~~The NAS Synchronisation Indicator (see [4]) is not applicable to GERAN Iu mode.~~

For GERAN, before the MSC server starts the access bearer assignment, the MSC server uses the Reserve Circuit procedure to seize a TDM circuit. For a non-speech call the MSC server also provides the MGW with a PLMN Bearer Capability [4] and a GSM channel coding. After the MGW has replied the TDM circuit seizure the MSC server requests access bearer assignment (bullet 2 in figure 6.4) in accordance with 3GPP TS 48.008 [27].

Framing protocol initialisation

In 3GPP CS CN speech and data shall be carried using the Iu/Nb User Plane Protocol. The specification for the Iu UP protocol is defined in [20] and the Nb UP Protocol in [7] and [21]. The Iu/Nb UP Protocol is established through the CN in a forward direction. This is established independently of the bearer establishment direction. The MGW derives the forward direction from information sent by the MSC server within the Establish Bearer and Prepare Bearer procedures [6].

Confirmation of bearer establishment

If the IAM was sent to the succeeding node indicating that the Continuity message will follow, the MSC server sends the Continuity message when the access bearer assignment has been completed.

Through-Connection

During the Prepare Bearer or Reserve Circuit procedures, the MSC server will use the Change Through-Connection procedure to request the MGW to through-connect the bearer terminations so that the bearer will be backward through-connected (bullet 1 or 2, and bullet 3 in figure 6.4).

When the MSC server receives the answer indication, it requests the MGW to both-way through-connect the bearer using the Change Through-Connection procedure (bullet 5 in figure 6.4).

Interworking function

The MGW may use an interworking function that is based on the PLMN Bearer Capability [4] of the bearer termination. The activation of the possible interworking function in both bearer terminations will be requested by the MSC server at reception of the answer indication using the Activate Interworking Function procedure (bullet 5 in figure 6.4).

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

A voice processing function located on the MGW may be used to achieve desired acoustic quality on the bearer terminations. The MSC server shall request the activation of the voice processing functions in the bearer terminations.

For non-speech calls, the MSC server has the ability to instruct the MGW to disable the voice processing functions (bullet 5 in figure 6.4).

Failure handling in MSC server

If any procedure between the MSC server and the MGW has not completed successfully, the call shall be cleared as described in clause 7.3, (G)MSC server initiated call clearing. Alternatively, the MSC server may only release the resources in the MGW that caused the failure, possibly select a new MGW for the bearer connection and continue the call establishment using new resources in the selected MGW.

Example

Figure 6.3 shows the network model for the mobile originating call. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in A-interface) and the bearer. The MSC server seizes one context with two bearer terminations in the MGW. The bearer termination T1 is used for the bearer towards the RNC/BSC and the bearer termination T2 is used for the bearer towards the succeeding MGW.

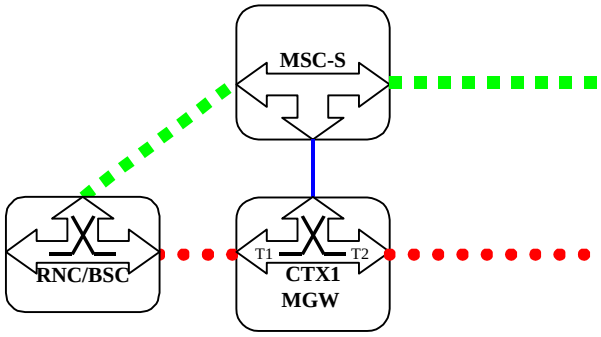


Figure 6.3 Basic Mobile Originating Call, Backward Bearer Establishment (network model)

Figure 6.4 shows the message sequence chart example for the mobile originating call. In the example the MSC server requests seizure of the access side bearer termination and network side bearer termination. As the access bearer assignment has been completed before the IAM, no Continuity message will be sent. When the MSC server receives an answer indication, it requests the MGW to both-way through-connect the bearer terminations. The MSC server, shall also request the possible activation of the interworking function in both bearer terminations. The MSC server shall request the possible activation of the voice processing functions for the bearer terminations.

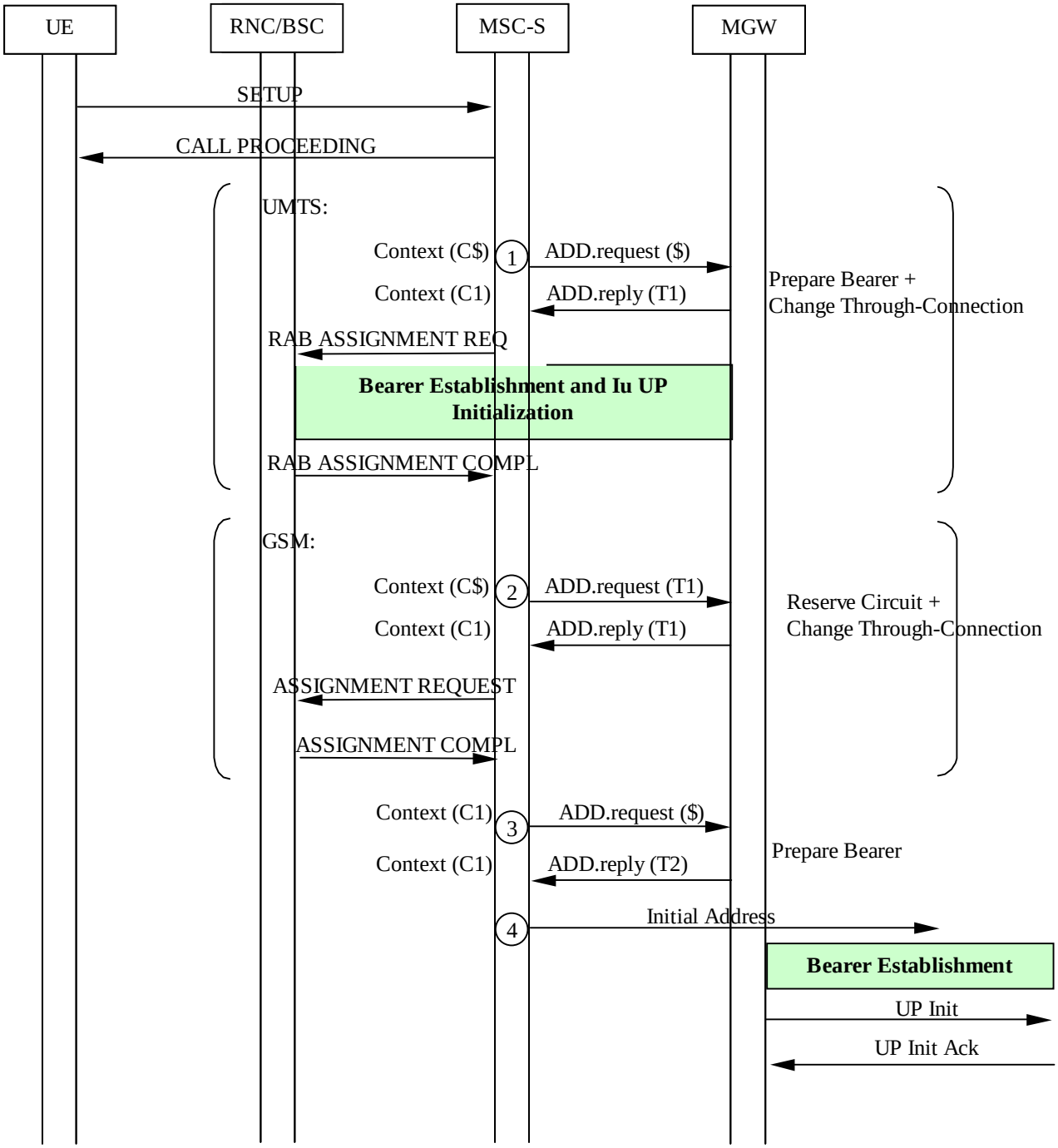


Figure 6.4/1 Basic Mobile Originating Call, Backward Bearer Establishment (message sequence chart)

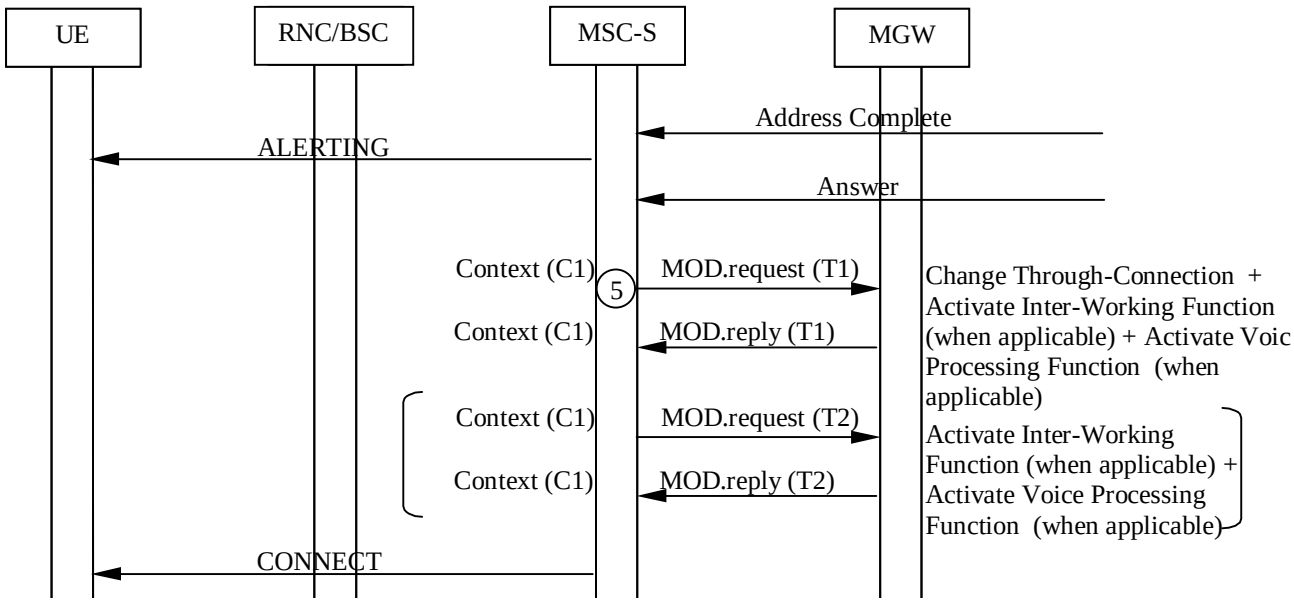


Figure 6.4/2 Basic Mobile Originating Call, Backward Bearer Establishment (message sequence chart continue)

**********NEXT MODIFICATION**********

6.2.1.2 MSC server

Paging

If the network side bearer establishment is delayed whilst the paging procedure is completed, the MSC server starts the Start_Bearer_Establishment timer when the paging procedure is started. The Start_Bearer_Establishment timer is stopped when the paging procedure is completed, or optionally when the Call Confirmed message is received in accordance with 3GPP TS 23.153 [3]. If the Start_Bearer_Establishment timer expires, the MSC server starts the network side bearer establishment.

Call setup

The MSC server indicates to the UE in the SETUP message that early access bearer assignment is used in order to establish the bearer end-to-end before the UE starts alerting. The MSC server indicates to the UE in SETUP message that early access bearer assignment is used if either of the following conditions is satisfied before sending the SETUP message (bullet 2 in figure 6.6):

1. The incoming IAM indicated that the Continuity message will follow, but no Continuity message has been received;

2. A notification of successful bearer establishment in the network side has not been received from the MGW.

MGW selection

The MSC server shall select an MGW for the bearer connection before it performs the network side bearer establishment or the access bearer assignment. This happens at latest after the UE has sent the Call Confirmed message. If the MSC server received an MGW-id from the preceding node, it may use this for the MGW selection (bullet 3 in figure 6.6).

Network side bearer establishment

The MSC server requests the MGW to prepare for the network side bearer establishment using the Prepare Bearer procedure. The MSC server requests the MGW to provide a bearer address, a binding reference and to notify when the bearer is established (bullet 3 in figure 6.6). The MSC server also provides the MGW with the bearer characteristics that was received from the preceding node in the IAM. After the MGW has replied with the bearer address and the binding reference, the MSC server provides the Bearer Information message to the preceding node. The MSC server may also provide the MGW-id in the Bearer Information message.

Access bearer assignment

The access bearer assignment may be started when both of the following conditions are satisfied:

1. Either:

   a. The incoming IAM indicated that the Continuity message will follow, and a Continuity message has been received from the preceding node, or

   b. The incoming IAM did not indicate that the Continuity message will follow;

2. A notification of successful bearer establishment in the network side has been received from the MGW (bullet 6 in figure 6.6).

The MSC server shall select bearer characteristics for the access bearer.

For the access bearer assignment in UTRAN the MSC server requests the MGW to prepare for the access bearer establishment using the Prepare Bearer procedure. The MSC server requests the MGW to provide a bearer address and a binding reference,provides the MGW with the bearer characteristics and requests notification that the bearer can be modified. For speech calls, the MSC server shall provide the MGW with the speech coding information for the bearer. For a non-speech call the MSC server also provides the MGW with a PLMN Bearer Capability [4]. After the MGW has replied with the bearer address and the binding reference the MSC server requests the access bearer assignment using the provided bearer address and the binding reference (bullet 9 in figure 6.6) in accordance with 3GPP TS 25.413 [26]. The MSC shall only be notified by the MGW using the Bearer Modification Support procedure if the existing link characteristics of the access bearer can be modified at a later stage, see subclause 13.18.1.

For GERAN Iu mode the MSC Server receives the GERAN capabilities within the RANAP INITIAL UE MESSAGE, indicating the services (e.g. for CS speech services the supported codec types and, for an adaptive codec type, the supported codec modes (for definition see [27])), which will be available at the RAB establishment procedure. The MSC server shall take the indicated GERAN capabilities into account as well as the received MS capabilities when negotiating a service. Additionally, when requesting the access bearer assignment the MSC server shall indicate to the GERAN the selected service (e.g. selected codec type). The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container..~~The NAS Synchronisation Indicator (see [4]) is not applicable to GERAN Iu mode.~~

For GERAN, before the MSC server starts the access bearer assignment, the MSC server uses the Reserve Circuit procedure to seize a TDM circuit. For a non-speech call the MSC server also provides the MGW with a PLMN Bearer Capability [4] and a GSM channel coding. After the MGW has replied the TDM circuit seizure the MSC server requests access bearer assignment (bullet 10 in figure 6.6) in accordance with 3GPP TS 48.008 [27].

Framing protocol initialisation

In 3GPP CS CN speech and data shall be carried using the Iu/Nb User Plane Protocol. The specification for the Iu UP protocol is defined in [20] and the Nb UP Protocol in [7] and [21]. The Iu/Nb UP Protocol is established through the CN in a forward direction. This is established independently of the bearer establishment direction. The MGW derives the forward direction from information sent by the MSC server within the Establish Bearer and Prepare Bearer procedures [6]. The notification of bearer establishment shall not be sent until the Nb UP has been initialised.

Called party alerting

For a speech call, when the MSC server receives an Alerting message, it requests the MGW to provide a ringing tone to the calling party using the Send Tone procedure (bullet 11 in figure 6.6).

NOTE: Other kind of tones may be provided to the calling party at an earlier stage of the call establishment.

Called party answer

For a speech call, when the MSC server receives a Connect message, it requests the MGW to stop providing the ringing tone to the calling party using the Stop Tone procedure (bullet 12 in figure 6.6).

Through-Connection

During the Prepare Bearer and Reserve Circuit procedures, the MSC server will use the Change Through-Connection procedure to request the MGW to through-connect the bearer terminations so that the bearer will be not through-connected (bullet 3, and bullet 9 or 10 in figure 6.6).

When the MSC server receives the Connect message, it requests the MGW to both-way through-connect the bearer using the Change Through-Connection procedure (bullet 12 in figure 6.6).

Interworking function

The MGW may use an interworking function that is based on the PLMN Bearer Capability [4] of the bearer termination. The activation of the possible interworking function in both bearer terminations will be requested by the MSC server at reception of the Connect message using the Activate Interworking Function procedure (bullet 12 in figure 6.6).

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

A voice processing function located on the MGW may be used to achieve desired acoustic quality on the bearer terminations. The MSC server shall request the activation of the voice processing functions in the bearer terminations. For non-speech calls, the MSC server has the ability to instruct the MGW to disable the voice processing functions (bullet 12 in figure 6.6).

Failure handling in MSC server

If any procedure between the MSC server and the MGW is not completed successfully, the call shall be cleared as described in clause 7.3, (G)MSC server initiated call clearing. Alternatively, the MSC server may only release the resources in the MGW that caused the failure, possibly select a new MGW for the bearer connection and continue the call establishment using new resources in the selected MGW.

Example

Figure 6.5 shows the network model for the basic mobile terminating call. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in A-interface) and the bearer. The MSC server seizes one context with two bearer terminations in MGWb. The bearer termination T1 is used for the bearer towards the RNC/BSC and the bearer termination T2 is used for the bearer towards the GMSC server selected MGWa. The GMSC server seizes one context with two bearer terminations in MGWa. The bearer termination T3 is used for the bearer towards the MSC server selected MGWb and the bearer termination T4 is used for the bearer towards the preceding MGW.

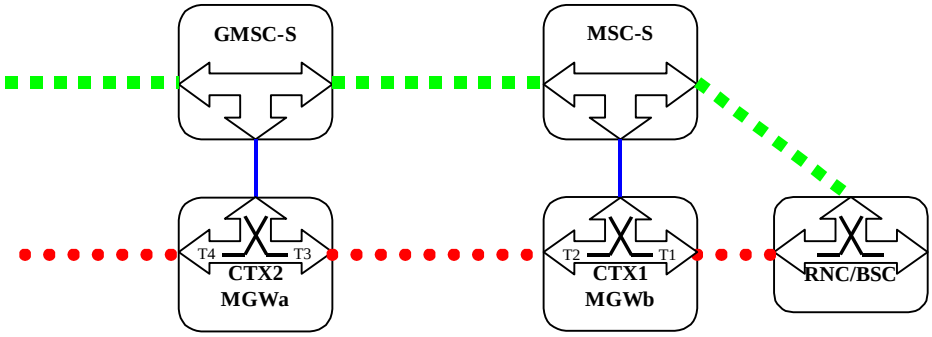


Figure 6.5 Basic Mobile Terminating Call Forward Bearer Establishment (network model)

Figure 6.6 shows the message sequence example for the basic mobile terminating call. In the example the GMSC server requests seizure of the outgoing side bearer termination and establishment of the bearer when the Bearer Information message is received from the MSC server. After the outgoing side bearer termination is seized the GMSC server requests seizure of the incoming side bearer termination. The MGW sends a notification of an established incoming side bearer. The MSC server requests seizure of the network side bearer termination when Call Confirmed message is received from the UE. The MGW sends a notification of an established network side bearer. When the Continuity message is received from the GMSC server, the MSC server requests seizure of the access side bearer termination. For a speech call the MSC server requests MGW to provide a ringing tone to the calling party at alerting. At answer the MSC server requests MGW to both-way through-connect the bearer. For a speech call the MSC server requests MGW to stop the ringing tone to the calling party at answer. When the MSC server receives an answer indication, it shall request the possible activation of the interworking function in both bearer terminations. The (G)MSC server shall request the possible activation of the voice processing functions for the bearer terminations.

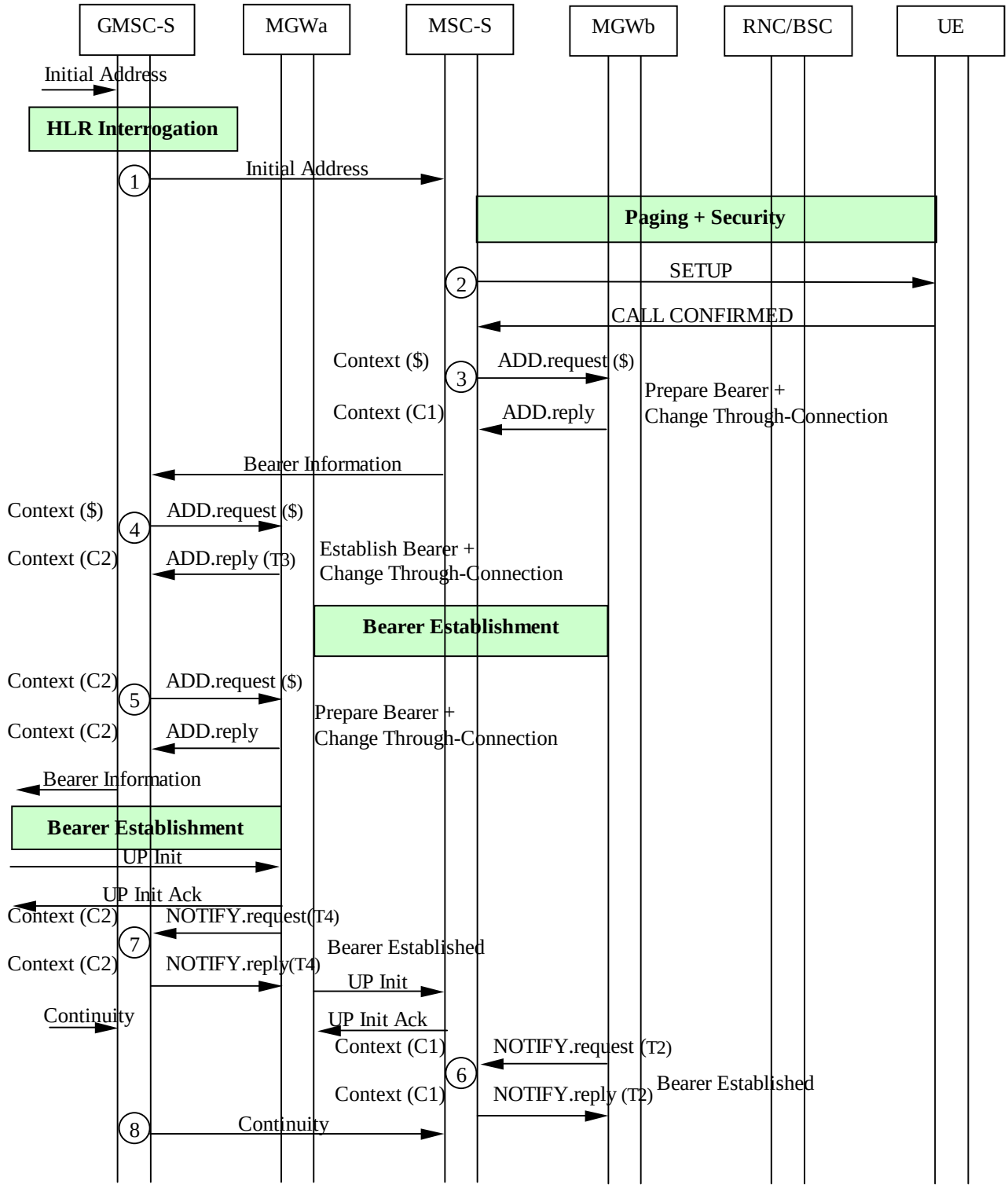


Figure 6.6/1 Basic Mobile Terminating Call, Forward Bearer Establishment (message sequence chart)

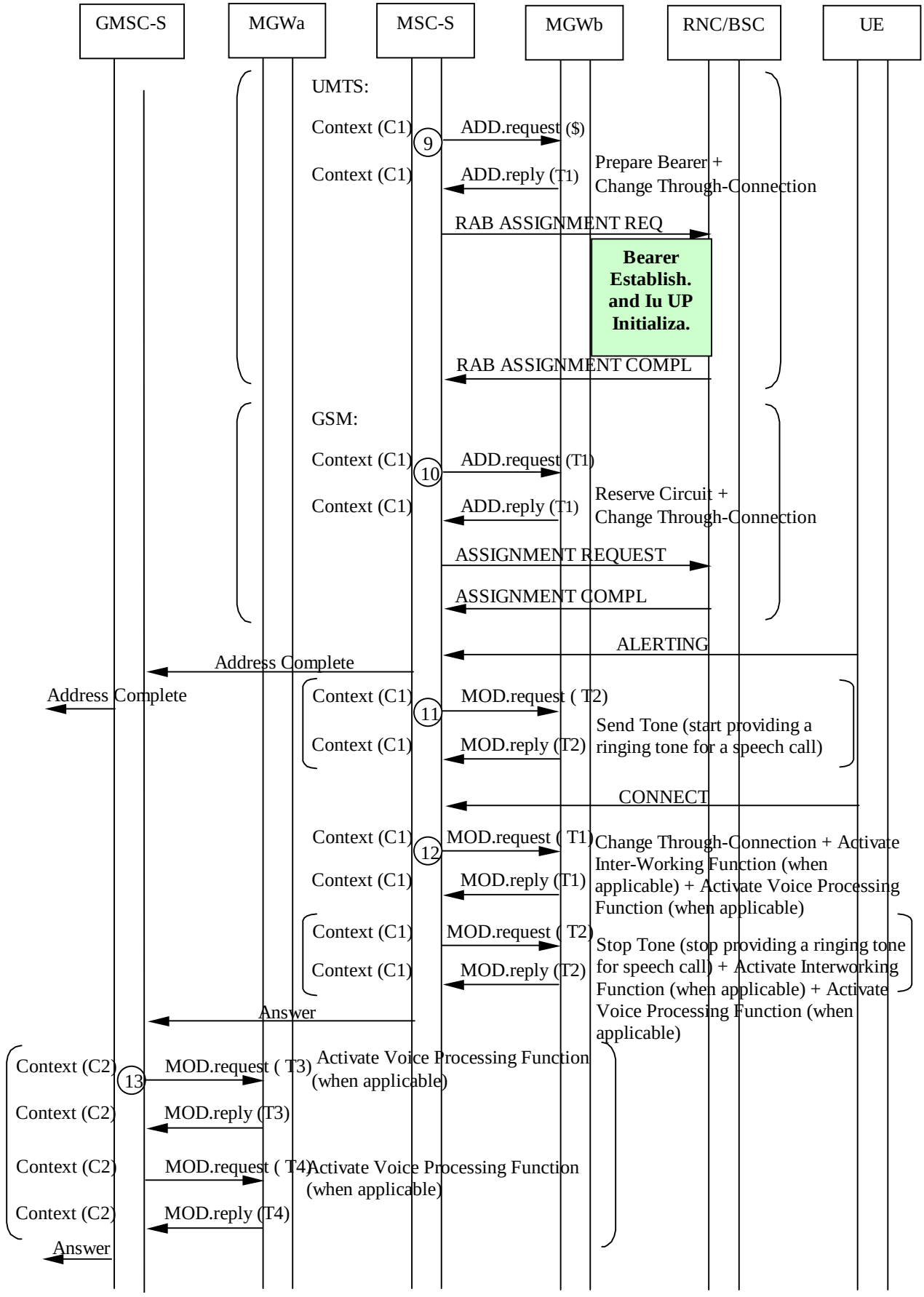


Figure 6.6/2 Basic Mobile Terminating Call, Forward Bearer Establishment (message sequence chart continue)

**********NEXT MODIFICATION**********

6.2.2.2 MSC server

Paging

If the network side bearer establishment is delayed whilst the paging procedure is completed, the MSC server starts the Start_Bearer_Establishment timer when the paging procedure is started. The Start_Bearer_Establishment timer is stopped when the paging procedure is completed, or optionally when the Call Confirmed message is received in accordance with 3GPP TS 23.153 [3]. If the Start_Bearer_Establishment timer expires, the MSC server starts the network side bearer establishment.

Call setup

The MSC server indicates to the UE in the SETUP message that early access bearer assignment is used in order to establish the bearer end-to-end before the UE starts alerting. The MSC server indicates to the UE in the SETUP message that early access bearer assignment is used, if and only if, either of the following conditions are satisfied before sending the SETUP message (bullet 5 in figure 6.8):

1. If the IAM indicated that the Continuity message will follow, but no Continuity message has been received.

2. A notification of successful bearer establishment in the network side has not been received from the MGW.

MGW selection

The MSC server shall select an MGW for the bearer connection before it performs the network side bearer establishment or the access bearer assignment. This happens at latest after the UE has sent the Call Confirmed message. If the MSC server received an MGW-id from the preceding node, it may use this for the MGW selection (bullet 6 in figure 6.8).

Network side bearer establishment

The MSC server requests the MGW to establish a bearer to the given destination MGW and to notify when the bearer is established using the Establish Bearer procedure. The MSC server provides the MGW with the bearer address, the binding reference and the bearer characteristics that were received from the preceding node in the IAM (bullet 6 in figure 6.8).

Access bearer assignment

The access bearer assignment may be started when both of the following conditions are satisfied:

1. Either:

    a. The incoming IAM indicated that the Continuity message will follow, and a Continuity message has been received from the preceding node, or

    b. The incoming IAM did not indicate that the Continuity message will follow;

2. A notification of successful bearer establishment in the network side has been received from the MGW (bullet 7 in figure 6.8).

The MSC server shall select bearer characteristics for the access bearer.

For the access bearer assignment in UTRAN the MSC server requests the MGW to prepare for the access bearer establishment using the Prepare Bearer procedure. The MSC server requests the MGW to provide a bearer address and a binding reference, provides the MGW with the bearer characteristics and requests notification that the bearer can be modified. For speech calls, the MSC server shall provide the MGW with the speech coding information for the bearer.

For a non-speech call the MSC server also provides the MGW with a PLMN Bearer Capability [4]. After the MGW has replied with the bearer address and the binding reference the MSC server requests the access bearer assignment using the provided bearer address and the binding reference (bullet 8 in figure 6.8) in accordance with 3GPP TS 25.413 [26]. The MSC shall only be notified by the MGW using the Bearer Modification Support procedure if the existing link characteristics of the access bearer can be modified at a later stage, see subclause 13.18.1.

For GERAN Iu mode the MSC Server receives the GERAN capabilities within the RANAP INITIAL UE MESSAGE, indicating the services (e.g. for CS speech services the supported codec types and, for an adaptive codec type, the supported codec modes (for definition see [27])), which will be available at the RAB establishment procedure. The MSC server shall take the indicated GERAN capabilities into account as well as the received MS capabilities when negotiating a service. Additionally, when requesting the access bearer assignment the MSC server shall indicate to the GERAN the selected service (e.g. selected codec type). The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container..~~The NAS Synchronisation Indicator (see [4]) is not applicable to GERAN Iu mode.~~

For GERAN, before the MSC server starts the access bearer assignment, the MSC server uses the Reserve Circuit procedure to seize a TDM circuit. For a non-speech call the MSC server also provides the MGW with a PLMN Bearer Capability [4] and a GSM channel coding. After the MGW has replied the TDM circuit seizure the MSC server requests access bearer assignment (bullet 9 in figure 6.8) in accordance with 3GPP TS 48.008 [27].

Framing protocol initialisation

In 3GPP CS CN speech and data shall be carried using the Iu/Nb User Plane Protocol. The specification for the Iu UP protocol is defined in [20] and the Nb UP Protocol in [7] and [21]. The Iu/Nb UP Protocol is established through the CN in a forward direction. This is established independently of the bearer establishment direction. The MGW derives the forward direction from information sent by the MSC server within the Establish Bearer and Prepare Bearer procedures [6]. The notification of bearer establishment shall not be sent until the Nb UP has been initialised.

Called party alerting

For a speech call, when the MSC server receives an Alerting message, it requests the MGW to provide a ringing tone to the calling party using the Send Tone procedure (bullet 10 in figure 6.8).

NOTE: Other kind of tones may be provided to the calling party at an earlier stage of the call establishment.

Called party answer

For a speech call, when the MSC server receives a Connect message, it requests the MGW to stop providing the ringing tone to the calling party using the Stop Tone procedure (bullet 11 in figure 6.8).

Through-Connection

During any one of the Prepare Bearer, Reserve Circuit and Establish Bearer procedures, the MSC server will use the Change Through-Connection procedure to request the MGW to through-connect the bearer terminations so that the bearer will be not through-connected (bullet 6, and bullet 8 or 9 in figure 6.8).

When the MSC server receives the Connect message, it requests the MGW to both-way through-connect the bearer using the Change Through-Connection procedure (bullet 11 in figure 6.8).

Interworking function

The MGW may use an interworking function that is based on the PLMN Bearer Capability [4] of the bearer termination. The activation of the possible interworking function in both bearer terminations will be requested by the MSC server at reception of the Connect message using the Activate Interworking Function procedure (bullet 11 in figure 6.8).

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

A voice processing function located on the MGW may be used to achieve desired acoustic quality on the bearer terminations. The MSC server shall request the activation of the voice processing functions in the bearer terminations. For non-speech calls, the MSC server has the ability to instruct the MGW to disable the voice processing functions (bullet 11 in figure 6.8).

Failure handling in MSC server

If any procedure between the MSC server and the MGW is not completed successfully or the MSC server receives a Bearer Released procedure from the MGW, the call shall be cleared as described in clause 7.3, (G)MSC server initiated call clearing or in clause 7.4, MGW initiated call clearing. Alternatively, the MSC server may only release the resources in the MGW that caused the failure, possibly select a new MGW for the bearer connection and continue the call establishment using new resources in the selected MGW.

Example

Figure 6.7 shows the network model for the basic mobile terminating call. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in A-interface) and the bearer. The MSC server seizes one context with two bearer terminations in MGWb. The bearer termination T1 is used for the bearer towards the RNC/BSC and the bearer termination T2 is used for the bearer towards the GMSC server selected MGWa. The GMSC server seizes one context with two bearer terminations in MGWa. The bearer termination T3 is used for the bearer towards the MSC server selected MGWb and the bearer termination T4 is used for the bearer towards the preceding MGW.

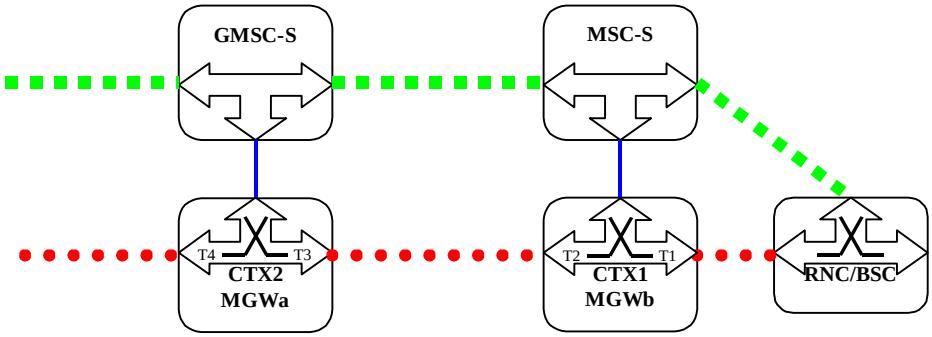


Figure 6.7 Basic Mobile Terminating Call, Backward Bearer Establishment (network model)

Figure 6.8 shows the message sequence example for the basic mobile terminating call. In the example the GMSC server requests seizure of the incoming side bearer termination and establishment of the bearer first. After a notification of incoming side bearer establishment has been received from the MGW, the GMSC server requests seizure of the outgoing side bearer termination. The MSC server requests seizure of the network side bearer termination and establishment of the bearer when the Call Confirmed message is received from the UE. After a notification of the network side bearer establishment has been received from the MGW the MSC server requests seizure of the access side bearer termination. For a speech call, When the MSC server receives an alerting message, it requests MGW to provide a ringing tone to the calling party. When the MSC server receives an answer indication, it requests MGW to both-way through-connect the bearer. For a speech, when the MSC server receives an answer indication, it requests MGW to stop the ringing tone to the calling party and requests the possible activation of the interworking function in both bearer terminations. The (G)MSC server shall request the possible activation of the voice processing functions for the bearer terminations.

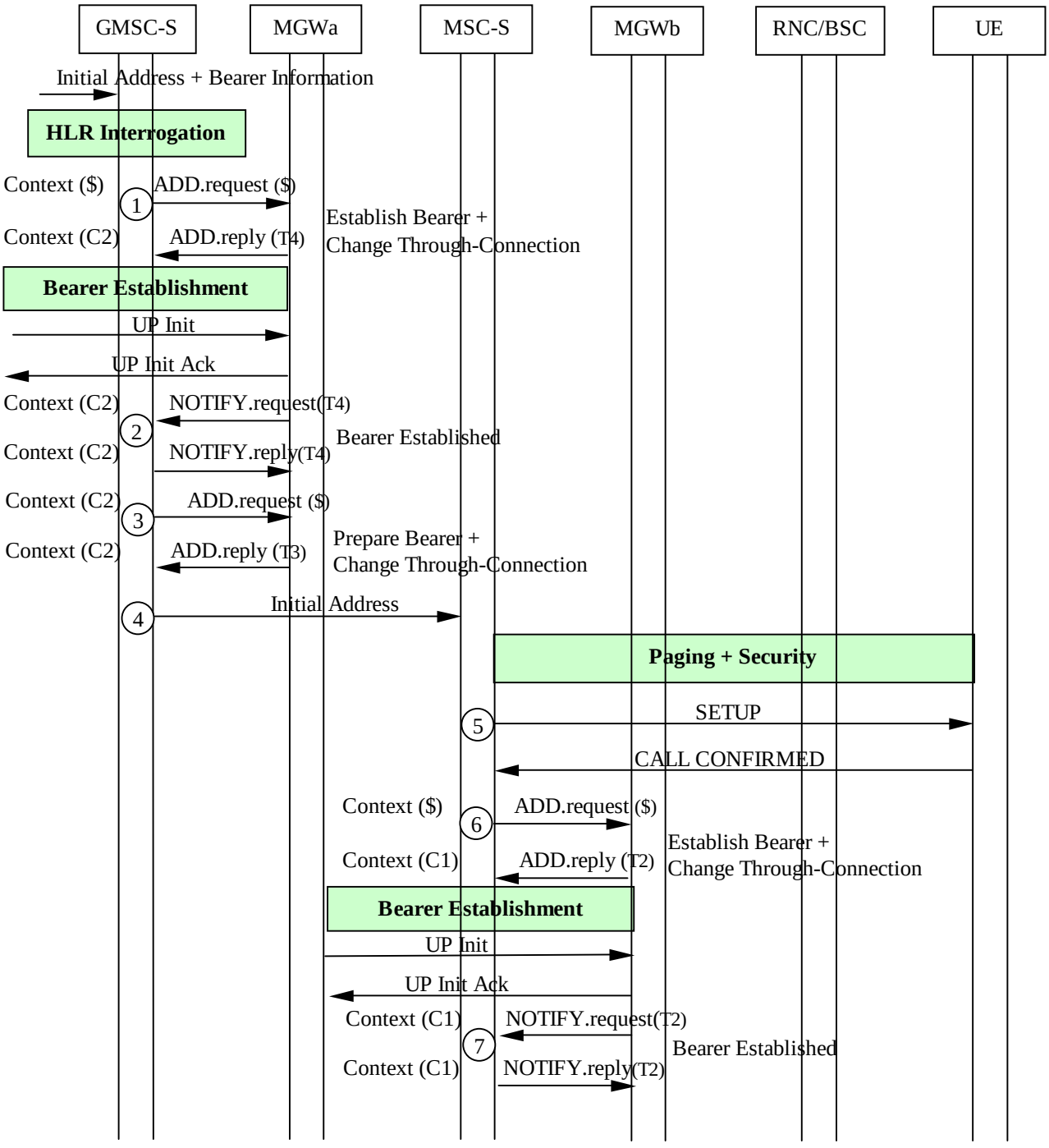


Figure 6.8/1 Basic Mobile Terminating Call, Backward Bearer Establishment (message sequence chart)

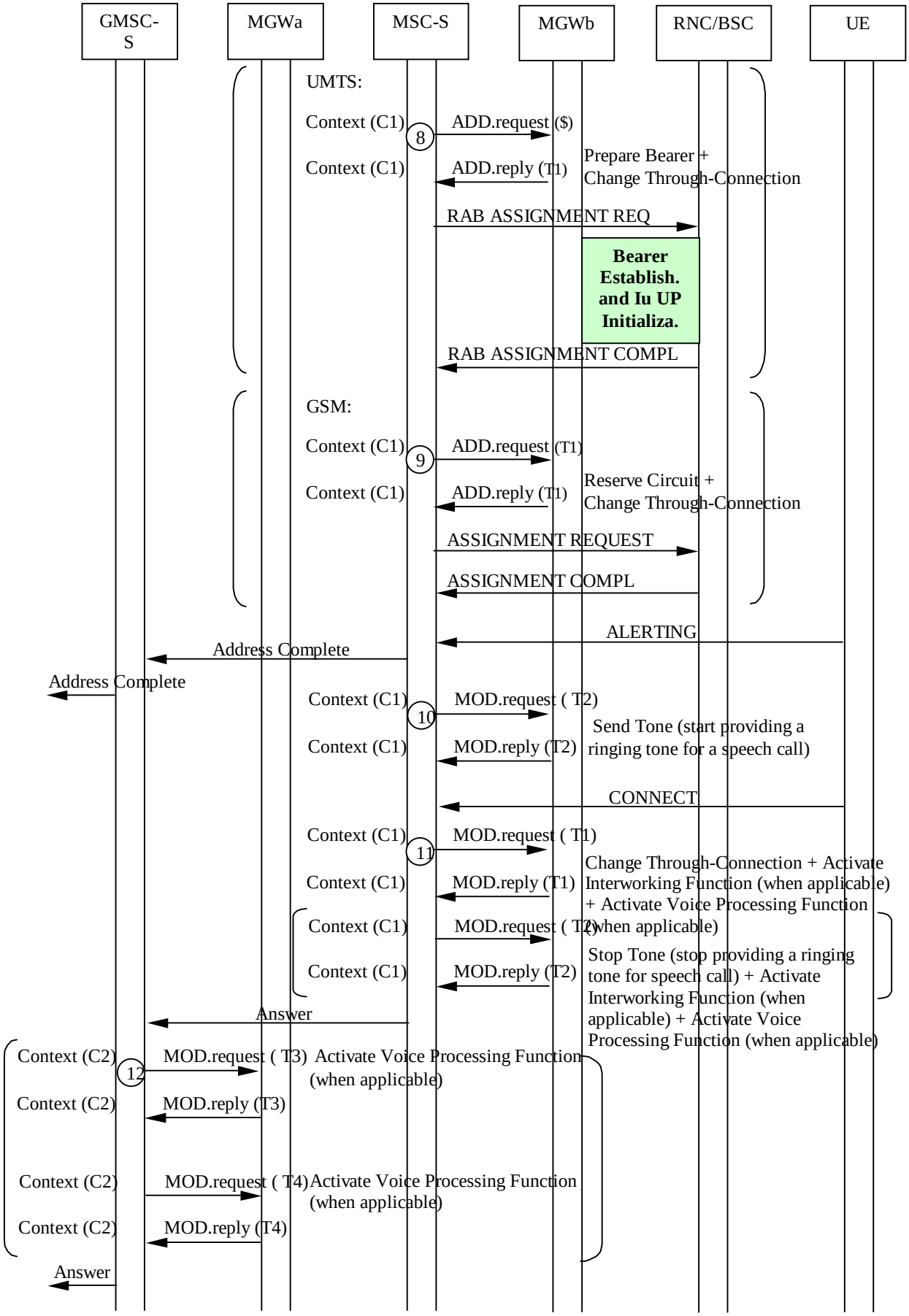

GMSC-S
MGWa
MSC-S
MGWb
RNC/BSC
UE
UMTS:
Context (C1)
8
ADD.request ($)
Context (C1)
ADD.reply (T1)
Prepare Bearer + Change Through-Connection
RAB ASSIGNMENT REQ
Bearer Establish. and Iu UP Initializa.
RAB ASSIGNMENT COMPL
GSM:
Context (C1)
9
ADD.request (T1)
Context (C1)
ADD.reply (T1)
Reserve Circuit + Change Through-Connection
ASSIGNMENT REQUEST
ASSIGNMENT COMPL
ALERTING
Address Complete
Address Complete
Context (C1)
10
MOD.request (T2)
Send Tone (start providing a ringing tone for a speech call)
Context (C1)
MOD.reply (T2)
CONNECT
Context (C1)
11
MOD.request (T1)
Change Through-Connection + Activate Interworking Function (when applicable) + Activate Voice Processing Function (when applicable)
Context (C1)
MOD.reply (T1)
Context (C1)
MOD.request (T2)
Stop Tone (stop providing a ringing tone for speech call) + Activate Interworking Function (when applicable) + Activate Voice Processing Function (when applicable)
Context (C1)
MOD.reply (T2)
Answer
Context (C2)
12
MOD.request (T3)
Activate Voice Processing Function (when applicable)
Context (C2)
MOD.reply (T3)
Context (C2)
MOD.request (T4)
Activate Voice Processing Function (when applicable)
Context (C2)
MOD.reply (T4)
Answer

Figure 6.8/2 Basic Mobile Terminating Call, Backward Bearer Establishment (message sequence chart continue)

****************NEXT MODIFICATION*********************

8.1.1 Intra-MSC SRNS Relocation

The procedures specified in 3GPP TS 23.009 [8] for 'Intra-3G_MSC SRNS Relocation' shall be followed. The following paragraphs describe the additional requirements for the bearer independent CS core network.

Relocation Required

When the Relocation Required message is received, the MSC server requests the MGW to provide a binding reference and a bearer address, using the Prepare Bearer procedure. For speech calls, the MSC server shall provide the MGW with the speech coding information for the bearer. For non-speech calls the MSC server also provides the MGW with the same PLMN Bearer Capability [4] as was provided at the last access bearer assignment. The MSC server uses the Change Flow Direction Procedure to request the MGW to set the Handover Device to initial state. The MSC server sends the Relocation Request message, containing the bearer address and the binding reference, to RNC-B (bullet 1 in figure 8.2/1).

For Relocation towards GERAN Iu mode the GERAN capabilities of the target cell ~~sha~~will be indicated to the MSC-Server~~-~~ within the RANAP RELOCATION REQUIRED message if the target cell provides different capabilities than the current cell. If no information about the GERAN capabilities of the target cell are received within this message, the MSC-Server shall assume that the GERAN target cell will provide the same capabilities as the current cell~~.~~ (for details see [29]). The MSC server shall indicate to GERAN the selected services within the RANAP RELOCATION REQUEST message. The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container..~~The NAS Synchronisation Indicator (see [4]) is not applicable to GERAN Iu mode.~~

Relocation Command/Relocation Detect

When the MSC server sends the Relocation Command message or alternatively if it receives the Relocation Detect message, the MSC server uses the Change Flow Direction procedure to request the MGW to set the Handover Device to intermediate state (bullet 2 in figure 8.2/1).

Relocation Complete

When the MSC server receives the Relocation Complete message, it requests RNC-A to release the IU. The MSC server also requests the MGW to set the Handover Device to its final state by removing the bearer termination towards RNC-A, using the Release Termination procedure (bullet 3 in figure 8.2/2).

Interworking function

The interworking function used by the MGW before relocation will also be used after relocation.

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

After relocation, the MGW may continue or modify voice-processing function(s) provided to each bearer termination.

Handling of multiple bearers (multicall)

If the UE is engaged with multiple bearers all procedures related to the handling of bearers and terminations described for the relocation of a single bearer shall be repeated for each bearer.

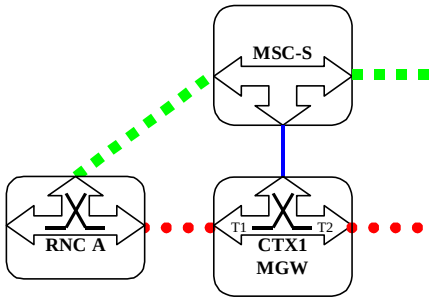
Failure Handling in MSC server

When a procedure between the MSC server and the MGW fails the MSC server shall handle the failure as an internal error in accordance with 3GPP TS 23.009 [8] and 3GPP TS 29.010 [23]. If MGW resources have been already seized at the target access side then the resources shall be released using the Release Termination procedure. If the call is to be cleared, then it shall be handled as described in clause 7.3.

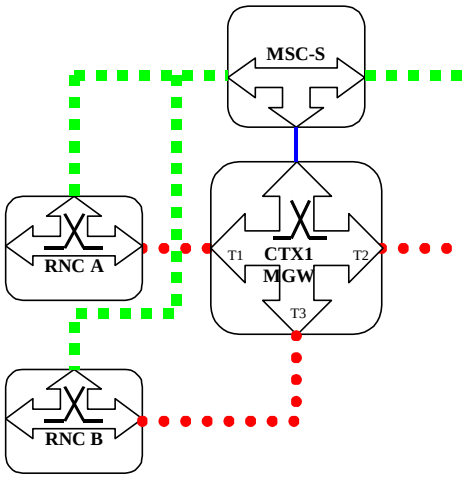
Example

Figure 8.1 shows the network model for the Intra-MSC SRNS Relocation. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling and the bearer. The bearer termination T1 is used for the bearer towards RNC-A, bearer termination T3 is used for the bearer towards RNC-B and the bearer termination T2 is used for the bearer towards the succeeding/preceding MGW.

Before Relocation:



During Relocation:



After Relocation:

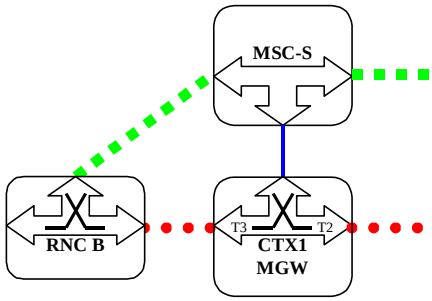


Figure 8.1 Intra-MSC SRNS Relocation (network model)

Figure 8.2 shows the message sequence example for the Intra-MSC SRNS Relocation.
It is assumed that the Handover Device is located in the MGW, which has been selected for the call establishment by the MSC server. The MSC server controls the call and the mobility management. It is also assumed that only one bearer has been established towards RNC-A.
In the example the MSC server requests seizure of RNC-B side bearer termination with specific flow directions. The MSC server orders the establishment of the bearer by sending Relocation Request towards RNC-B. When the relocation is detected in RNC-B the MSC server requests to change the flow directions between the terminations within the context. When the MSC server receives a Relocation Complete indication from RNC-B it orders RNC-A to release the IU. This action causes release of the bearer between the RNC and the MGW. Finally the MSC server requests the MGW to release RNC-A side bearer termination.

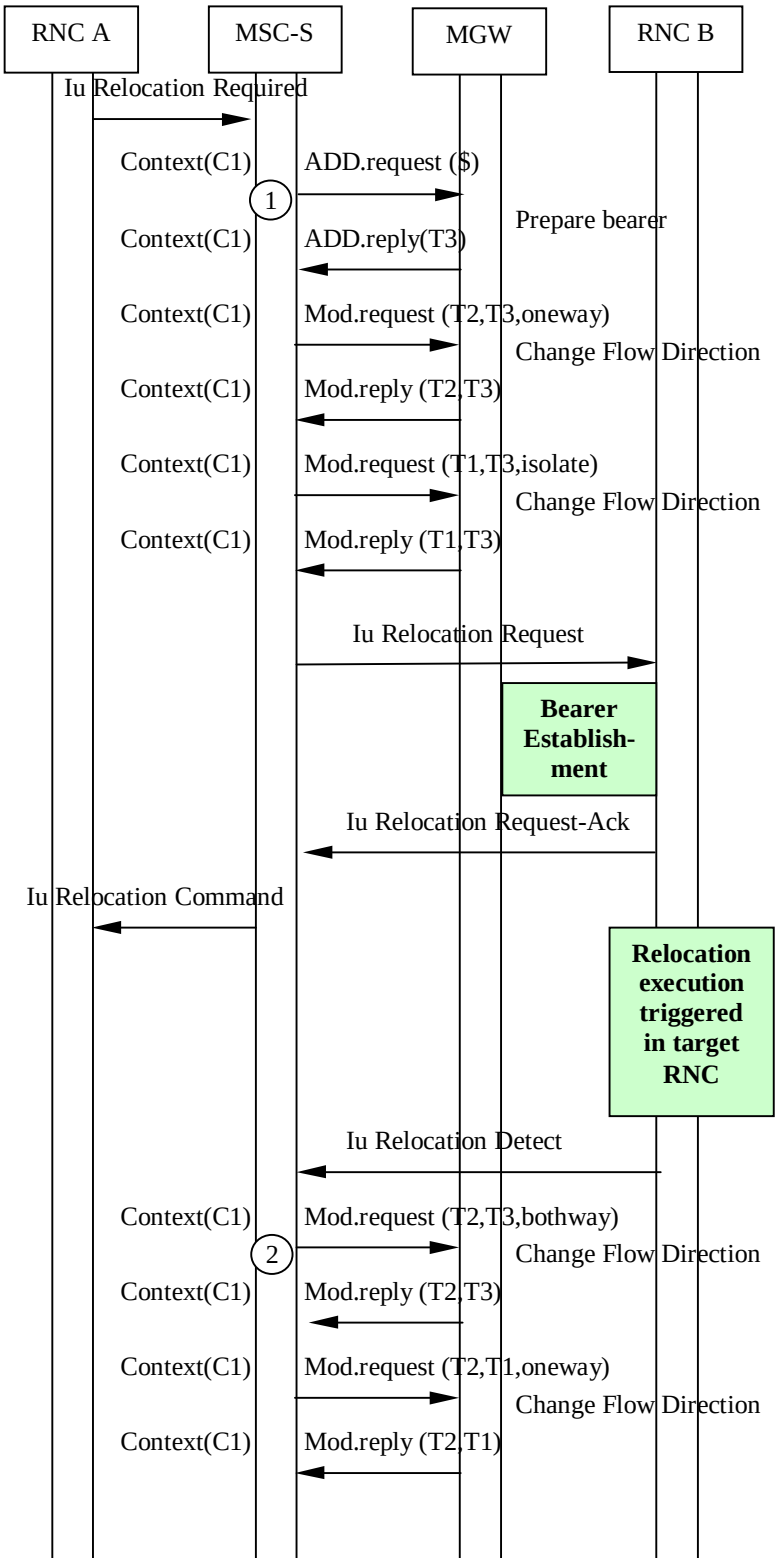


Figure 8.2/1 Intra-MSC SRNS Relocation (message sequence chart)

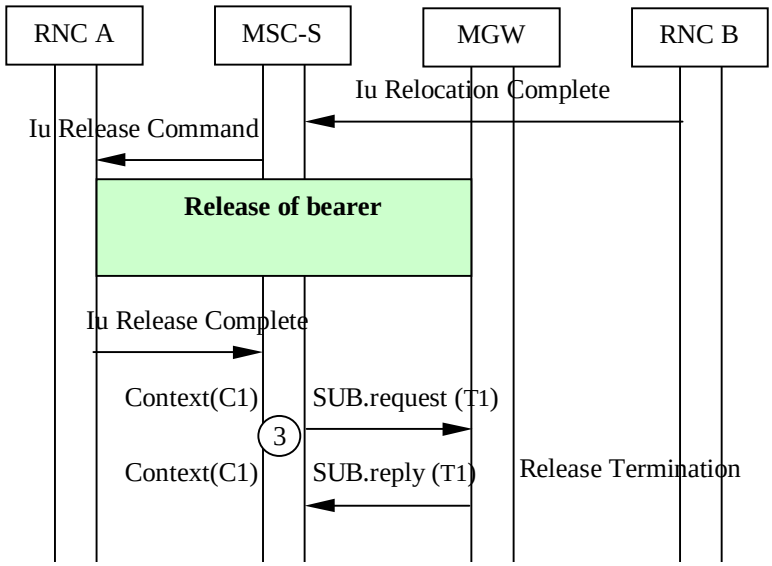


Figure 8.2/2 Intra-MSC SRNS Relocation (message sequence chart)

* * * * * * * * * * * * NEXT MODIFICATION *

8.1.2.1 MSC-A/MGW-A

Relocation Required

For Relocation towards GERAN Iu mode the GERAN capabilities of the target cell ~~sha~~will be indicated to the MSC-A server within the RANAP RELOCATION REQUIRED message if the target cell provides different capabilities than the current cell. If no information about the GERAN capabilities of the target cell are received within this message, the MSC-A server shall assume that the GERAN target cell will provide the same capabilities as the current cell (for details see [29]).

The MSC-A server shall indicate to the MSC-B server the GERAN capabilities of the target cell, if available, with the MAP Prepare Handover request. For speech calls, the MSC-A server shall additionally indicate to the MSC-B server the selected codec, the list of supported codecs, and the currently used codec.

Furthermore, the MSC-A server shall indicate to the GERAN the selected service within the RANAP RELOCATION REQUEST message and shall set the RAB parameters within the RANAP RELOCATION REQUEST message according to the selected service. The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container..~~The NAS Synchronisation Indicator (see [4]) is not applicable to GERAN Iu mode.~~

Bearer establishment between MGW-A and MGW-B

The handling of the bearer establishment is as described for a Basic Mobile Originating Call, using either forward or backward bearer establishment. For speech calls, the MSC-A server shall provide the MGW-A with the speech coding information for the bearer. For non-speech calls, the MSC-A server shall provide MGW-A with the same PLMN Bearer Capability [4] as was provided at the last access bearer assignment. The MSC-A server also uses the Change Flow Direction procedure to request MGW-A to set the Handover Device to initial state (bullet 3 in figure 8.4/1).

Relocation Command/Relocation Detect

When the MSC-A server sends the Relocation Command message or alternatively if it receives the Relocation Detect message, the MSC-A server uses the Change Flow Direction procedure to requests MGW-A to set the Handover Device to intermediate state (bullet 4 in figure 8.4/2).

Relocation Complete

When the MSC-A server receives the Relocation Complete message, it requests RNC-A to release the IU. The MSC-A server also requests MGW-A to set the Handover Device to its final state by removing the bearer termination towards RNC-A, using the Release Termination procedure (bullet 5 in figure 8.4/2).

Interworking function

The interworking function used by MGW-A before relocation will also be used after relocation.

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

Voice processing function(s) provided by MGW-A before relocation, may be modified or disabled by MGW-A after relocation.

Handling of multiple bearers (multicall)

If the UE is engaged with multiple bearers all procedures related to the handling of bearers and terminations described for the relocation of a single bearer shall be repeated for each bearer.

Failure Handling in MSC server

When a procedure between the MSC-A server and MGW-A fails the MSC-A server shall handle the failure as an internal error in accordance with 3GPP TS 23.009 [8] and 3GPP TS 29.010 [23]. If call establishment towards MSC-B has already started then the call towards MSC-B server shall be cleared as described in clause 7.3. If the original call is to be cleared, then it shall be handled as described in clause 7.3.

8.1.2.2 MSC-B/MGW-B

MGW selection

The MSC-B server selects an MGW when it receives Prepare Handover Request message (bullet 1 in figure 8.4/1).

Bearer establishment towards RNC-B

When the MSC-B server has selected MGW-B it requests MGW-B to provide a binding reference and a bearer address, using the Prepare Bearer procedure. For speech calls, the MSC-B server shall provide the MGW-B with the speech coding information for the bearer. The MSC-B server sends the Relocation Request message to the RNC-B containing the bearer addresses and binding references (bullet 2 in figure 8.4/1).

For Relocation towards GERAN Iu mode, if the selected service is speech and the MSC-B server cannot provide the codec requested by the MSC-A server, the MSC-B server shall select another codec according to the received GERAN capabilities of the target cell and the received list of supported codecs, and shall set the RAB parameters within the RANAP RELOCATION REQUEST message according to the new selected codec. Furthermore, the MSC-B server shall report the chosen codec and codec modes back to the MSC-A server with MAP Prepare Handover response.

Bearer establishment between MGW-A and MGW-B

The handling of the bearer establishment is as described at Basic Mobile Terminating Call, using either forward or backward bearer establishment.

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

Voice processing function(s) provided by MGW-A before relocation, may be continued or modified by MGW-B after relocation.

Handling of multiple bearers (multicall)

If the UE is engaged with multiple bearers all procedures related to the handling of bearers and terminations described for the relocation of a single bearer shall be repeated for each bearer.

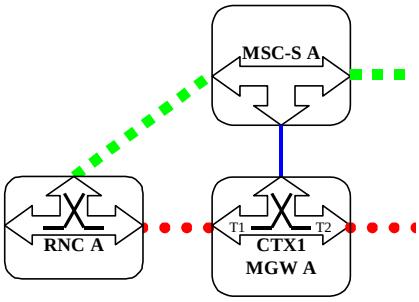
Failure Handling in MSC server

When a procedure between the MSC-B server and MGW-B fails the MSC-B server shall handle the failure as an internal error in accordance with 3GPP TS 23.009 [8] and 3GPP TS 29.010 [23]. If MGW-B resources have been already seized at the target access side then the resources shall be released using the Release Termination procedure. The call from MSC-A server shall be released as described at clause 7.1.

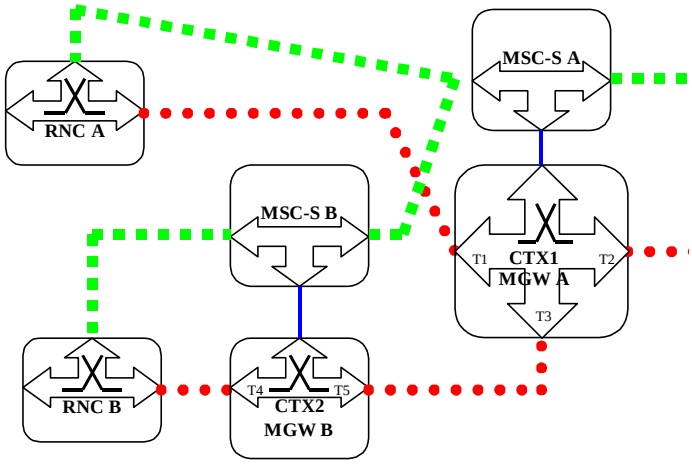
Example

Figure 8.3 shows the network model for the Basic Inter-MSC SRNS Relocation. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling and the bearer. In MGW-A the bearer termination T1 is used for the bearer towards RNC-A, bearer termination T3 is used for the bearer towards MGW-B, and the bearer termination T2 is used for the bearer towards the succeeding/preceding MGW. In MGW-B the bearer termination T4 is used for the bearer towards RNC-B, bearer termination T5 is used for the bearer towards MGW-A.

Before Relocation:



During Relocation:



After Relocation:

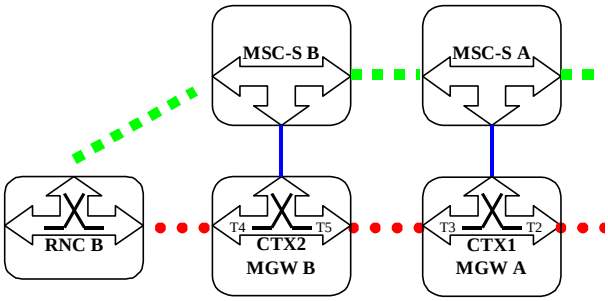


Figure 8.3 Basic Inter-MSC SRNS Relocation (network model)

Figure 8.4 shows the message sequence example for the Basic Inter-MSC SRNS Relocation. It is assumed that the Handover Device is located in the MGW (MGW-A) selected for the call establishment by the MSC server (MSC-A server) which controls the call and the mobility management. It is also assumed that only one bearer has been established towards RNC-A. In the example the MSC-B server requests MGW-B to seize an RNC-B side bearer. The MSC-B server orders the establishment of the bearer towards RNC-B by sending Relocation Request. The call is established between MSC-A and MSC-B servers, and the bearer is established between MGW-A and MGW-B. When the relocation is detected in RNC-B the MSC-A server requests to change the flow directions between the terminations within the context in MGW-A. When MSC-A server receives Relocation Complete indication from MSC-B server it orders RNC-A to release the IU. This action causes release of the bearer between RNC-A and MGW-A. Finally MSC-A server requests MGW-A to remove RNC-A side bearer termination.

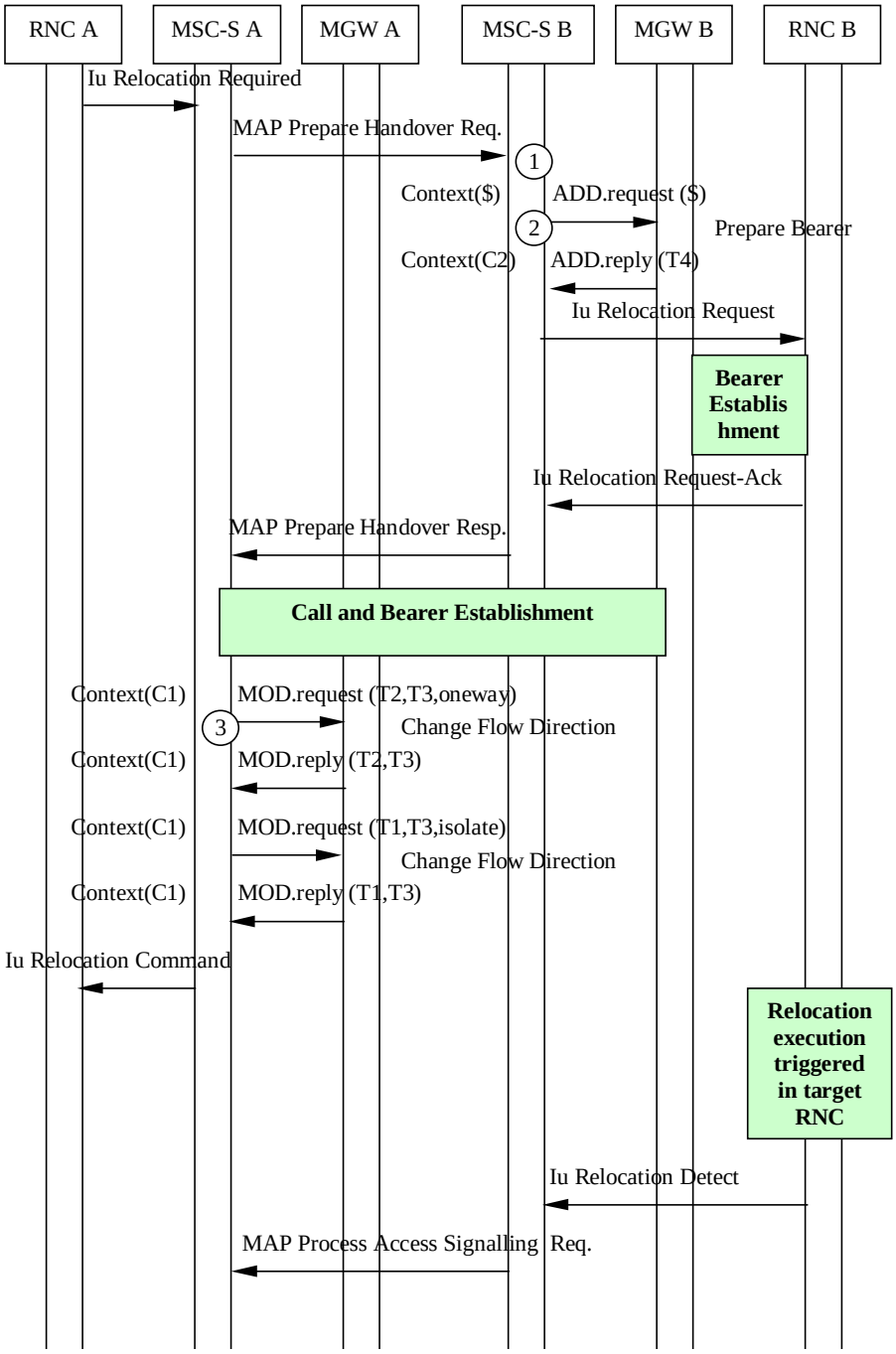


Figure 8.4/1 Basic Inter-MSC SRNS Relocation (message sequence chart)

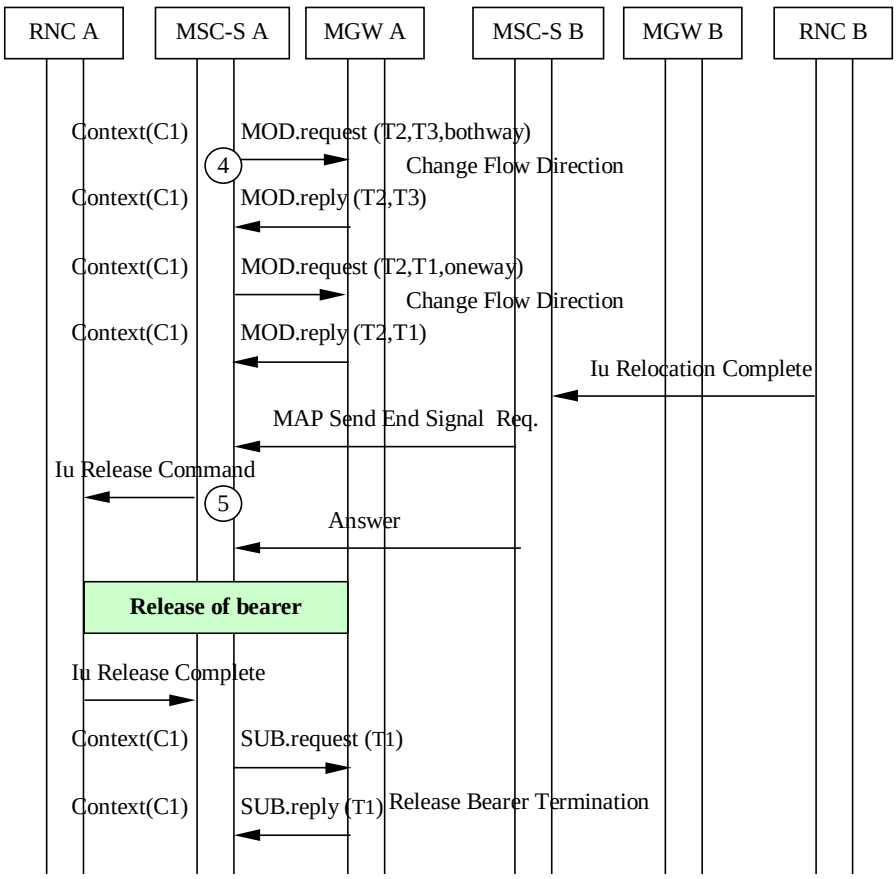


Figure 8.4/2 Basic Inter-MSC SRNS Relocation (message sequence chart)

* * * * * * * * * * * * NEXT MODIFICATION *

8.1.3.1 MSC-A/MGW-A

Relocation Required

When the MSC-A server receives the Relocation Required message, it requests MGW-A to provide a binding reference and a bearer address using the Prepare Bearer procedure. For speech calls, the MSC-A server shall provide the MGW-A with the speech coding information for the bearer. For non-speech calls the MSC-A server shall provide MGW-A with the same PLMN Bearer Capability [4] as was provided at the last access bearer assignment. The MSC-A server uses the Change Flow Direction procedure to request the MGW-A to set the Handover Device to initial state. The MSC-A server sends the Relocation Request message, containing the bearer address and the binding reference, to RNC-B (bullet 1 in figure 8.6/1).

For Relocation towards GERAN Iu mode, if the selected service is speech and the MSC-A server cannot provide the codec requested by the MSC-B server, the MSC-A server shall select another codec according to the received GERAN capabilities of the target cell and the list of supported codecs.

Relocation Command/Relocation Detect

When the MSC-A server sends the Relocation Command message or alternatively if it receives the Relocation Detect message, the MSC-A server uses the Change Flow Direction procedure to requests MGW-A to set the Handover Device to intermediate state (bullet 2 in figure 8.6/1).

Relocation Complete

When the MSC-A server receives the Relocation Complete message, it informs the MSC-B server about reception of this message. The MSC-A server then initiates call clearing towards the MSC-B server as described in clause 7.3.

Interworking function

The interworking function used by MGW-A before relocation will also be used after relocation.

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

Voice processing function(s) provided by MGW-A and MGW-B before relocation, may be continued or modified by MGW-A after relocation.

Handling of multiple bearers (multicall)

If the UE is engaged with multiple bearers all procedures related to the handling of bearers and terminations described for the relocation of a single bearer shall be repeated for each bearer.

Failure Handling in MSC server

When a procedure between the MSC-A server and the MGW fails the MSC-A server shall handle the failure as an internal error in accordance with 3GPP TS 23.009 [8] and 3GPP TS 29.010 [23]. If MGW resources have already been seized at the target access side then the resources shall be released using the Release Termination procedure. If the call is to be cleared, then it shall be handled as described in clause 7.3.

8.1.3.2 MSC-B/MGW-B

Relocation Required

For Relocation towards GERAN Iu mode the GERAN capabilities of the target cell ~~sha~~will be indicated to the MSC-B server within the RANAP RELOCATION REQUIRED message if the target cell provides different capabilities than the current cell. If no information about the GERAN capabilities of the target cell are received within this message, the MSC-B server shall assume that the GERAN target cell will provide the same capabilities as the current cell (for details see [29]). The different interworking scenarios (e.g. interworking to pre-Rel5 UTRAN) are described in [29].

The MSC-B server shall indicate to the MSC-A server the GERAN capabilities of the target cell, if available, with the MAP Prepare Subsequent Handover request. For speech calls, the MSC-B server shall additionally indicate to the MSC-A server the selected codec and the currently used codec.

Furthermore, the MSC-B server shall indicate to the GERAN the selected service within the RANAP RELOCATION REQUEST message and shall set the RAB parameters within the RANAP RELOCATION REQUEST message according to the selected service. The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container.~~. The NAS Synchronisation Indicator (see [4]) is not applicable to GERAN Iu mode~~.

Relocation Complete

When the MSC-B server receives the Relocation Complete message, it requests RNC-A to release the IU. The MSC-B server requests MGW-B to remove the bearer termination towards RNC-A using the Release Termination procedure (bullet 3 in figure 8.6/2).

Release of bearer towards MGW-A

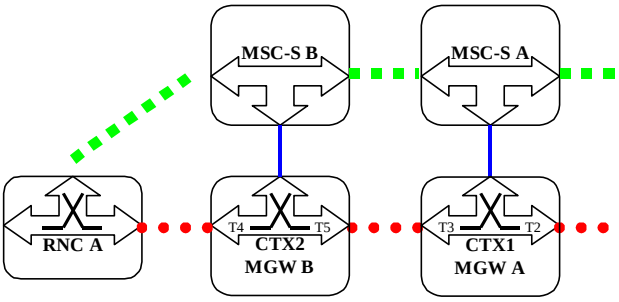
When the MSC-B server receives a call clearing indication from the MSC-A server, the MSC-B server handles it as described in clause 7.2.

Handling of multiple bearers (multicall)

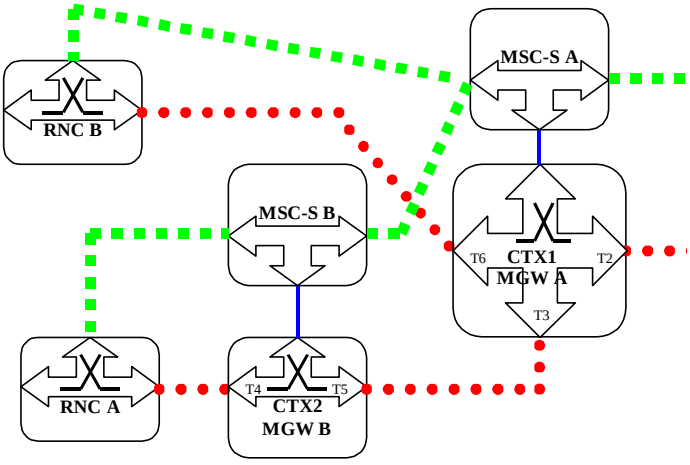
If the UE is engaged with multiple bearers all procedures related to the handling of bearers and terminations described for the relocation of a single bearer shall be repeated for each bearer.

Example

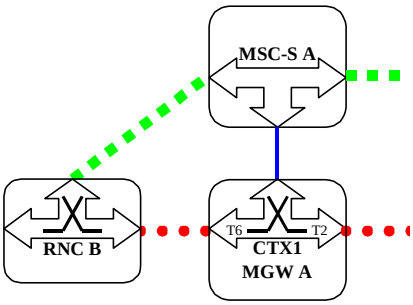
Figure 8.5 shows the network model for the Subsequent Inter-MSC SRNS Relocation back to the Anchor MSC. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling and the bearer. In MGW-A the bearer termination T6 is used for the bearer towards RNC-B, bearer termination T3 is used for the bearer towards MGW-B, and the bearer termination T2 is used for the bearer towards the succeeding/preceding MGW. In MGW-B the bearer termination T4 is used for the bearer towards RNC-A, bearer termination T5 is used for the bearer towards MGW-A.



Before Relocation:



During Relocation:



After Relocation:

Figure 8.5 Subsequent Inter-MSC SRNS Relocation back to the Anchor MSC (network model)

Figure 8.6 shows the message sequence example for the Subsequent Inter-MSC SRNS Relocation back to the Anchor MSC. It is assumed that the Handover Device is located in the MGW (MGW-A) selected for the call establishment by the MSC server (MSC-A server) which controls the call and the mobility management. Also assumed that only one bearer has been established towards RNC-A. In the example the MSC-A server requests MGW-A to seize RNC-B side bearer termination with specific flow directions. The MSC server orders the establishment of the bearer towards RNC-B by sending Relocation Request. When the relocation is detected in RNC-B the MSC-A server requests to change the flow directions between the terminations within the context in MGW-A. When the MSC-A server receives a Relocation Complete indication from RNC-B it transfers this indication to MSC-B server. MSC-B server orders RNC-A to release the IU. This action causes release of the bearer between RNC-A and the MGW-B. MSC-A server initiates call clearing towards MSC-B server.

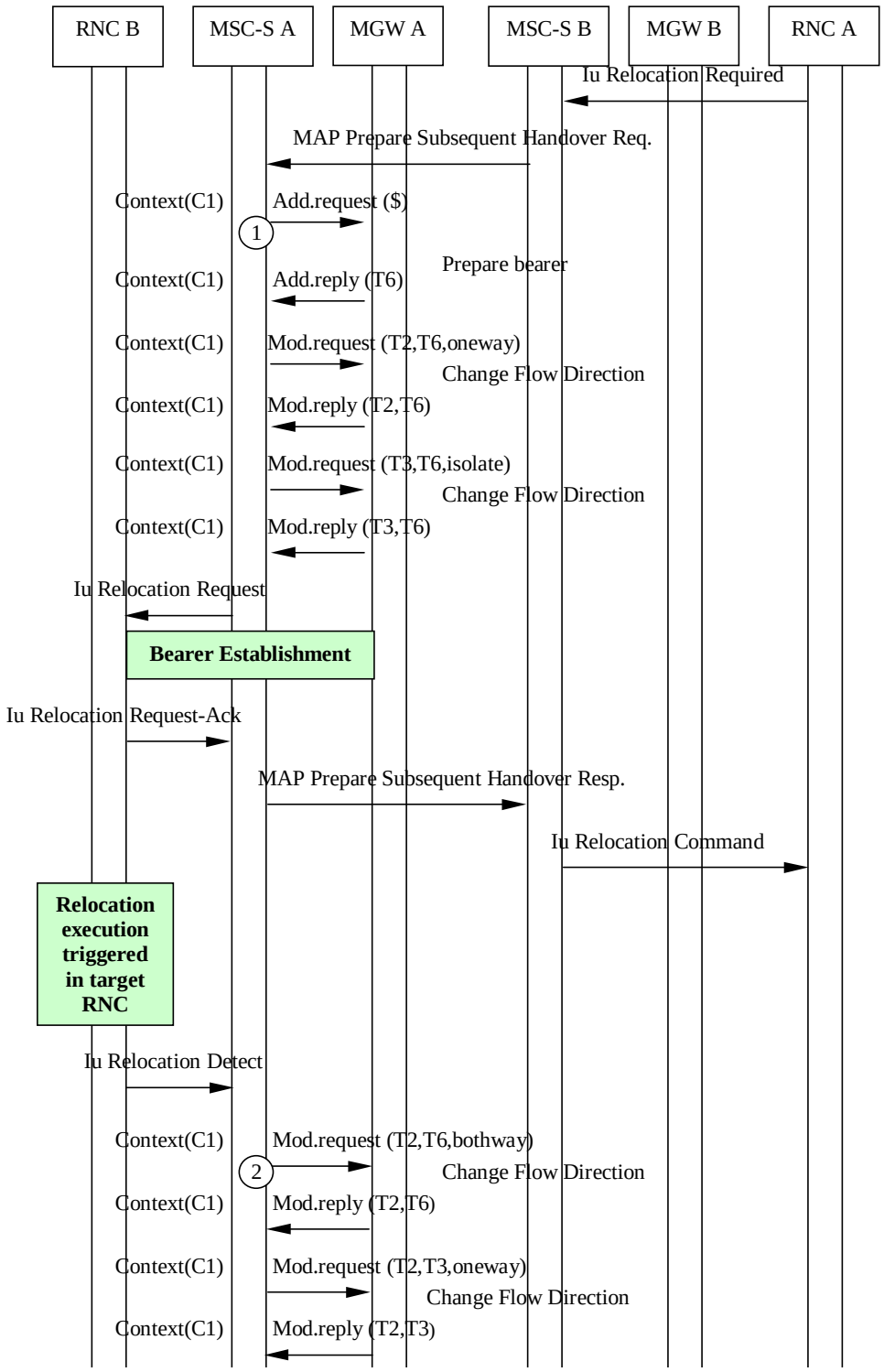


Figure 8.6/1 Subsequent Inter-MSC SRNS Relocation back to the Anchor MSC (message sequence chart)

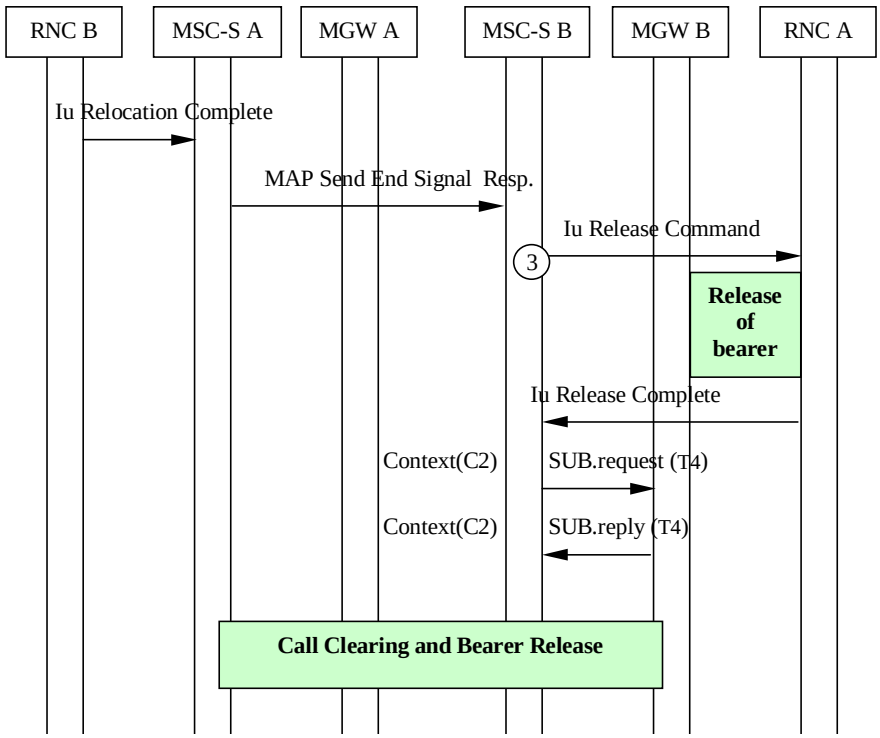


Figure 8.6/2 Subsequent Inter-MSC SRNS Relocation back to the Anchor MSC (message sequence chart)

* * * * * * * * * * * * * N E X T M O D I F I C A T I O N *

8.3.1 Intra-MSC GSM to UMTS Handover

The procedures specified in 3GPP TS 23.009 [8] for 'Intra-3G_MSC GSM to UMTS Handover' shall be followed. The following paragraphs describe the additional requirements for the bearer independent CS core network.

Handover Required

When the MSC server receives the Handover Required message, it requests the MGW to provide a binding reference and a bearer address using the Prepare Bearer procedure. For speech calls, the MSC server shall provide the MGW with the speech coding information for the bearer. For non-speech calls the MSC server shall provide the MGW with the same PLMN Bearer Capability [4] as was provided at the last channel assignment. The MSC server uses the Change Flow Direction procedure to request the MGW to set the Handover Device to initial state. The MSC server sends the Relocation Request message to the RNC-B containing the bearer address and binding reference (bullet 1 in figure 8.14).

For Relocation towards GERAN Iu mode the GERAN capabilities of the target cell ~~sha~~will be indicated to the MSC-Server~~-~~ within the Handover Required message if the target cell provides different capabilities than the current cell. If no information about the GERAN capabilities of the target cell are received within this message, the MSC-Server~~-~~ shall assume that the GERAN target cell will provide the same capabilities as the current cell (for details see [29]). The MSC server shall indicate to GERAN the selected services within the RANAP RELOCATION REQUEST message. The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container..~~The NAS Synchronisation Indicator (see [4]) is not applicable to GERAN Iu mode.~~

Handover Command/Relocation Detect

When the MSC server sends the Handover Command message or alternatively if it receives a Relocation Detect message, the MSC server uses the Change Flow Direction procedure to requests the MGW to set the Handover Device to intermediate state (bullet 2 in figure 8.14).

Relocation Complete

When the MSC server receives the Relocation Complete message, it releases the A-interface line towards BSC-A and requests the MGW to set the Handover Device to its final state removing the bearer termination towards BSC-A, using Release Termination procedure (bullet 3 in figure 8.14).

Interworking function

The interworking function used by the MGW before handover will also be used after handover.

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

After handover, the MGW may continue or modify voice processing function(s) provided to each bearer termination.

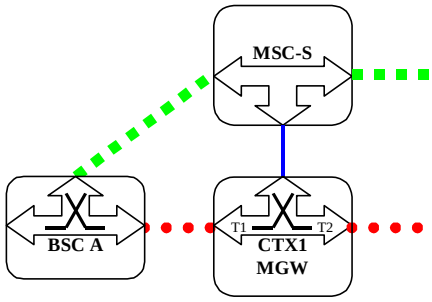
Failure Handling in MSC server

When a procedure between the MSC server and the MGW fails the MSC server shall handle the failure as an internal error in accordance with 3GPP TS 23.009 [8] and 3GPP TS 29.010 [23]. If MGW resources have already been seized at the target access side then the resources shall be released using the Release Termination procedure. If the call is to be cleared, then it shall be handled as described in clause 7.3.

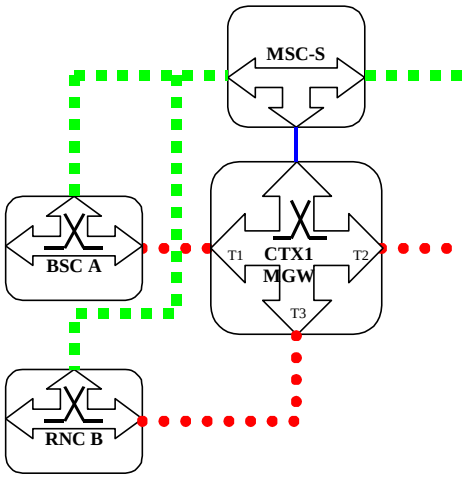
Example

Figure 8.13 shows the network model for the Intra-3G_MSC GSM to UMTS Handover. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling and the bearer. The bearer termination T1 is used for the bearer towards the BSC-A (connected through the MSC server), the bearer termination T3 is used for the bearer towards the RNC-B and the bearer termination T2 is used for the bearer towards the succeeding/preceding MGW.

Before Handover:



During Handover:



After Handover:

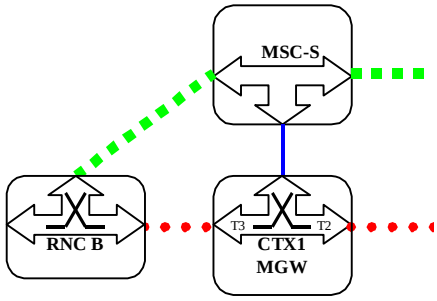


Figure 8.13 Intra-3G_MSC GSM to UMTS Handover (network model)

Figure 8.14 shows the message sequence example for the Intra-MSC GSM to UMTS Handover.
It is assumed that the Handover Device is located in the MGW selected for the call establishment by the MSC server, which controls the call and the mobility management. In the example the MSC server requests seizure of RNC-B side bearer termination with specific flow directions. The MSC server starts handover execution by sending Relocation Request towards RNC-B. When the relocation is detected in RNC-B the MSC server requests to change the flow directions between the terminations within the context. When MSC server receives Relocation Complete indication from RNC-B it releases the A-interface line towards the BSC-A. Finally the MSC server requests the MGW to release BSC-A side bearer termination.

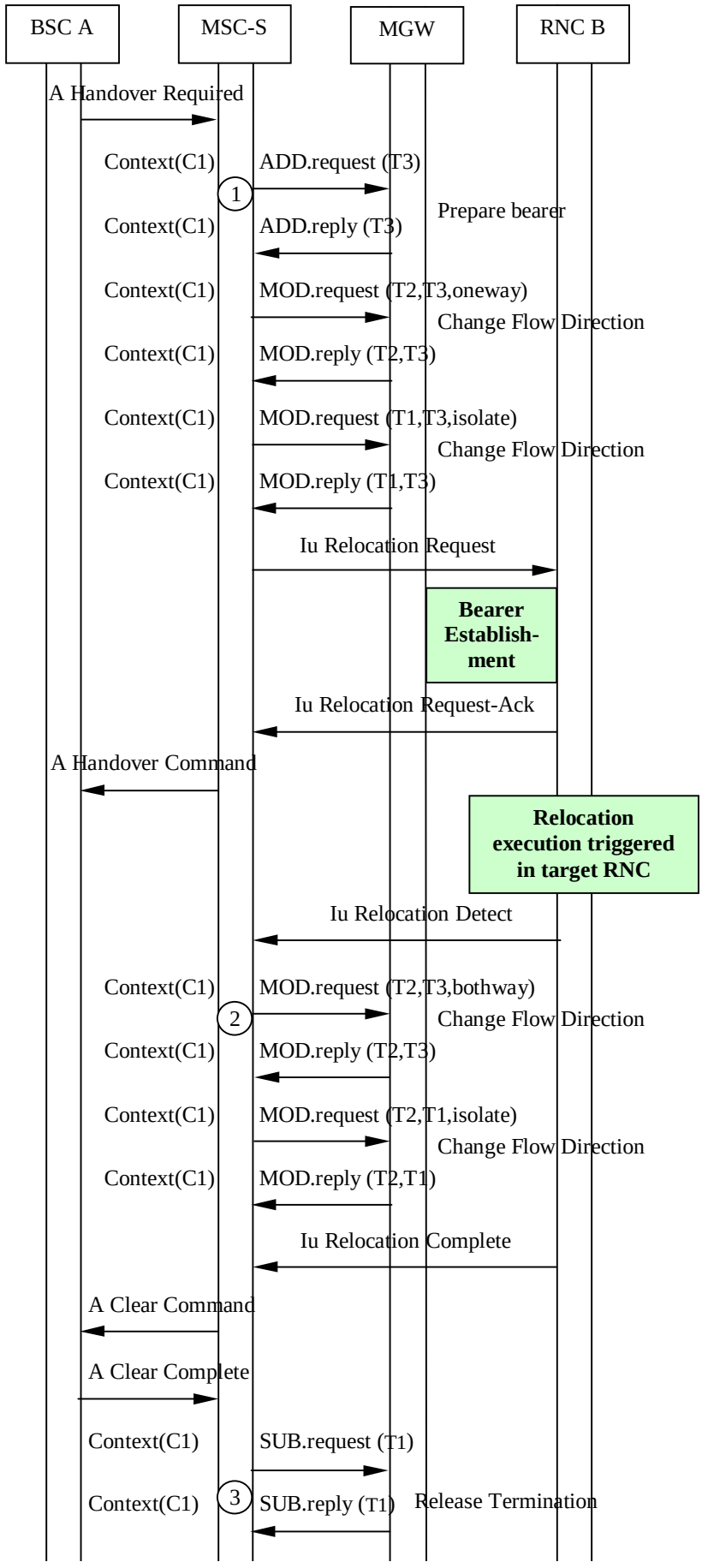


Figure 8.14 Intra-3G_MSC GSM to UMTS Handover (message sequence chart)

* * * * * * * * * * * * * N E X T M O D I F I C A T I O N *

.

8.3.2.1 MSC-A

Handover Required

For Handover towards GERAN Iu mode the GERAN capabilities of the target cell ~~sha~~will be indicated to the MSC-A server within the Handover Required message if the target cell provides different capabilities than the current cell. If no information about the GERAN capabilities of the target cell are received within this message, the MSC-A server shall assume that the GERAN target cell will provide the same capabilities as the current cell (for details see [29]).

The MSC-A server shall indicate to the MSC-B server the GERAN capabilities of the target cell, if available, with the MAP Prepare Handover request. For speech calls, the MSC-A server shall additionally indicate to the MSC-B server the selected codec, the list of supported codecs, and the currently used codec.

Bearer establishment between MGW-A and MGW-B

The handling of the bearer establishment between MGW-A and MGW-B is as described for a Basic Mobile Originating Call, using either forward or backward bearer establishment. For speech calls, the MSC-A server shall provide the MGW-A with the speech coding information for the bearer. For non-speech calls the MSC-A server shall provide MGW-A with the same PLMN Bearer Capabilities [4] as were provided at the last access bearer assignment. The MSC-A server also uses the Change Flow Direction procedure to request MGW-A to set the Handover Device to initial state (bullet 3 in figure 8.16/1).

Handover Command/Handover Detect

When the MSC-A server sends the Handover Command message or alternatively if it receives the Handover Detect message, the MSC-A server uses the Change Flow Direction procedure to requests MGW-A to set the Handover Device to intermediate state (bullet 4 in figure 8.16/2).

Handover Complete

When the MSC-A server receives the Handover Complete message, it releases the A-interface line towards BSC-A and requests MGW-A to set the Handover Device to its final state by removing the bearer termination towards BSC-A, using Release Termination procedure (bullet 5 in figure 8.16/2).

Interworking function

The interworking function used by MGW-A before handover will also be used after handover.

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

Voice processing function(s) provided by MGW-A before handover, may be modified or disabled by MGW-A after handover.

Failure Handling in MSC server

When a procedure between the MSC-A server and MGW-A fails the MSC-A server shall handle the failure as an internal error in accordance with 3GPP TS 23.009 [8] and 3GPP TS 29.010 [23]. If the call establishment towards

MSC-B has already started then the call towards MSC-B server shall be cleared as described in clause 7.3. If the original call is to be cleared, then it shall be handled as described in clause 7.3.

8.3.2.2 MSC-B

MGW selection

The MSC-B server selects an MGW when it receives Prepare Handover Request message (bullet 1 in figure 8.16).

Bearer establishment towards RNC-B

When the MSC-B server has selected MGW-B it requests MGW-B to provide a binding reference and a bearer address using the Prepare Bearer procedure. For speech calls, the MSC server shall provide the MGW with the speech coding information for the bearer. The MSC-B server sends the Relocation Request message to the RNC-B containing the bearer address and binding reference (bullet 2 in figure 8.16).

For Handover towards GERAN Iu-mode, the MSC-B Server shall select a service according to the Channel Type received with the Handover Request message and the capabilities of the GERAN target cell, if the GERAN classmark was received. For speech calls, the MSC-B server shall additionally take into account the selected codec, the list of supported codecs and the currently used codec received with MAP Prepare Handover request. The list of permitted speech versions received with the Channel Type in the Handover Request message is applicable to GERAN A/Gb mode only.

The MSC-B server shall indicate to the GERAN the selected service within the RANAP RELOCATION REQUEST message and shall set the RAB parameters within the RANAP RELOCATION REQUEST message according to the selected service. The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container..~~The NAS Synchronisation Indicator (see [4]) is not applicable to GERAN Iu mode.~~

For speech calls, the MSC-B server shall report the chosen codec and codec modes back to the MSC-A server with MAP Prepare Handover response.

Bearer establishment between MGW-A and MGW-B

The handling of the bearer establishment is as described at Basic Mobile Terminating Call, using either forward or backward bearer establishment.

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

Voice processing function(s) provided by MGW-A before handover, may be continued or modified by MGW-B after handover.

Failure Handling in MSC server

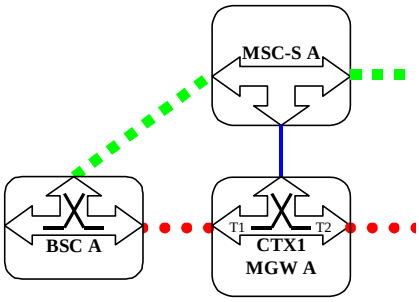
When a procedure between the MSC-B server and MGW-B fails the MSC-B server shall handle the failure as an internal error in accordance with 3GPP TS 23.009 [8] and 3GPP TS 29.010 [23]. If MGW-B resources have already been seized at the target access side then the resources shall be released using the Release Termination procedure. The call from MSC-A server shall be released as described at clause 7.1.

Example

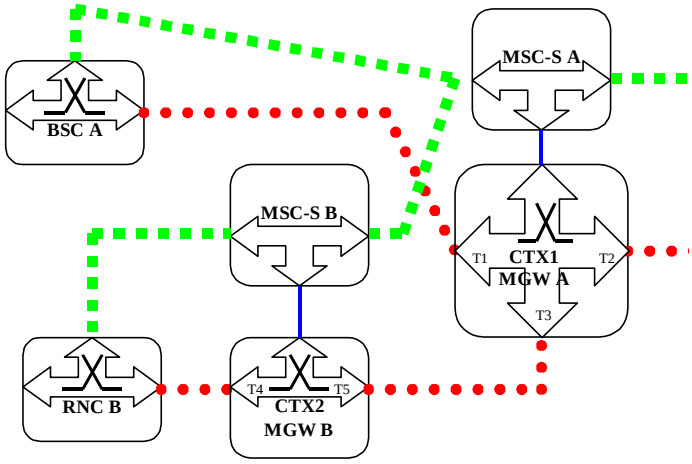
Figure 8.15 shows the network model for the Basic Inter-MSC GSM to UMTS Handover. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in case of GSM access) and the bearer. In MGW-A the bearer termination T1 is used for the bearer towards BSC-A, bearer termination T3 is used for the bearer towards MGW-B, and the bearer termination T2 is used for the bearer towards the

succeeding/preceding MGW. In MGW-B the bearer termination T4 is used for the bearer towards RNC-B, bearer termination T5 is used for the bearer towards MGW-A.

Before Handover:



During Handover:



After Handover:

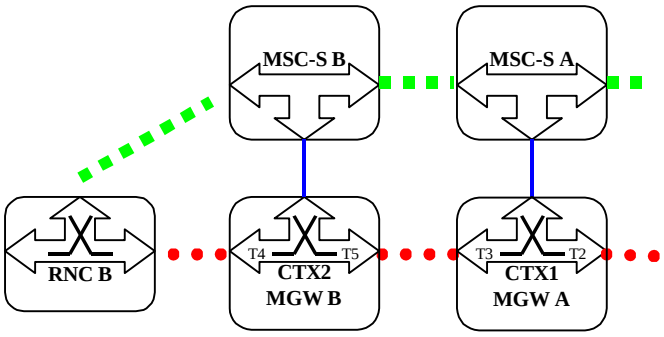


Figure 8.15 Basic Inter-MSC GSM to UMTS Handover (network model)

Figure 8.16 shows the message sequence example for the Basic Inter-MSC GSM to UMTS Handover.
It is assumed that the Handover Device is located in the MGW (MGW-A) selected for the call establishment by the MSC server (MSC-A server) which controls the call and the mobility management.

In the example the MSC-B server requests MGW-B to seize RNC-B side bearer termination. The call is established between MSC-A server and MSC-B server, and the bearer is established between MGW-A and MGW-B. When the relocation is detected in RNC-B the MSC-A server requests to change the flow directions between the terminations within the context in MGW-A. When MSC-A server receives Handover Complete indication from MSC-B server it

releases the A-interface line towards the BSC-A. Finally MSC-A server requests MGW-A to remove BSC-A side bearer termination.

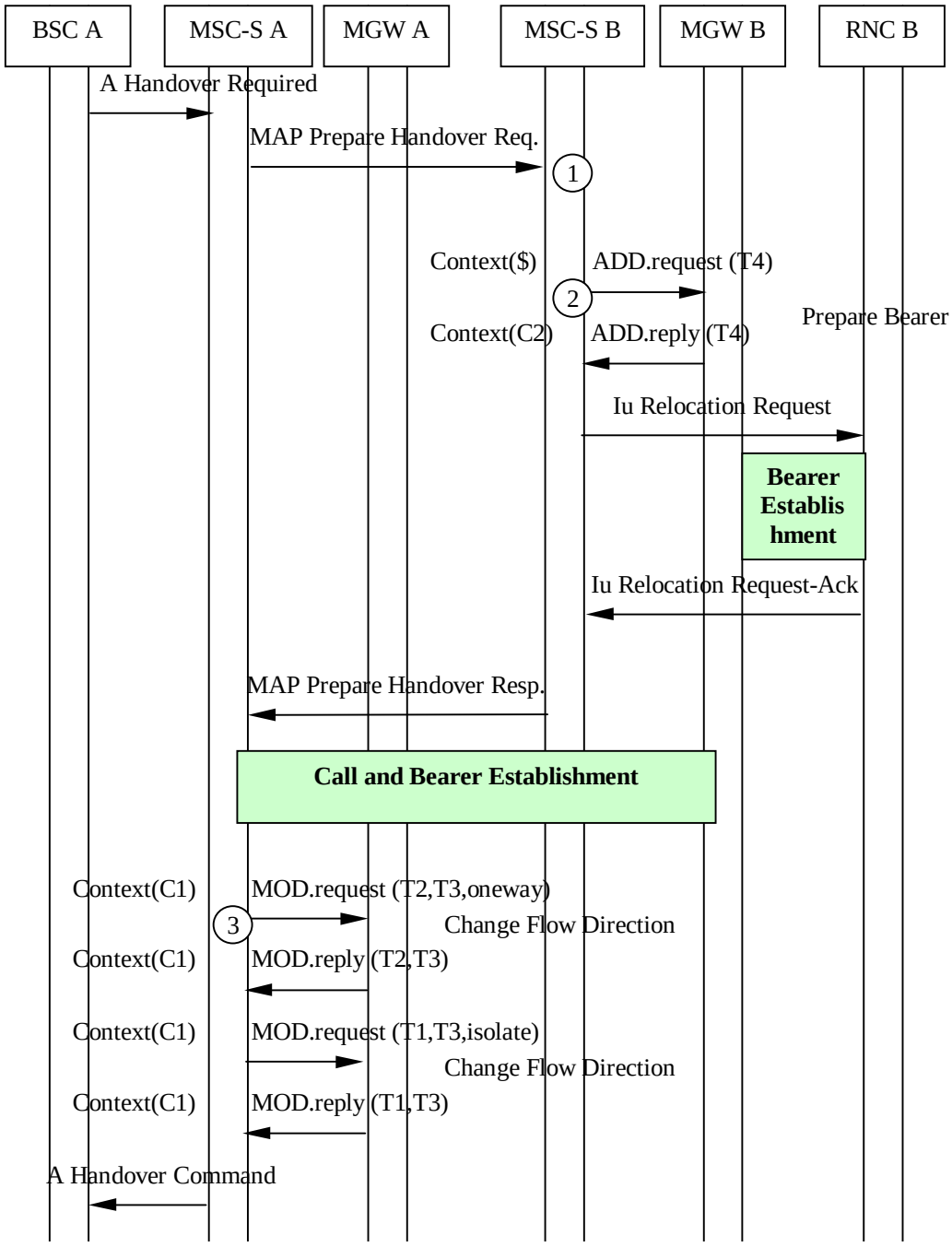


Figure 8.16/1 Basic Inter-MSC GSM to UMTS Handover (message sequence chart)

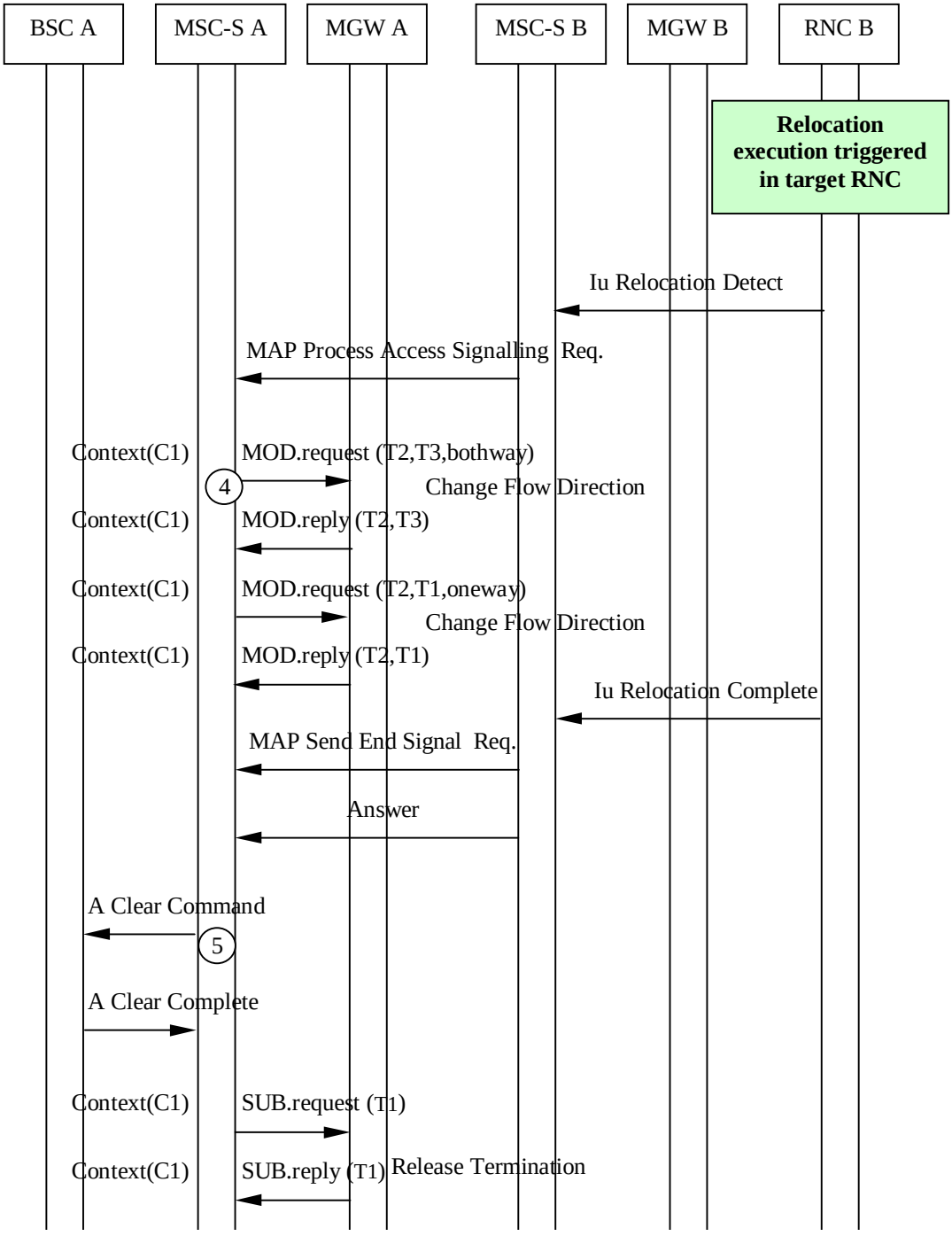


Figure 8.16/2 Basic Inter-MSC GSM to UMTS Handover (message sequence chart)

**********LAST MODIFICATION**********

8.3.3.1 MSC-A

Handover Required

When the MSC-A server receives a Handover Required message from BSC-A (via MSC-B server), it requests the MGW-A to provide a binding reference and a bearer address using the Prepare Bearer procedure. For speech calls, the MSC-A server shall provide the MGW-A with the speech coding information for the bearer. For non-speech calls the

MSC-A server shall provide MGW-A with the same PLMN Bearer Capability [4] as was provided at the last channel assignment. The MSC-A server uses the Change Flow Direction Procedure to request the MGW-A to set the Handover Device to initial state. The MSC-A server sends the Relocation Request message to the RNC-B containing the bearer address and binding reference (bullet 1 in figure 8.18/1).

For Handover towards GERAN Iu-mode, the MSC-A Server shall select a service according to the Channel Type received with the Handover Request message and the capabilities of the GERAN target cell, if the GERAN classmark was received. For speech calls, the MSC-A server shall additionally take into account the selected codec and the currently used codec received with MAP Prepare Subsequent Handover request, and the list of supported codecs.

The MSC-A server shall indicate to the GERAN the selected service within the RANAP RELOCATION REQUEST message and shall set the RAB parameters within the RANAP RELOCATION REQUEST message according to the selected service. The MSC server shall not set codec information in the NAS Synchronisation Indicator (see [4]). Instead it shall set codec information in the GERAN BSC container..~~The NAS Synchronisation Indicator (see [4]) is not applicable to GERAN Iu mode.~~

Handover Command/Relocation Detect

When the MSC-A server sends the Handover Command message or alternatively if it receives a Relocation Detect message, the MSC-A server uses the Change Flow Direction procedure to requests the MGW-A to set the Handover Device to intermediate state (bullet 2 in figure 8.18/2).

Relocation Complete

When the MSC-A server receives a Relocation Complete message, it informs the MSC-B server about reception of this message. MSC-A server then initiates call clearing towards the MSC-B server as described in clause 7.3.

Interworking function

The interworking function used by MGW-A before handover will also be used after handover.

Codec handling

The MGW may include a speech transcoder based upon the speech coding information provided to each bearer termination.

Voice Processing function

Voice processing function(s) provided by MGW-A and MGW-B before handover, may be continued or modified by MGW-A after handover.

Failure Handling in MSC server

When a procedure between the MSC-A server and the MGW fails the MSC-A server shall handle the failure as an internal error in accordance with 3GPP TS 23.009 [8] and 3GPP TS 29.010 [23]. If MGW resources have been already seized at the target access side then the resources shall be released using the Release Termination procedure. If the call is to be cleared, then it shall be handled as described in clause 7.3.

8.3.3.2 MSC-B / MGW-B

Handover Required

For Handover towards GERAN Iu mode the GERAN capabilities of the target cell ~~sha~~will be indicated to the MSC-B server within the Handover Required message if the target cell provides different capabilities than the current cell. If no information about the GERAN capabilities of the target cell are received within this message, the MSC-B server shall assume that the GERAN target cell will provide the same capabilities as the current cell (for details see [29]).

The MSC-B server shall indicate to the MSC-A server the GERAN capabilities of the target cell, if available, with the MAP Prepare Subsequent Handover request. For speech calls, the MSC-B server shall additionally indicate to the MSC-A server the selected codec and the currently used codec.

Handover Complete

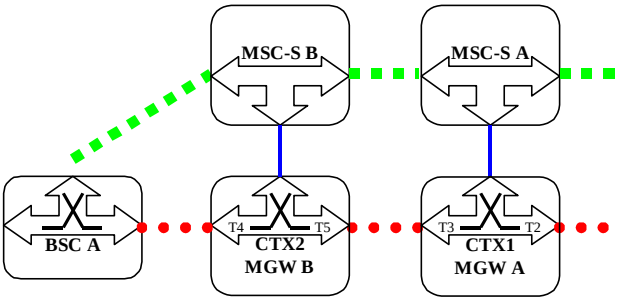
When the MSC-B server receives the Handover Complete message, it releases the A-interface line towards the BSC-A and requests the MGW-B to remove the bearer termination towards the BSC-A using the Release Termination procedure (bullet 3 in figure 8.18/2).

Release of bearer towards MGW-A

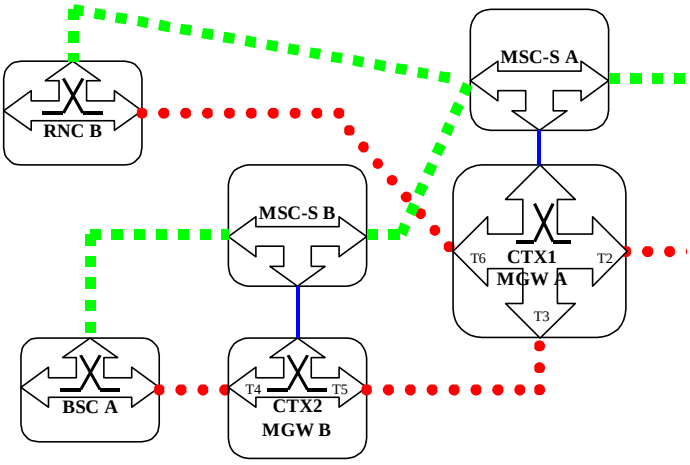
When the MSC-B server receives a call clearing indication from the MSC-A server, the MSC-B server handles it as described in subclause 7.2.

Example

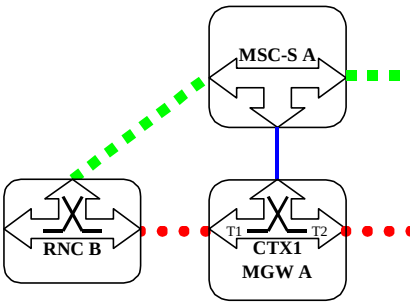
Figure 8.17 shows the network model for Subsequent Inter-MSC GSM to UMTS Handover back to the Anchor MSC. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in case of GSM access) and the bearer. In the MGW the bearer termination T1 is used for the bearer towards RNC-B, the bearer termination T3 is used for the bearer towards MSC-A server, and the bearer termination T2 is used for the bearer towards the succeeding/preceding MGW. In MGW-B the bearer termination T4 is used for the bearer towards BSC-A, bearer termination T5 is used for the bearer towards MGW-A.



Before Handover:



During Handover:



After Handover:

Figure 8.17 Subsequent Inter-MSC GSM to UMTS Handover back to the Anchor MSC (network model)

Figure 8.18 shows the message sequence example for the Subsequent Inter-MSC GSM to UMTS Handover back to the Anchor MSC. It is assumed that the Handover Device is located in the MGW (MGW-A) selected for the call establishment by the MSC server (MSC-A server) which controls the call and the mobility management.

In the example the MSC-A server requests MGW-A to seize RNC-B side bearer termination with specific flow directions. When the relocation is detected in RNC-B the MSC-A server requests to change the flow directions between the terminations within the context in MGW-A. When MSC-A server receives Handover Complete indication from RNC-B it transfers this indication to MSC-B server. MSC-B server releases the A-interface line towards the BSC-A. MSC-A server initiates call clearing towards MSC-B server.

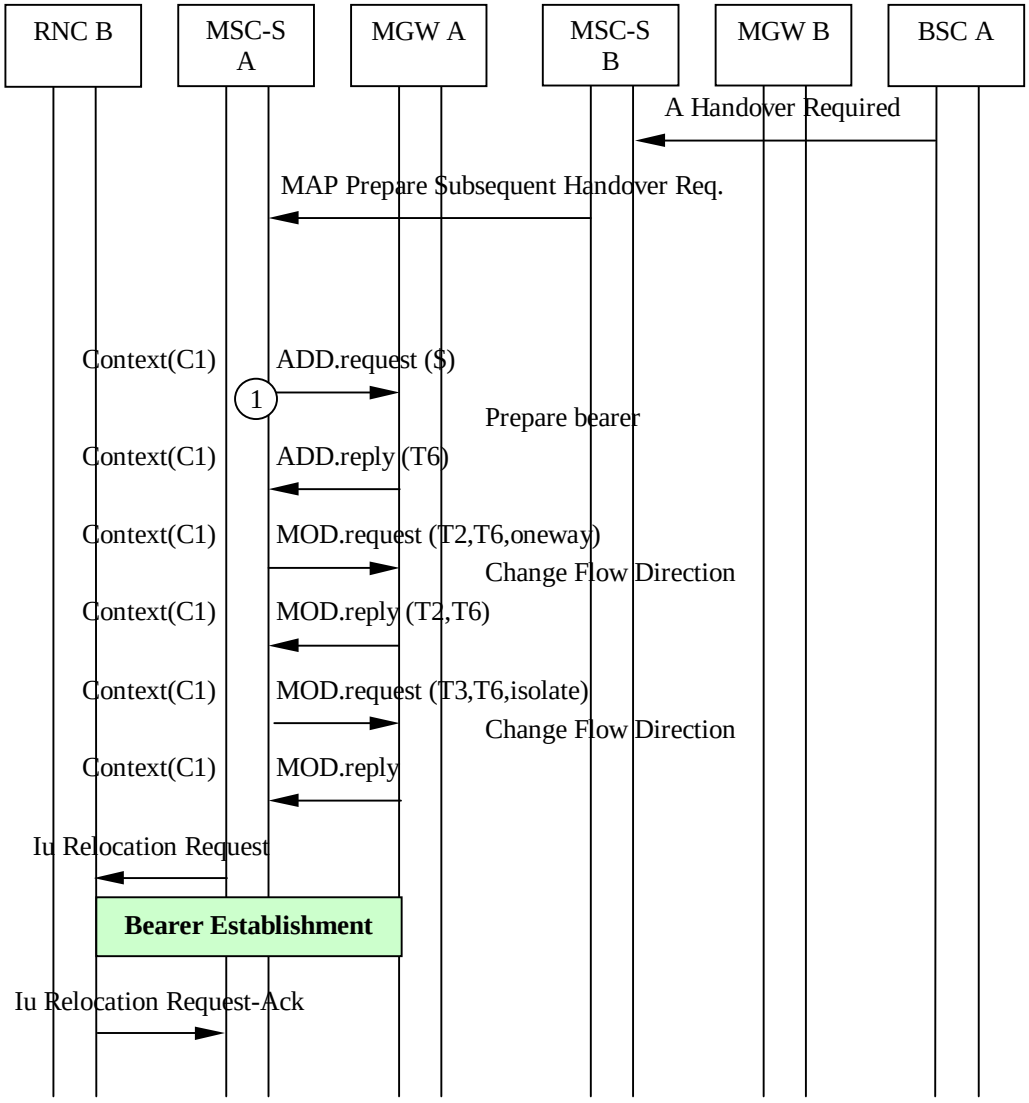


Figure 8.18/1 Subsequent Inter-MSC GSM to UMTS Handover back to the Anchor MSC (message sequence chart)

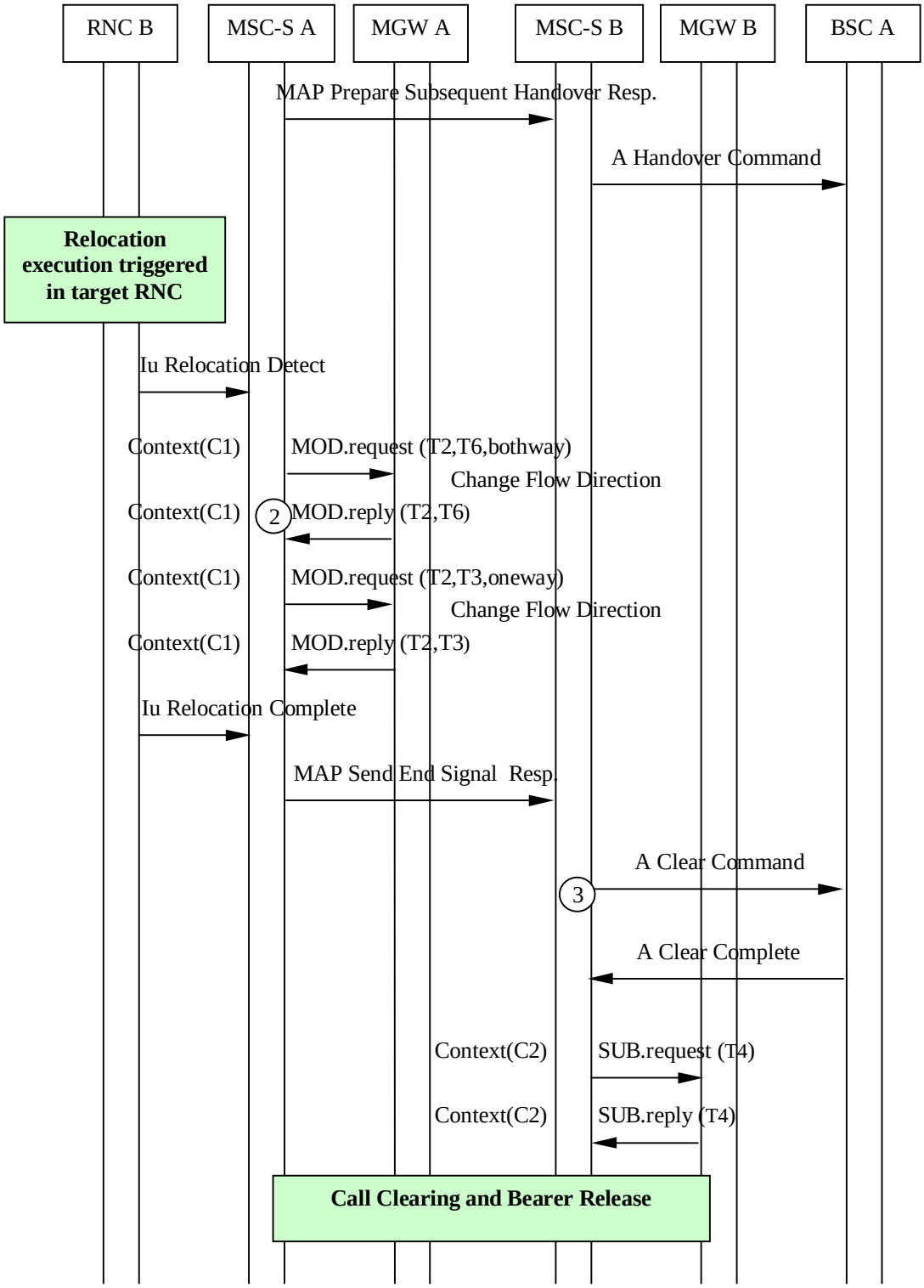


Figure 8.18/2 Subsequent Inter-MSC GSM to UMTS Handover back to the Anchor MSC (message sequence chart)

3GPP TSG CN WG4 Meeting #15 ***N4-021088***
Helsinki, Finland, 29th July – 2nd August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **29.002** **CR** **462** ⌘ **rev** **1** ⌘ Current version: **5.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Introduction of GERAN classmark
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	01/08/2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	During Handover the destination cell must be aware of the codeclist of the target cell
Summary of change:	⌘	GERAN Class mark is addded to MAP prepare handover service
Consequences if not approved:	⌘	The destination Cell does not know the capabilities of the target cell

Clauses affected:	⌘	7.6, 7.6.56, 8.4.1, 17.7.1			
		Y	**N**		
Other specs	⌘	**X**		Other core specifications	⌘ 3GPP TS 48.008 039, 3GPP TS 25.413, 3GPP TS 23.153 031, 3GPP TS 23.205 026, 3GPP TS 43.051 036, 3GPP TS 29.010 060
affected:			**X**	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

****** FIRST MODIFIED SECTION ******

7.6 Definition of parameters

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

Encryption Information	7.6.6.9
Equipment status	7.6.3.2
Extensible Basic Service Group	7.6.3.5
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
Failure Cause	7.6.7.9
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
GERAN Classmark	7.6.6.4
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	7.6.6.8
Inter CUG options	7.6.3.27
Intra CUG restrictions	7.6.3.28
Roaming Restricted In SGSN Due To Unsupported Feature	7.6.3.49
Roaming Restriction Due To Unsupported Feature	7.6.3.13
Current Security Context	7.6.7.8
Selected RAB ID	7.6.2.56
Service centre address	7.6.2.27
Serving Cell Id	7.6.2.37
SGSN address	7.6.2.39
SGSN CAMEL Subscription Info	7.6.3.75
SGSN number	7.6.2.38
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
Supported GAD Shapes	7.6.11.20
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 RNC Id	7.6.2.8A
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 MODIFIED SECTION ******

7.6.6 Radio parameters

7.6.6.1 - 7.6.6.43 Void

7.6.6.4 GERAN Classmark

This information element is sent from one- MSC -to the other MSC in the signalling for inter MSC handover. It is used to convey information related to cell capabilities, as defined in 3GPP TS 48.008.

****** NEXT MODIFIED SECTION ******

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(=)		
IMSI	C	C(=)		
Integrity Protection Information	C	C(=)		
Encryption Information	C	C(=)		
Radio Resource Information	C	C(=)		
AN-APDU	C	C(=)	C	C(=)
Allowed GSM Algorithms	C	C(=)		
Allowed UMTS Algorithms	C	C(=)		
Radio Resource List	C	C(=)		
RAB ID	C	C(=)		
GERAN Classmark	C	C(=)		
Handover Number			C	C(=)
Relocation Number List			C	C(=)
Multicall Bearer Information			C	C(=)
Multiple Bearer Requested	C	C(=)		
Multiple Bearer Not Supported			C	C(=)
Selected UMTS Algorithms			C	C(=)
Chosen Radio Resource Information			C	C(=)
User error			C	C(=)
Provider error				O

8.4.1.3 Parameter use

Invoke Id

For definition of this parameter see clause 7.6.1.

Target Cell Id

For definition of this parameter see clause 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 or the inter-system handover GSM to UMTS procedure described in 3G TS 23.009.

Target RNC Id

For definition of this parameter see clause 7.6.2. This parameter shall be included if the service is a part of the Inter-MSC SRNS Relocation procedure or the inter-system handover GSM to UMTS procedure described in 3G TS 23.009.

HO-Number Not Required

For definition of this parameter see clause 7.6.6.

IMSI

For definition of this parameter see clause 7.6.2. This UMTS parameter shall be included if:

- available and
- 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 parameter see clause 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 parameter see clause 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 parameter see clause 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. If the parameter Radio Resource List is sent , the parameter Radio Resource Information shall not be sent.

AN-APDU

For definition of this parameter see clause 7.6.9.

Allowed GSM Algorithms

For definition of this parameter see clause 7.6.6. This parameters includes allowed GSM algorithms. This GSM parameter shall be included if:

- the service is a part of the Inter-MSC SRNS Relocation procedure and
- Ciphering or Security Mode Setting procedure has been performed.and
- there is an indication that the UE also supports GSM.

Allowed UMTS Algorithms

For definition of this parameter see clause 7.6.6. This UMTS parameter shall be included if all of the following conditions apply:

- access network protocol is BSSAP and
- Integrity Protection Information and Encryption Information are not available and

Ciphering or Security Mode Setting procedure has been performed.

Radio Resource List

For definition of this parameter see clause 7.6.6. This parameter shall be included if the access network protocol is RANAP and there is an indication that the UE also supports GSM. This parameter shall be sent when MSC-A requests multiple bearers to MSC-B. If the parameter Radio Resource Information is sent , the parameter Radio Resource List shall not be sent.

RAB ID

For definition of this parameter see subclause 7.6.2. This parameter shall be included when MSC-A supports multiple bearers and access network protocol is BSSAP and the RAB ID has a value other than 1.

GERAN Classmark

For definition of this parameter see subclause 7.6.6 This parameter shall be included if available.

.Handover Number

For definition of this parameter see clause 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 clause 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.

Multicall Bearer Information

For a definition of this parameter see clause 7.6.2. This parameter shall be returned at relocation in the case that MSC-B supports multiple bearers.

Multiple Bearer Requested

For a definition of this parameter see clause 7.6.2. This parameter shall be sent when MSC-A requests multiple bearers to MSC-B.

Multiple Bearer Not Supported

For a definition of this parameter see clause 7.6.2. This parameter shall be returned at relocation when MSC-B receives Multiple Bearer Requested parameter and MSC-B does not support multiple bearers.

Selected UMTS Algorithms

For definition of this parameter see clause 7.6.6. This parameters includes the UMTS integrity and optionally encryption algorithms selected by RNC under the control of MSC-B. This UMTS parameter shall be included if the service is a part of the inter MSC inter system handover from GSM to UMTS.

Chosen Radio Resource Information

For definition of this parameter see clause 7.6.6. This parameter shall be returned at relocation if the encapsulated PDU is RANAP RAB Assignment Response and MS is in GSM access.

User error

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

- No handover number available.
- Target cell outside group call area;
- System failure.

- Unexpected data value.
- Data Missing.

Provider error

See definition of provider errors in clause 7.6.1.

****** NEXT MODIFIED SECTION ******

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	C(=)		
Target RNC Id	C	C(=)		
Target MSC Number	M	M(=)		
Selected RAB ID	C	C(=)		
GERAN Classmark	C	C(=)		
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 clause 7.6.1.

Target Cell Id

For definition of this parameter see clause 7.6.2. This parameter shall be excluded if the service is a part of the Inter-MSC SRNS Relocation procedure or the inter-system handover GSM to UMTS procedure described in 3G TS 23.009.

Target RNC Id

For definition of this parameter see clause 7.6.2. This parameter shall be included if the service is a part of the Inter-MSC SRNS Relocation procedure or the inter-system handover GSM to UMTS procedure described in 3G TS 23.009.

Target MSC Number

For definition of this parameter see clause 7.6.2.

Selected RAB ID

For definition of this parameter see clause 7.6.2.

GERAN Classmark

For definition of this parameter see subclause 7.6.6 This parameter shall be included if available.

AN-APDU

For definition of this parameter see clause 7.6.9.

User error

For definition of this parameter see clause 7.6.1. The following error causes defined in clause 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 clause 7.6.1.

17.7.1 Mobile Service data types

.....

```
PrepareHO-Arg ::= [3] SEQUENCE {
     targetCellId                       [0] GlobalCellId                  OPTIONAL,
     ho-NumberNotRequired               NULL                              OPTIONAL,
     targetRNCId                        [1] RNCId                         OPTIONAL,
     an-APDU                            [2] AccessNetworkSignalInfo       OPTIONAL,
     multipleBearerRequested            [3] NULL                          OPTIONAL,
     imsi                               [4] IMSI                          OPTIONAL,
     integrityProtectionInfo            [5] IntegrityProtectionInformation  OPTIONAL,
     encryptionInfo                     [6] EncryptionInformation          OPTIONAL,
     radioResourceInformation           [7] RadioResourceInformation      OPTIONAL,
     allowedGSM-Algorithms              [9]  AllowedGSM-Algorithms        OPTIONAL,
     allowedUMTS-Algorithms             [10] AllowedUMTS-Algorithms       OPTIONAL,
     radioResourceList                  [11] RadioResourceList            OPTIONAL,
     extensionContainer                 [8] ExtensionContainer            OPTIONAL,
     ... ,
     rab-Id                             [12] RAB-Id                       OPTIONAL,
     geran-classmark                    [13] GERAN-Classmark              OPTIONAL }
```

.....

```
PrepareSubsequentHO-Arg ::= [3] SEQUENCE {
     targetCellId                       [0] GlobalCellId                  OPTIONAL,
     targetMSC-Number                   [1] ISDN-AddressString,
     targetRNCId                        [2] RNCId                         OPTIONAL,
     an-APDU                            [3]  AccessNetworkSignalInfo      OPTIONAL,
     selectedRab-Id                     [4]  RAB-Id                       OPTIONAL,
     extensionContainer                 [5]  ExtensionContainer           OPTIONAL,
     ...,
     geran-classmark                    [6] GERAN-Classmark               OPTIONAL }
```

•••••

.

```
GERAN-Classmark ::= OCTET STRING (SIZE (2..87))
     -- Octets are coded according the GERAN Classmark information element in 3G TS 48.008
```

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3GPP TSG CN WG4 Meeting #15 ***N4-020934***
Helsinki, Finland, 29th July – 2nd August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **29.010** **CR** **060** ⌘ **rev** **-** ⌘ Current version: **5.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Introduction of GERAN Iu-mode
Source:	⌘	CN4
Work item code:	⌘	TEI5
Date:	⌘	16.07.2002
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change:	⌘	GERAN does not provide a generic mechanism for the transmission of frames via the air interface. Within GERAN frames will be transmitted at the air interface using a service specific channel coding. As the support of transceivers with limited capabilities (e.g. GERAN does not support all possible codec types due to restrictions inside the RAN) has to be assured, the CN has to take the GERAN capabilities into account during call set-up and handover. The GERAN capabilities are described by new information elements ("GERAN Classmark") which are added to BSSMAP, RANAP, and MAP.
Summary of change:	⌘	For the new information element GERAN Classmark the mapping between BSSMAP and MAP, the mapping between RANAP and MAP, and the processing in 3G_MSC-B is specified. The cause mapping for the new BSSMAP and RANAP cause "GERAN Iu-mode failure" is added.
Consequences if not approved:	⌘	GERAN Feature not complete

Clauses affected:	⌘	1.1, 1.3, 4.7.1, 4.7.2, 4.7.5.10 (new), 4.7.6, 4.8.1, 4.8.2, 4.8.5.10 (new)

		Y	N			
Other specs affected:	⌘	X		Other core specifications	⌘	3GPP TS 48.008 039, 3GPP TS 25.413, 3GPP TS 23.153 031, 3GPP TS 43.051 036, 3GPP TS 29.002 462
			X	Test specifications		
			X	O&M Specifications		

Other comments: ⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

1.1 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

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

[2] 3GPP TS 23.009: "Handover procedures".

[3] 3GPP TS 23.040: "Technical realization of the Short Message Service (SMS) Point to Point (PP)".

[4] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols-Stage 3".

[5] 3GPP TS 24.010: "Mobile radio interface layer 3 Supplementary services specification - General aspects".

[6] 3GPP TSº24.011: "Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface".

[7] 3GPP TS 25.413: "Iu interface RANAP signalling".

[8] 3GPP TS 27.001: " General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS)".

[9] 3GPP TS 29.002: "Mobile Application Part (MAP) specification".

[10] 3GPP TS 29.007: "General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)".

[11] 3GPP TS 29.011: "Digital cellular telecommunications system (Phase 2+); Signalling interworking for supplementary services".

[12] 3GPP TS 48.008: " Mobile Switching Centre - Base Station System (MSC - BSS) interface Layer 3 specification".

[13] GSM 09.03: "Digital cellular telecommunications system (Phase 2+); Signalling requirements on interworking between the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) and the Public Land Mobile Network (PLMN)".

[14] 3GPP TS 49.008: "Digital cellular telecommunications system (Phase 2+); Application of the Base Station System Application Part (BSSAP) on the E-interface".

[15] 3GPP TS 29.108: "Application of the Radio Access Network Application Part (RANAP) on the E-interface"

[16] 3GPP TS 23.271: "Functional stage 2 description of LCS"

[17] 3GPP TS 43.051: "Technical Specification Group GSM/EDGE; Radio Access Network; Overall description - Stage 2".

********** NEXT MODIFIED SECTION **********

1.3 Definitions

The following terms are used in this Technical Specification:

A/Gb mode: mode of operation of the MS when connected to the Core Network via GERAN and the A and/or Gb interfaces. Throughout this specification the term GSM refers to GERAN A/Gb mode.

Iu mode: mode of operation of the MS when connected to the Core Network via GERAN or UTRAN and the Iu interface. Throughout this specification the term UMTS refers to UTRAN or GERAN Iu mode.

********** NEXT MODIFIED SECTION **********

4.7 Inter-MSC Handover (GSM to UMTS)

…

4.7.1 Basic Inter-MSC Handover

…

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

	08.08	29.002	Notes
Forward message	HANDOVER REQUIRED	MAP PREPARE HANDOVER request	
		-ho-NumberNotRequired	1
	BSSMAP information elements	-target RNC Id -IMSI	
		-Integrity protection info	2
		-Encryption info	
		-an-APDU(HANDOVER REQUEST, MSC INVOKE TRACE)	3 4
	GERAN classmark	-GERAN classmark	7
Positive result		MAP PREPARE HANDOVER response	5
		-handover number -an-APDU(HANDOVER REQUEST ACKNOWLEDGE or HANDOVER FAILURE)	
Negative result	HANDOVER REQUIRED REJECT	MAP PREPARE HANDOVER	6
	equipment failure	System Failure	
	equipment failure	No Handover Number available	
	equipment failure	UnexpectedDataValue	
	equipment failure	Data Missing	
	equipment failure	MAP CLOSE	
	equipment failure	MAP U/P -ABORT	

NOTE 1: The 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: Integrity protection information, encryption information and IMSI parameters are included by MSC-A, only when the MSC-A uses 29.002 as per release 99. These IEs are not included if the MSC-A is R98 or earlier.

NOTE 3: The process performed on the BSSMAP information elements received in the HANDOVER REQUIRED message is described in the GSM Recommendation 08.08.

NOTE 4: The process performed on the BSSMAP information elements received in the MSC INVOKE TRACE message is described in subclause 4.5.5.6.

NOTE 5: The response to the Prepare-Handover request can include in its an-APDU parameter, identifying the GSM 08.06 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 3GPP TS 29.010 and lies in 3GPP TS 48.008).

NOTE 6: The possible sending of the HANDOVER REQUIRED REJECT message is described in 3GPP TS 48.008.

NOTE 7: If the GERAN Classmark was not received with the HANDOVER REQUIRED message initiating the handover, MSC-A shall include any previously received GERAN Classmark. See 3GPP TS 43.051 [17].

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 -target RNC Id -IMSI -Integrity protection info -Encryption info -RANAP service handover -an-APDU(HANDOVER REQUEST, MSC INVOKE TRACE)	RELOCATION REQUEST	1
	BSSMAP information elements: Channel Type Cause sRNC to tRNC container	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)	RELOCATION REQUEST ACK	
	BSSMAP information elements: Layer 3 info	RANAP information elements: tRNC to sRNC container	
Negative result	MAP PREPARE HANDOVER response -an-APDU(HANDOVER FAILURE)	RELOCATION FAILURE	
	BSSMAP information elements: GERAN classmark	RANAP information elements: GERAN classmark	2

NOTE 1: Integrity protection information, encryption information, IMSI and RANAP service handover parameters are included by MSC-A, only when the MSC-A uses 29.002 as per release 99. These IEs are not included if the MSC-A is R98 or earlier.

NOTE 2: If a handover to GERAN Iu-mode failed, the target RNS may include a GERAN classmark in the RELOCATION FAILURE message. See 3GPP TS 43.051 [17].

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

…

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

	08.08	29.002	Notes
Forward message	HANDOVER REQUIRED	MAP PREPARE SUBSEQUENT HANDOVER request -target MSC number -target RNC Id -an-APDU(HANDOVER REQUEST)	1
	BSSMAP information elements		
	GERAN classmark	-GERAN classmark	4
Positive result	HANDOVER REQUIRED	MAP PREPARE SUBSEQUENT HANDOVER response -an-APDU(HANDOVER REQUEST ACKNOWLEDGE or HANDOVER FAILURE)	2
Negative result	HANDOVER REQUIRED REJECT	MAP PREPARE SUBSEQUENT HANDOVER response	3
	equipment failure	Unknown MSC	
	equipment failure	Subsequent Handover Failure	
	equipment failure	UnexpectedDataValue	
	equipment failure	Data Missing	
	CLEAR COMMAND		
	equipment failure	MAP CLOSE	
	equipment failure	MAP U/P -ABORT	

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 08.06 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 3GPP TS 29.010 and lies in 3GPP TS 48.008).

NOTE 3: The possible sending of the HANDOVER REQUIRED REJECT message is described in 3GPP TS 48.008.

NOTE 4: If the GERAN Classmark was not received with the HANDOVER REQUIRED message initiating the handover, MSC-B shall include any previously received GERAN Classmark. See 3GPP TS 43.051 [17].

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 -target RNC ID -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) BSSMAP information elements: GERAN classmark	RELOCATION FAILURE RANAP information elements: GERAN classmark	1

NOTE 1: If a handover to GERAN Iu-mode failed, the target RNS may include a GERAN classmark in the RELOCATION FAILURE message. See 3GPP TS 43.051 [17].

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.

********** NEXT MODIFIED SECTION **********

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 3GPP TS 48.008. Each BSSMAP message listed in 3GPP TS 49.008 being transferred on E-interface shall use the mechanisms given in subclause 4.5.4 and is described in 3GPP TS 48.008.

…

4.7.5.10 GERAN Classmark

The GERAN Classmark shall be stored by 3G_MSC-B and can be received from MSC-A, from the serving BSS or serving RNS, or from the target RNS. The GERAN Classmark shall be used together with other parameters, e.g. the Channel Type, for selecting a service and for generating RAB parameters for handover to GERAN Iu-mode, subsequent relocation or handover to GERAN Iu-mode, and RAB (re-)assignment when the MS is in GERAN Iu-mode.

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

Received by 3G_MSC-B in:

- the Prepare Handover Request MAP message.

Transfer of Information due to GERAN Classmark received from the serving BSS or serving RNS:

Received by 3G_MSC-B in:

- the Handover Required BSSMAP message;
- the Relocation Required RANAP message;
- the Initial UE RANAP message; or
- the RAB Assignment Response RANAP message.

Transfer of Information due to GERAN Classmark received from the target RNS:

Received by 3G_MSC-B in:

- the Relocation Failure RANAP message.

********** NEXT MODIFIED SECTION **********

4.7.6 Cause Code Mapping

When a Mobile Station is handed over between GSM and UMTS, a mapping of the cause codes used in the BSSMAP and the RANAP protocols is needed. The mapping described here is applicable to the BSSMAP protocol even when used inside MAP in the E-interface.

The mapping between the cause codes received in BSSMAP Handover Required and the cause codes sent in RANAP Relocation Request is as follows:

08.08	25.413	Notes
HANDOVER REQUIRED	RELOCATION REQUEST	
-Better Cell	-Time critical reloc.	
-Directed retry	-Directed retry	
-Distance	-Time critical reloc.	
-Downlink quality	-Time critical reloc.	
-Downlink strength	-Time critical reloc.	
-O and M intervention	-O and M intervention	
-Preemption	-RAB pre-empted	
-Response to MSC invocation	-Time critical reloc.	
-Switch circuit pool		1
-Traffic	-Time critical reloc.	
-Uplink quality	-Time critical reloc.	
-Uplink strength	-Time critical reloc.	
-Any other value	-Time critical reloc.	

NOTE 1: Cause code not used at inter-system handover.

The mapping between the cause codes received in BSSMAP Handover Request and the cause codes sent in RANAP Relocation Request is as follows (the mapping is only used for the MAP-E interface):

08.08	25.413	Notes
HANDOVER REQUEST	RELOCATION REQUEST	
-Better Cell	-Time critical reloc.	
-Directed retry	- Directed retry	
-Distance	-Time critical reloc.	
-Downlink quality	-Time critical reloc.	
-Downlink strength	-Time critical reloc.	
-O and M intervention	-O and M intervention	
-Preemption	-RAB pre-empted	
-Response to MSC invocation	-Time critical reloc.	
-Switch circuit pool		1
-Traffic	-Time critical reloc.	
-Uplink quality	-Time critical reloc.	
-Uplink strength	-Time critical reloc.	
-Any other value	-Time critical reloc.	

NOTE 1: Cause code not used at inter-system handover.

The mapping between the cause codes received in BSSMAP Handover Failure and the cause codes sent in RANAP Iu Release Command is as follows:

08.08	25.413	Notes
HANDOVER FAILURE	IU RELEASE COMMAND	
-Ciphering algorithm not supported		2
-Circuit pool mismatch		1
-Equipment failure	-Relocation cancelled	
-Invalid message contents	-Abstract Syntax Error	
-No radio resource available		2
-O and M intervention	-O and M intervention	
-Radio interface failure, reversion to old channel	-Relocation cancelled	
-Radio interface message failure	-Relocation cancelled	
-Requested speech version unavailable		2
-Requested terrestrial resource unavailable		2
-Requested transcoding/rate adaption unavailable		2
-Switch circuit pool		1
-Terrestrial circuit already allocated	-Relocation cancelled	
-Any other value	-Relocation cancelled	

NOTE 1: Cause code not used at inter-system handover.

NOTE 2: Cause code not applicable to this traffic case.

The mapping between the cause codes received in RANAP Relocation Failure and the cause codes sent in BSSMAP Handover Failure is as follows (this mapping is only used for the MAP-E interface):

25.413	08.08	Notes
RELOCATION FAILURE	HANDOVER FAILURE	
-GERAN Iu-mode failure	-GERAN Iu-mode failure	
-Any other value	-No radio resource available	

The mapping between the cause codes received in RANAP Relocation Failure and the cause codes sent in BSSMAP Handover Required~~est~~ Reject is as follows:

25.413	08.08	Notes
RELOCATION FAILURE	HANDOVER REQUIRED REJECT	
-GERAN Iu-mode failure	-GERAN Iu-mode failure	
-Any other value	-No radio resource available	

The mapping between the RANAP and the BSSMAP assignment messages is used in the MAP-E interface. RANAP RAB Assignment Response with successful result is mapped to BSSMAP Assignment Complete; RANAP RAB Assignment Response with unsuccessful result is mapped to BSSMAP Assignment Failure. The mapping between the cause codes received in RANAP RAB Assignment Response and the cause codes sent in BSSMAP Assignment Failure is as follows (this mapping is only used for the MAP-E interface):

25.413	08.08	Notes
RAB ASSIGNMENT RESPONSE	ASSIGNMENT FAILURE	
-Requested traffic class not available	–No radio resource available	
-Invalid RAB parameters value	–Invalid msg. contents	
-Requested max bit rate not available	–No radio resource available	
-Requested max bit rate for DL not available	–No radio resource available	
-Requested max bit rate for UL not available	–No radio resource available	
-Requested guaranteed bit rate not available	–No radio resource available	
-Requested guaranteed bit rate for DL not available	–No radio resource available	
-Requested guaranteed bit rate for UL not available	–No radio resource available	
-Requested transfer delay not achievable	–No radio resource available	
-Invalid RAB param. combination	–Invalid msg. contents	
-Condition violation for SDU parameters	–Invalid msg. contents	
-Condition violation for traffic handling priority	–Invalid msg. contents	
-Condition violation for guaranteed bit rate	–Invalid msg. contents	
-User plane not supported	–No radio resource available	
-Iu UP failure	–Equipment failure	
-Tqueuing expiry	–Radio interface message failure	
-Invalid RAB id	–Invalid msg. contents	
-Request superseeded	–No radio resource available	
-Relocation triggered	-No radio resource available	
-GERAN Iu-mode failure	-GERAN Iu-mode failure	
-Any other value	–Radio interface message failure	

The mapping between the cause codes received in RANAP Location Report and the cause codes sent in BSSMAP Handover Performed is as follows (this mapping is only used for the MAP-E interface):

25.413	08.08	Notes
LOCATION REPORT	HANDOVER PERFORMED	
-User restriction start ind.	–O&M intervention	
-User restriction start ind.	–O&M intervention	
-Requested report type not supported		1
-Any other value	-Better cell	

NOTE 1: In this case, no Handover Performed is sent.

4.8 Inter-MSC Relocation

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4.8.1 Basic Inter-MSC Relocation

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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	1
	RANAP information elements	-target RNC Id -Radio Resource Info -an-APDU(	
		RELOCATION REQUEST, CN INVOKE TRACE)	2
	GERAN classmark	-GERAN classmark	4
Positive result	MAP PREPARE HANDOVER response		3
		-relocation numbers -an-APDU(	
	RELOCATION COMMAND	RELOCATION REQUEST ACKNOWLEDGE	
		or	
	RELOCATION PREP FAILURE	RELOCATION 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 3GPP TS 25.413.

NOTE 3: The response to the Prepare-Handover request can include in its an-APDU parameter, identifying the 3GPP 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.

NOTE 4: If the GERAN Classmark was not received with the RELOCATION REQUIRED message initiating the relocation, 3G_MSC-A shall include any previously received GERAN Classmark. See 3GPP TS 43.051 [17].

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

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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	
	RANAP information elements	-target MSC number -target RNC Id -an-APDU(RELOCATION REQ)	1
	GERAN classmark	-GERAN classmark	3
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 TS 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.

NOTE 3: If the GERAN Classmark was not received with the RELOCATION REQUIRED message initiating the relocation, MSC-B shall include any previously received GERAN Classmark. See 3GPP TS 43.051 [17].

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

********** NEXT MODIFIED SECTION **********

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.

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4.8.5.10 GERAN Classmark

The GERAN Classmark shall be stored by 3G_MSC-B and can be received from MSC-A, from the serving BSS or serving RNS, or from the target RNS. The GERAN Classmark shall be used together with other parameters, e.g. the Channel Type, for selecting a service and for generating RAB parameters for relocation to GERAN Iu-mode, subsequent relocation or handover to GERAN Iu-mode, and RAB (re-)assignment when the MS is in GERAN Iu-mode.

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

Received by 3G_MSC-B in:

- the Prepare Handover Request MAP message.

Transfer of Information due to GERAN Classmark received from the serving RNS:

Received by 3G_MSC-B in:

- the Handover Required BSSMAP message;
- the Relocation Required RANAP message;
- the Initial UE RANAP message; or
- the RAB Assignment Response RANAP message.

Transfer of Information due to GERAN Classmark received from the target RNS:

Received by 3G_MSC-B in:

- the Relocation Failure RANAP message.