

**Source:** TSG CN WG4  
**Title:** CRs on Rel-5 Technical Enhancements and Improvements  
**Agenda item:** 8.8  
**Document for:** APPROVAL

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**Introduction:**

This document contains 11 CRs on Rel-5 Work Item "TEI5", that have been agreed by TSG CN WG4, and are forwarded to TSG CN Plenary meeting #16 for approval.

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
29.002	398	1	N4-020318	Rel-5	Check of NAM and Requesting Node Type on receipt of SendAuthenticationInfo	C	5.1.0
29.232	034		N4-020586	Rel-5	Allow the usage of logical port	C	5.1.0
29.060	311		N4-020329	Rel-5	Clarification on create PDP context for existing PDP context	F	5.1.0
23.205	024		N4-020350	Rel-5	MSC server GTT enhancement	B	5.1.0
29.232	032		N4-020391	Rel-5	Update to TFO package to explicitly reference TS 26.103 for 3GPP codecs	D	5.1.0
29.232	030	1	N4-020491	Rel-5	GTT enhancement on Mc	B	5.1.0
29.232	033	2	N4-020492	Rel-5	CTM Text Transport package	B	5.1.0
29.002	441		N4-020543	Rel-5	Correction of Object Identifiers for ASN.1 modules	F	5.1.0
24.080	020		N4-020544	Rel-5	Correction of Object Identifiers for ASN.1 modules	F	5.0.0
23.205	025		N4-020579	Rel-5	Alignment of terminology regarding GERAN access	B	5.1.0
23.003	045		N4-020719	Rel-5	Use of the TLLI codespace in GERAN lu mode	F	5.2.0

3GPP TSG CN WG4 Meeting #14  
Budapest, Hungary, 13th – 17th May 2002

N4-020719

CR-Form-v4

## CHANGE REQUEST

⌘ **23.003** CR **45** ⌘ ev **-** ⌘ 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:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Use of the TLLI codespace in GERAN lu mode		
<b>Source:</b>	⌘ CN4		
<b>Work item code:</b>	⌘ TEI5 (2345 – Alignment of 3G functional Split and lu)	<b>Date:</b>	⌘ 18/04/2002
<b>Category:</b>	⌘ <b>F</b> Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="http://www.3gpp.org/ftp/Specs/3GPP2/2345-TR-21.900">TR 21.900</a> .	<b>Release:</b>	⌘ <b>REL-5</b> Use <u>one</u> of the following releases: <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘ A currently reserved section of the TLLI codespace has been re-used for the G-RNTI identifier in GERAN lu mode and this must be indicated in the CN identifiers specification to prevent re-use of these values.
<b>Summary of change:</b>	⌘ Bit combination used by G-RNTI in GERAN is indicated in the TLLI table, and the structure of the G-RNTI is added to align with current description of TLLI values
<b>Consequences if not approved:</b>	⌘ There is a risk that a future enhancement which makes use of the TLLI codespace will use the same values as the G-RNTI

<b>Clauses affected:</b>	⌘ 1.1, 2.6		
<b>Other specs Affected:</b>	⌘ <input checked="" type="checkbox"/> Other core specifications	⌘ 44.060	
	<input type="checkbox"/> Test specifications		
	<input type="checkbox"/> O&M Specifications		
<b>Other comments:</b>	⌘		

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Comprehensive information and tips about how to create CRs can be found at: [http://www.3gpp.org/3G\\_Specs/CRs.htm](http://www.3gpp.org/3G_Specs/CRs.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/](http://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.





## CHANGE REQUEST

⌘ **23.205 CR 024** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

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

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ MSC server GTT enhancement		
<b>Source:</b>	⌘ CN4		
<b>Work item code:</b>	⌘ TEI5	<b>Date:</b>	⌘ 28.3.2002
<b>Category:</b>	⌘ <b>B</b>	<b>Release:</b>	⌘ REL-5
	<i>Use one of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		<i>Use one of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘ 3GPP TS 23.205 needs to be enhanced according to 3GPP TS 23.226 (Rel5) to support pooling mechanism of GTT feature, which is one alternative solution for CTM to V.18 conversion in Bearer independent core network. If CTM need is indicated by MT, MSC server has to have capability to create CTM channel.
<b>Summary of change:</b>	⌘ General GTT description and reference to GTT spec. is added. MOC and MTC descriptions are enhanced with indication when H.248 procedures are affected. Conditional "Text telephone" and "Call discrimination" information elements are added to Establish Bearer procedure. Conditional "Text Conversation" and "Cellular Text telephony modem" information elements are added to Prepare Bearer procedure.
<b>Consequences if not approved:</b>	⌘ GTT does not work like specified in 3GPP 23.226.

<b>Clauses affected:</b>	⌘ 2, 6.1.1, 6.1.2, 6.2.1.2, 6.2.2.2 16.2.4 and 16.2.5		
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	
<b>Other comments:</b>	⌘		

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- 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 \*\*\*\***

## 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 TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.002: "Network Architecture".
- [3] 3GPP TS 23.153: "Out of Band Transcoder Control; Stage 2".
- [4] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".
- [5] ITU-T Recommendation H.248: "Gateway Control Protocol".
- [6] 3GPP TS 29.232: "Media Gateway Controller (MGC); Media Gateway (MGW) interface; Stage 3".
- [7] 3GPP TS 29.415: "Core Network Nb User Plane Protocols; Stage 3".
- [8] 3GPP TS 23.009: "Handover procedures".
- [9] 3GPP TS 23.072: "Call Deflection (CD) supplementary service; Stage2".
- [10] 3GPP TS 23.078: "Customized Applications for Mobile network Enhanced Logic (CAMEL) - Phase 3; Stage 2".
- [11] 3GPP TS 23.079: "Support of Optimal Routeing (SOR); Technical Realisation".
- [12] 3GPP TS 23.082: "Call Forwarding (CF) Supplementary Services; Stage 2".
- [13] 3GPP TS 23.083: "Call Waiting (CW) and Call Hold (HOLD) Supplementary Services; Stage 2".
- [14] 3GPP TS 23.084: "Digital cellular telecommunications system (Phase 2+); Multi Party (MPTY) Supplementary Service; Stage 2".
- [15] 3GPP TS 23.091: "Explicit Call Transfer (ECT) Supplementary Service; Stage 2".
- [16] 3GPP TS 23.093: "Technical realisation of Completion of Calls to Busy Subscriber (CCBS); Stage 2".
- [17] 3GPP TS 23.135: "Multicall supplementary service; Stage 2".
- [18] 3GPP TS 23.108: "Mobile radio interface layer 3 specification; Core Network Protocols; Stage 2".
- [19] GSM TS 02.32: "Immediate Service Termination (IST); Service Description; Stage 1".
- [20] 3GPP TS 25.415: "UTRAN Iu Interface User Plane Protocols".



- [21] 3GPP TS 29.414: "Core Network Nb Data Transport and Transport Signalling".
- [22] 3GPP TS 29.205: "Application of Q.1900 Series to Bearer Independent circuit-switched core network architecture; Stage 3".
- [23] 3GPP TS 29.010: "Information element mapping between Mobile Station - Base Station System (MS - BSS) and Base Station System - Mobile-services Switching Centre (BSS - MSC); Signalling procedures and the Mobile Application Part (MAP)".
- [24] GSM TS 03.45: "Technical realization of facsimile group 3 transparent".
- [25] 3GPP TS 23.146: "Technical realization of facsimile group 3 non-transparent".
- [26] 3GPP TS 23.226: "Global Text Telephony (GTT)"

### 3 Definitions, symbols and abbreviations

## \*\*\* Second Modified Section \*\*\*

### 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, and provides the MGW with the bearer characteristics. For speech calls, the MSC server shall provide the MGW with the speech coding information and conditionally GTT related information in accordance with 3GPP TS 23.226 [26] 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).

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).

#### 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

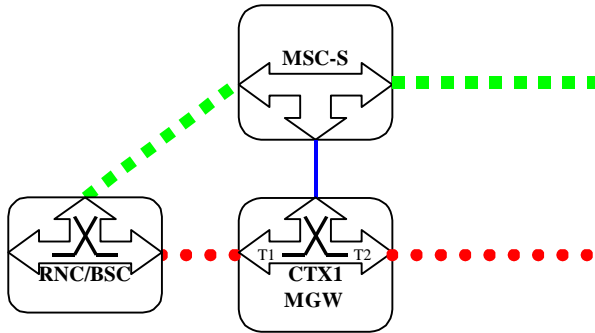
A voice processing function located on the MGW may be used to achieve desired acoustic quality on the bearer terminations. The MSC server shall request the activation of voice processing functions in the bearer terminations. For non-speech calls, the MSC server has the ability to instruct the MGW to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

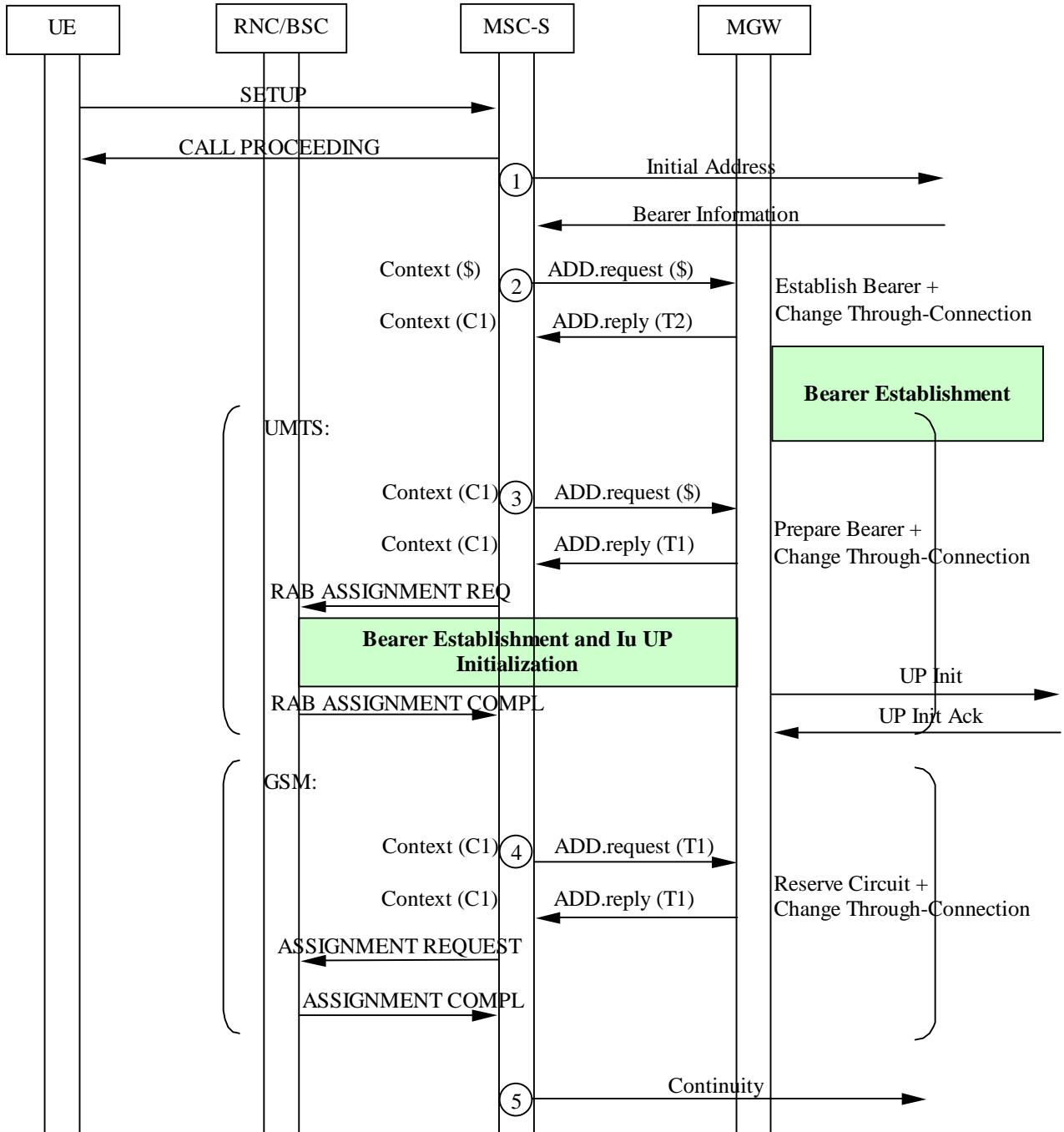
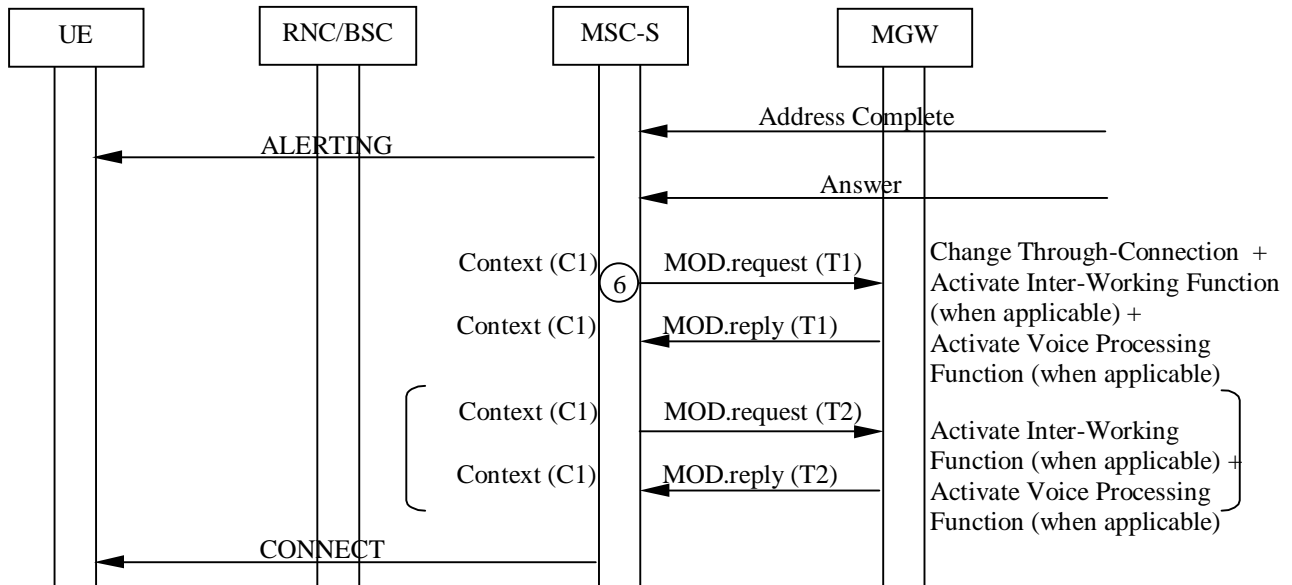


Figure 6.2/1 Basic Mobile Originating Call, Forward Bearer Establishment (message sequence chart)



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

**\*\*\* Third Modified Section \*\*\***

### 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, and provides the MGW with the bearer characteristics. For speech calls, the MSC server shall provide the MGW with the speech coding information and conditionally GTT related information in accordance with 3GPP TS 23.226 [26] 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).

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).

### 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

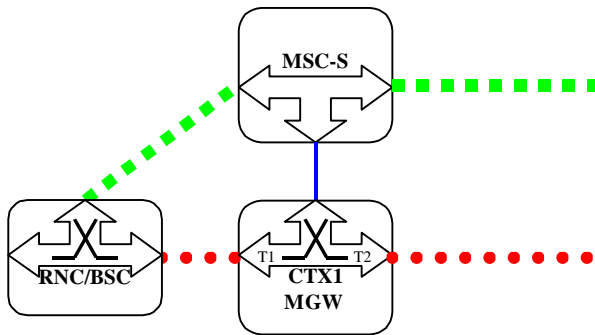
A voice processing function located on the MGW may be used to achieve desired acoustic quality on the bearer terminations. The MSC server shall request the activation of the voice processing functions in the bearer terminations. For non-speech calls, the MSC server has the ability to instruct the MGW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

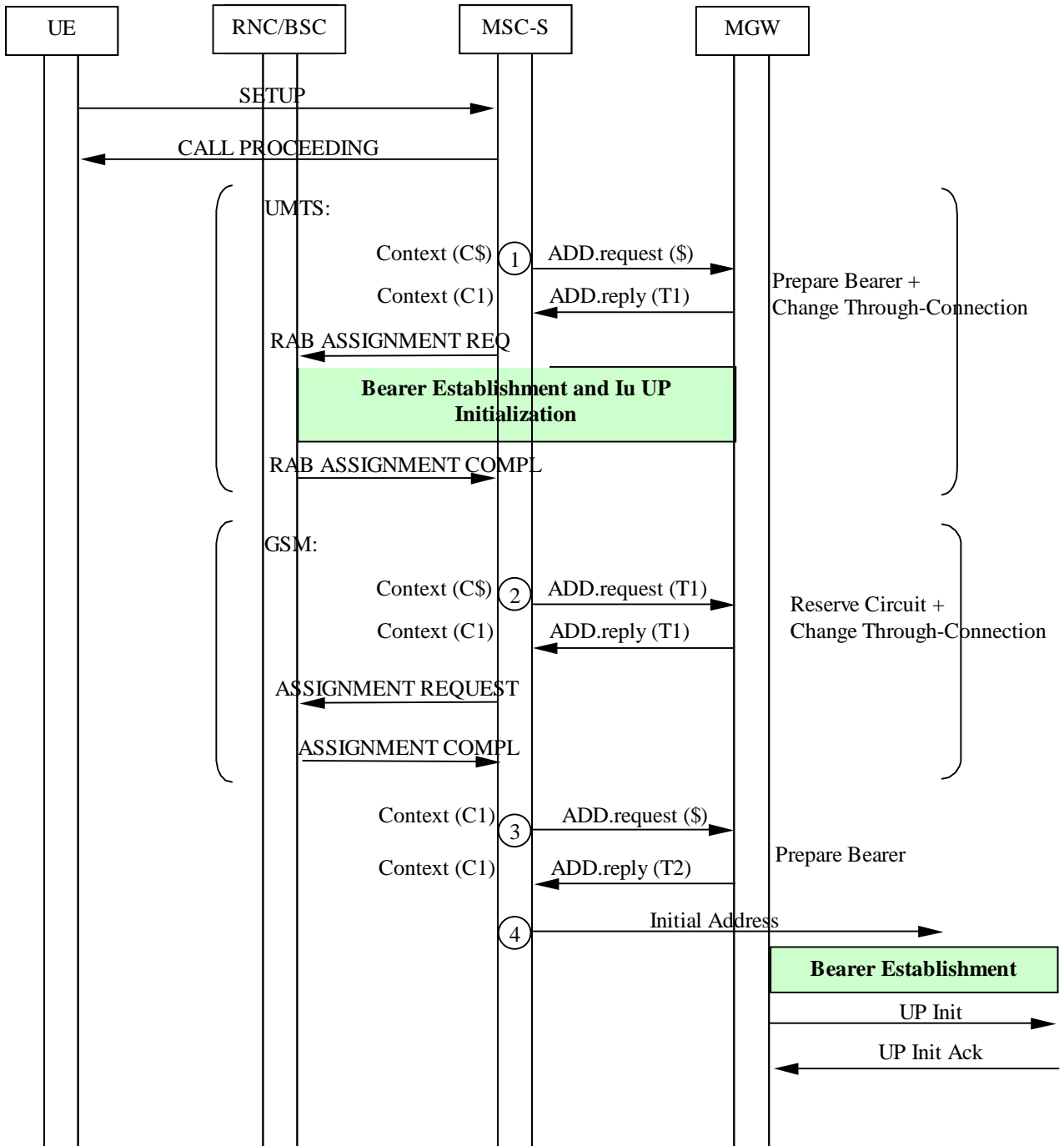


Figure 6.4/1 Basic Mobile Originating Call, Backward Bearer Establishment (message sequence chart)



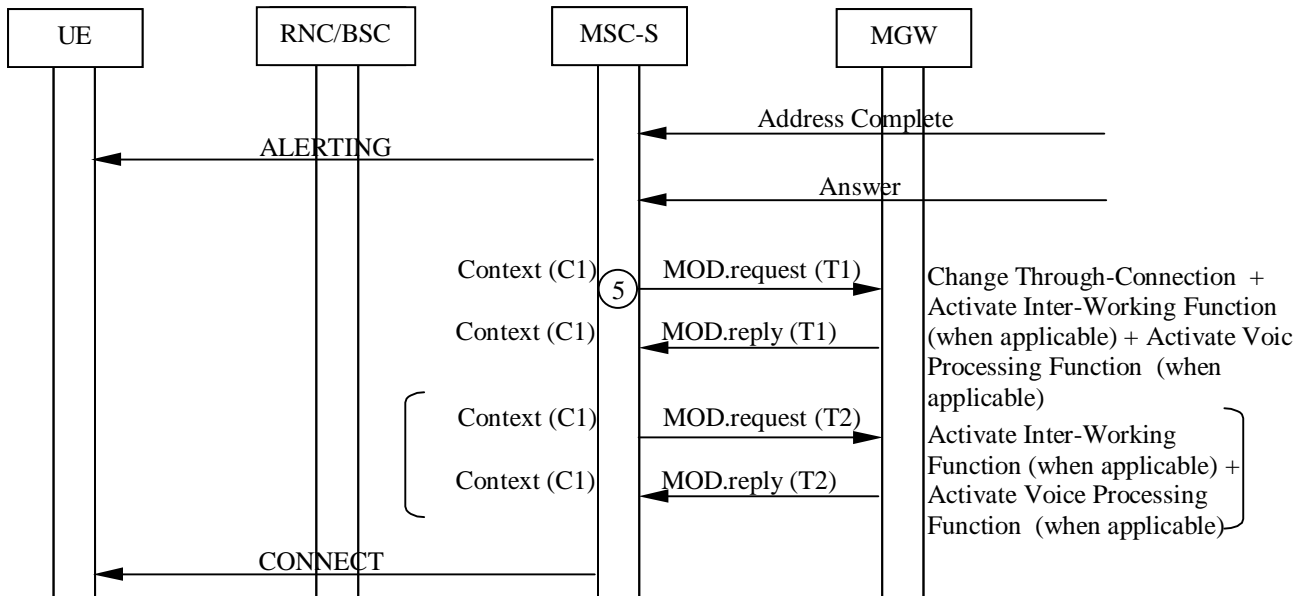


Figure 6.4/2 Basic Mobile Originating Call, Backward Bearer Establishment (message sequence chart continue)

**\*\*\*\* Fourth Modified Section \*\*\*\***

### 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, and provides the MGW with the bearer characteristics. For speech calls, the MSC server shall provide the MGW with the speech coding information and conditionally GTT related information in accordance with 3GPP TS 23.226 [26] 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).

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).

### 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.

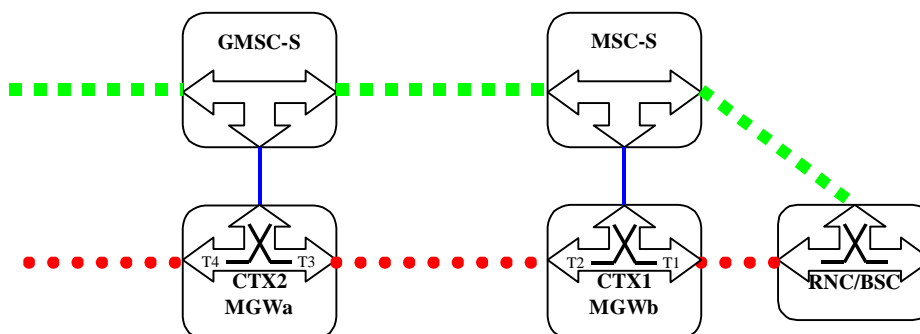


Figure 6.5 Basic Mobile Terminating Call Forward Bearer Establishment (network model)

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.

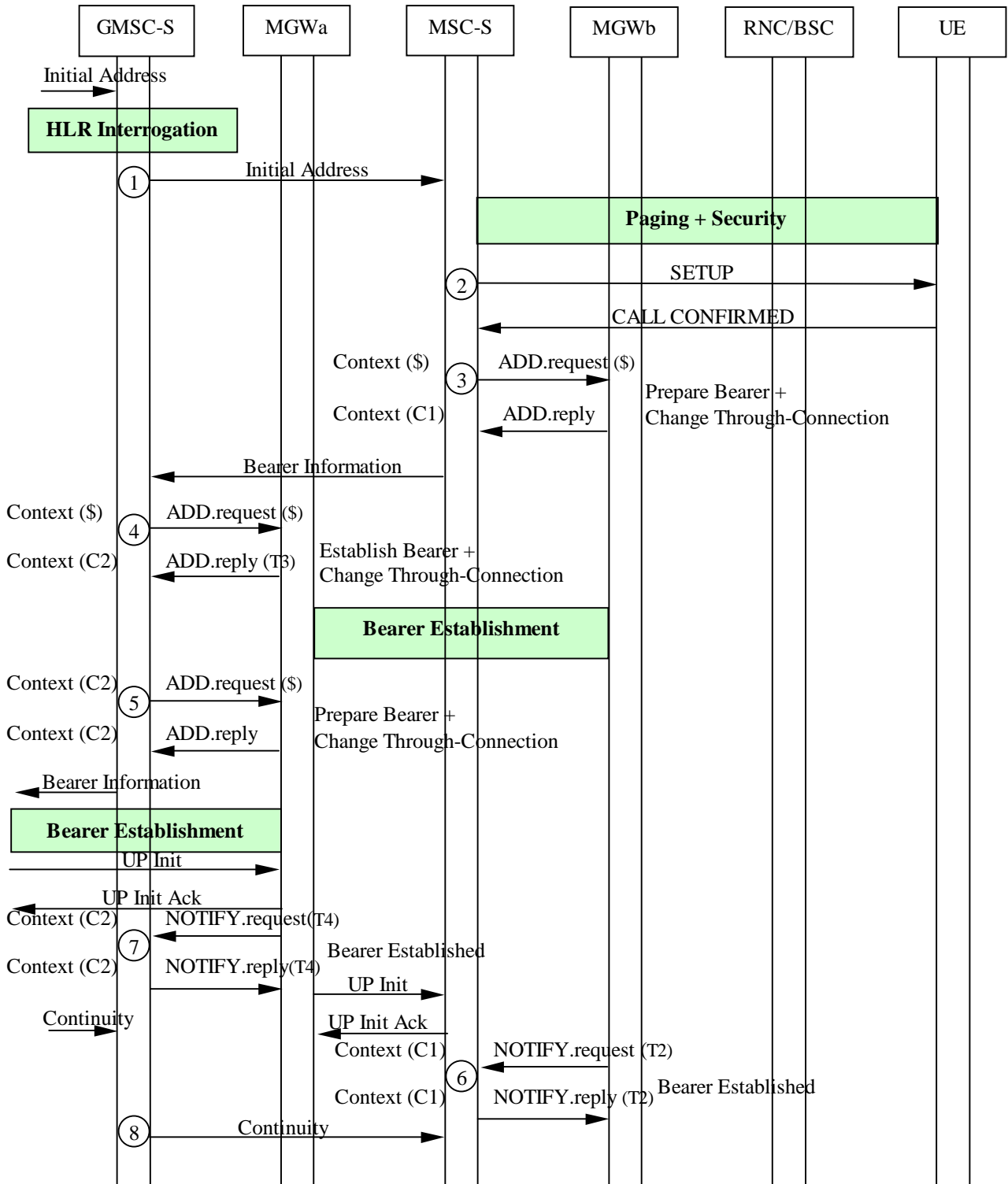


Figure 6.6/1 Basic Mobile Terminating Call, Forward Bearer Establishment (message sequence chart)

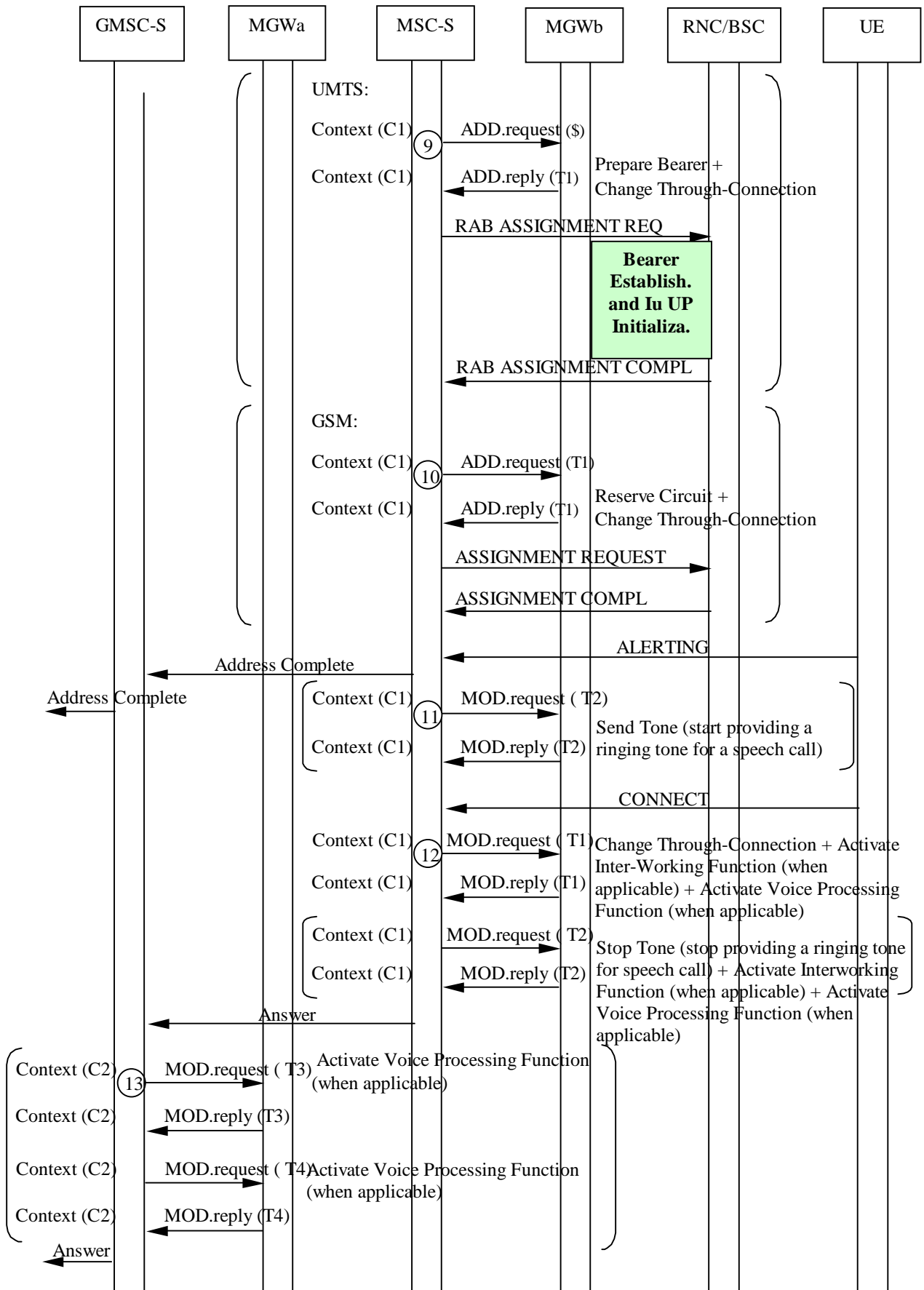


Figure 6.6/2 Basic Mobile Terminating Call, Forward Bearer Establishment (message sequence chart continue)

**\*\*\*\* Fifth Modified Section \*\*\*\***

## 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 and provides the MGW with the bearer characteristics. For speech calls, the MSC server shall provide

the MGW with the speech coding information and conditionally GTT related information in accordance with 3GPP TS 23.226 [26] 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).

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).

#### 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.

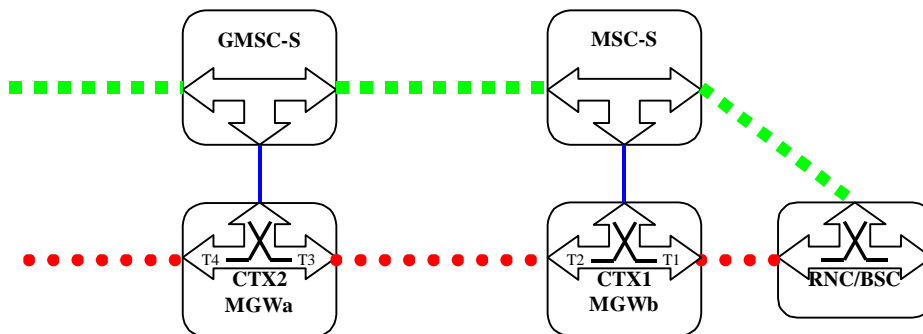


Figure 6.7 Basic Mobile Terminating Call, Backward Bearer Establishment (network model)

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.

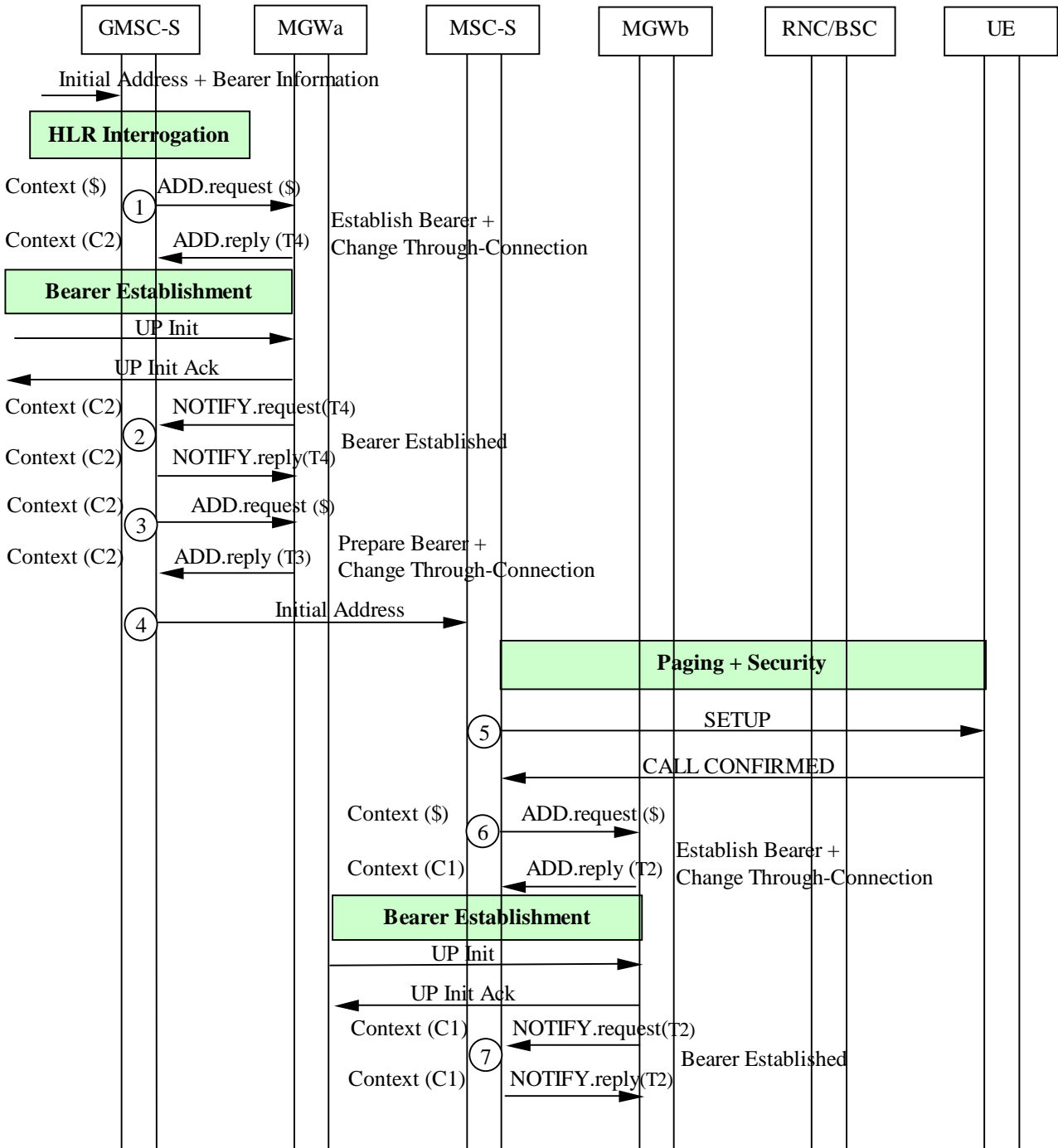


Figure 6.8/1 Basic Mobile Terminating Call, Backward Bearer Establishment (message sequence chart)

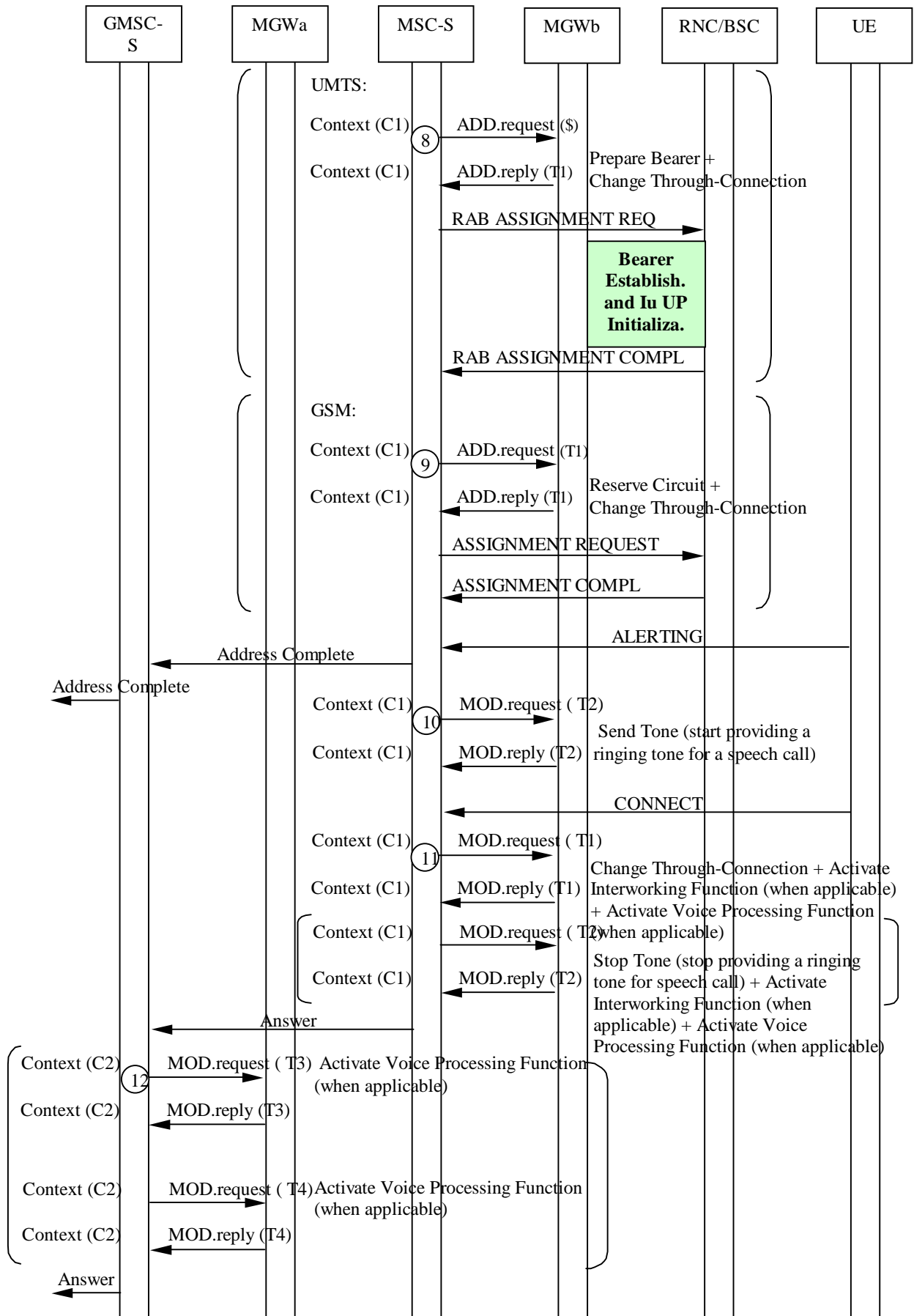


Figure 6.8/2 Basic Mobile Terminating Call, Backward Bearer Establishment (message sequence chart continue)

**\*\*\*\* Sixth Modified Section \*\*\*\***

## 14.7 Global Text Telephony

3GPP TS 23.226 [26] describes the high level architecture and functionality of GTT. When text based conversation is needed by a subscriber, the call is established with general call control functions like any other call. Within the call control transactions MT might indicate the need for text conversation (see 3GPP TS 24.008 [4]), which then requires actions in a core network where the pooling mechanism is chosen for GTT feature.

MSC Server indicated by MT about the need of text conversation, allocates terminations in MGW with CTM (Cellular Text telephony Modem) capabilities for the detection of CTM signals from radio access network. The default action of the call path in the CTM-detection/conversion function in MGW is to transfer audio transparently while monitoring for text telephone signals. When valid text telephone signals are detected, the converting action of the channel takes effect. The path converts between the detected CTM and PSTN text telephone methods. This mode of operation continues until text signaling ceases. Then transparent audio transport is re-established, again monitoring for text signals.

The CTM channel is created with Prepare bearer procedure by including Cellular Text Telephone package and Establish Bearer procedure by including Text Telephone and Call Discrimination packages (see 16.2.4 and 16.2.5).

**\*\*\*\* Seventh Modified Section \*\*\*\***

### 16.2.4 Establish Bearer

This procedure is used to request a bearer establishment.

Table 16.5: Procedures between (G)MSC server and MGW: Establish Bearer

Procedure	Initiated	Information element name	Information element required	Information element description
Establish Bearer	(G)MSC-S	Context/Context Request	M	This information element indicates the existing context or requests a new context for the bearer termination.
		Bearer Termination/Bearer Termination Request	M	This information element indicates the existing bearer termination or requests a new bearer termination for the bearer to be established.
		Bearer Establishment Request	M	This information element requests establishment of a bearer.
		Destination Binding Reference	M	This information element indicates the bearer identifier in the destination MGW.
		Destination Bearer Address	M	This information element indicates the bearer address of the destination MGW.
		Bearer Characteristics	M	This information element indicates the characteristics of the bearer connection.
		Bearer Service Characteristics	C	This information element indicates the bearer service requested by the user. This information element is included if neither Codec information element nor Circuit Switched Data information elements are provided.
		Notify Established Bearer	O	This information element requests a notification of an established bearer.
		Tunnel Support	O	This information element indicates the support of tunnel data transfer and when to send tunnel data.
		Circuit Switched Data	C	This information element indicates the PLMN bearer capabilities and when applicable GSM channel coding. This information element is included for a non-speech call by the MSC server, or by the anchor-MSC in case of inter-MSC handover, for a radio access network side bearer termination.
		Framing Protocol	O	This information element indicates the framing protocol to be used for the bearer.
		<u>Call Type Discrimination</u>	<u>C</u>	<u>This information element supports modem signaling for GTT feature.</u>
		<u>Text Telephone</u>	<u>C</u>	<u>This information element supports interworking with PSTN text telephone.</u>
Establish Bearer Ack	MGW	Context	M	This information element indicates the context where the command was executed.
		Bearer Termination	M	This information element indicates the bearer termination where the command was executed.
		Tunnel Usage	O	This information element indicates the usage of tunnel data transfer in the call control protocol.

**\*\*\* Eight Modified Section \*\*\***

## 16.2.5 Prepare Bearer

This procedure is used to prepare for a bearer establishment.

**Table 16.6: Procedures between (G)MSC server and MGW: Prepare Bearer**

Procedure	Initiated	Information element name	Information element required	Information element description
Prepare Bearer	(G)MSC-S	Context/Context Request	M	This information element indicates the existing context or requests a new context for the bearer termination.
		Bearer Termination Request	M	This information element requests a new bearer termination for the bearer to be established.
		Binding Reference Request	M	This information element requests the bearer identifier in the MGW.
		Bearer Address Request	M	This information element requests the bearer address of the MGW.
		Sender Binding Reference	O	This information element indicates the bearer identifier of the sending MGW.
		Sender Bearer Address	O	This information element indicates the bearer address of the sending MGW.
		Bearer Characteristics/ Bearer Characteristics Requests	M	This information element indicates the preferred characteristics of the bearer connection or requests the MGW to select and provide the bearer characteristics.
		Bearer Service Characteristics	C	This information element indicates the bearer service requested by the user. This information element is included if neither Codec information element nor Circuit Switched Data information elements are provided.
		Notify Established Bearer	O	This information element requests a notification of an established bearer.
		Tunnel Support	O	This information element indicates the support of tunnel data transfer and when to send tunnel data.
		Circuit Switched Data	C	This information element indicates the PLMN bearer capabilities and when applicable GSM channel coding. This information element is included for a non-speech call by the MSC server, or by the anchor-MSC in case of inter-MSC handover, for a radio access network side bearer termination.
		Codec	C	This information element indicates the speech coding format to be used for the bearer. This information element is included for a speech call for a radio access network side bearer termination.
		Framing Protocol	O	This information element indicates the framing protocol to be used for the bearer.
<u>Cellular Text telephony modem</u>	<u>C</u>	<u>This information element indicates the need of CTM function.</u>		
Prepare Bearer Ack	MGW	Context	M	This information element indicates the context where the command was executed.
		Bearer Termination	M	This information element indicates the bearer termination where the command was executed.
		Binding Reference	M	This information element indicates the bearer identifier in the MGW.
		Bearer Address	M	This information element indicates the bearer address of the MGW

		Bearer Characteristics	C	This information element indicates the characteristics of the bearer connection. This information element is included, if requested by the (G)MSC server or changed from the (G)MSC server preferred one.
		Tunnel Usage	O	This information element indicates the usage of tunnel data transfer in the call control protocol.

**\*\*\* End of modifications \*\*\***



## CHANGE REQUEST

⌘ **23.205 CR 025** ⌘ rev **1** ⌘ Current version: **5.1.0** ⌘

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

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Alignment of terminology regarding GERAN access		
<b>Source:</b>	⌘ CN4		
<b>Work item code:</b>	⌘ TEI	<b>Date:</b>	⌘ 30.04.2002
<b>Category:</b>	⌘ <b>B</b>	<b>Release:</b>	⌘ REL-5
	<i>Use one of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		<i>Use one of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘ In Release 5 the lu interface was introduced to the GERAN architecture. GERAN will reuse existing procedures already defined for UTRAN. Therefore the terms "A/Gb mode" and "lu mode" are introduced.
<b>Summary of change:</b>	⌘ Section 1 Scope is enhanced by GERAN lu Interface. Reference to GERAN stage 2 specification is added. Several references are updated. "GERAN" is added to section 3.2 Abbreviations New terminology is introduced, i.e. terms "lu mode" and "A/Gb mode"
<b>Consequences if not approved:</b>	⌘ The terminology used is not consistent between specifications.

<b>Clauses affected:</b>	⌘ 1, 2, 3.2, 3.3, 6.1.1, 6.1.2, 6.2.1.2, 6.2.2.2, 7.1.2, 7.2.2, 7.3.2, 7.4.2, 8.1, 8.1.1, 8.1.2, 8.1.3, 8.1.4, 8.2, 8.3, 13.17, 14.2		
<b>Other specs affected:</b>	⌘ <input checked="" type="checkbox"/> Other core specifications	⌘ 3GPP TS 48.008 039, 3GPP TS 25.413, 3GPP TS 23.153 031, 3GPP TS 43.051 036	
	<input type="checkbox"/> Test specifications		
	<input type="checkbox"/> O&M Specifications		
<b>Other comments:</b>	⌘		

### How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: [http://www.3gpp.org/3G\\_Specs/CRs.htm](http://www.3gpp.org/3G_Specs/CRs.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.

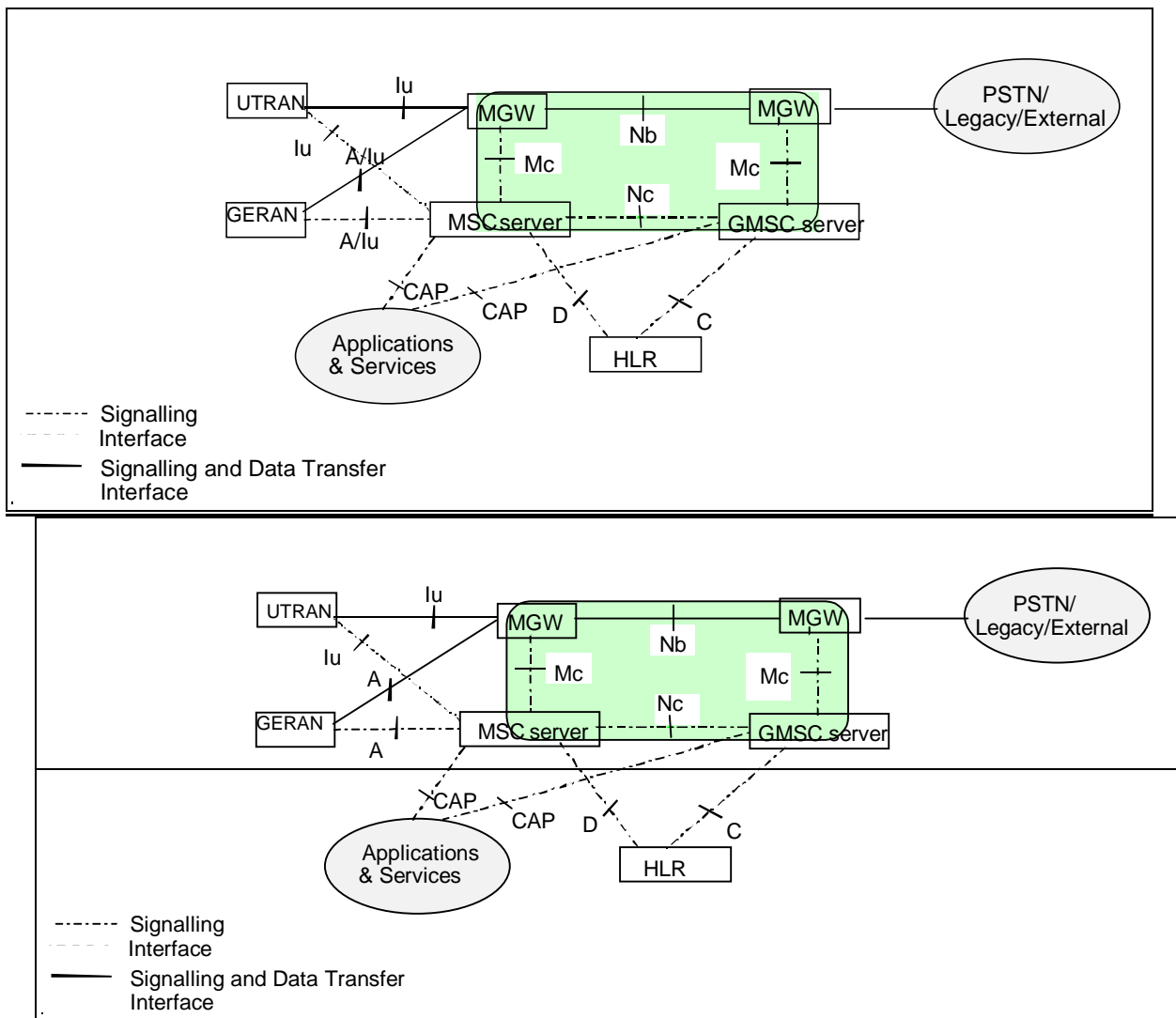
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

# 1 Scope

The present document defines the stage 2 description for the bearer independent CS core network. The stage 2 shall cover the information flow between the GMSC server, MSC server and media gateways. Note that nothing in the present document shall preclude an implementation of a combined MSC Server and MGW. The present document shall show the CS core network termination of the Iu interface in order to cover the information flow stimulus to the core network and describe the interaction with the supplementary and value added services and capabilities.

For the purposes of the present document, the protocol used over the Nc interface is an enhanced call control protocol supporting call bearer separation such as BICC (which is specified in [22]). The protocol used over the Mc interface is H.248 (which is specified in [5]). Existing specifications and recommendations shall not be repeated, as such the relevant specification shall be referred to.

The present document is applicable only for ATM or IP transport in the CS core network.



**Figure 1: CS core network logical architecture**

The CAP interfaces and the interfaces towards the HLR are outside the scope of the present document.

Details of Transcoder-Free Operation are outside the scope of the present document. Please see 3GPPTS 23.153 [3] for more information.

\*\*\*\*\* NEXT MODIFICATION \*\*\*\*\*

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## 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 TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.002: "Network Architecture".
- [3] 3GPP TS 23.153: "Out of Band Transcoder Control; Stage 2".
- [4] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".
- [5] ITU-T Recommendation H.248: "Gateway Control Protocol".
- [6] 3GPP TS 29.232: "Media Gateway Controller (MGC); Media Gateway (MGW) interface; Stage 3".
- [7] 3GPP TS 29.415: "Core Network Nb User Plane Protocols; Stage 3".
- [8] 3GPP TS 23.009: "Handover procedures".
- [9] 3GPP TS 23.072: "Call Deflection (CD) supplementary service; Stage2".
- [10] 3GPP TS 23.078: "Customized Applications for Mobile network Enhanced Logic (CAMEL) - Phase 3; Stage 2".
- [11] 3GPP TS 23.079: "Support of Optimal Routeing (SOR); Technical Realisation".
- [12] 3GPP TS 23.082: "Call Forwarding (CF) Supplementary Services; Stage 2".
- [13] 3GPP TS 23.083: "Call Waiting (CW) and Call Hold (HOLD) Supplementary Services; Stage 2".
- [14] 3GPP TS 23.084: "Digital cellular telecommunications system (Phase 2+); Multi Party (MPTY) Supplementary Service; Stage 2".
- [15] 3GPP TS 23.091: "Explicit Call Transfer (ECT) Supplementary Service; Stage 2".
- [16] 3GPP TS 23.093: "Technical realisation of Completion of Calls to Busy Subscriber (CCBS); Stage 2".
- [17] 3GPP TS 23.135: "Multicall supplementary service; Stage 2".
- [18] 3GPP TS 23.108: "Mobile radio interface layer 3 specification; Core Network Protocols; Stage 2".
- [19] ~~GSM~~ 3GPP TS 0242.032: "Immediate Service Termination (IST); Service Description; Stage 1".
- [20] 3GPP TS 25.415: "UTRAN Iu Interface User Plane Protocols".
- [21] 3GPP TS 29.414: "Core Network Nb Data Transport and Transport Signalling".
- [22] 3GPP TS 29.205: "Application of Q.1900 Series to Bearer Independent circuit-switched core network architecture; Stage 3".

- [23] 3GPP TS 29.010: "Information element mapping between Mobile Station - Base Station System (MS - BSS) and Base Station System - Mobile-services Switching Centre (BSS - MSC); Signalling procedures and the Mobile Application Part (MAP)".
- [24] ~~GSM~~ 3GPP TS ~~0343.045~~: "Technical realization of facsimile group 3 transparent".
- [25] 3GPP TS 23.146: "Technical realization of facsimile group 3 non-transparent".
- [26] 3GPP TS 25.413: "UTRAN Iu Interface RANAP Signalling"
- [27] 3GPP TS 48.008: "Mobile-services Switching Centre – Base Station System (MSC – BSS) interface; layer 3 specification"
- [28] 3GPP TS 43.051: "Technical Specification Group GSM/EDGE; Radio Access Network; Overall description - Stage 2:"

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

### 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BCF	Bearer Control Function
BICC	Bearer Independent Call Control
CIC	Call Instance Code
CCF	Call Control Function
CS	Circuit Switched
<u>GERAN</u>	<u>GSM/EDGE Radio Access Network</u>
IAM	Initial Address Message
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
MGW	Media Gateway
MGC	Media Gateway Controller
MSC-S	MSC Server
MTP2	Message Transfer Part layer 2
MTP3	Message Transfer Part layer 3
NNI	Network-Network interface
RAB	Radio Access Bearer
RANAP	Radio Access Network Application Protocol
<u>SBSS</u>	<u>Serving Base Station System</u>
<u>SRNS</u>	<u>Serving Radio Network Subsystem</u>
TCAP	Transaction Capabilities Application Part
TFO	Tandem free operation
TRAU	Transcoder and Rate Adapter Unit
TrFO	Transcoder free operation
UDP	User Datagram Protocol
UTRAN	UMTS Terrestrial Radio Access Network

\*\*\*\*\*NEXT (NEW) MODIFICATION\*\*\*\*\*

### 3.3 Definitions

**UE :** User equipment. This specification makes no distinction between MS (mobile station) and UE.

**A/Gb mode:** mode of operation of the UE 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 UE 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 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~~UMTS, 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, and 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 [26]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/GSM, 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

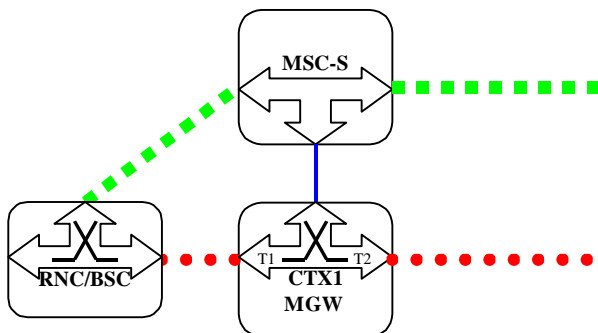
A voice processing function located on the MGW may be used to achieve desired acoustic quality on the bearer terminations. The MSC server shall request the activation of voice processing functions in the bearer terminations. For non-speech calls, the MSC server has the ability to instruct the MGW to 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/Gb mode for the 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 request 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.



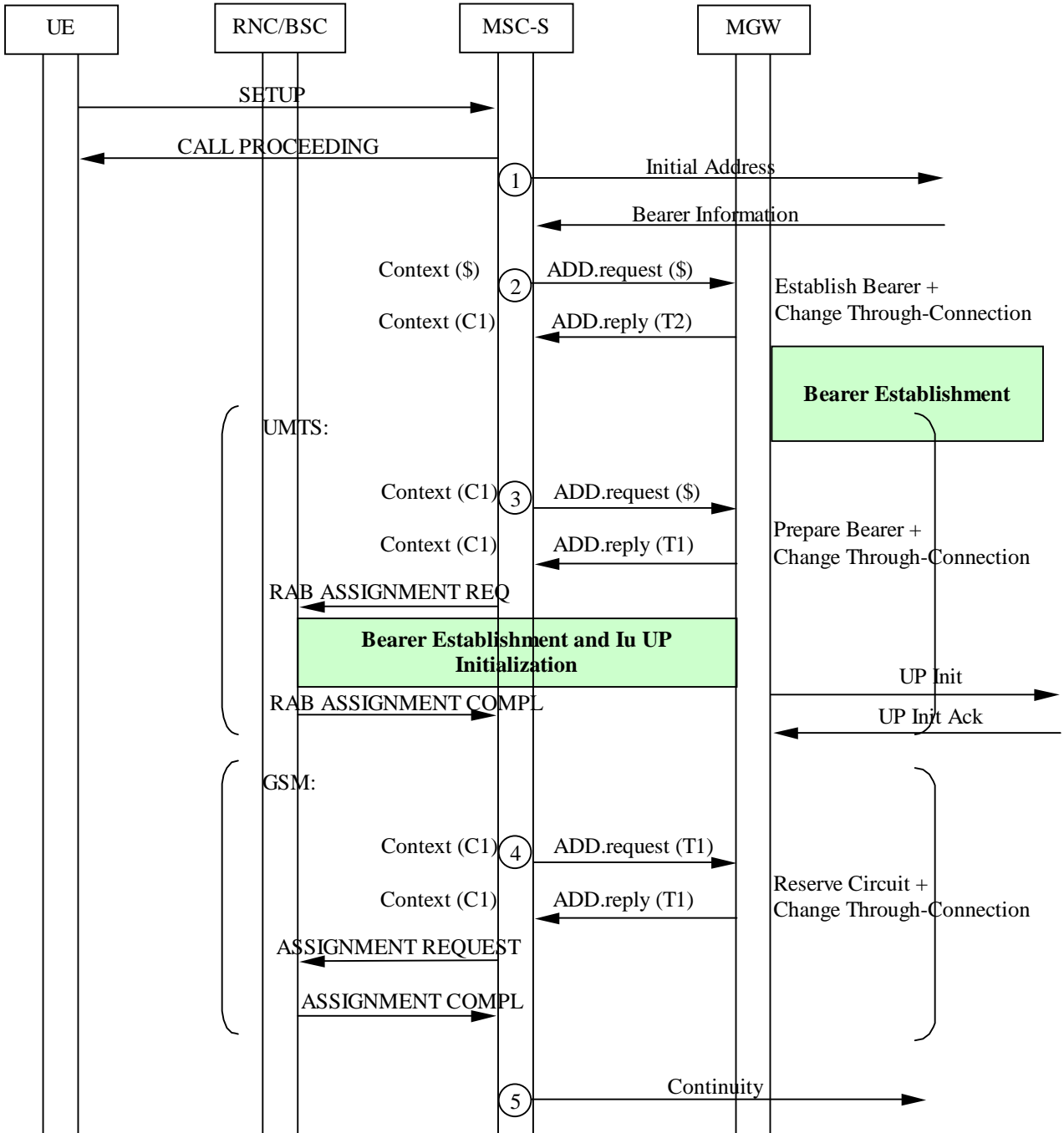
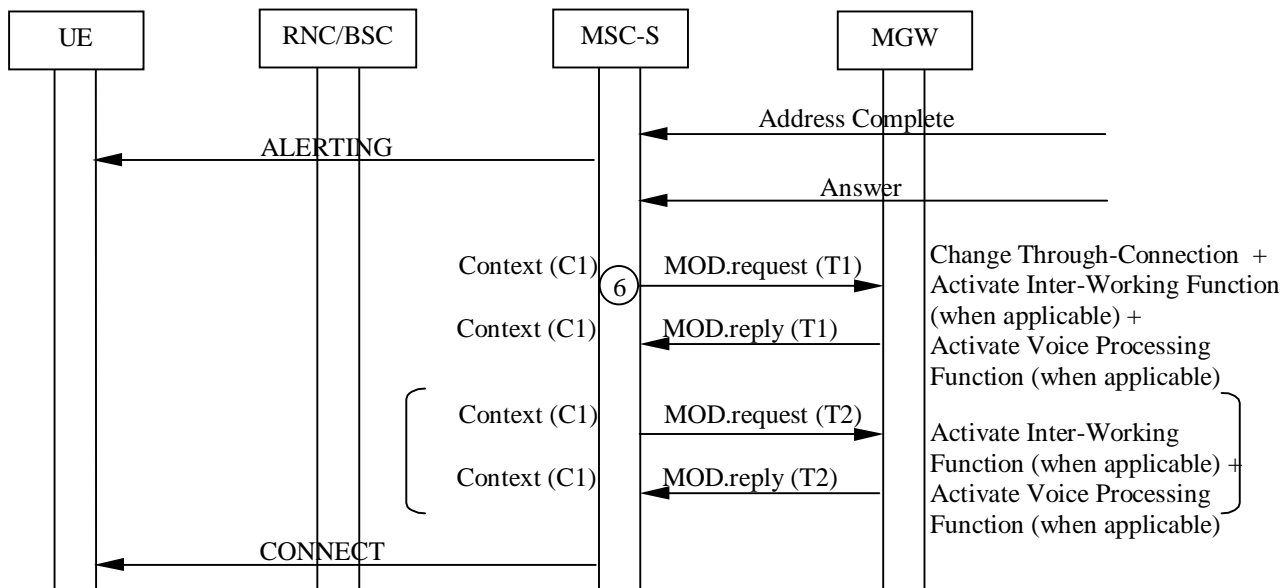


Figure 6.2/1 Basic Mobile Originating Call, Forward Bearer Establishment (message sequence chart)



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

### 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/UMTS, 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, and 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 [26]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 ~~GERANGSM~~, 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

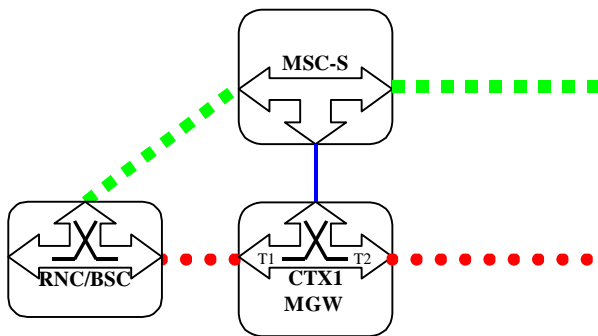
A voice processing function located on the MGW may be used to achieve desired acoustic quality on the bearer terminations. The MSC server shall request the activation of the voice processing functions in the bearer terminations. For non-speech calls, the MSC server has the ability to instruct the MGW 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/Gb mode for the 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.

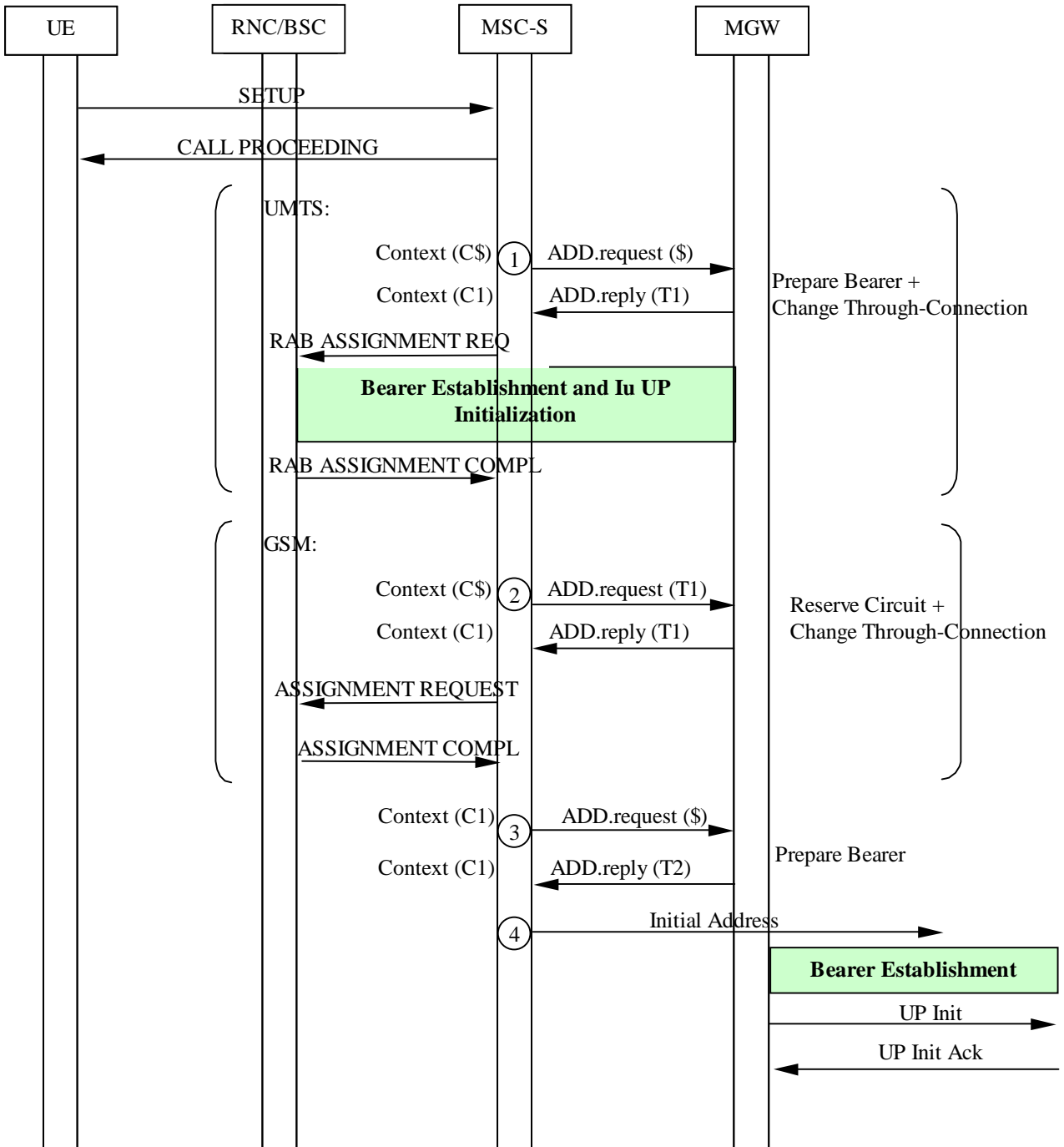


Figure 6.4/1 Basic Mobile Originating Call, Backward Bearer Establishment (message sequence chart)

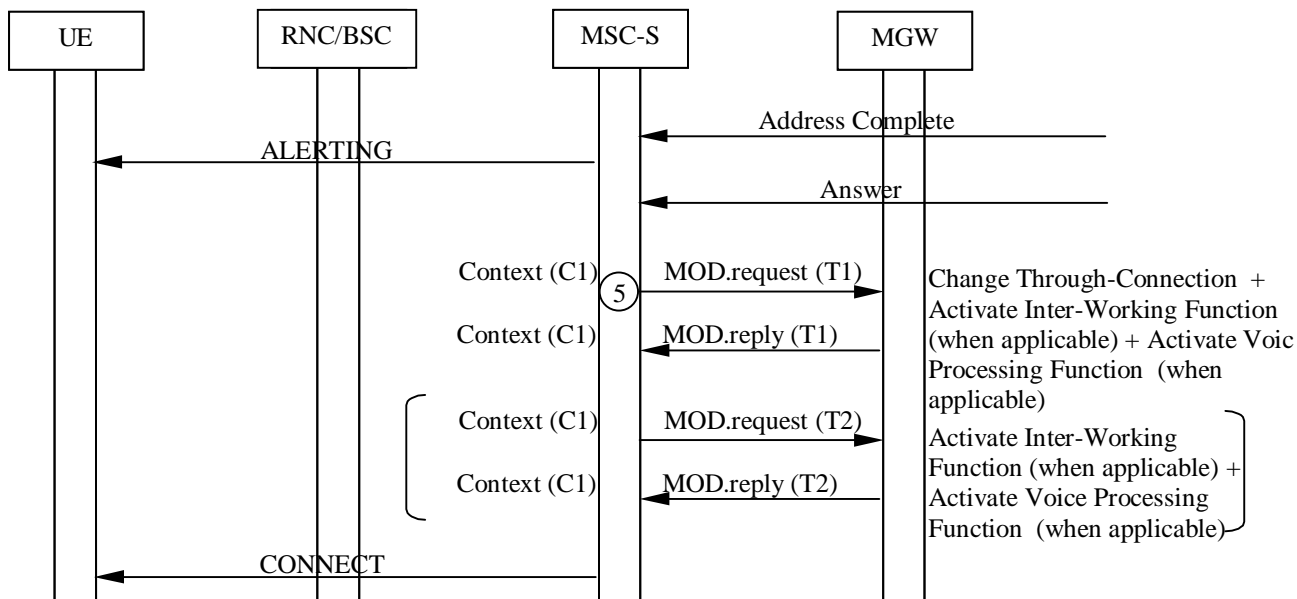


Figure 6.4/2 Basic Mobile Originating Call, Backward Bearer Establishment (message sequence chart continue)

\*\*\*\*\*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~~ ~~UMTS~~ 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, and 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 [26]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~~ ~~GSM~~, 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 [27]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/Gb mode for the 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.

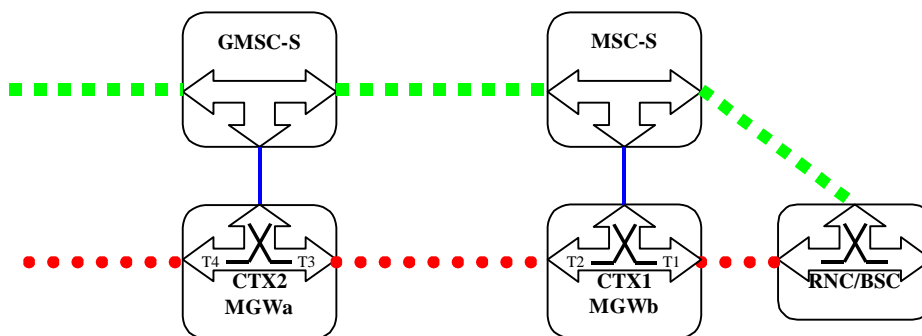


Figure 6.5 Basic Mobile Terminating Call Forward Bearer Establishment (network model)

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.

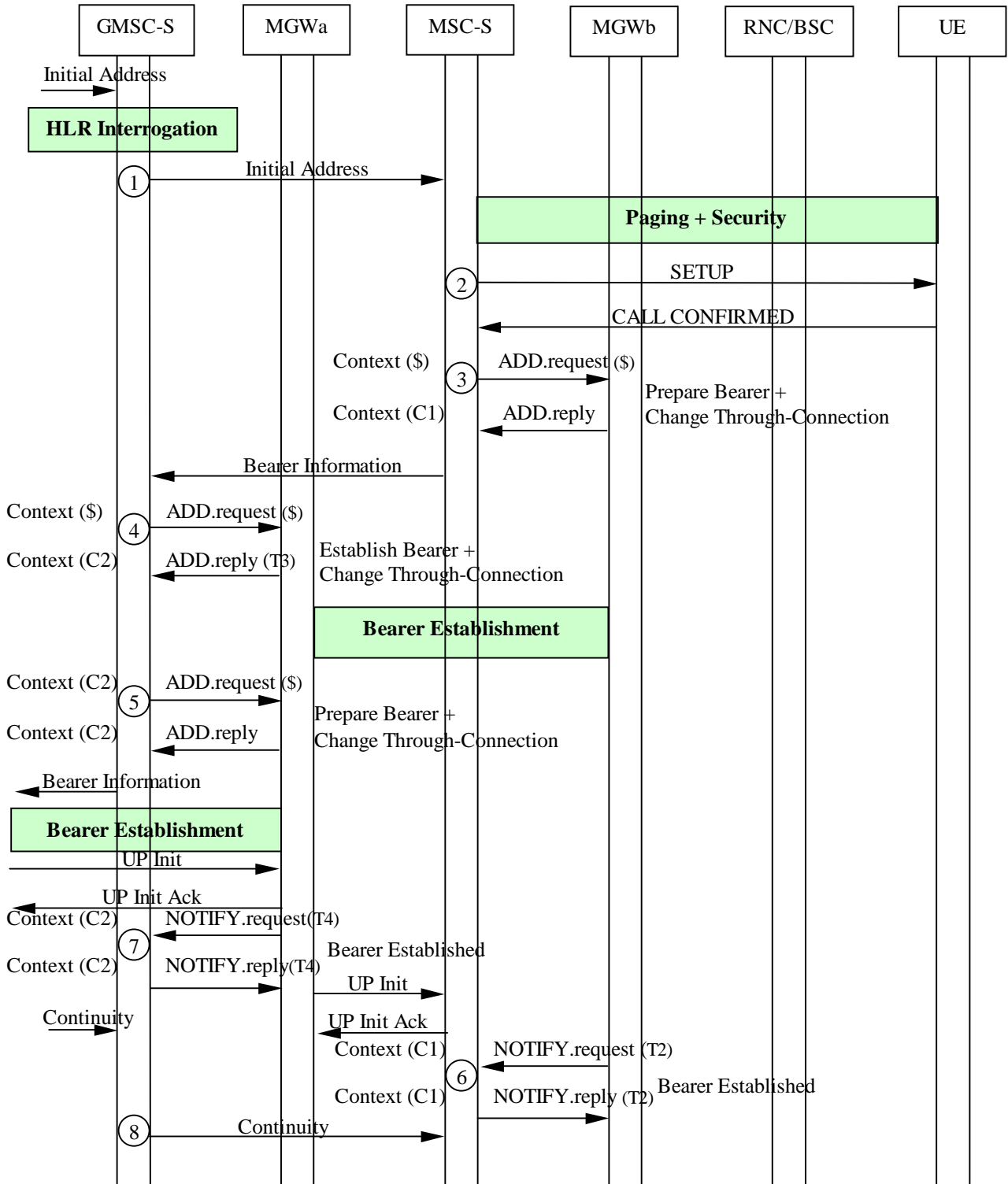


Figure 6.6/1 Basic Mobile Terminating Call, Forward Bearer Establishment (message sequence chart)

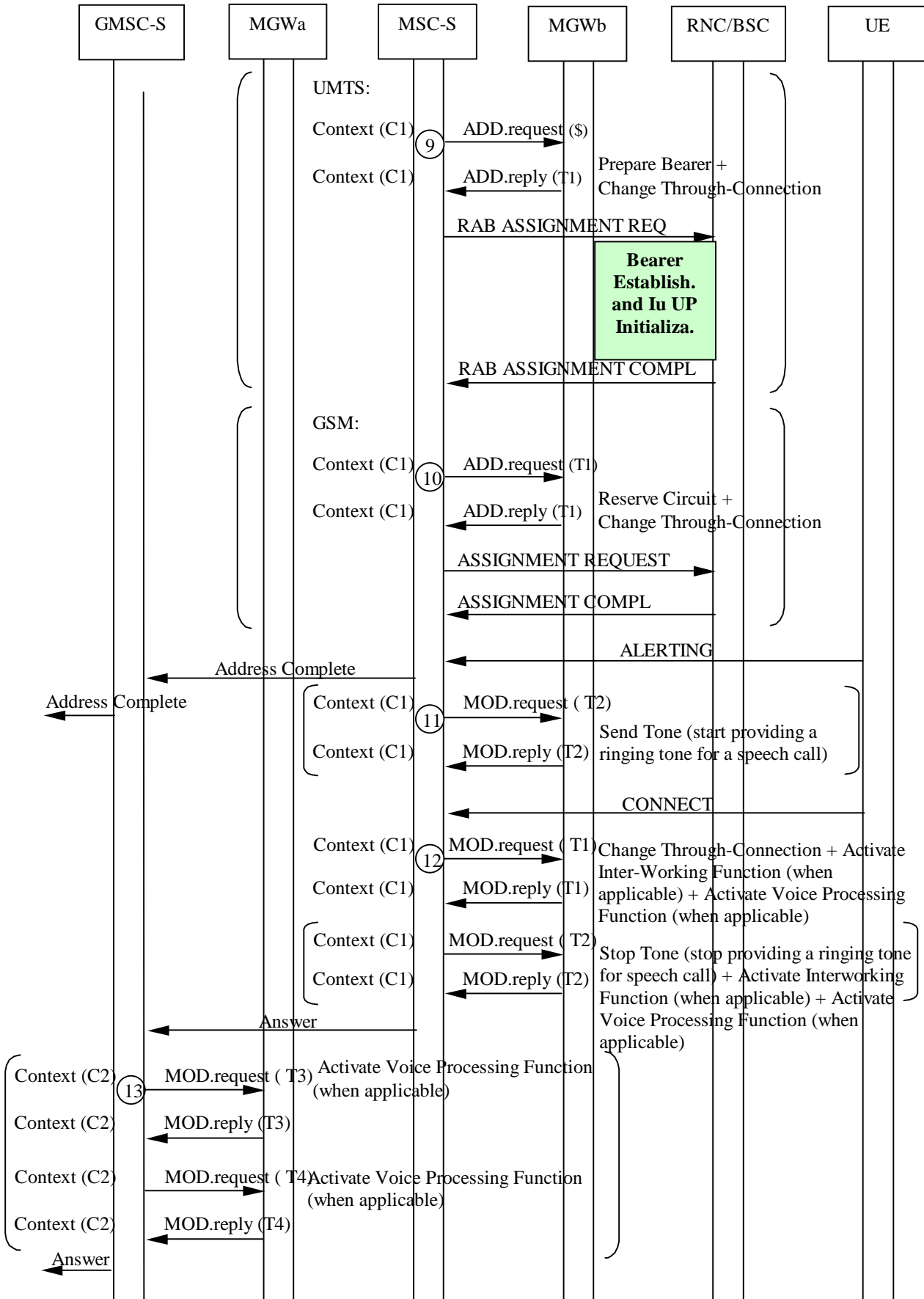


Figure 6.6/2 Basic Mobile Terminating Call, Forward Bearer Establishment (message sequence chart continue)

\*\*\*\*\*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, and 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 [26]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 ~~GERANGSM~~, 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/Gb mode for the 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 MGWb. The GMSC server seizes one context with two bearer terminations in MGWb. 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.

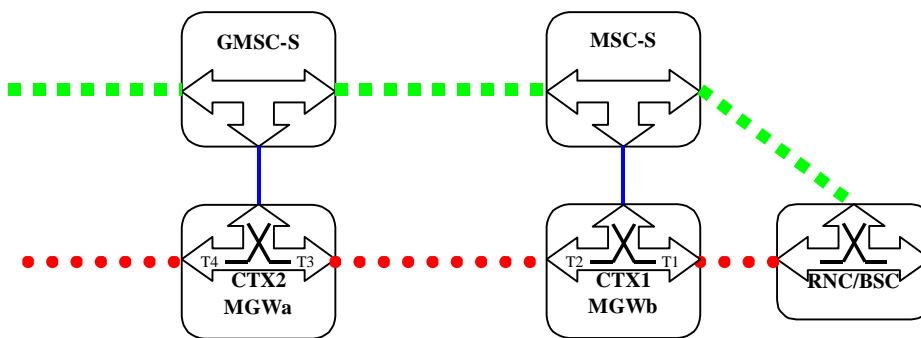


Figure 6.7 Basic Mobile Terminating Call, Backward Bearer Establishment (network model)

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.

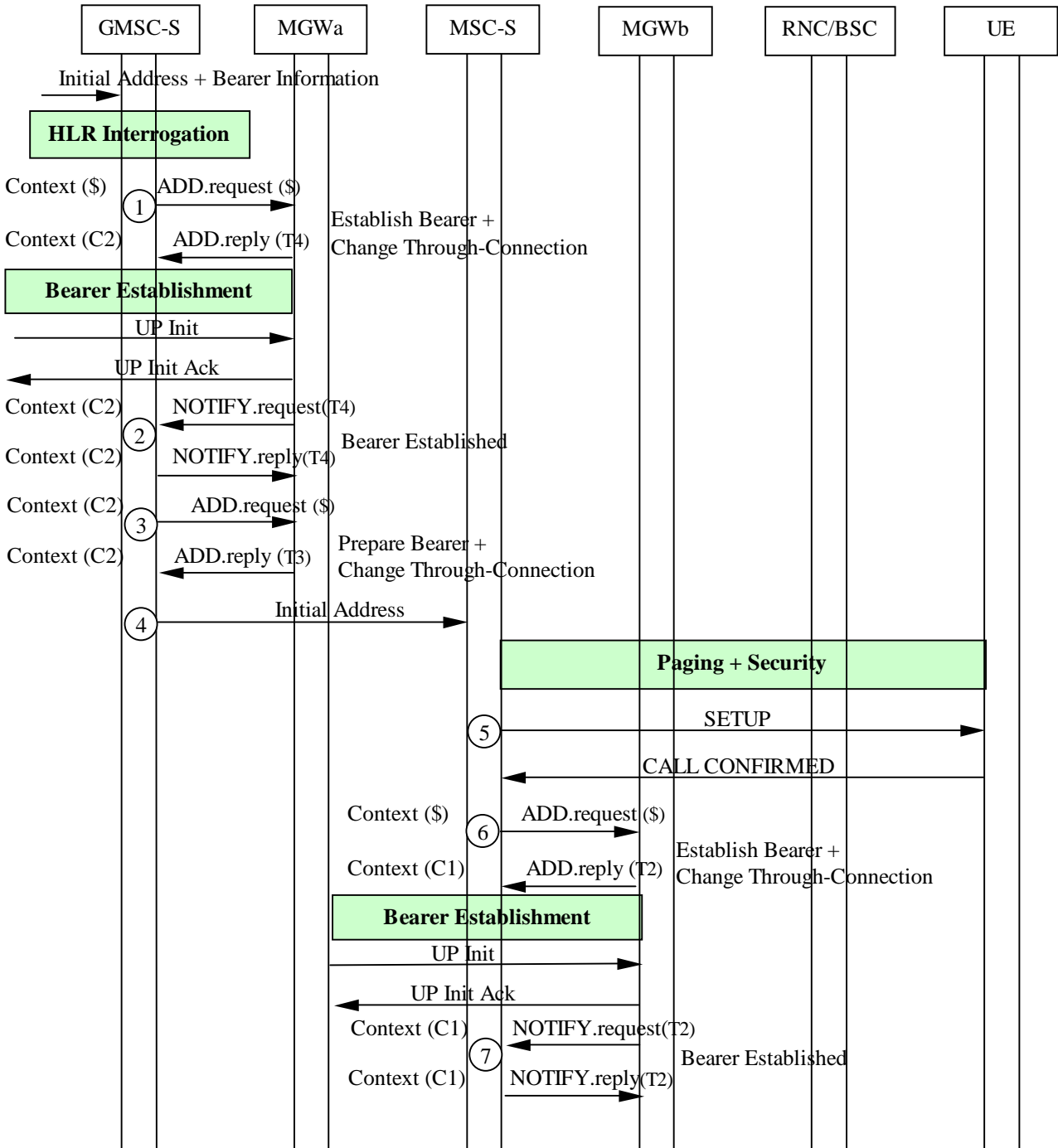


Figure 6.8/1 Basic Mobile Terminating Call, Backward Bearer Establishment (message sequence chart)

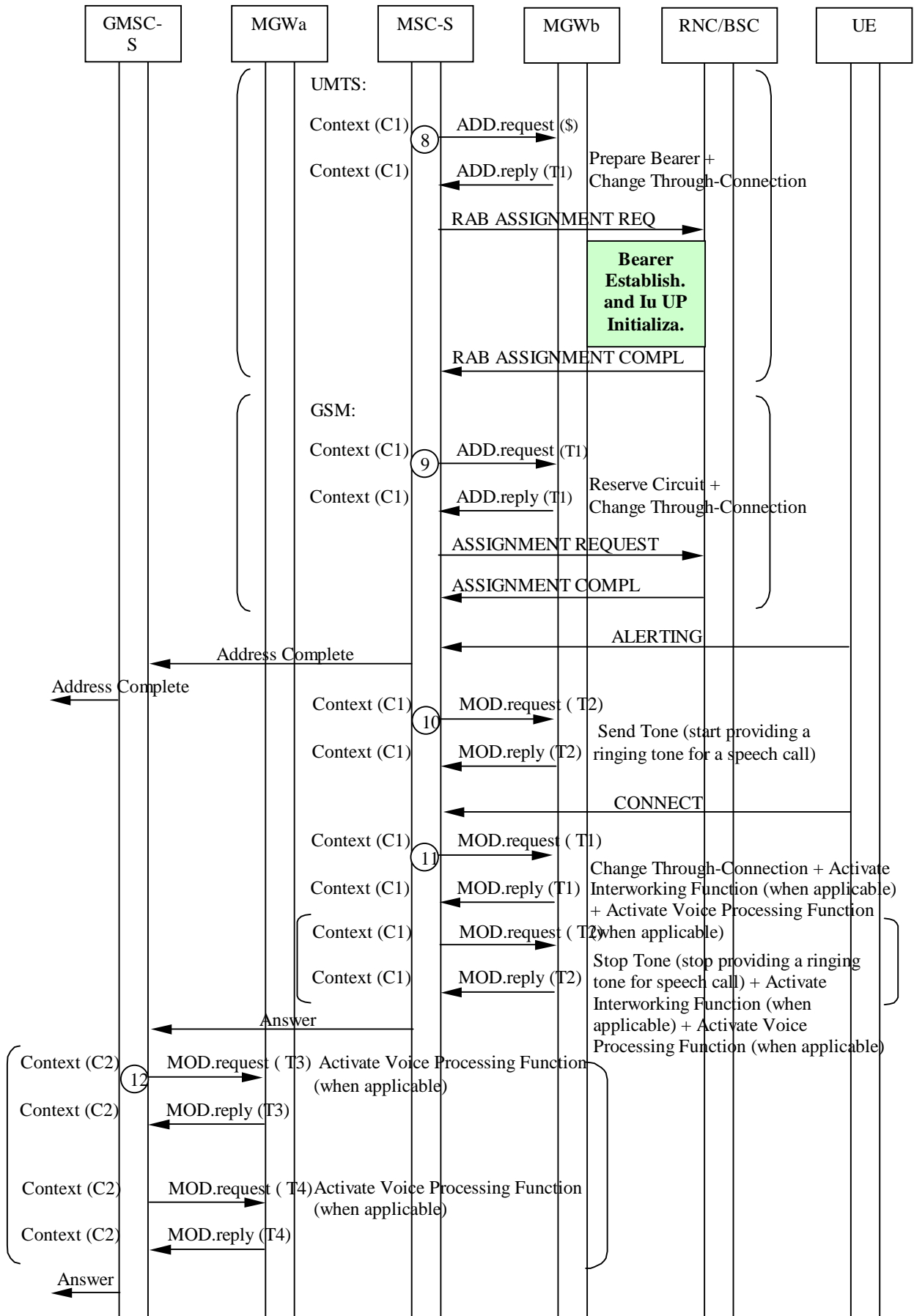


Figure 6.8/2 Basic Mobile Terminating Call, Backward Bearer Establishment (message sequence chart continue)

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

### 7.1.2 MSC server

The network initiated call clearing shall be performed in accordance with 3GPP TS 23.108 [18]. The following paragraphs describe the additional requirements for the bearer independent CS core network.

#### Call clearing from the network side

Once the Release message has been received from the preceding/succeeding node, the MSC server releases any MGW allocated resources for the network side. If any resources were seized in the MGW, the MSC server shall use the Release Bearer, Change Through-Connection and Release Termination procedures to indicate to the MGW to remove the network side bearer termination and that the bearer can be released towards the preceding/succeeding MGW. After the resources in the MGW are released the MSC server sends the Release Complete message to the preceding/succeeding node (bullet 1 in figure 7.2).

#### Call clearing to the UE

The MSC server initiates call clearing towards the UE and requests release of the associated radio resources as described in 3GPP TS 23.108[18]. Once the call clearing and the release of the associated radio resources have been completed, the MSC server releases any MGW allocated resources for the access side. If any resources were seized in the MGW, the MSC server uses the Release Termination procedure to requests the MGW to remove the access side bearer termination (bullet 2 or bullet 3 in figure 7.2).

#### Example

Figure 7.1 shows the network model for a network initiated clearing of the mobile call. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in A/Gb mode for the A-interface) and the bearer. The MSC server seizes one context with two bearer terminations in the MGW. Bearer termination T1 is used for the bearer towards RNC/BSC and bearer termination T2 is used for the bearer towards succeeding MGW.

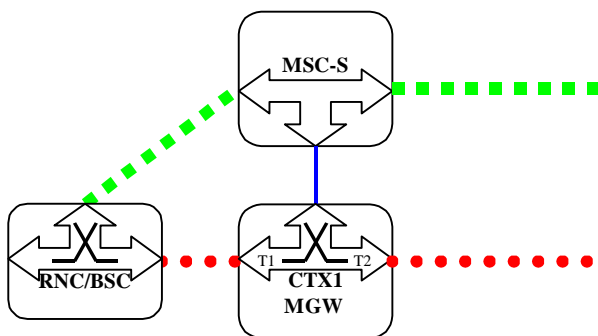
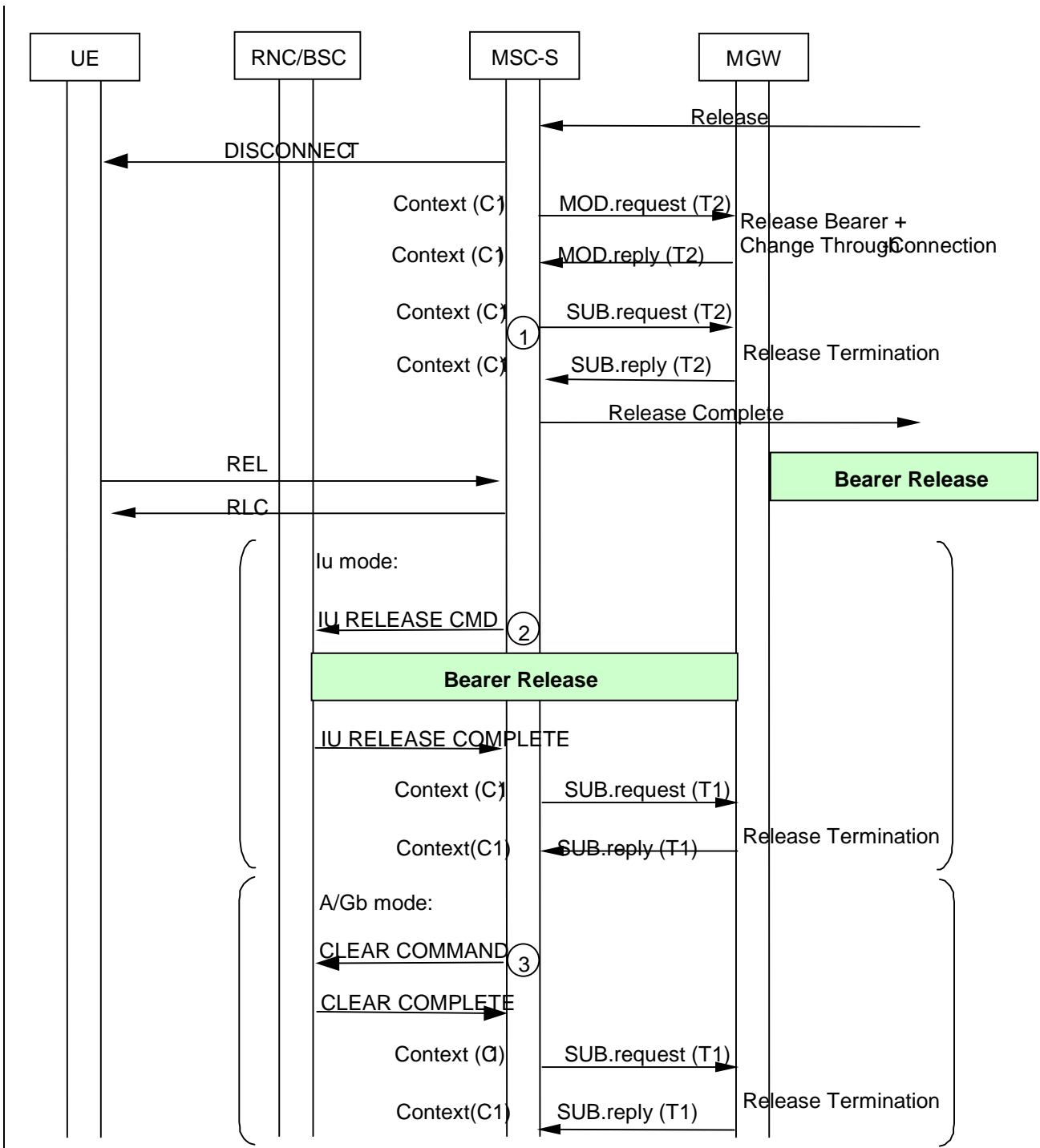


Figure 7.1 Network Initiated Call Clearing (Network model)

Figure 7.2 shows the message sequence example for the network initiated clearing of a mobile call. In the example when the call clearing indication is received from the preceding/succeeding node, MSC server indicates that the network bearer can be released and to release the network side bearer termination. After the release of the network side bearer termination the MSC server indicates to the preceding/succeeding node that call clearing has been completed. The MSC server initiates call clearing towards the UE and requests release of the radio resource. After the response of the radio resource release is received then the MSC server requests release of the access side bearer termination.





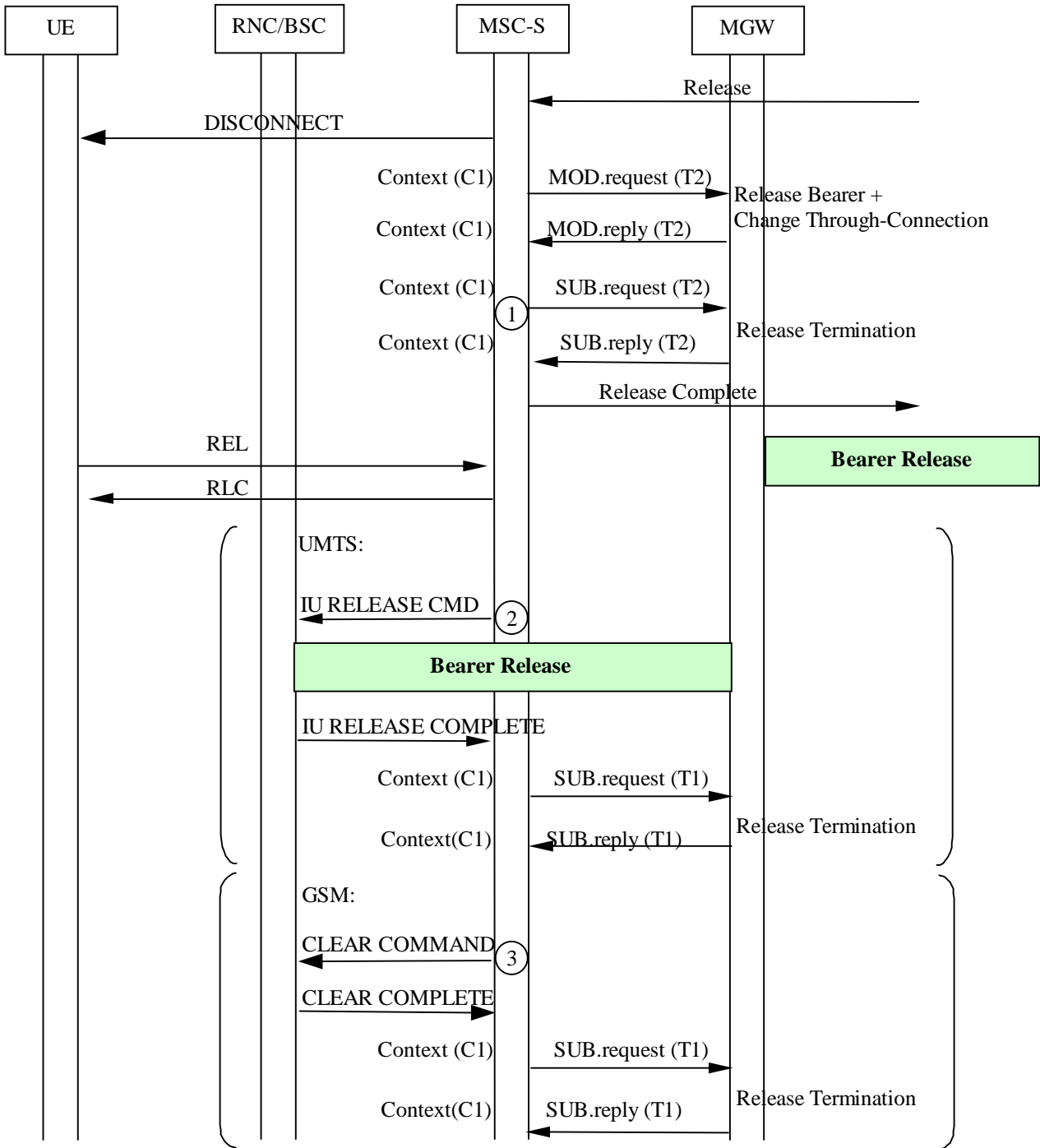


Figure 7.2 Network Initiated Call Clearing (message sequence chart)

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

### 7.2.2 MSC server

#### Call clearing from the UE

The UE initiated call clearing is performed and the release of the associated radio resources is performed as described in 3GPP TS 23.108 [18]. Once the call clearing and the associated radio resources release have been completed, the MSC server releases any MGW allocated resources for the access side. If any resources were seized in the MGW the MSC

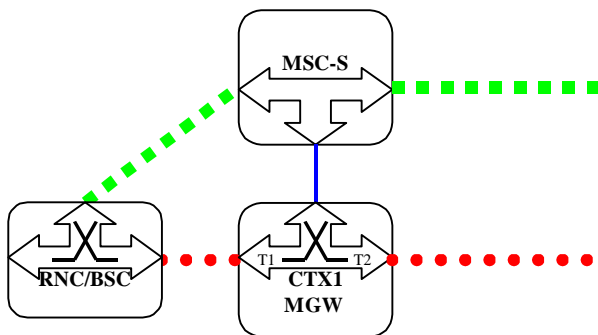
server uses the Release Termination procedure to requests the MGW to remove the access side bearer termination (bullet 1 or bullet 2 in figure 7.4).

### Call clearing to the network side

The MSC server sends the Release message to the preceding/succeeding node. Once the preceding/succeeding node has sent the Release Complete, the MSC server releases any MGW allocated resources for the network side. If any resources were seized in the MGW server shall use the Release Bearer, Change Through-Connection and Release Termination procedures to indicate to the MGW to remove the network side bearer termination and that the bearer can be released towards the preceding/succeeding MGW (bullet 3 in figure 7.4).

### Example

Figure 7.3 shows the network model for a user initiated clearing of a mobile call. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in A/Gb mode for the A-interface) and the bearer. The MSC server seizes one context with two bearer terminations in the MGW. Bearer termination T1 is used for the bearer towards RNC/BSC and bearer termination T2 is used for the bearer towards succeeding MGW.



**Figure 7.3 User Initiated Call Clearing (Network model)**

Figure 7.4 shows the message sequence example for the user initiated clearing of a mobile call. In the example the UE initiates call clearing towards the MSC server and the MSC server requests release of the radio resource. After the response of the radio resource release is received the MSC server requests the release of the access side bearer termination. The MSC server initiates call clearing towards the preceding/succeeding node. Once the preceding/succeeding node has indicated that call clearing has been completed, the MSC server indicates that the network bearer can be released and to release the network side bearer termination.

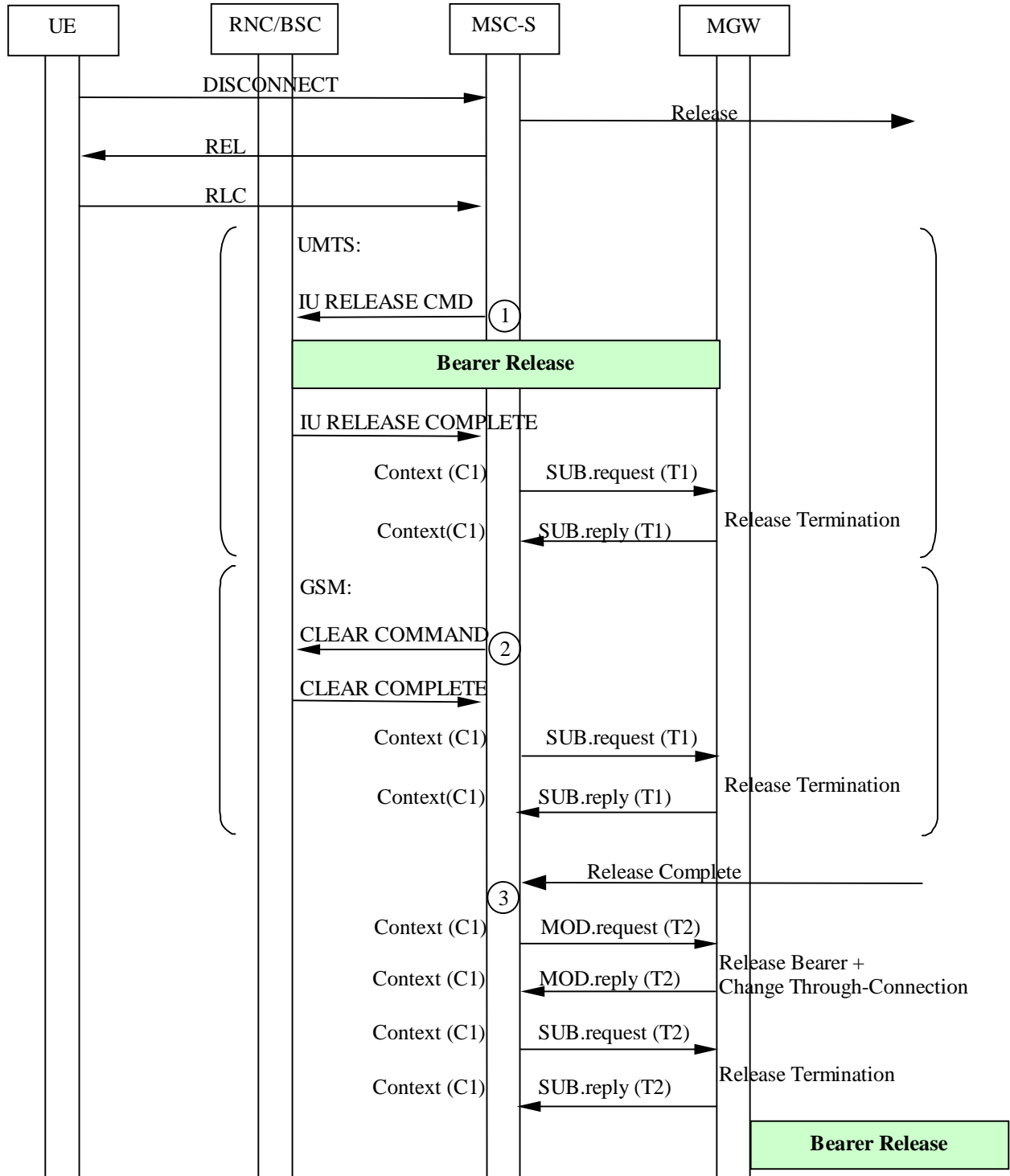


Figure 7.4 User Initiated Call Clearing (message sequence chart)

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

### 7.3.2 MSC server

#### Call clearing to the UE

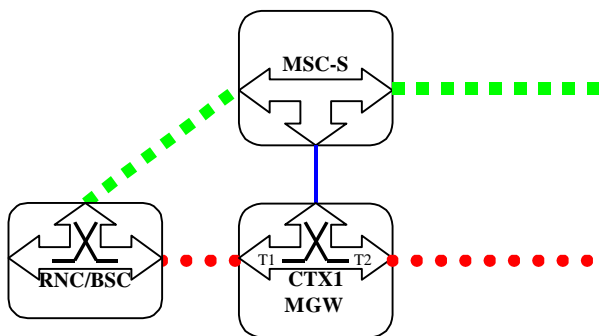
The call clearing to the UE is performed as described in clause 7.1.2, call clearing to the UE (bullet 1 and bullet 2 in figure 7.6).

### Call clearing to the network side

If the call is already established towards the network side, the call clearing to the network side is performed as described in clause 7.2.2, call clearing to the network side (bullet 3 in figure 7.6).

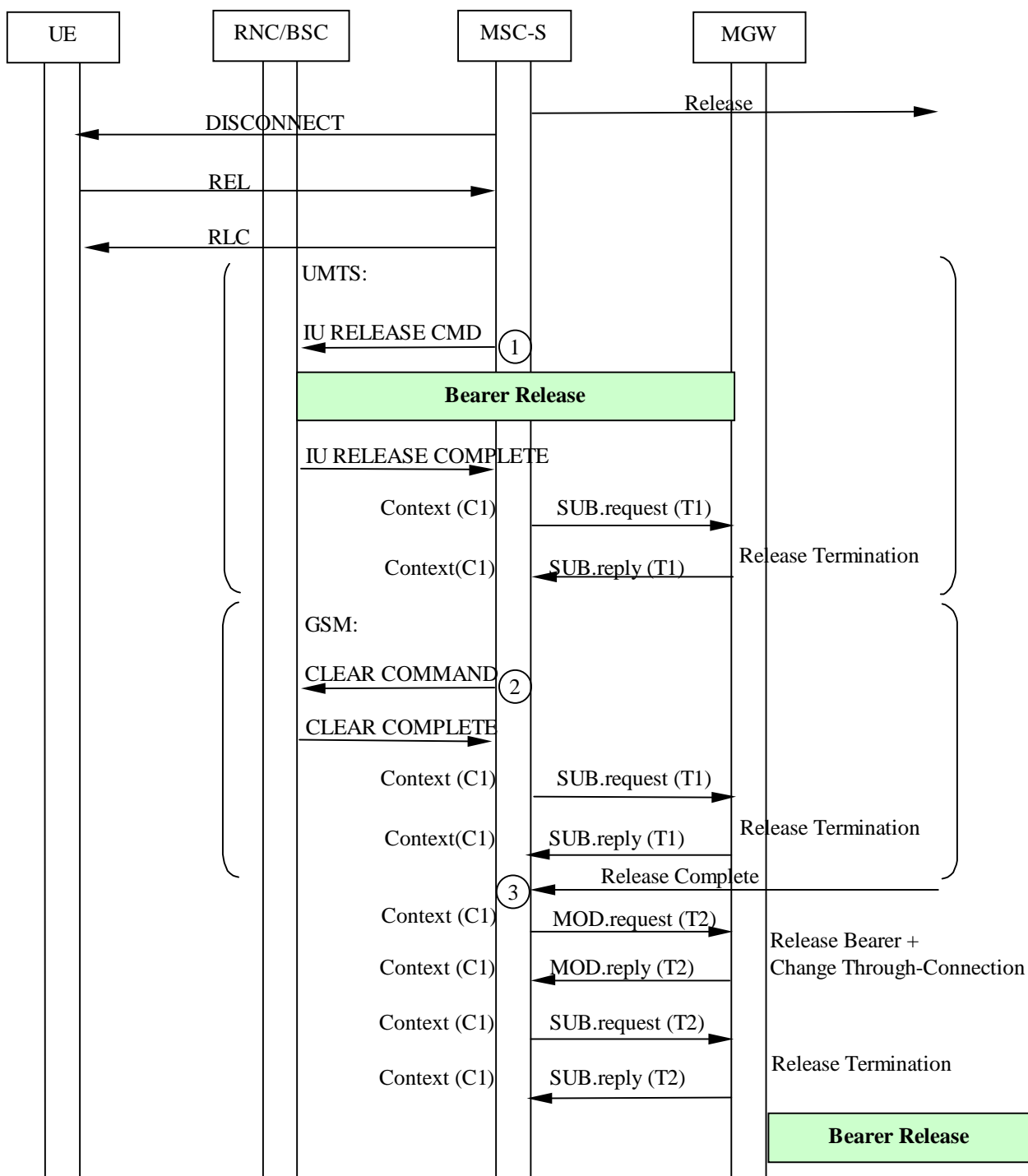
### Example

Figure 7.5 shows the network model for the MSC server initiated clearing of the mobile call. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in A/Gb mode for the A-interface) and the bearer. The MSC server seizes one context with two bearer terminations in the MGW. Bearer termination T1 is used for the bearer towards RNC/BSC and bearer termination T2 is used for the bearer towards succeeding MGW.



**Figure 7.5 MSC Server Initiated Call Clearing (Network model)**

Figure 7.6 shows the message sequence example for the MSC server initiated clearing of a mobile call. In the example the MSC server initiates call clearing of the network side and the access side. After the call clearing towards the UE and the release of the radio resource have been completed the MSC server requests release of the access side bearer termination. Once the preceding/succeeding node has indicated that call clearing has been completed, the MSC server indicates that the network bearer can be released and to release the network side bearer termination.



**Figure 7.6 MSC Server Initiated Call Clearing (message sequence chart)**

\*\*\*\*\* NEXT MODIFICATION \*\*\*\*\*

## 7.4.2 MSC server

### Bearer released on the access side

After the MSC server has received the Bearer Released procedure from the MGW, the MSC server initiates the call clearing towards the UE and requests release of the allocated radio resources as described in 3GPP TS 23.108 [18]. Once the call clearing and the radio resources release have been completed, the MSC server releases any MGW allocated resources for the access side. The MSC server uses the Release Termination procedure to request the MGW to remove the access side bearer termination.

If the call is already established towards the network side, call clearing to the network side is performed as described in clause 7.2, call clearing to the network side.

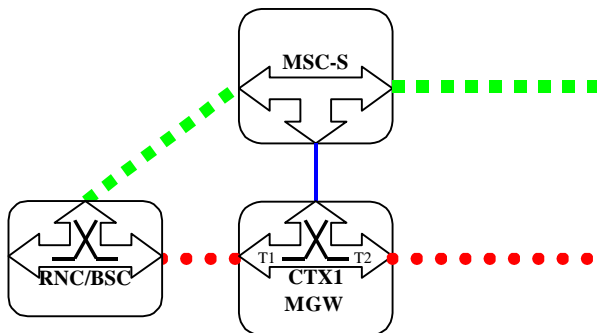
**Bearer released on the network side**

After the MSC server has received the Bearer Released procedure from the MGW, the MSC server sends the Release message to the preceding/succeeding node. Once the preceding/succeeding node has sent the Release Complete message, the MSC server releases any MGW allocated resources for the network side. The MSC server uses the Release Termination procedure to request the MGW to remove the network side bearer termination (bullet 1 and bullet 2 in figure 7.8).

Call clearing to the UE is performed as described in clause 7.1.2.2, call clearing to the UE (bullet 3 in figure 7.8).

**Example**

Figure 7.7 shows the network model for an MGW initiated clearing of a mobile call. The 'squared' line represents the call control signalling. The 'dotted' line represents the bearer control signalling (not applicable in A/Gb mode for the A- interface) and the bearer. The MSC server seizes one context with two bearer terminations in the MGW. Bearer termination T1 is used for the bearer towards RNC/BSC and bearer termination T2 is used for the bearer towards succeeding MGW.



**Figure 7.7 MGW Initiated Call Clearing (Network model)**

Figure 7.8 shows the message sequence example for the MGW initiated clearing of a mobile call. After the MSC server is notified that the MGW has released the network side bearer, the MSC server initiates call clearing of the network side and the access side. After the call clearing towards the UE and the radio resource release have been completed the MSC server requests release of the access side bearer termination. Once the preceding/succeeding node has indicated that call clearing has been completed, the MSC server requests the release of the network side bearer termination.

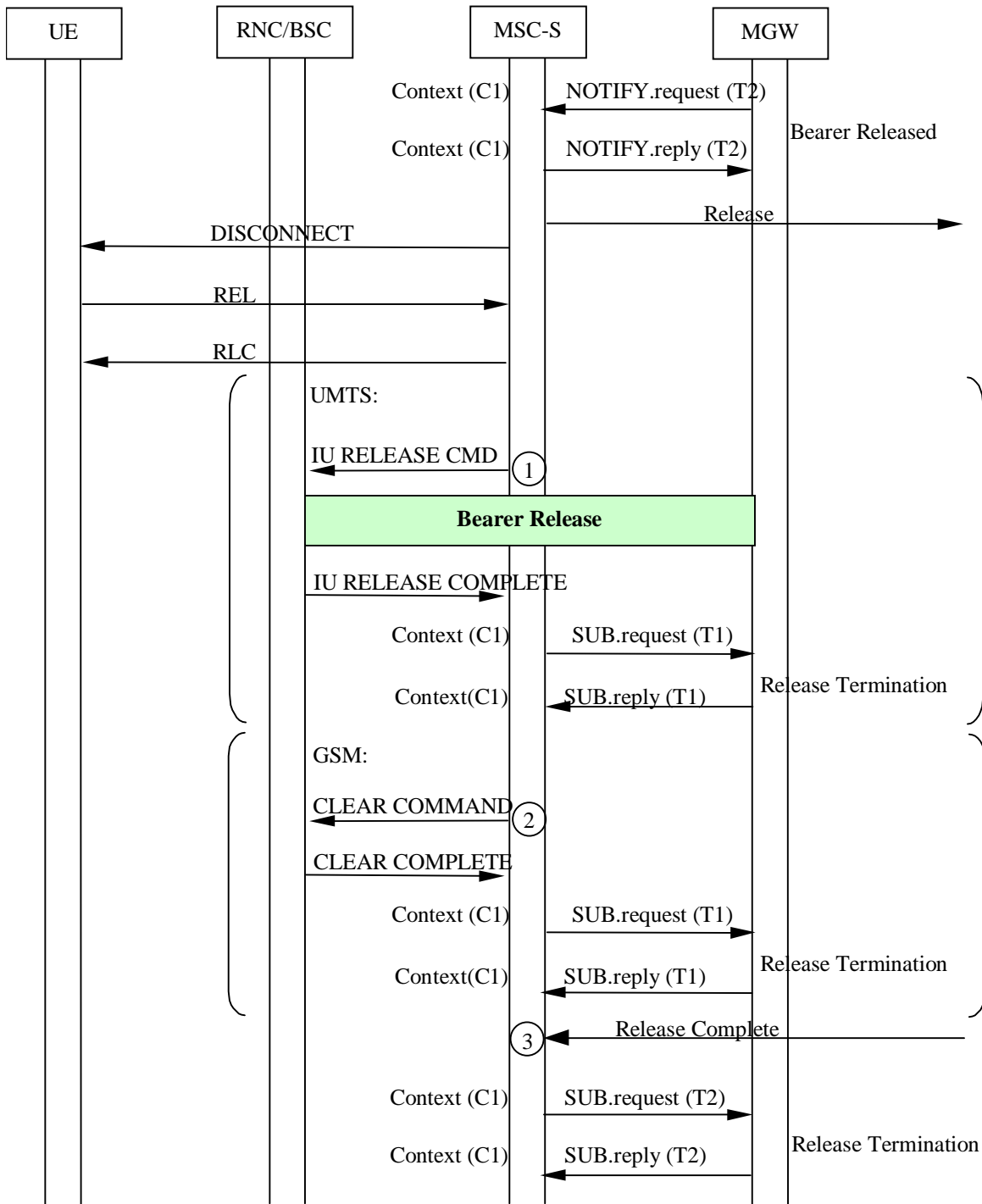


Figure 7.8 MGW Initiated Call Clearing (message sequence chart)

\*\*\*\*\* NEXT MODIFICATION \*\*\*\*\*

## 8.1 ~~8.1~~ UMTS to UMTS

In the context of the following paragraphs, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving an UE in Iu mode.

### 8.1.1 Intra-MSC SRNS/SBSS 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).

## 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.

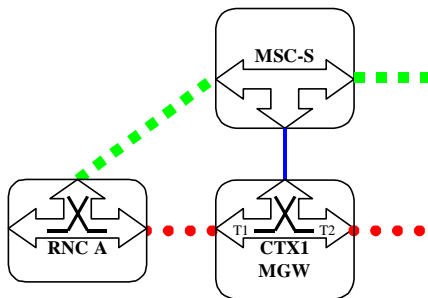
## Failure Handling in MSC server

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.

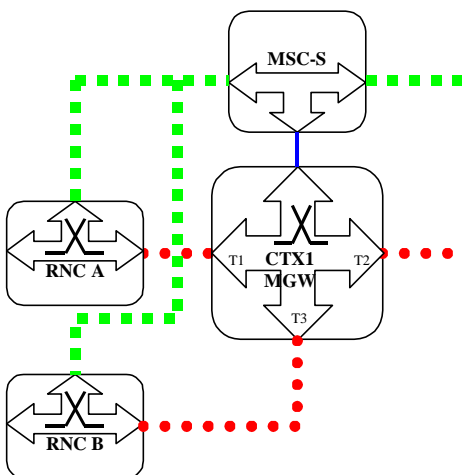
## Example

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.

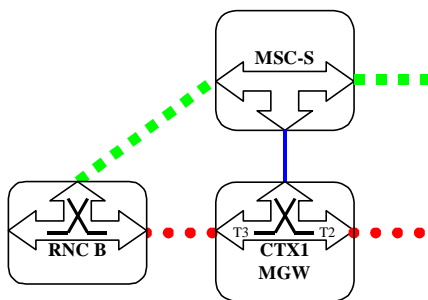
Before Relocation:



During Relocation:



After Relocation:



**Figure 8.1 Intra-MSR SRNS Relocation (network model)**

Figure 8.2 shows the message sequence example for the Intra-MSR 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.

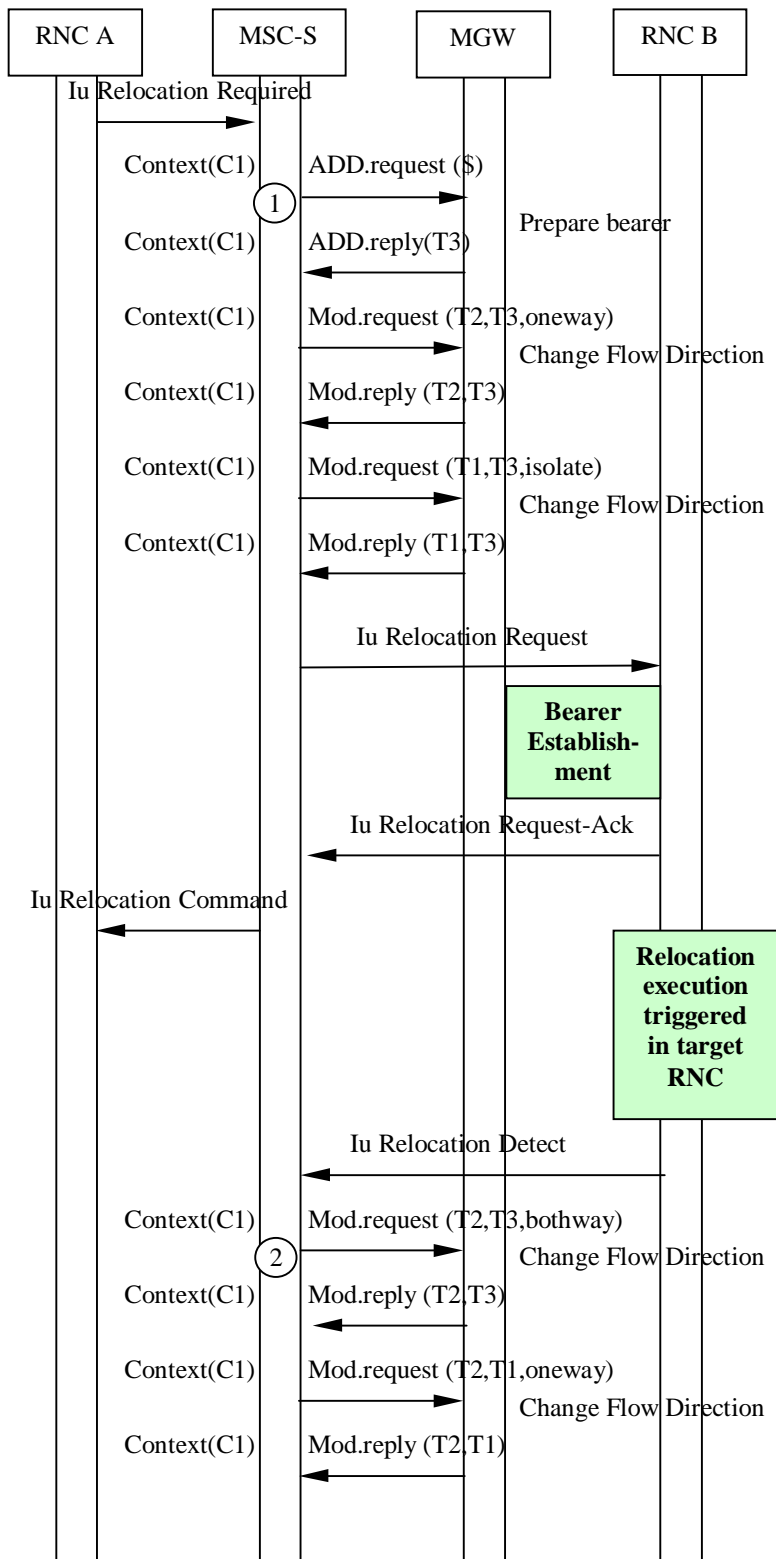


Figure 8.2/1 Intra-MSC SRNS Relocation (message sequence chart)

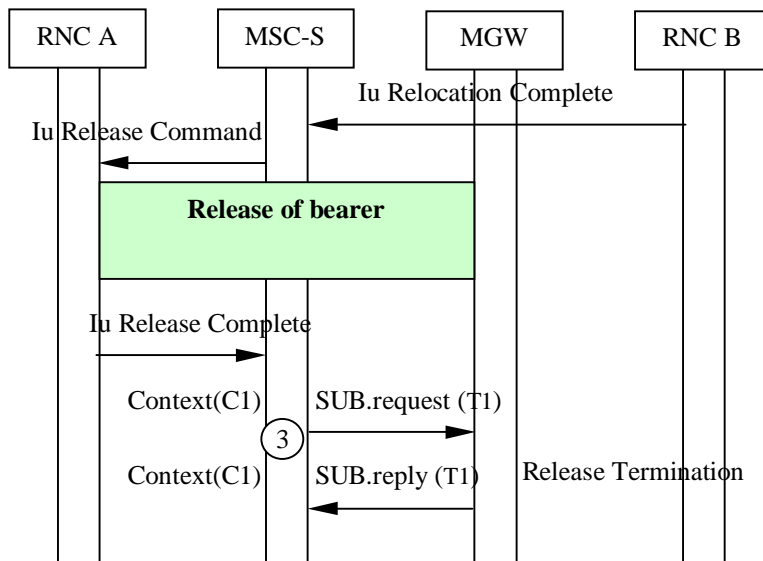


Figure 8.2/2 Intra-MSR SRNS Relocation (message sequence chart)

### 8.1.2 Basic Inter-MSR SRNS/SBSS Relocation

The procedures specified in 3GPP TS 23.009 [8] for 'Basic Relocation Procedure Requiring a Circuit Connection between 3G\_MSC-A and 3G\_MSC-B' shall be followed. The following paragraphs describe the additional requirements for the bearer independent CS core network.

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

### 8.1.3 Subsequent Inter-MSR SRNS/SBSS Relocation back to the Anchor MSR

The procedures specified in 3GPP TS 23.009 [8] for 'Subsequent Relocation from 3G\_MSC-B to 3G\_MSC-A requiring a Circuit Connection between 3G\_MSC-A and 3G\_MSC-B' shall be followed. The following paragraphs describe the additional requirements for the bearer independent CS core network.

### 8.1.4 Subsequent Inter-MSR SRNS/SBSS Relocation to a third MSR

The relocation to a third MSR server (from MSR-B server to MSR-B' server) is the combination of the two previous inter-MSR handover cases:

- for MSR-B server a subsequent relocation from MSR-B server back to MSR-A server as described in clause 8.1.3; and
- for MSR-B' server a basic relocation from MSR-A server to MSR-B' server as described in clause 8.1.2.

MSR-A server implements the corresponding parts of each handover case; i.e. access handling in MSR-A server is not included.

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

## 8.2 ~~8.2~~ UMTS to GSM

In the context of the following paragraphs, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving an UE in Iu mode.

## 8.3 ~~8.3~~ GSM to UMTS

In the context of the following paragraphs, the terms RNS or RNC refer also to a GERAN BSS or BSC (respectively) when serving an UE in Iu mode.

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

## 13.17 Alternate Speech/Fax

The procedures for facsimile group 3 transparent/non-transparent shall be followed in accordance with GSM ~~3GPP TS 0343.045~~ [24] and 3GPP TS 23.146 [25]. 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].

Call and bearer establishment shall be handled as described in the Call Establishment clause. In order to change from speech to fax (or vice versa), the MSC server shall modify the access bearer as described in subclause 13.18.1. the MSC server shall request the MGW either to modify the existing access side bearer termination using the Modify Bearer Characteristics procedure, or to create a new access side bearer termination. In both cases the MSC server will initiate an access bearer modification using either the existing bearer address and binding reference or the new bearer address and binding reference.

If the MGW responds with an error to any of the procedures initiated by the MSC server, or the MSC server receives a Bearer Failure procedure from the MGW, the MSC server may either clear the call or reject the change from speech to fax (or vice versa).

After this possible modification, the MGW shall seize an interworking function if a PLMN Bearer Capability [4] has been supplied to the access side bearer termination. When the MSC server receives an answer indication, it shall request activation of the interworking function using the Activate Interworking Function procedure.

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

### 13.18.1 Modification of Bearer Characteristics

The modification of the access bearer is possible during a call establishment and during an active call. If the MSC server needs to modify the access bearer, the existing access side bearer termination in the MGW is modified or a new access side bearer termination is created.using the Modify Bearer Characteristics procedure before the access bearer modification is initiated towards the UTRAN/GERAN. The MGW is provided with the new characteristics for the access bearer. The modification of the access bearer shall be performed in accordance with 3GPP TS 25.413 [26] or 3GPP TS 48.008 [27].

#### UTRAN-Iu mode

If the link characteristics for the existing access bearer need to be changed and the MSC server previously received a notification from the MGW that modification of link characteristics of the current transport connection is supported [refer to 26], the MSC server shall use the Modify Bearer Characteristics procedure to provide the MGW with the new

bearer characteristics for the existing access side bearer termination. After the MGW has replied, the MSC server shall initiate the access bearer modification towards UTRAN.

If the MSC server has not previously received a notification from the MGW that modification of existing link characteristics is supported, the MSC server shall use the Prepare Bearer procedure to request the MGW to add a new context and a new access side bearer termination, and to provide a bearer address and a binding reference. After the MGW has replied, the MSC server shall initiate the access bearer modification towards UTRAN using the provided bearer address and the binding reference. Upon successful access bearer modification, the MSC server shall connect the new access side bearer termination to the old context and release the old access side bearer termination.

If the user plane mode of the modified access bearer is 'Support Mode', the Iu UP will also be re-initialised as defined in [20].

GERAN-A/Gb mode

The MSC server shall use the Modify Bearer Characteristics procedure to the MGW to provide the new bearer characteristics for the existing access side bearer termination. After the MGW has replied, the MSC server shall initiate the access bearer modification towards GERAN.

\*\*\*\*\*LAST MODIFICATION\*\*\*\*\*

## 14.2 IST

The handling of IST shall be performed in accordance with ~~GSM-3GPP TS 0242.032~~ [19]. This clause describes the additional requirements for the Bearer Independent CS Core Network.

The clearing of calls due to IST is the same as for (G)MSC server initiated call clearing, refer to clause 7.3,(G)MSC server Initiated.

## CHANGE REQUEST

⌘ **24.080 CR 20** ⌘ 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:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Correction of Object Identifiers for ASN.1 modules		
<b>Source:</b>	⌘ Siemens		
<b>Work item code:</b>	⌘ TEI	<b>Date:</b>	⌘ 17.04.2002
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	<b>F</b> (correction)		<b>2</b> (GSM Phase 2)
	<b>A</b> (corresponds to a correction in an earlier release)		<b>R96</b> (Release 1996)
	<b>B</b> (addition of feature),		<b>R97</b> (Release 1997)
	<b>C</b> (functional modification of feature)		<b>R98</b> (Release 1998)
	<b>D</b> (editorial modification)		<b>R99</b> (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		<b>REL-4</b> (Release 4)
			<b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘ ASN.1 modules in 24.080 Rel-5 are different from those in 24.080 Rel-4. Therefore they must have different Object Identifiers		
<b>Summary of change:</b>	⌘ Replace "version7 (7)" with "version8 (8)" wherever it occurs.		
<b>Consequences if not approved:</b>	⌘ Different ASN.1 modules are identified by the same Object Identifier		

<b>Clauses affected:</b>	⌘ 4.2, 4.3.1, 4.4.2, 4.5		
<b>Other specs affected:</b>	⌘ <input checked="" type="checkbox"/> Other core specifications	⌘ 29.002	
	<input type="checkbox"/> Test specifications		
	<input type="checkbox"/> O&M Specifications		
<b>Other comments:</b>	⌘		

### 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.

## 4.2 Operation types

Table 4.1 summarizes the operations defined for supplementary services in this specification and shows which of these operations are call related and call independent. The terms "call related" and "call independent" are defined in TS 24.010.

**Table 4.1: Relevance of supplementary service operations**

Operation name	Call related SS	Call independent SS
RegisterSS	-	+
EraseSS	-	+
ActivateSS	-	+
DeactivateSS	-	+
InterrogateSS	-	+
RegisterPassword	-	+
GetPassword	-	+
ProcessUnstructuredSS-Data	+	+
ForwardCheckSS-Indication	-	+
ProcessUnstructuredSS-Request	-	+
UnstructuredSS-Request	-	+
UnstructuredSS-Notify	-	+
ForwardChargeAdvice	+	-
NotifySS	+	-
ForwardCUG-Info	+	-
BuildMPTY	+	-
HoldMPTY	+	-
RetrieveMPTY	+	-
SplitMPTY	+	-
ExplicitCT	+	-
AccessRegisterCCEnter	+	-
EraseCCEnter	-	+
CallDeflection	+	-
UserUserService	+	-
LCS-LocationNotification	-	+
LCS-MOLR	-	+

NOTE: The ProcessUnstructuredSS-Data operation may be used call related by a GSM Phase 1 MS.

```

SS-Operations {
    ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2) modules (3)
    | ss-Operations (0) version7 (7)version8 (8)}

DEFINITIONS ::=

BEGIN

EXPORTS

-- exports operation types

-- operations defined in this specification
ProcessUnstructuredSS-Data, NotifySS, ForwardChargeAdvice, ForwardCUG-Info, BuildMPTY, HoldMPTY,
RetrieveMPTY, SplitMPTY, ExplicitCT, AccessRegisterCCEnter, CallDeflection, UserUserService,
LCS-LocationNotification, LCS-MOLR;

IMPORTS

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

-- The MAP operations:
-- RegisterSS, EraseSS, ActivateSS, DeactivateSS, InterrogateSS, RegisterPassword,
-- GetPassword, ProcessUnstructuredSS-Request, UnstructuredSS-Request, UnstructuredSS-Notify
-- ForwardCheckSS-Indication
-- are imported from MAP-Operations in SS-Protocol module.

-- imports SS-data types
NotifySS-Arg,
ForwardChargeAdviceArg,

```



```

ForwardCUG-InfoArg,
SS-UserData,
AccessRegisterCCEntryArg,
CallDeflectionArg,
UserUserServiceArg,
LocationNotificationArg,
LocationNotificationRes,
LCS-MOLRArg,
LCS-MOLRRes
FROM SS-DataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2) modules (3)
  | ss-DataTypes (2) version7 (7)version8 (8)}

-- imports MAP-SS-data types
RegisterCC-EntryRes
FROM MAP-SS-DataTypes {
  | ccitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-SS-DataTypes (14) version7 (7)version8 (8)}

-- imports MAP-errors
IllegalSS-Operation, SS-ErrorStatus, SS-NotAvailable, SS-SubscriptionViolation,
SS-Incompatibility, SystemFailure, FacilityNotSupported, CallBarred,UnexpectedDataValue,
ShortTermDenial, LongTermDenial, DataMissing, ForwardingViolation, ForwardingFailed,
PositionMethodFailure
FROM MAP-Errors {
  | ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
  map-Errors (10) version7 (7)version8 (8)}

-- imports SS-Errors
ResourcesNotAvailable, MaxNumberOfMPTY-ParticipantsExceeded,DeflectionToServedSubscriber,
InvalidDeflectedToNumber, SpecialServiceCode, RejectedByUser, RejectedByNetwork
FROM SS-Errors {
  | ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2) modules (3)
  ss-Errors (1) version7 (7)version8 (8)}
;

-- operation types definition

ProcessUnstructuredSS-Data ::= OPERATION -- Timer T(PUSSD)= 15s to 30s
  ARGUMENT
  ss-UserData      SS-UserData
  RESULT
  ss-UserData      SS-UserData
-- optional
  ERRORS{
  SystemFailure,
  UnexpectedDataValue}

NotifySS ::= OPERATION
  ARGUMENT
  notifySS-Arg     NotifySS-Arg

ForwardChargeAdvice ::= OPERATION -- Timer T(AoC)= 1s to 40s
  ARGUMENT
  forwardChargeAdviceArg ForwardChargeAdviceArg
  RESULT

ForwardCUG-Info ::= OPERATION
  ARGUMENT
  forwardCUG-InfoArg ForwardCUG-InfoArg

BuildMPTY ::= OPERATION -- Timer T(BuildMPTY)= 5s to 30s
  RESULT
  ERRORS{
  IllegalSS-Operation,
  SS-ErrorStatus,
  SS-NotAvailable,
  SS-Incompatibility,
  SystemFailure,
  ResourcesNotAvailable,
  MaxNumberOfMPTY-ParticipantsExceeded}

HoldMPTY ::= OPERATION -- Timer T(HoldMPTY)= 5s to 30s
  RESULT
  ERRORS{
  IllegalSS-Operation,
  SS-ErrorStatus,
  SS-Incompatibility,
  FacilityNotSupported,
  SystemFailure}

RetrieveMPTY ::= OPERATION -- Timer T(RetrieveMPTY)= 5s to 30s
  RESULT

```

```

ERRORS{
  IllegalSS-Operation,
  SS-ErrorStatus,
  SS-Incompatibility,
  FacilityNotSupported,
  SystemFailure}

SplitMPTY ::= OPERATION -- Timer T(SplitMPTY)= 5s to 30s
  RESULT
  ERRORS{
    IllegalSS-Operation,
    SS-ErrorStatus,
    SS-Incompatibility,
    FacilityNotSupported,
    SystemFailure}

ExplicitCT ::= OPERATION -- Timer T(ECT)= 5s to 15s
  RESULT
  ERRORS{
    IllegalSS-Operation,
    SS-ErrorStatus,
    SS-NotAvailable,
    SS-Incompatibility,
    FacilityNotSupported,
    SystemFailure,
    ResourcesNotAvailable,
    CallBarred}

AccessRegisterCCEntry ::= OPERATION -- Timer T(AccRegCCEntry)= 30s
  ARGUMENT
  accessRegisterCCEntryArg  AccessRegisterCCEntryArg
  RESULT
  registerCCEntryRes  RegisterCC-EntryRes
  ERRORS{
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    CallBarred,
    IllegalSS-Operation,
    SS-ErrorStatus,
    SS-Incompatibility,
    ShortTermDenial,
    LongTermDenial,
    FacilityNotSupported}

-- the timer value is defined by T308, see also in TS 24.008 for definition of timer T308

CallDeflection ::= OPERATION -- Timer T(CD)= 30s
  ARGUMENT
  callDeflectionArg  CallDeflectionArg
  RESULT
  ERRORS{
    IllegalSS-Operation,
    SS-ErrorStatus,
    SS-NotAvailable,
    SS-Incompatibility,
    FacilityNotSupported,
    SystemFailure,
    ResourcesNotAvailable,
    ForwardingViolation,
    CallBarred,
    DeflectionToServedSubscriber,
    InvalidDeflectedToNumber,
    SpecialServiceCode,
    ForwardingFailed}

-- the timer value is defined by T305, see also in TS 24.008 for definition of timer T305
-- extensionContainer shall not be used with this operation

UserUserService ::= OPERATION -- Timer T(UUS3)= 10s
  ARGUMENT
  userUserServiceArg  UserUserServiceArg
  RESULT
  ERRORS{
    IllegalSS-Operation,
    SS-ErrorStatus,
    SS-NotAvailable,
    SS-Incompatibility,
    FacilityNotSupported,
    SystemFailure,
    ResourcesNotAvailable,
    RejectedByNetwork,
    RejectedByUser}

```

```
-- The timer value for UUS3 is 10s; it is applicable only if UUS3 is activated by FACILITY
-- message. If UUS service (UUS1, UUS2 or UUS3) is activated by SETUP message, no timers are
-- needed. In those cases Return Result or Return Error must be received within certain call
-- control messages, see GSM 04.87.
-- extensionContainer shall not be used with this operation.
```

```
LCS-LocationNotification ::= OPERATION -- Timer T(LCSN)= 10s to 20s
  ARGUMENT
    locationNotificationArg      LocationNotificationArg
  RESULT
    locationNotificationRes      LocationNotificationRes
  ERRORS{
    SystemFailure,
    UnexpectedDataValue}
```

```
LCS-MOLR ::= OPERATION -- Timer T(LCSL)= 10s to 30s
  ARGUMENT
    lcs-MOLRArg      LCS-MOLRArg
  RESULT
    lcs-MOLRRes      LCS-MOLRRes
  ERRORS{
    SystemFailure,
    UnexpectedDataValue,
    DataMissing,
    FacilityNotSupported,
    SS-SubscriptionViolation,
    PositionMethodFailure}
```

```
END
```

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

### 4.3.1 Error types ASN.1 specification

The following ASN.1 module provides an ASN.1 specification of errors. Errors from MAP are imported in the SS-Protocol module in subclause 4.5.

```
SS-Errors {
  ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2) modules (3)
  | ss-Errors (1) version7 (7)version8 (8)}

DEFINITIONS ::=

BEGIN

IMPORTS

ERROR FROM
TCAPMessages {
  ccitt recommendation q 773 modules (2) messages (1) version2 (2)};

-- The MAP errors
-- UnknownSubscriber, BearerServiceNotProvisioned, TeleserviceNotProvisioned,
-- IllegalSS-Operation, SS-ErrorStatus, SS-NotAvailable, SS-SubscriptionViolation,
-- SS-Incompatibility, SystemFailure, DataMissing, UnexpectedDataValue, FacilityNotSupported,
-- PW-RegistrationFailure, NegativePW-Check, CallBarred, NumberOfPW-AttemptsViolation,
-- AbsentSubscriber, IllegalSubscriber, IllegalEquipment, USSD-Busy, UnknownAlphabet,
-- ForwardingViolation, ForwardingFailed
-- are imported from MAP-Errors in SS-Protocol module.

-- error types definition
ResourcesNotAvailable ::= ERROR
MaxNumberOfEMPTY-ParticipantsExceeded ::= ERROR
InvalidDeflectedToNumber ::= ERROR
SpecialServiceCode ::= ERROR
DeflectionToServedSubscriber ::= ERROR
RejectedByNetwork ::= ERROR
RejectedByUser ::= ERROR

END
```

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

## 4.4.2 ASN.1 data types

This subclause provides an ASN.1 module defining the abstract data types in operations and errors specification. Only data types which are specific for this specification are defined. All other data types are imported from MAP together with the import of operations and errors.

```

SS-DataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2) modules (3)
  |  ss-DataTypes (2) version7 (7)version8 (8)}

DEFINITIONS

IMPLICIT TAGS ::=

BEGIN

-- exports all data types defined in this module

IMPORTS

SS-Code
FROM MAP-SS-Code {
  ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
  |  map-SS-Code (15) version7 (7)version8 (8)}

-- imports MAP-SS-DataTypes
SS-Status, USSD-DataCodingScheme, USSD-String, CCBS-Feature
-- USSD-DataCodingScheme, USSD-String were introduced because of CNAP.
FROM MAP-SS-DataTypes {
  |  ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
  |  map-SS-DataTypes (14) version7 (7)version8 (8)}

CUG-Index,
NotificationToMSUser
FROM MAP-MS-DataTypes {
  |  ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
  |  map-MS-DataTypes (11) version7 (7)version8 (8)}

maxSignalInfoLength,
ISDN-AddressString,
ISDN-SubaddressString,
AlertingPattern,
LCSCClientExternalID,
AddressString
FROM MAP-CommonDataTypes {
  |  ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
  |  map-CommonDataTypes (18) version7 (7)version8 (8)}

LocationType,
LCSCClientName,
LCS-QoS,
Horizontal-Accuracy,
ResponseTime,
Ext-GeographicalInformation,
SupportedGADShapes,
Add-GeographicalInformation,
LCSRequestorID
FROM MAP-LCS-DataTypes {
  |  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  |  gsm-Network (1) modules (3) map-LCS-DataTypes (25) version7 (7)version8 (8)}

;

-- data types definition

SS-UserData ::= IA5String (SIZE (1.. maxSignalInfoLength))

```

```

NotifySS-Arg ::= SEQUENCE{
    ss-Code           [1]    SS-Code OPTIONAL,
    ss-Status        [4]    SS-Status OPTIONAL,
    ss-Notification  [5]    SS-Notification OPTIONAL,
    callIsWaiting-Indicator [14] NULL OPTIONAL,
    callOnHold-Indicator [15] CallOnHold-Indicator OPTIONAL,
    mpty-Indicator   [16]    NULL OPTIONAL,
    cug-Index        [17]    CUG-Index OPTIONAL,
    clirSuppressionRejected [18] NULL OPTIONAL,
    ... ,
    ect-Indicator    [19]    ECT-Indicator OPTIONAL,
    nameIndicator    [20]    NameIndicator OPTIONAL,
    ccbs-Feature     [21]    CCBS-Feature OPTIONAL,
    alertingPattern  [22]    AlertingPattern OPTIONAL,
    multicall-Indicator [23] Multicall-Indicator OPTIONAL}

-- The nameIndicator is defined because of CNAP.

Multicall-Indicator ::= ENUMERATED {
    nbr-SNexceeded (0),
    nbr-Userexceeded (1)}

ForwardChargeAdviceArg ::= SEQUENCE{
    ss-Code           [0]    SS-Code,
    chargingInformation [1]    ChargingInformation,
    ...}

SS-Notification ::= OCTET STRING (SIZE (1))

-- Bit 8 7 6 5 4 00000 (Unused)

-- Bit 3 Call is forwarded indication to A-subscriber
-- (calling subscriber)
-- 0 No information content
-- 1 Outgoing call has been forwarded to C

-- Bit 2 Call is forwarded indication to B-subscriber
-- (forwarding subscriber)
-- 0 No information content
-- 1 Incoming call has been forwarded to C

-- Bit 1 Call is forwarded indication to C-subscriber
-- (forwarded-to subscriber)
-- 0 No information content
-- 1 Incoming call is a forwarded call

ChargingInformation ::= SEQUENCE{
    e1 [1] E1 OPTIONAL,
    e2 [2] E2 OPTIONAL,
    e3 [3] E3 OPTIONAL,
    e4 [4] E4 OPTIONAL,
    e5 [5] E5 OPTIONAL,
    e6 [6] E6 OPTIONAL,
    e7 [7] E7 OPTIONAL,
    ...}

E1 ::= INTEGER (0..max10TimesUnitsPerTime)
max10TimesUnitsPerTime INTEGER ::= 8191

E2 ::= INTEGER (0..max10TimesTimeInterval)
max10TimesTimeInterval INTEGER ::= 8191

E3 ::= INTEGER (0..max100TimesScalingFactor)
max100TimesScalingFactor INTEGER ::= 8191

E4 ::= INTEGER (0..max10TimesIncrement)
max10TimesIncrement INTEGER ::= 8191

E5 ::= INTEGER (0..max10TimesIncrementPerDataInterval)
max10TimesIncrementPerDataInterval INTEGER ::= 8191

E6 ::= INTEGER (0..maxNumberOfSegmentsPerDataInterval)
maxNumberOfSegmentsPerDataInterval INTEGER ::= 8191

E7 ::= INTEGER (0..max10TimesInitialTime)
max10TimesInitialTime INTEGER ::= 8191

CallOnHold-Indicator ::= ENUMERATED {
    callRetrieved (0),
    callOnHold (1)}

```

```

ForwardCUG-InfoArg ::= SEQUENCE {
    cug-Index          [0] CUG-Index OPTIONAL,
    suppressPrefCUG    [1] NULL OPTIONAL,
    suppressOA         [2] NULL OPTIONAL,
    ...}

ECT-Indicator ::= SEQUENCE {
    ect-CallState      [0] ECT-CallState,
    rdn [1] RDN OPTIONAL,
    ...}

ECT-CallState ::= ENUMERATED {
    alerting (0),
    active (1)}

NameIndicator ::= SEQUENCE {
    callingName        [0] Name OPTIONAL,
    ...}

Name ::= CHOICE {
    namePresentationAllowed [0] NameSet,
    presentationRestricted [1] NULL,
    nameUnavailable         [2] NULL,
    namePresentationRestricted [3] NameSet}

NameSet ::= SEQUENCE {
    dataCodingScheme [0] USSD-DataCodingScheme,
    lengthInCharacters [1] INTEGER,
    nameString        [2] USSD-String,
    ...}

-- NameIndicator, Name and NameSet are defined because of CNAP.
-- The USSD-DataCodingScheme shall indicate use of the default alphabet through the
-- following encoding:
--   bit 7 6 5 4 3 2 1 0
--   | 0 0 0 0 | 1 1 1 1|

RDN ::= CHOICE {
    presentationAllowedAddress [0] RemotePartyNumber,
    presentationRestricted      [1] NULL,
    numberNotAvailableDueToInterworking [2] NULL,
    presentationRestrictedAddress [3] RemotePartyNumber}

RemotePartyNumber ::= SEQUENCE {
    partyNumber [0] ISDN-AddressString,
    partyNumberSubaddress [1] ISDN-SubaddressString OPTIONAL,
    ...}

AccessRegisterCCEnterArg ::= SEQUENCE {
    ...}

CallDeflectionArg ::= SEQUENCE {
    deflectedToNumber [0] AddressString,
    deflectedToSubaddress [1] ISDN-SubaddressString OPTIONAL,
    ...}

UserUserServiceArg ::= SEQUENCE {
    uUS-Service [0] UUS-Service,
    uUS-Required [1] BOOLEAN,
    ...}

UUS-Service ::= ENUMERATED {
    uUS1 (1),
    uUS2 (2),
    uUS3 (3),
    ...}

-- exception handling:
-- In case of UUS-Service with any other value, indicated as "UUS required",
-- but not understood by the MS, the call will be cleared.

LocationNotificationArg ::= SEQUENCE {
    notificationType [0] NotificationToMSUser,
    locationType     [1] LocationType,
    lcsClientExternalID [2] LCSClientExternalID OPTIONAL,
    lcsClientName      [3] LCSClientName OPTIONAL,
    ... ,
    lcsRequestorID     [4] LCSRequestorID OPTIONAL}

-- exception handling:
-- At reception of an unrecognised notificationType value the receiver shall reject the
-- operation with a return error cause of unexpected data value.
-- At reception of an unrecognised locationType value the receiver shall reject the
-- operation with a return error cause of unexpected data value.

```

```

LocationNotificationRes ::= SEQUENCE {
    verificationResponse [0] VerificationResponse OPTIONAL,
    ...}

VerificationResponse ::= ENUMERATED {
    permissionDenied (0),
    permissionGranted (1),
    ... }

-- exception handling:
-- an unrecognized value shall be treated the same as value 0 (permissionDenied)

LCS-MOLRArg ::= SEQUENCE {
    molr-Type [0] MOLR-Type,
    locationMethod [1] LocationMethod OPTIONAL,
    lcs-QoS [2] LCS-QoS OPTIONAL,
    lcsClientExternalID [3] LCSClientExternalID OPTIONAL,
    mlc-Number [4] ISDN-AddressString OPTIONAL,
    gpsAssistanceData [5] GPSAssistanceData OPTIONAL,
    ...,
    supportedGADShapes [6] SupportedGADShapes OPTIONAL}
-- The parameter locationMethod shall be included if and only if the molr-Type is set to value
-- deCipherringKeys or assistanceData.
-- The parameter gpsAssistanceData shall be included if and only if the molr-Type is set to value
-- assistanceData and LocationMethod is set to value assistedGPS.

MOLR-Type ::= ENUMERATED {
    locationEstimate (0),
    assistanceData (1),
    deCipherringKeys (2),
    ... }
-- exception handling:
-- an unrecognized value shall be rejected by the receiver with a return error cause of
-- unexpected data value.

LocationMethod ::= ENUMERATED {
    msBasedEOTD (0),
    msAssistedEOTD (1),
    assistedGPS (2),
    ...,
    msBasedOTDOA (3),
    msAssistedOTDOA (4)
}
-- exception handling:
-- an unrecognized value shall be rejected by the receiver with a return error cause of
-- unexpected data value.

GPSAssistanceData ::= OCTET STRING (SIZE (1..38))
-- Octets 1 to 38 are coded in the same way as the octets 3 to 7+2n of Requested GPS Data IE
-- in GSM 09.31.

LCS-MOLRRes ::= SEQUENCE {
    locationEstimate [0] Ext-GeographicalInformation OPTIONAL,
    decipherringKeys [1] DecipherringKeys OPTIONAL,
    ...,
    add-LocationEstimate [2] Add-GeographicalInformation OPTIONAL}
-- Parameters locationEstimate or add-LocationEstimate (one but not both)
-- shall be included if and only if the
-- molr-Type in LocationRequestArg was set to value locationEstimate.
-- Parameter add-LocationEstimate shall not be included if the supportedGADShapes
-- parameter was not received in the LCS-MOLRArg.
-- Parameter decipherringKeys shall be included if and only if the molr-Type
-- in LocationRequestArg was set to value deCipherringKeys.
--

DecipherringKeys ::= OCTET STRING (SIZE (15))
-- Octets in DecipherringKeys are coded in the same way as the octets 3 to 17 of Decipherring Key IE
-- in GSM 09.31. I.e. these octets contain Current Decipherring Key, Next Decipherring Key and
-- Cipherring Key Flag.

```

END

\*\*\*\*\*NEXT MODIFICATION\*\*\*\*\*

## 4.5 Operations and errors implementation

For the actual implementation of supplementary services, operations and errors have to be defined by value. The following ASN.1 module, imports operation types from the ASN.1 module described in subclause 4.2 and operation and error types from MAP. It defines operations by allocating operations and errors a local value. For the involved operations and errors the same local values as in MAP are allocated.

```

SS-Protocol {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Access (2) modules (3) ss-Protocol (3) version7 (7)version8 (8)}

DEFINITIONS ::=

BEGIN

IMPORTS

-- imports operation types

-- imports operation type from MAP-MobileServiceOperations
ForwardCheckSS-Indication
FROM MAP-MobileServiceOperations {
    ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
    | map-MobileServiceOperations (5) version7 (7)version8 (8)}

-- imports operation types from MAP-SupplementaryServiceOperations
RegisterSS, EraseSS, ActivateSS, DeactivateSS, InterrogateSS, RegisterPassword, GetPassword,
ProcessUnstructuredSS-Request, UnstructuredSS-Request, UnstructuredSS-Notify, EraseCC-Entry
FROM MAP-SupplementaryServiceOperations {
    ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
    | map-SupplementaryServiceOperations (8) version7 (7)version8 (8)}

-- imports operation types from SS-Operations
ProcessUnstructuredSS-Data, NotifySS, ForwardChargeAdvice, BuildMPTY, HoldMPTY, RetrieveMPTY,
SplitMPTY, ExplicitCT, ForwardCUG-Info, AccessRegisterCCEntry, CallDeflection, UserUserService,
LCS-LocationNotification, LCS-MOLR
FROM SS-Operations {
    ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2) modules (3)
    | ss-Operations (0) version7 (7)version8 (8)}

-- imports error types

-- imports error types from MAP-Errors
UnknownSubscriber, BearerServiceNotProvisioned, TeleserviceNotProvisioned,
IllegalSS-Operation, SS-ErrorStatus, SS-NotAvailable, SS-SubscriptionViolation,
SS-Incompatibility, SystemFailure, DataMissing, UnexpectedDataValue, PW-RegistrationFailure,
NegativePW-Check, FacilityNotSupported, CallBarred, NumberOfPW-AttemptsViolation,
AbsentSubscriber, IllegalSubscriber, IllegalEquipment, USSD-Busy, UnknownAlphabet,
ShortTermDenial, LongTermDenial, ForwardingViolation, ForwardingFailed, PositionMethodFailure

FROM MAP-Errors {
    ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
    | map-Errors (10) version7 (7)version8 (8)}

-- imports error types from SS-Errors
ResourcesNotAvailable, MaxNumberOfMPTY-ParticipantsExceeded,
InvalidDeflectedToNumber, SpecialServiceCode, DeflectionToServedSubscriber,
RejectedByNetwork, RejectedByUser

FROM SS-Errors {
    ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Access (2) modules (3)
    | ss-Errors (1) version7 (7)version8 (8)}
;

-- allocation of local values to operations
registerSS RegisterSS ::= localValue 10

```



```
eraseSS      EraseSS ::= localValue 11
activateSS   ActivateSS ::= localValue 12
deactivateSS DeactivateSS ::= localValue 13
interrogateSS InterrogateSS ::= localValue 14
notifySS     NotifySS ::= localValue 16
registerPassword RegisterPassword ::= localValue 17
getPassword  GetPassword ::= localValue 18
processUnstructuredSS-Data ProcessUnstructuredSS-Data ::= localValue 19
forwardCheckSS-Indication ForwardCheckSS-Indication ::= localValue 38
processUnstructuredSS-Request ProcessUnstructuredSS-Request ::= localValue 59
unstructuredSS-Request UnstructuredSS-Request ::= localValue 60
unstructuredSS-Notify UnstructuredSS-Notify ::= localValue 61
eraseCCEntry EraseCC-Entry ::= localValue 77
callDeflection CallDeflection ::= localValue 117
userUserService UserUserService ::= localValue 118
accessRegisterCCEntry AccessRegisterCCEntry ::= localValue 119
forwardCUG-Info ForwardCUG-Info ::= localValue 120
splitMPTY    SplitMPTY ::= localValue 121
retrieveMPTY RetrieveMPTY ::= localValue 122
holdMPTY     HoldMPTY ::= localValue 123
buildMPTY    BuildMPTY ::= localValue 124
forwardChargeAdvice ForwardChargeAdvice ::= localValue 125
explicitCT   ExplicitCT ::= localValue 126
lcs-LocationNotification LCS-LocationNotification ::= localValue 116
lcs-MOLR     LCS-MOLR ::= localValue 115

-- allocation of local values to errors

unknownSubscriber UnknownSubscriber ::= localValue 1
illegalSubscriber IllegalSubscriber ::= localValue 9
bearerServiceNotProvisioned BearerServiceNotProvisioned ::= localValue 10
teleserviceNotProvisioned TeleserviceNotProvisioned ::= localValue 11
illegalEquipment IllegalEquipment ::= localValue 12
callBarred CallBarred ::= localValue 13
illegalSS-Operation IllegalSS-Operation ::= localValue 16
ss-ErrorStatus SS-ErrorStatus ::= localValue 17
ss-NotAvailable SS-NotAvailable ::= localValue 18
ss-SubscriptionViolation SS-SubscriptionViolation ::= localValue 19
ss-Incompatibility SS-Incompatibility ::= localValue 20
facilityNotSupported FacilityNotSupported ::= localValue 21
absentSubscriber AbsentSubscriber ::= localValue 27
shortTermDenial ShortTermDenial ::= localValue 29
longTermDenial LongTermDenial ::= localValue 30
systemFailure SystemFailure ::= localValue 34
dataMissing DataMissing ::= localValue 35
unexpectedDataValue UnexpectedDataValue ::= localValue 36
pw-RegistrationFailure PW-RegistrationFailure ::= localValue 37
negativePW-Check NegativePW-Check ::= localValue 38
numberOfPW-AttemptsViolation NumberOfPW-AttemptsViolation ::= localValue 43
positionMethodFailure PositionMethodFailure ::= localValue 54
unknownAlphabet UnknownAlphabet ::= localValue 71
ussd-Busy USSD-Busy ::= localValue 72
-- nbr-SbExceeded Nbr-SbExceeded ::= localValue 120
--.editor's note: a CR is needed to resolve the unresolved TypeReference "Nbr-SbExceeded".
-- CR 011r1 is not complete!
rejectedByUser RejectedByUser ::= localValue 121
rejectedByNetwork RejectedByNetwork ::= localValue 122
deflectionToServedSubscriber DeflectionToServedSubscriber ::= localValue 123
specialServiceCode SpecialServiceCode ::= localValue 124
invalidDeflectedToNumber InvalidDeflectedToNumber ::= localValue 125
maxNumberOfMPTY-ParticipantsExceeded MaxNumberOfMPTY-ParticipantsExceeded ::= localValue 126
resourcesNotAvailable ResourcesNotAvailable ::= localValue 127

END
```

## CHANGE REQUEST

⌘ **29.002 CR 398** ⌘ rev **1** ⌘ Current version: **5.1.0** ⌘

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

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Check of NAM and Requesting Node Type on receipt of SendAuthenticationInfo		
<b>Source:</b>	⌘ CN4		
<b>Work item code:</b>	⌘ TEI4	<b>Date:</b>	⌘ 2002-03-18
<b>Category:</b>	⌘ <b>C</b>	<b>Release:</b>	⌘ Rel-5
	<i>Use one of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.	<i>Use one of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)	

<b>Reason for change:</b>	⌘ Requesting Node Type parameter has been introduced in the Send Authentication Info invoke operation. To save signalling load, it would be beneficial to check that received Requesting Node Type with regard to the subscriber's Network Access Mode ('gprs-only', 'non-gprs only', 'both') in order to deny the mobile access already at authentication info request. Currently this check is done later on at receipt of the update location request.
<b>Summary of change:</b>	⌘ In MAP process Obtain_Auth_Sets_HLR, the SendAuthenticationInfo request is refused if the requesting node is a VLR (resp. SGSN) and the involved subscriber is 'gprs only' (resp. 'non-gprs only').
<b>Consequences if not approved:</b>	⌘ Un-necessary signalling load in case of authentication information request from VLR or SGSN for 'gprs only' or 'non-gprs only' subscribers.

<b>Clauses affected:</b>	⌘ § 25.5.5		
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	
<b>Other comments:</b>	⌘ No reference given to 29.010 because there is no Rel-5 version.		

### How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: [http://www.3gpp.org/3G\\_Specs/CRs.htm](http://www.3gpp.org/3G_Specs/CRs.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.

## 25.5.5 Process Obtain\_Auth\_Sets\_HLR

Opening of the dialogue is described in the macro Receive\_Open\_Ind in clause 25.1, with outcomes:

- reversion to version one or two procedure;
- procedure termination; or
- dialogue acceptance, with proceeding as below.

This process is used by the HLR to obtain authentication vectors from the AuC, upon request from the VLR or from the SGSN. The process acts as follows:

- a MAP\_SEND\_AUTHENTICATION\_INFO indication is received by the HLR;
- the HLR checks the service indication for errors. If any, they are reported to the VLR or to the SGSN in the MAP\_SEND\_AUTHENTICATION\_INFO response.
- If Network Access Mode is set to “non-GPRS only” and if the Requesting Node Type is present and indicates ‘SGSN’, the error Unknown Subscriber (with diagnostic value set to “Gprs Subscription Unknown”) is returned in the response. The process terminates;
- If Network Access Mode is set to “GPRS only” and if the Requesting Node Type is present and indicates ‘VLR’, the error Unknown Subscriber is returned in the response. The process terminates;
- If no errors are detected, authentication vectors are fetched from the AuC. Further details are found in 3GPP TS 43.020 [24];
- if errors are detected they are reported to the VLR or to the SGSN in the MAP\_SEND\_AUTHENTICATION\_INFO response. Otherwise the authentication vectors are returned.
- if segmentation of the response message is required and allowed, a MAP\_SEND\_AUTHENTICATION\_INFO\_response, containing at least one authentication vector, followed by a MAP\_DELIMITER\_request is returned to the VLR or SGSN, the remaining authentication vectors are stored and the HLR waits for a new service indication from the VLR or SGSN.

The process is described in figure 25.5/5.

**NEXT MODIFICATION**

Process Obtain\_Auth\_Sets\_HLR

1(2)

Figure 25.5/5: Process in the HLR to obtain authentication sets from the AuC and relay them to the VLR

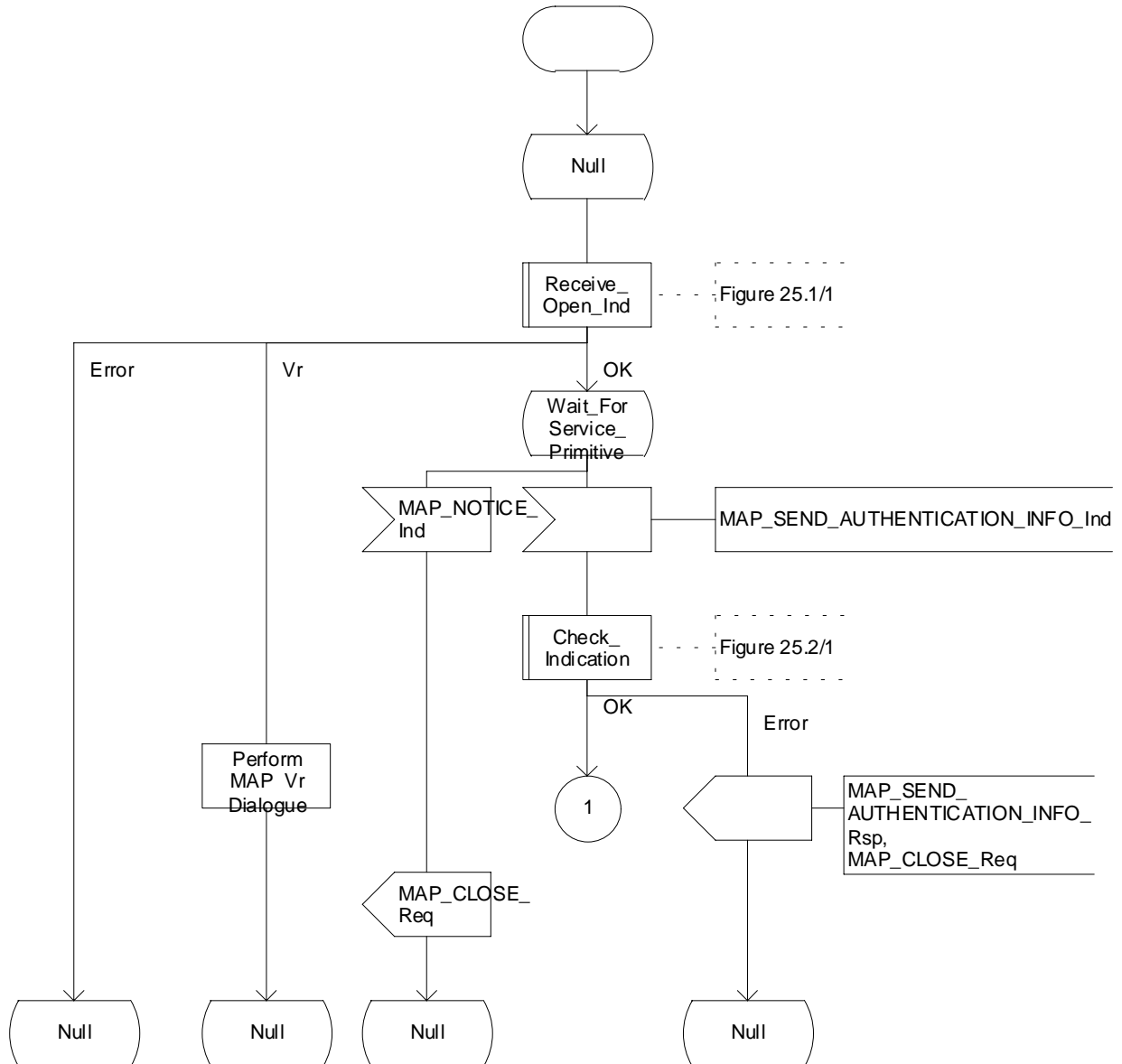
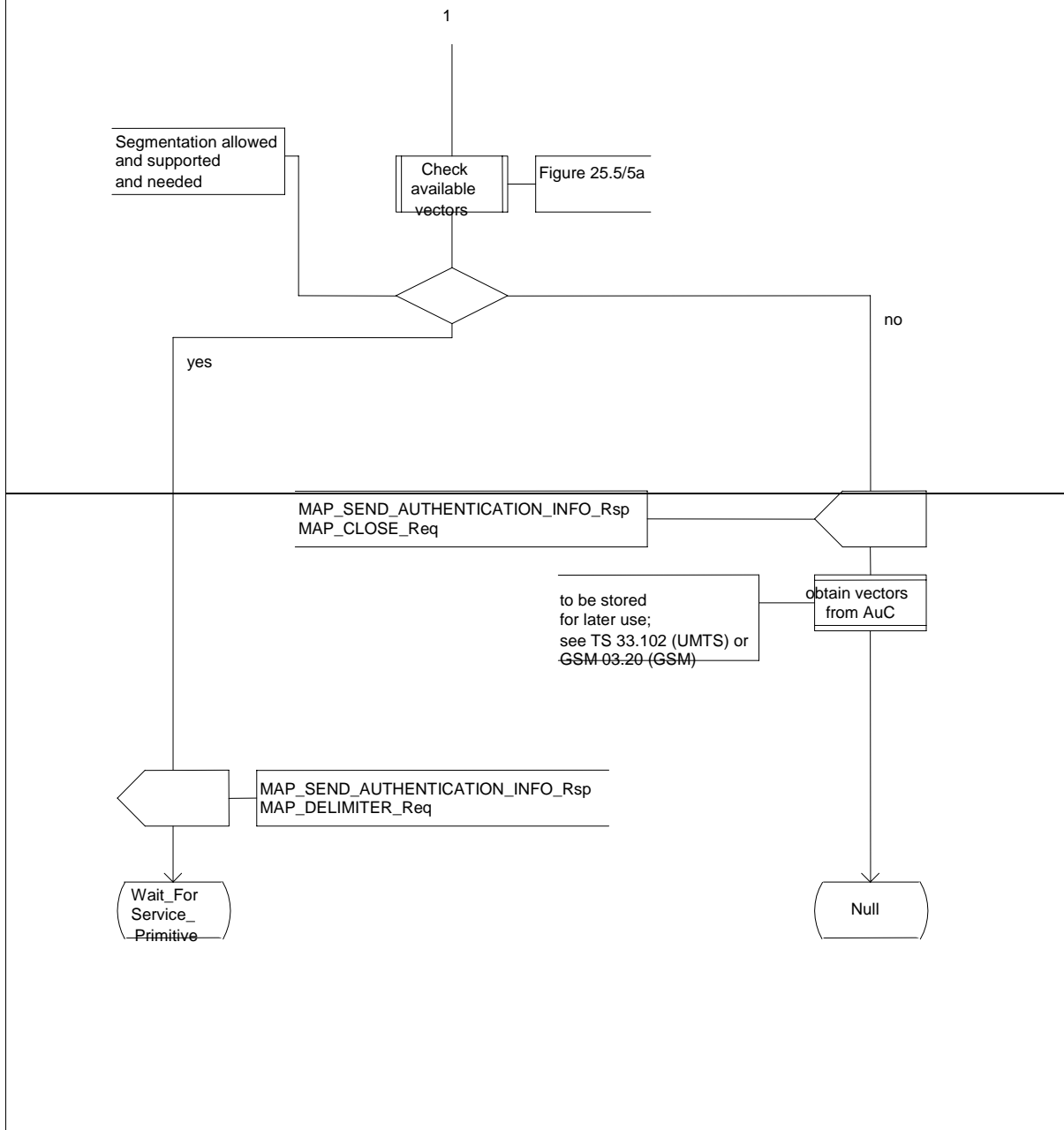


Figure 25.5/5 (sheet 1 of 2): Process Obtain\_Auth\_Sets\_HLR

Process

2(2)

Figure 25.5/5: Process in the HLR to obtain authentication sets from the AuC and relay them to the VLR



process Obtain\_Auth\_Sets\_HLR

2(2)

Figure 25.5/5: Process in the HLR to obtain authentication sets from the AuC and relay them to the VLR

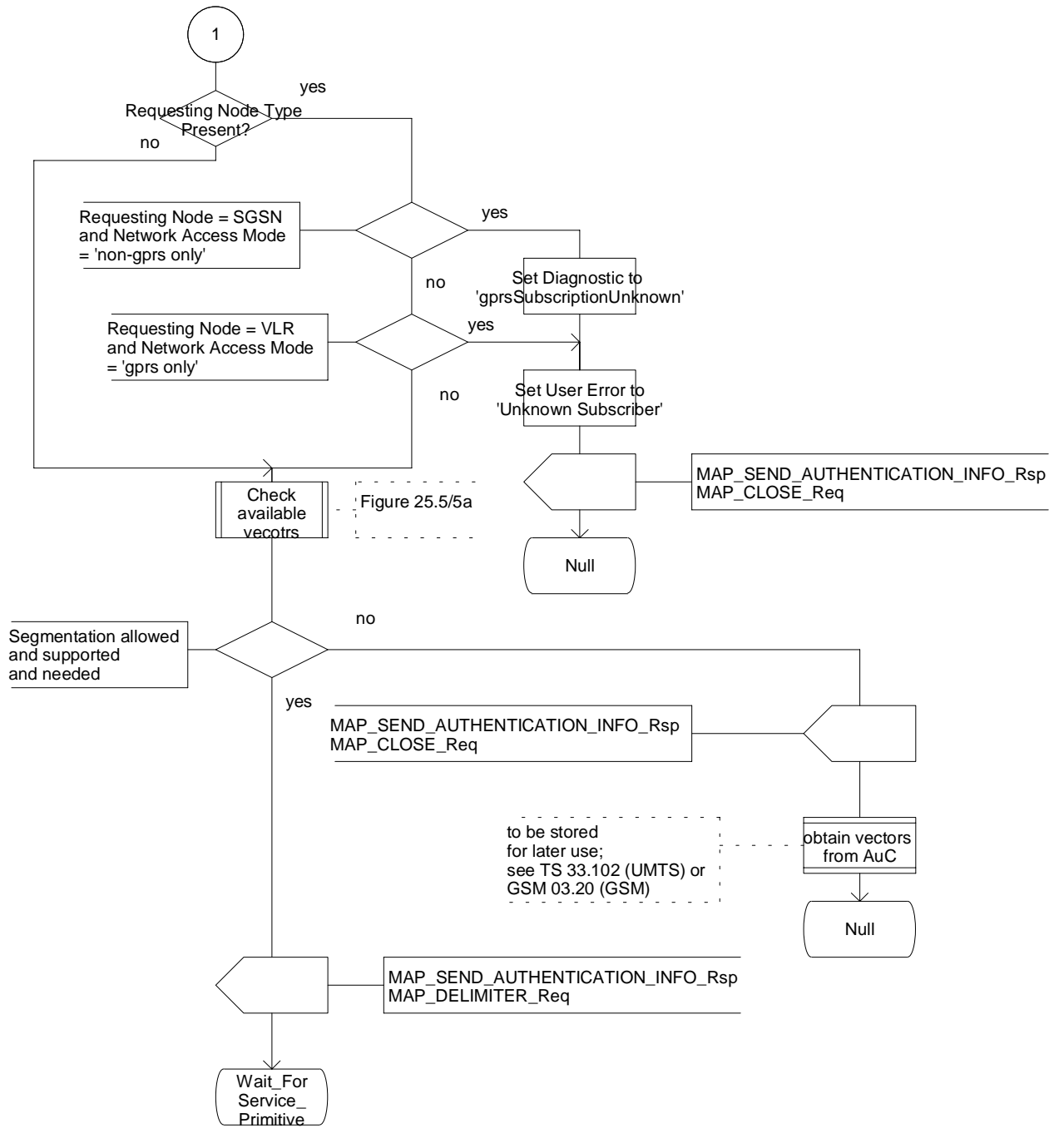


Figure 25.5/5 (sheet 2 of 2): Process Obtain\_Auth\_Sets\_HLR





### 17.3.3 ASN.1 Module for application-context-names

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

```
MAP-ApplicationContexts {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-ApplicationContexts (2) version7 (7)version8 (8)}
```

DEFINITIONS

::=

BEGIN

-- EXPORTS everything

IMPORTS

gsm-NetworkId,  
ac-Id

FROM MobileDomainDefinitions {

ccitt (0) identified-organization (4) etsi (0) mobileDomain (0)  
mobileDomainDefinitions (0) version1 (1)}

;

-- application-context-names

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

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

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

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

```
authenticationFailureReportContext-v3 OBJECT IDENTIFIER ::=
  {map-ac authenticationFailureReport(39) version3(3)}
```

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

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

```
handoverControlContext-v3 OBJECT IDENTIFIER ::=
  {map-ac handoverControl(11) version3(3)}
```

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

```
gprsLocationInfoRetrievalContext-v4 OBJECT IDENTIFIER ::=
    {map-ac gprsLocationInfoRetrieval(33) version4(4)}
```

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

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

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

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

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

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

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

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

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

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

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

```
secureTransportHandlingContext-v3 OBJECT IDENTIFIER ::=
  {map-ac secureTransportHandling(40) version3(3)}
```

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

AC Name & Version	Object Identifier
-- networkLocUpContext-v1	map-ac networkLocUp (1) version1 (1)
-- networkLocUpContext-v2	map-ac networkLocUp (1) version2 (2)
-- locationCancellationContext-v1	map-ac locationCancellation (2) version1 (1)
-- locationCancellationContext-v2	map-ac locationCancellation (2) version2 (2)
-- roamingNumberEnquiryContext-v1	map-ac roamingNumberEnquiry (3) version1 (1)
-- roamingNumberEnquiryContext-v2	map-ac roamingNumberEnquiry (3) version2 (2)
-- locationInfoRetrievalContext-v1	map-ac locationInfoRetrieval (5) version1 (1)
-- locationInfoRetrievalContext-v2	map-ac locationInfoRetrieval (5) version2 (2)
-- resetContext-v1	map-ac reset (10) version1 (1)
-- handoverControlContext-v1	map-ac handoverControl (11) version1 (1)
-- handoverControlContext-v2	map-ac handoverControl (11) version2 (2)
-- equipmentMngtContext-v1	map-ac equipmentMngt (13) version1 (1)
-- infoRetrievalContext-v1	map-ac infoRetrieval (14) version1 (1)
-- infoRetrievalContext-v2	map-ac infoRetrieval (14) version2 (2)
-- interVlrlInfoRetrievalContext-v2	map-ac interVlrlInfoRetrieval (15) version2 (2)
-- subscriberDataMngtContext-v1	map-ac subscriberDataMngt (16) version1 (1)
-- subscriberDataMngtContext-v2	map-ac subscriberDataMngt (16) version2 (2)
-- tracingContext-v1	map-ac tracing (17) version1 (1)
-- tracingContext-v2	map-ac tracing (17) version2 (2)
-- networkFunctionalSsContext-v1	map-ac networkFunctionalSs (18) version1 (1)
-- shortMsgGatewayContext-v1	map-ac shortMsgGateway (20) version1 (1)
-- shortMsgGatewayContext-v2	map-ac shortMsgGateway (20) version2 (2)
-- shortMsgRelayContext-v1	map-ac shortMsgRelay (21) version1 (1)
-- shortMsgAlertContext-v1	map-ac shortMsgAlert (23) version1 (1)
-- mwdMngtContext-v1	map-ac mwdMngt (24) version1 (1)
-- mwdMngtContext-v2	map-ac mwdMngt (24) version2 (2)
-- shortMsgMT-RelayContext-v2	map-ac shortMsgMT-Relay (25) version2 (2)
-- msPurgingContext-v2	map-ac msPurging (27) version2 (2)
-- callControlTransferContext-v3	map-ac callControlTransferContext (6) version3 (3)
-- gprsLocationInfoRetrievalContext-v3	map-ac gprsLocationInfoRetrievalContext (33) version3 (3)

END

## 17.4 MAP Dialogue Information

```
MAP-DialogueInformation {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-DialogueInformation (3) version7 (7)version8 (8)}
```

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

```
  map-DialogueAS,
  MAP-DialoguePDU,
  map-ProtectedDialogueAS,
  MAP-ProtectedDialoguePDU
```

;

IMPORTS

```
  gsm-NetworkId,
  as-Id
```

FROM MobileDomainDefinitions {

```
  ccitt (0) identified-organization (4) etsi (0) mobileDomain (0)
  mobileDomainDefinitions (0) version1 (1)}
```

```

AddressString
FROM MAP-CommonDataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network(1) modules (3) map-CommonDataTypes (18) version7 (7)version8 (8)}

ExtensionContainer
FROM MAP-ExtensionDataTypes {
  | ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 (8)}

SecurityHeader,
ProtectedPayload
FROM MAP-ST-DataTypes {
  | ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-ST-DataTypes (27) version7 (7)version8 (8)}
;

```

-- abstract syntax name for MAP-DialoguePDU

```

map-DialogueAS OBJECT IDENTIFIER ::=
  {gsm-NetworkId as-Id map-DialoguePDU (1) version1 (1)}

```

```

MAP-DialoguePDU ::= CHOICE {
  map-open [0] MAP-OpenInfo,
  map-accept [1] MAP-AcceptInfo,
  map-close [2] MAP-CloseInfo,
  map-refuse [3] MAP-RefuseInfo,
  map-userAbort [4] MAP-UserAbortInfo,
  map-providerAbort [5] MAP-ProviderAbortInfo}

```

```

MAP-OpenInfo ::= SEQUENCE {
  destinationReference [0] AddressString OPTIONAL,
  originationReference [1] AddressString OPTIONAL,
  ...,
  extensionContainer ExtensionContainer OPTIONAL
  -- extensionContainer must not be used in version 2
}

```

```

MAP-AcceptInfo ::= SEQUENCE {
  ...,
  extensionContainer ExtensionContainer OPTIONAL
  -- extensionContainer must not be used in version 2
}

```

```

MAP-CloseInfo ::= SEQUENCE {
  ...,
  extensionContainer ExtensionContainer OPTIONAL
  -- extensionContainer must not be used in version 2
}

```

```

MAP-RefuseInfo ::= SEQUENCE {
  reason Reason,
  ...,
  extensionContainer ExtensionContainer OPTIONAL,
  -- extensionContainer must not be used in version 2
  alternativeApplicationContext OBJECT IDENTIFIER OPTIONAL
  -- alternativeApplicationContext must not be used in version 2
}

```

```

Reason ::= ENUMERATED {
  noReasonGiven (0),
  invalidDestinationReference (1),
  invalidOriginatingReference (2),
  encapsulatedAC-NotSupported (3),
  transportProtectionNotAdequate (4)}
  -- encapsulatedAC-NotSupported and transportProtectionNotAdequate must not be used in
  -- dialogues with an AC different from secureTransportHandling

```

```

MAP-UserAbortInfo ::= SEQUENCE {
  map-UserAbortChoice MAP-UserAbortChoice,
  ...,
  extensionContainer ExtensionContainer OPTIONAL
  -- extensionContainer must not be used in version 2
}

```

```
MAP-UserAbortChoice ::= CHOICE {
    userSpecificReason      [0] NULL,
    userResourceLimitation [1] NULL,
    resourceUnavailable     [2] ResourceUnavailableReason,
    applicationProcedureCancellation [3] ProcedureCancellationReason}
```

```
ResourceUnavailableReason ::= ENUMERATED {
    shortTermResourceLimitation (0),
    longTermResourceLimitation (1)}
```

```
ProcedureCancellationReason ::= ENUMERATED {
    handoverCancellation (0),
    radioChannelRelease (1),
    networkPathRelease (2),
    callRelease (3),
    associatedProcedureFailure (4),
    tandemDialogueRelease (5),
    remoteOperationsFailure (6)}
```

```
MAP-ProviderAbortInfo ::= SEQUENCE {
    map-ProviderAbortReason      MAP-ProviderAbortReason,
    ...,
    extensionContainer           ExtensionContainer           OPTIONAL
    -- extensionContainer must not be used in version 2
}
```

```
MAP-ProviderAbortReason ::= ENUMERATED {
    abnormalDialogue (0),
    invalidPDU (1)}
```

-- abstract syntax name for MAP-ProtectedDialoguePDU

```
map-ProtectedDialogueAS OBJECT IDENTIFIER ::=
    {gsm-NetworkId as-Id map-ProtectedDialoguePDU (3) version1 (1)}
```

```
MAP-ProtectedDialoguePDU ::= SEQUENCE {
    encapsulatedAC          OBJECT IDENTIFIER,
    securityHeader          SecurityHeader           OPTIONAL,
    protectedPayload        ProtectedPayload         OPTIONAL,
    ...}
-- The protectedPayload carries the result of applying the security function
-- defined in 3G TS 33.200 to the encoding of the securely transported
-- MAP-DialoguePDU
```

END

## 17.5 MAP operation and error codes

```
MAP-Protocol {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-Protocol (4) version7 (7)version8 \(8\)}
```

DEFINITIONS

::=

BEGIN

IMPORTS

```
UpdateLocation,
CancelLocation,
PurgeMS,
SendIdentification,
UpdateGprsLocation,
PrepareHandover,
SendEndSignal,
ProcessAccessSignalling,
ForwardAccessSignalling,
PrepareSubsequentHandover,
SendAuthenticationInfo,
AuthenticationFailureReport,
CheckIMEI,
InsertSubscriberData,
DeleteSubscriberData,
Reset,
ForwardCheckSS-Indication,
```

```
RestoreData,  
ProvideSubscriberInfo,  
AnyTimeInterrogation,  
AnyTimeSubscriptionInterrogation,  
AnyTimeModification,  
SendRoutingInfoForGprs,  
FailureReport,  
NoteMsPresentForGprs,  
NoteMM-Event,  
NoteSubscriberDataModified
```

```
FROM MAP-MobileServiceOperations {  
  ccitt identified-organization (4) etsi (0) mobileDomain (0)  
  gsm-Network (1) modules (3) map-MobileServiceOperations (5)  
  version7 (7)version8 \(8\)}
```

```
ActivateTraceMode,  
DeactivateTraceMode,  
SendIMSI
```

```
FROM MAP-OperationAndMaintenanceOperations {  
  ccitt identified-organization (4) etsi (0) mobileDomain (0)  
  gsm-Network (1) modules (3) map-OperationAndMaintenanceOperations (6)  
  version7 (7)version8 \(8\)}
```

```
SendRoutingInfo,  
ProvideRoamingNumber,  
ResumeCallHandling,  
ProvideSIWFSNumber,  
SIWFSSignallingModify,  
SetReportingState,  
StatusReport,  
RemoteUserFree,  
IST-Alert,  
IST-Command
```

```
FROM MAP-CallHandlingOperations {  
  ccitt identified-organization (4) etsi (0) mobileDomain (0)  
  gsm-Network (1) modules (3) map-CallHandlingOperations (7)  
  version7 (7)version8 \(8\)}
```

```
RegisterSS,  
EraseSS,  
ActivateSS,  
DeactivateSS,  
InterrogateSS,  
ProcessUnstructuredSS-Request,  
UnstructuredSS-Request,  
UnstructuredSS-Notify,  
RegisterPassword,  
GetPassword,  
SS-InvocationNotification,  
RegisterCC-Entry,  
EraseCC-Entry
```

```
FROM MAP-SupplementaryServiceOperations {  
  ccitt identified-organization (4) etsi (0) mobileDomain (0)  
  gsm-Network (1) modules (3) map-SupplementaryServiceOperations (8)  
  version7 (7)version8 \(8\)}
```

```
SendRoutingInfoForSM,  
MO-ForwardSM,  
MT-ForwardSM,  
ReportSM-DeliveryStatus,  
AlertServiceCentre,  
InformServiceCentre,  
ReadyForSM
```

```
FROM MAP-ShortMessageServiceOperations {  
  ccitt identified-organization (4) etsi (0) mobileDomain (0)  
  gsm-Network (1) modules (3) map-ShortMessageServiceOperations (9)  
  version7 (7)version8 \(8\)}
```

```
PrepareGroupCall,  
ProcessGroupCallSignalling,  
ForwardGroupCallSignalling,  
SendGroupCallEndSignal
```

```
FROM MAP-Group-Call-Operations {  
  ccitt identified-organization (4) etsi (0) mobileDomain (0)  
  gsm-Network (1) modules (3) map-Group-Call-Operations (22)  
  version7 (7)version8 \(8\)}
```

```

ProvideSubscriberLocation,
SendRoutingInfoForLCS,
SubscriberLocationReport
FROM MAP-LocationServiceOperations {
ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-LocationServiceOperations (24)
version7 (7)version8 \(8\)}

```

```

SecureTransportClass1,
SecureTransportClass2,
SecureTransportClass3,
SecureTransportClass4

```

```

FROM MAP-SecureTransportOperations {
ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-SecureTransportOperations (26)
version7 (7)version8 \(8\)}

```

```

SystemFailure,
DataMissing,
UnexpectedDataValue,
FacilityNotSupported,
UnknownSubscriber,
NumberChanged,
UnknownMSC,
UnidentifiedSubscriber,
UnknownEquipment,
RoamingNotAllowed,
IllegalSubscriber,
IllegalEquipment,
BearerServiceNotProvisioned,
TeleserviceNotProvisioned,
NoHandoverNumberAvailable,
SubsequentHandoverFailure,
TracingBufferFull,
OR-NotAllowed,
NoRoamingNumberAvailable,
AbsentSubscriber,
BusySubscriber,
NoSubscriberReply,
CallBarred,
ForwardingViolation,
ForwardingFailed,
CUG-Reject,
ATI-NotAllowed,
IllegalSS-Operation,
SS-ErrorStatus,
SS-NotAvailable,
SS-SubscriptionViolation,
SS-Incompatibility,
UnknownAlphabet,
USSD-Busy,
PW-RegistrationFailure,
NegativePW-Check,
NumberOfPW-AttemptsViolation,
SubscriberBusyForMT-SMS,
SM-DeliveryFailure,
MessageWaitingListFull,
AbsentSubscriberSM,
ResourceLimitation,
NoGroupCallNumberAvailable,
ShortTermDenial,
LongTermDenial,
IncompatibleTerminal,
UnauthorizedRequestingNetwork,
UnauthorizedLCSCClient,
PositionMethodFailure,
UnknownOrUnreachableLCSCClient,
ATSI-NotAllowed,
ATM-NotAllowed,
InformationNotAvailable,
MM-EventNotSupported,
TargetCellOutsideGroupCallArea,
SecureTransportError

```

```

FROM MAP-Errors {

```

```
ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-Errors (10) version7 (7)version8 (8)}
;
```

```
-- location registration operation codes
```

```
updateLocation UpdateLocation ::= localValue 2
cancelLocation CancelLocation ::= localValue 3
purgeMS PurgeMS ::= localValue 67
sendIdentification SendIdentification ::= localValue 55
```

```
-- handover operation codes
```

```
prepareHandover PrepareHandover ::= localValue 68
sendEndSignal SendEndSignal ::= localValue 29
processAccessSignalling ProcessAccessSignalling ::= localValue 33
forwardAccessSignalling ForwardAccessSignalling ::= localValue 34
prepareSubsequentHandover PrepareSubsequentHandover ::=
    localValue 69
```

```
-- authentication operation codes
```

```
sendAuthenticationInfo SendAuthenticationInfo ::= localValue 56
authenticationFailureReport AuthenticationFailureReport ::= localValue 15
```

```
-- IMEI MANAGEMENT operation codes
```

```
checkIMEI CheckIMEI ::= localValue 43
```

```
-- subscriber management operation codes
```

```
insertSubscriberData InsertSubscriberData ::= localValue 7
deleteSubscriberData DeleteSubscriberData ::= localValue 8
```

```
-- fault recovery operation codes
```

```
reset Reset ::= localValue 37
forwardCheckSS-Indication ForwardCheckSS-Indication ::=
    localValue 38
restoreData RestoreData ::= localValue 57
```

```
-- operation and maintenance operation codes
```

```
activateTraceMode ActivateTraceMode ::= localValue 50
deactivateTraceMode DeactivateTraceMode ::= localValue 51
sendIMSI SendIMSI ::= localValue 58
```

```
-- call handling operation codes
```

```
sendRoutingInfo SendRoutingInfo ::= localValue 22
provideRoamingNumber ProvideRoamingNumber ::= localValue 4
resumeCallHandling ResumeCallHandling ::= localValue 6
provideSIWFSNumber ProvideSIWFSNumber ::= localValue 31
sIWFSsignallingModify SIWFSsignallingModify ::= localValue 32
setReportingState SetReportingState ::= localValue 73
statusReport StatusReport ::= localValue 74
remoteUserFree RemoteUserFree ::= localValue 75
istAlert IST-Alert ::= localValue 87
istCommand IST-Command ::= localValue 88
```

```
-- supplementary service handling operation codes
```



```
registerSS RegisterSS ::= localValue 10
eraseSS EraseSS ::= localValue 11
activateSS ActivateSS ::= localValue 12
deactivateSS DeactivateSS ::= localValue 13
interrogateSS InterrogateSS ::= localValue 14
processUnstructuredSS-Request ProcessUnstructuredSS-Request ::=
    localValue 59
unstructuredSS-Request UnstructuredSS-Request ::= localValue 60
unstructuredSS-Notify UnstructuredSS-Notify ::= localValue 61
registerPassword RegisterPassword ::= localValue 17
getPassword GetPassword ::= localValue 18
registerCC-Entry RegisterCC-Entry ::= localValue 76
eraseCC-Entry EraseCC-Entry ::= localValue 77
```

-- short message service operation codes

```
sendRoutingInfoForSM SendRoutingInfoForSM ::= localValue 45
mo-forwardSM MO-ForwardSM ::= localValue 46
mt-forwardSM MT-ForwardSM ::= localValue 44
reportSM-DeliveryStatus ReportSM-DeliveryStatus ::= localValue 47
informServiceCentre InformServiceCentre ::= localValue 63
alertServiceCentre AlertServiceCentre ::= localValue 64
readyForSM ReadyForSM ::= localValue 66
```

-- provide subscriber info operation codes

```
provideSubscriberInfo ProvideSubscriberInfo ::= localValue 70
```

-- any time interrogation operation codes

```
anyTimeInterrogation AnyTimeInterrogation ::= localValue 71
```

-- any time information handling operation codes

```
anyTimeSubscriptionInterrogation AnyTimeSubscriptionInterrogation ::= localValue 62
anyTimeModification AnyTimeModification ::= localValue 65
```

-- subscriber data modification notification operation codes

```
noteSubscriberDataModified NoteSubscriberDataModified ::= localValue 5
```

-- supplementary service invocation notification operation codes

```
ss-InvocationNotification SS-InvocationNotification ::= localValue 72
```

--Group Call operation codes

```
prepareGroupCall PrepareGroupCall ::= localValue 39
sendGroupCallEndSignal SendGroupCallEndSignal ::= localValue 40
processGroupCallSignalling ProcessGroupCallSignalling ::= localValue 41
forwardGroupCallSignalling ForwardGroupCallSignalling ::= localValue 42
```

-- gprs location updating operation codes

```
updateGprsLocation UpdateGprsLocation ::= localValue 23
```

-- gprs location information retrieval operation codes

```
sendRoutingInfoForGprs SendRoutingInfoForGprs ::= localValue 24
```

-- failure reporting operation codes

```
failureReport FailureReport ::= localValue 25
```

-- GPRS notification operation codes

```
noteMsPresentForGprs NoteMsPresentForGprs ::= localValue 26
```

-- Location service operation codes

```
provideSubscriberLocation ProvideSubscriberLocation ::= localValue 83
sendRoutingInfoForLCS SendRoutingInfoForLCS ::= localValue 85
subscriberLocationReport SubscriberLocationReport ::= localValue 86
```

-- Mobility Management operation codes

```
noteMM-Event NoteMM-Event ::= localValue 89
```

-- Secure transport operation codes

```
secureTransportClass1 SecureTransportClass1 ::= localValue 78
secureTransportClass2 SecureTransportClass2 ::= localValue 79
secureTransportClass3 SecureTransportClass3 ::= localValue 80
secureTransportClass4 SecureTransportClass4 ::= localValue 81
```

-- generic error codes

```
systemFailure SystemFailure ::= localValue 34
dataMissing DataMissing ::= localValue 35
unexpectedDataValue UnexpectedDataValue ::= localValue 36
facilityNotSupported FacilityNotSupported ::= localValue 21
incompatibleTerminal IncompatibleTerminal ::= localValue 28
resourceLimitation ResourceLimitation ::= localValue 51
```

-- identification and numbering error codes

```
unknownSubscriber UnknownSubscriber ::= localValue 1
numberChanged NumberChanged ::= localValue 44
unknownMSC UnknownMSC ::= localValue 3
unidentifiedSubscriber UnidentifiedSubscriber ::= localValue 5
unknownEquipment UnknownEquipment ::= localValue 7
```

-- subscription error codes

```
roamingNotAllowed RoamingNotAllowed ::= localValue 8
illegalSubscriber IllegalSubscriber ::= localValue 9
illegalEquipment IllegalEquipment ::= localValue 12
bearerServiceNotProvisioned BearerServiceNotProvisioned ::=
    localValue 10
teleserviceNotProvisioned TeleserviceNotProvisioned ::=
    localValue 11
```

-- handover error codes

```
noHandoverNumberAvailable NoHandoverNumberAvailable ::=
    localValue 25
subsequentHandoverFailure SubsequentHandoverFailure ::=
    localValue 26
targetCellOutsideGroupCallArea TargetCellOutsideGroupCallArea ::=
    localValue 42
```

-- operation and maintenance error codes

```
tracingBufferFull TracingBufferFull ::= localValue 40
```

-- call handling error codes

```
noRoamingNumberAvailable NoRoamingNumberAvailable ::= localValue 39
absentSubscriber AbsentSubscriber ::= localValue 27
busySubscriber BusySubscriber ::= localValue 45
noSubscriberReply NoSubscriberReply ::= localValue 46
callBarred CallBarred ::= localValue 13
forwardingFailed ForwardingFailed ::= localValue 47
or-NotAllowed OR-NotAllowed ::= localValue 48
forwardingViolation ForwardingViolation ::= localValue 14
cug-Reject CUG-Reject ::= localValue 15
```

-- any time interrogation error codes

**ati-NotAllowed** ATI-NotAllowed ::= localValue 49

-- any time information handling error codes

**atsi-NotAllowed** ATSI-NotAllowed ::= localValue 60  
**atm-NotAllowed** ATM-NotAllowed ::= localValue 61  
**informationNotAvailable** InformationNotAvailable ::= localValue 62

-- Group Call error codes

**noGroupCallNumberAvailable** NoGroupCallNumberAvailable ::= localValue 50

-- supplementary service error codes

**illegalSS-Operation** IllegalSS-Operation ::= localValue 16  
**ss-ErrorStatus** SS-ErrorStatus ::= localValue 17  
**ss-NotAvailable** SS-NotAvailable ::= localValue 18  
**ss-SubscriptionViolation** SS-SubscriptionViolation ::= localValue 19  
**ss-Incompatibility** SS-Incompatibility ::= localValue 20  
**unknownAlphabet** UnknownAlphabet ::= localValue 71  
**ussd-Busy** USSD-Busy ::= localValue 72  
**pw-RegistrationFailure** PW-RegistrationFailure ::= localValue 37  
**negativePW-Check** NegativePW-Check ::= localValue 38  
**numberOfPW-AttemptsViolation** NumberOfPW-AttemptsViolation ::= localValue 43  
**shortTermDenial** ShortTermDenial ::= localValue 29  
**longTermDenial** LongTermDenial ::= localValue 30

-- short message service error codes

**subscriberBusyForMT-SMS** SubscriberBusyForMT-SMS ::= localValue 31  
**sm-DeliveryFailure** SM-DeliveryFailure ::= localValue 32  
**messageWaitingListFull** MessageWaitingListFull ::= localValue 33  
**absentsubscriberSM** AbsentSubscriberSM ::= localValue 6

-- location service error codes

**unauthorizedRequestingNetwork** UnauthorizedRequestingNetwork ::= localValue 52  
**unauthorizedLCSCClient** UnauthorizedLCSCClient ::= localValue 53  
**positionMethodFailure** PositionMethodFailure ::= localValue 54  
**unknownOrUnreachableLCSCClient** UnknownOrUnreachableLCSCClient ::= localValue 58

-- Mobility Management error codes

**mm-EventNotSupported** MM-EventNotSupported ::= localValue 59

-- Secure transport error codes

**secureTransportError** SecureTransportError ::= localValue 4

-- The following operation codes are reserved for operations  
 -- existing in previous versions of the protocol

Operation Name	AC used	Oper. Code
--		
-- sendParameters	map-ac infoRetrieval (14) version1 (1)	localValue 9
-- processUnstructuredSS-Data	map-ac networkFunctionalSs (18) version1 (1)	localValue 19
-- performHandover	map-ac handoverControl (11) version1 (1)	localValue 28
-- performSubsequentHandover	map-ac handoverControl (11) version1 (1)	localValue 30
-- noteInternalHandover	map-ac handoverControl (11) version1 (1)	localValue 35
-- noteSubscriberPresent	map-ac mwdMngt (24) version1 (1)	localValue 48
-- alertServiceCentreWithoutResult	map-ac shortMsgAlert (23) version1 (1)	localValue 49
-- traceSubscriberActivity	map-ac handoverControl (11) version1 (1)	localValue 52
-- beginSubscriberActivity	map-ac networkFunctionalSs (18) version1 (1)	localValue 54

-- The following error codes are reserved for errors  
 -- existing in previous versions of the protocol

-- Error Name	AC used	Error Code
-- unknownBaseStation	map-ac handoverControl (11) version1 (1)	localValue 2
-- invalidTargetBaseStation	map-ac handoverControl (11) version1 (1)	localValue 23
-- noRadioResourceAvailable	map-ac handoverControl (11) version1 (1)	localValue 24

END

## 17.6 MAP operation and error types

### 17.6.1 Mobile Service Operations

```
MAP-MobileServiceOperations {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-MobileServiceOperations (5)
    version7 (7)version8 (8)}
```

DEFINITIONS

::=

BEGIN

EXPORTS

```

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

    -- gprs location registration operations
    UpdateGprsLocation,

    -- subscriber information enquiry operations
    ProvideSubscriberInfo,

    -- any time information enquiry operations
    AnyTimeInterrogation,

    -- any time information handling operations
    AnyTimeSubscriptionInterrogation,
    AnyTimeModification,

    -- subscriber data modification notification operations
    NoteSubscriberDataModified,

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

    -- authentication management operations
    SendAuthenticationInfo,
    AuthenticationFailureReport,

    -- IMEI management operations
    CheckIMEI,

    -- subscriber management operations
    InsertSubscriberData,
    DeleteSubscriberData,

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

    -- gprs location information retrieval operations
    SendRoutingInfoForGprs,
```

```

-- failure reporting operations
FailureReport,

-- gprs notification operations
NoteMsPresentForGprs,

-- Mobility Management operations
NoteMM-Event

```

```
;
```

```

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

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

FROM MAP-Errors {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-Errors (10) version7-(7)version8 \(8\)}

  UpdateLocationArg,
  UpdateLocationRes,
  CancelLocationArg,
  CancelLocationRes,
  PurgeMS-Arg,
  PurgeMS-Res,
  SendIdentificationArg,
  SendIdentificationRes,
  UpdateGprsLocationArg,
  UpdateGprsLocationRes,
  PrepareHO-Arg,
  PrepareHO-Res,
  ForwardAccessSignalling-Arg,
  ProcessAccessSignalling-Arg,
  SendEndSignal-Arg,
  SendEndSignal-Res,
  PrepareSubsequentHO-Res,
  PrepareSubsequentHO-Arg,
  SendAuthenticationInfoArg,
  SendAuthenticationInfoRes,
  AuthenticationFailureReportArg,
  AuthenticationFailureReportRes,
  EquipmentStatus,
  InsertSubscriberDataArg,
  InsertSubscriberDataRes,
  DeleteSubscriberDataArg,
  DeleteSubscriberDataRes,
  ResetArg,
  RestoreDataArg,

```

```

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

```

```

FROM MAP-MS-DataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-MS-DataTypes (11) version7 (7)version8 (8)}

```

IMEI

```

FROM MAP-CommonDataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 (8)}
;

```

-- location registration operations

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

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

<pre> <b>PurgeMS</b> ::= OPERATION                                     --Timer m   ARGUMENT     purgeMS-Arg                PurgeMS-Arg   RESULT     purgeMS-Res                PurgeMS-Res     -- optional   ERRORS{     DataMissing,     UnexpectedDataValue,     UnknownSubscriber} </pre>
--

```

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

*-- gprs location registration operations*

```

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

*-- subscriber information enquiry operations*

```

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

*-- any time information enquiry operations*

```

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

*-- any time information handling operations*

```

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

```

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

-- subscriber data modification notification operations

```

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

-- handover operations

```

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

```

SendEndSignal ::= OPERATION --Timer l
    ARGUMENT
        sendEndSignal-Arg      SendEndSignal-Arg
    RESULT
        sendEndSignal-Res      SendEndSignal-Res
    
```

```

ProcessAccessSignalling ::= OPERATION --Timer s
    ARGUMENT
        processAccessSignalling-Arg  ProcessAccessSignalling-Arg
    
```

```

ForwardAccessSignalling ::= OPERATION --Timer s
    ARGUMENT
        forwardAccessSignalling-Arg  ForwardAccessSignalling-Arg
    
```

```

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

-- authentication management operations



```

SendAuthenticationInfo ::= OPERATION --Timer m
  ARGUMENT
    sendAuthenticationInfoArg SendAuthenticationInfoArg
    -- optional
    -- if segmentation is used, sendAuthenticationInfoArg shall be present in the first
    -- segment and shall not be present in subsequent segments. If received in
    -- subsequent segments it shall be discarded.

  RESULT
    sendAuthenticationInfoRes SendAuthenticationInfoRes
    -- optional
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber}

```

```

AuthenticationFailureReport ::= OPERATION --Timer m
  ARGUMENT
    authenticationFailureReportArg AuthenticationFailureReportArg
  RESULT
    authenticationFailureReportRes AuthenticationFailureReportRes
    -- optional
  ERRORS {
    SystemFailure,
    UnexpectedDataValue,
    UnknownSubscriber}

```

*-- IMEI management operations*

```

CheckIMEI ::= OPERATION --Timer m
  ARGUMENT
    imei IMEI
  RESULT
    equipmentStatus EquipmentStatus
  ERRORS {
    SystemFailure,
    DataMissing,
    UnknownEquipment}

```

*-- subscriber management operations*

```

InsertSubscriberData ::= OPERATION --Timer m
  ARGUMENT
    insertSubscriberDataArg InsertSubscriberDataArg
  RESULT
    insertSubscriberDataRes InsertSubscriberDataRes
    -- optional
  ERRORS {
    DataMissing,
    UnexpectedDataValue,
    UnidentifiedSubscriber}

```

```

DeleteSubscriberData ::= OPERATION --Timer m
  ARGUMENT
    deleteSubscriberDataArg DeleteSubscriberDataArg
  RESULT
    deleteSubscriberDataRes DeleteSubscriberDataRes
    -- optional
  ERRORS {
    DataMissing,
    UnexpectedDataValue,
    UnidentifiedSubscriber}

```

*-- fault recovery operations*

```

Reset ::= OPERATION --Timer m
  ARGUMENT
    resetArg ResetArg

```

```

ForwardCheckSS-Indication ::= OPERATION --Timer s

```

```

RestoreData ::= OPERATION --Timer m
  ARGUMENT
    restoreDataArg          RestoreDataArg
  RESULT
    restoreDataRes          RestoreDataRes
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber}

```

-- gprs location information retrieval operations

```

SendRoutingInfoForGprs ::= OPERATION --Timer m
  ARGUMENT
    sendRoutingInfoForGprsArg  SendRoutingInfoForGprsArg
  RESULT
    sendRoutingInfoForGprsRes  SendRoutingInfoForGprsRes
  ERRORS {
    AbsentSubscriber,
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber,
    CallBarred }

```

-- failure reporting operations

```

FailureReport ::= OPERATION --Timer m
  ARGUMENT
    failureReportArg          FailureReportArg
  RESULT
    failureReportRes          FailureReportRes
    -- optional
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber}

```

-- gprs notification operations

```

NoteMsPresentForGprs ::= OPERATION --Timer m
  ARGUMENT
    noteMsPresentForGprsArg    NoteMsPresentForGprsArg
  RESULT
    noteMsPresentForGprsRes    NoteMsPresentForGprsRes
    -- optional
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber}

```

```

NoteMM-Event ::= OPERATION --Timer m
  ARGUMENT
    noteMM-EventArg           NoteMM-EventArg
  RESULT
    noteMM-EventRes           NoteMM-EventRes
  ERRORS {
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber,
    MM-EventNotSupported}

```

END

## 17.6.2 Operation and Maintenance Operations

```

MAP-OperationAndMaintenanceOperations {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-OperationAndMaintenanceOperations (6)
  version7 (7)version8 (8)}

```

DEFINITIONS

```

 ::=

BEGIN

EXPORTS
  ActivateTraceMode,
  DeactivateTraceMode,
  SendIMSI
;

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

  SystemFailure,
  DataMissing,
  UnexpectedDataValue,
  FacilityNotSupported,
  UnknownSubscriber,
  UnidentifiedSubscriber,
  TracingBufferFull
FROM MAP-Errors {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-Errors (10) version7-(7)version8 (8)}

  ActivateTraceModeArg,
  ActivateTraceModeRes,
  DeactivateTraceModeArg,
  DeactivateTraceModeRes
FROM MAP-OM-DataTypes {
  | ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-OM-DataTypes (12) version7-(7)version8 (8)}

  ISDN-AddressString,
  IMSI
FROM MAP-CommonDataTypes {
  | ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-CommonDataTypes (18) version7-(7)version8 (8)}
;

```

<pre> <b>ActivateTraceMode</b> ::= OPERATION                                --Timer m   ARGUMENT     activateTraceModeArg      ActivateTraceModeArg   RESULT     activateTraceModeRes      ActivateTraceModeRes     -- optional   ERRORS {     SystemFailure,     DataMissing,     UnexpectedDataValue,     FacilityNotSupported,     UnidentifiedSubscriber,     TracingBufferFull} </pre>
---

<pre> <b>DeactivateTraceMode</b> ::= OPERATION                                --Timer m   ARGUMENT     deactivateTraceModeArg    DeactivateTraceModeArg   RESULT     deactivateTraceModeRes    DeactivateTraceModeRes     -- optional   ERRORS {     SystemFailure,     DataMissing,     UnexpectedDataValue,     FacilityNotSupported,     UnidentifiedSubscriber} </pre>
--

```

SendIMSI ::= OPERATION --Timer m
  ARGUMENT
    msisdn ISDN-AddressString
  RESULT
    imsi IMSI
  ERRORS {
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber}

```

END

### 17.6.3 Call Handling Operations

```

MAP-CallHandlingOperations {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-CallHandlingOperations (7)
  version7 (7)version8 \(8\)}

DEFINITIONS

 ::=

BEGIN

EXPORTS
  SendRoutingInfo,
  ProvideRoamingNumber,
  ResumeCallHandling,
  ProvideSIWFSNumber,
  SIWFSSignallingModify,
  SetReportingState,
  StatusReport,
  RemoteUserFree,
  IST-Alert,
  IST-Command
;

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

  SystemFailure,
  DataMissing,
  UnexpectedDataValue,
  FacilityNotSupported,
  OR-NotAllowed,
  UnknownSubscriber,
  NumberChanged,
  BearerServiceNotProvisioned,
  TeleserviceNotProvisioned,
  NoRoamingNumberAvailable,
  AbsentSubscriber,
  BusySubscriber,
  NoSubscriberReply,
  CallBarred,
  ForwardingViolation,
  ForwardingFailed,
  CUG-Reject,
  ResourceLimitation,
  IncompatibleTerminal,
  UnidentifiedSubscriber

FROM MAP-Errors {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-Errors (10) version7 (7)version8 \(8\)}
  SendRoutingInfoArg,
  SendRoutingInfoRes,
  ProvideRoamingNumberArg,
  ProvideRoamingNumberRes,
  ResumeCallHandlingArg,
  ResumeCallHandlingRes,
  ProvideSIWFSNumberArg,
  ProvideSIWFSNumberRes,
  SIWFSSignallingModifyArg,
  SIWFSSignallingModifyRes,
  SetReportingStateArg,

```

```

SetReportingStateRes,
StatusReportArg,
StatusReportRes,
RemoteUserFreeArg,
RemoteUserFreeRes,
IST-AlertArg,
IST-AlertRes,
IST-CommandArg,
IST-CommandRes
FROM MAP-CH-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-CH-DataTypes (13) version7 (7)version8 (8)}
;

```

```

SendRoutingInfo ::= OPERATION --Timer m
-- The timer is set to the upper limit of the range if the GMSC supports pre-paging.
ARGUMENT
    sendRoutingInfoArg          SendRoutingInfoArg
RESULT
    sendRoutingInfoRes         SendRoutingInfoRes
ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    FacilityNotSupported,
    OR-NotAllowed,
    UnknownSubscriber,
    NumberChanged,
    BearerServiceNotProvisioned,
    TeleserviceNotProvisioned,
    AbsentSubscriber,
    BusySubscriber,
    NoSubscriberReply,
    CallBarred,
    CUG-Reject,
    ForwardingViolation}

```

```

ProvideRoamingNumber ::= OPERATION --Timer m
-- The timer is set to the upper limit of the range if the HLR supports pre-paging.
ARGUMENT
    provideRoamingNumberArg     ProvideRoamingNumberArg
RESULT
    provideRoamingNumberRes     ProvideRoamingNumberRes
ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    FacilityNotSupported,
    OR-NotAllowed,
    AbsentSubscriber,
    NoRoamingNumberAvailable}

```

```

ResumeCallHandling ::= OPERATION --Timer m
ARGUMENT
    resumeCallHandlingArg       ResumeCallHandlingArg
RESULT
    resumeCallHandlingRes       ResumeCallHandlingRes
    -- optional
ERRORS {
    ForwardingFailed,
    OR-NotAllowed,
    UnexpectedDataValue,
    DataMissing }

```

```

ProvideSIWFSNumber ::= OPERATION --Timer m
ARGUMENT
    provideSIWFSNumberArg       ProvideSIWFSNumberArg
RESULT
    provideSIWFSNumberRes       ProvideSIWFSNumberRes
ERRORS {
    ResourceLimitation,
    DataMissing,
    UnexpectedDataValue,
    SystemFailure}

```

```

SIWFSSignallingModify ::= OPERATION --Timer m
  ARGUMENT
    siWFSSignallingModifyArg      SIWFSSignallingModifyArg
  RESULT
    siWFSSignallingModifyRes      SIWFSSignallingModifyRes
    -- optional
  ERRORS {
    ResourceLimitation,
    DataMissing,
    UnexpectedDataValue,
    SystemFailure}

```

```

SetReportingState ::= OPERATION --Timer m
  ARGUMENT
    setReportingStateArg          SetReportingStateArg
  RESULT
    setReportingStateRes          SetReportingStateRes
    -- optional
  ERRORS {
    SystemFailure,
    UnidentifiedSubscriber,
    UnexpectedDataValue,
    DataMissing,
    ResourceLimitation,
    FacilityNotSupported}

```

```

StatusReport ::= OPERATION --Timer m
  ARGUMENT
    statusReportArg              StatusReportArg
  RESULT
    statusReportRes              StatusReportRes
    -- optional
  ERRORS {
    UnknownSubscriber,
    SystemFailure,
    UnexpectedDataValue,
    DataMissing}

```

```

RemoteUserFree ::= OPERATION --Timer ml
  ARGUMENT
    remoteUserFreeArg            RemoteUserFreeArg
  RESULT
    remoteUserFreeRes            RemoteUserFreeRes
  ERRORS {
    UnexpectedDataValue,
    DataMissing,
    IncompatibleTerminal,
    AbsentSubscriber,
    SystemFailure,
    BusySubscriber}

```

```

IST-Alert ::= OPERATION --Timer m
  ARGUMENT
    istAlertArg                  IST-AlertArg
  RESULT
    istAlertRes                  IST-AlertRes
    -- optional
  ERRORS {
    UnexpectedDataValue,
    ResourceLimitation,
    UnknownSubscriber,
    SystemFailure,
    FacilityNotSupported}

```

```

IST-Command ::= OPERATION --Timer m
  ARGUMENT
    istCommandArg                IST-CommandArg
  RESULT
    istCommandRes                IST-CommandRes
    -- optional
  ERRORS {
    UnexpectedDataValue,
    ResourceLimitation,
    UnknownSubscriber,
    SystemFailure,
    FacilityNotSupported}

```

END

## 17.6.4 Supplementary service operations

```

MAP-SupplementaryServiceOperations {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-SupplementaryServiceOperations (8)
    version7 (7)version8 (8)}

DEFINITIONS

 ::=

BEGIN

EXPORTS
    RegisterSS,
    EraseSS,
    ActivateSS,
    DeactivateSS,
    InterrogateSS,
    ProcessUnstructuredSS-Request,
    UnstructuredSS-Request,
    UnstructuredSS-Notify,
    RegisterPassword,
    GetPassword,
    SS-InvocationNotification,
    RegisterCC-Entry,
    EraseCC-Entry
;

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

    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber,
    BearerServiceNotProvisioned,
    TeleserviceNotProvisioned,
    CallBarred,
    IllegalSS-Operation,
    SS-ErrorStatus,
    SS-NotAvailable,
    SS-SubscriptionViolation,
    SS-Incompatibility,
    PW-RegistrationFailure,
    NegativePW-Check,
    NumberOfPW-AttemptsViolation,
    UnknownAlphabet,
    USSD-Busy,
    AbsentSubscriber,
    IllegalSubscriber,
    IllegalEquipment,
    ShortTermDenial,
    LongTermDenial,
    FacilityNotSupported
FROM MAP-Errors {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-Errors (10) version7 (7)version8 (8)}

    RegisterSS-Arg,
    SS-Info,
    SS-ForBS-Code,
    InterrogateSS-Res,
    USSD-Arg,
    USSD-Res,
    Password,
    GuidanceInfo,
    SS-InvocationNotificationArg,
    SS-InvocationNotificationRes,
    RegisterCC-EntryArg,
    RegisterCC-EntryRes,
    EraseCC-EntryArg,
    EraseCC-EntryRes
FROM MAP-SS-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)

```

```

|   gsm-Network (1) modules (3) map-SS-DataTypes (14) version7 (7)version8 (8)}
|
|   SS-Code
| FROM MAP-SS-Code {
|   ccitt identified-organization (4) etsi (0) mobileDomain (0)
|   gsm-Network (1) modules (3) map-SS-Code (15) version7 (7)version8 (8)}
| ;

```

-- supplementary service handling operations

<pre> <b>RegisterSS</b> ::= OPERATION ARGUMENT     registerSS-Arg                RegisterSS-Arg RESULT     ss-Info                       SS-Info     -- optional ERRORS {     SystemFailure,     DataMissing,     UnexpectedDataValue,     BearerServiceNotProvisioned,     TeleserviceNotProvisioned,     CallBarred,     IllegalSS-Operation,     SS-ErrorStatus,     SS-Incompatibility} </pre>	--Timer m
--	-----------

<pre> <b>EraseSS</b> ::= OPERATION ARGUMENT     ss-ForBS                       SS-ForBS-Code RESULT     ss-Info                       SS-Info     -- optional ERRORS {     SystemFailure,     DataMissing,     UnexpectedDataValue,     BearerServiceNotProvisioned,     TeleserviceNotProvisioned,     CallBarred,     IllegalSS-Operation,     SS-ErrorStatus } </pre>	--Timer m
--	-----------

<pre> <b>ActivateSS</b> ::= OPERATION ARGUMENT     ss-ForBS                       SS-ForBS-Code RESULT     ss-Info                       SS-Info     -- optional ERRORS {     SystemFailure,     DataMissing,     UnexpectedDataValue,     BearerServiceNotProvisioned,     TeleserviceNotProvisioned,     CallBarred,     IllegalSS-Operation,     SS-ErrorStatus,     SS-SubscriptionViolation,     SS-Incompatibility,     NegativePW-Check,     NumberOfPW-AttemptsViolation} </pre>	--Timer m
--	-----------



```

DeactivateSS ::= OPERATION                                --Timer m
  ARGUMENT
    ss-ForBS                      SS-ForBS-Code
  RESULT
    ss-Info                        SS-Info
    -- optional
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    BearerServiceNotProvisioned,
    TeleserviceNotProvisioned,
    CallBarred,
    IllegalSS-Operation,
    SS-ErrorStatus,
    SS-SubscriptionViolation,
    NegativePW-Check,
    NumberOfPW-AttemptsViolation}
    
```

```

InterrogateSS ::= OPERATION                             --Timer m
  ARGUMENT
    ss-ForBS                      SS-ForBS-Code
  RESULT
    interrogateSS-Res              InterrogateSS-Res
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    BearerServiceNotProvisioned,
    TeleserviceNotProvisioned,
    CallBarred,
    IllegalSS-Operation,
    SS-NotAvailable}
    
```

```

ProcessUnstructuredSS-Request ::= OPERATION             --Timer 10 minutes
  ARGUMENT
    ussd-Arg                      USSD-Arg
  RESULT
    ussd-Res                      USSD-Res
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    UnknownAlphabet,
    CallBarred}
    
```

```

UnstructuredSS-Request ::= OPERATION                   --Timer m1
  ARGUMENT
    ussd-Arg                      USSD-Arg
  RESULT
    ussd-Res                      USSD-Res
    -- optional
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    AbsentSubscriber,
    IllegalSubscriber,
    IllegalEquipment,
    UnknownAlphabet,
    USSD-Busy}
    
```

```

UnstructuredSS-Notify ::= OPERATION                   --Timer m1
  ARGUMENT
    ussd-Arg                      USSD-Arg
  RESULT
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    AbsentSubscriber,
    IllegalSubscriber,
    IllegalEquipment,
    UnknownAlphabet,
    USSD-Busy}
    
```

```

RegisterPassword ::= OPERATION --Timer ml
  ARGUMENT
    ss-Code SS-Code
  RESULT
    newPassword Password
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    CallBarred,
    SS-SubscriptionViolation,
    PW-RegistrationFailure,
    NegativePW-Check,
    NumberOfPW-AttemptsViolation}
  LINKED {
    GetPassword}
    
```

```

GetPassword ::= OPERATION --Timer m
  ARGUMENT
    guidanceInfo GuidanceInfo
  RESULT
    currentPassword Password
    
```

```

SS-InvocationNotification ::= OPERATION --Timer m
  ARGUMENT
    ss-InvocationNotificationArg SS-InvocationNotificationArg
  RESULT
    ss-InvocationNotificationRes SS-InvocationNotificationRes
    -- optional
  ERRORS {
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber}
    
```

```

RegisterCC-Entry ::= OPERATION --Timer m
  ARGUMENT
    registerCC-EntryArg RegisterCC-EntryArg
  RESULT
    registerCC-EntryRes RegisterCC-EntryRes
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    CallBarred,
    IllegalSS-Operation,
    SS-ErrorStatus,
    SS-Incompatibility,
    ShortTermDenial,
    LongTermDenial,
    FacilityNotSupported}
    
```

```

EraseCC-Entry ::= OPERATION --Timer m
  ARGUMENT
    eraseCC-EntryArg EraseCC-EntryArg
  RESULT
    eraseCC-EntryRes EraseCC-EntryRes
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    CallBarred,
    IllegalSS-Operation,
    SS-ErrorStatus}
    
```

END

### 17.6.5 Short message service operations

```

MAP-ShortMessageServiceOperations {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-ShortMessageServiceOperations (9)
  version7 (7)version8 (8)}
    
```

DEFINITIONS

::=

```

BEGIN

EXPORTS
  SendRoutingInfoForSM,
  MO-ForwardSM,
  MT-ForwardSM,
  ReportSM-DeliveryStatus,
  AlertServiceCentre,
  InformServiceCentre,
  ReadyForSM
;

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

  SystemFailure,
  DataMissing,
  UnexpectedDataValue,
  FacilityNotSupported,
  UnknownSubscriber,
  UnidentifiedSubscriber,
  IllegalSubscriber,
  IllegalEquipment,
  TeleserviceNotProvisioned,
  CallBarred,
  SubscriberBusyForMT-SMS,
  SM-DeliveryFailure,
  MessageWaitingListFull,
  AbsentSubscriberSM
FROM MAP-Errors {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-Errors (10) version7-(7)version8 \(8\)}

  RoutingInfoForSM-Arg,
  RoutingInfoForSM-Res,
  MO-ForwardSM-Arg,
  MO-ForwardSM-Res,
  MT-ForwardSM-Arg,
  MT-ForwardSM-Res,
  ReportSM-DeliveryStatusArg,
  ReportSM-DeliveryStatusRes,
  AlertServiceCentreArg,
  InformServiceCentreArg,
  ReadyForSM-Arg,
  ReadyForSM-Res
FROM MAP-SM-DataTypes {
  | ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-SM-DataTypes (16) version7-(7)version8 \(8\)}

;

```

<b>SendRoutingInfoForSM</b> ::= OPERATION	--Timer m
ARGUMENT	
routingInfoForSM-Arg	RoutingInfoForSM-Arg
RESULT	
routingInfoForSM-Res	RoutingInfoForSM-Res
ERRORS {	
SystemFailure,	
DataMissing,	
UnexpectedDataValue,	
FacilityNotSupported,	
UnknownSubscriber,	
TeleserviceNotProvisioned,	
CallBarred,	
AbsentSubscriberSM}	

```

MO-ForwardSM ::= OPERATION                                --Timer m1
  ARGUMENT
    mo-forwardSM-Arg                                     MO-ForwardSM-Arg
  RESULT
    mo-forwardSM-Res                                     MO-ForwardSM-Res
    -- optional
  ERRORS {
    SystemFailure,
    UnexpectedDataValue,
    FacilityNotSupported,
    SM-DeliveryFailure}
    
```

```

MT-ForwardSM ::= OPERATION                                --Timer m1
  ARGUMENT
    mt-forwardSM-Arg                                     MT-ForwardSM-Arg
  RESULT
    mt-forwardSM-Res                                     MT-ForwardSM-Res
    -- optional
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue,
    FacilityNotSupported,
    UnidentifiedSubscriber,
    IllegalSubscriber,
    IllegalEquipment,
    SubscriberBusyForMT-SMS,
    SM-DeliveryFailure,
    AbsentSubscriberSM}
    
```

```

ReportSM-DeliveryStatus ::= OPERATION                    --Timer s
  ARGUMENT
    reportSM-DeliveryStatusArg                         ReportSM-DeliveryStatusArg
  RESULT
    reportSM-DeliveryStatusRes                         ReportSM-DeliveryStatusRes
    -- optional
  ERRORS {
    DataMissing,
    UnexpectedDataValue,
    UnknownSubscriber,
    MessageWaitingListFull}
    
```

```

AlertServiceCentre ::= OPERATION                        --Timer s
  ARGUMENT
    alertServiceCentreArg                               AlertServiceCentreArg
  RESULT
  ERRORS {
    SystemFailure,
    DataMissing,
    UnexpectedDataValue}
    
```

```

InformServiceCentre ::= OPERATION                       --Timer s
  ARGUMENT
    informServiceCentreArg                             InformServiceCentreArg
    
```

```

ReadyForSM ::= OPERATION                                --Timer m
  ARGUMENT
    readyForSM-Arg                                     ReadyForSM-Arg
  RESULT
    readyForSM-Res                                     ReadyForSM-Res
    -- optional
  ERRORS {
    DataMissing,
    UnexpectedDataValue,
    FacilityNotSupported,
    UnknownSubscriber}
    
```

END

## 17.6.6 Errors

```
MAP-Errors {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-Errors (10) version7 (7)version8 (8)}

DEFINITIONS

 ::=

BEGIN

EXPORTS

  -- generic errors
  SystemFailure,
  DataMissing,
  UnexpectedDataValue,
  FacilityNotSupported,
  IncompatibleTerminal,
  ResourceLimitation,

  -- identification and numbering errors
  UnknownSubscriber,
  NumberChanged,
  UnknownMSC,
  UnidentifiedSubscriber,
  UnknownEquipment,

  -- subscription errors
  RoamingNotAllowed,
  IllegalSubscriber,
  IllegalEquipment,
  BearerServiceNotProvisioned,
  TeleserviceNotProvisioned,

  -- handover errors
  NoHandoverNumberAvailable,
  SubsequentHandoverFailure,
  TargetCellOutsideGroupCallArea,

  -- operation and maintenance errors
  TracingBufferFull,

  -- call handling errors
  OR-NotAllowed,
  NoRoamingNumberAvailable,
  BusySubscriber,
  NoSubscriberReply,
  AbsentSubscriber,
  CallBarred,
  ForwardingViolation,
  ForwardingFailed,
  CUG-Reject,

  -- any time interrogation errors
  ATI-NotAllowed,

  -- any time information handling errors
  ATSI-NotAllowed,
  ATM-NotAllowed,
  InformationNotAvailable,

  -- supplementary service errors
  IllegalSS-Operation,
  SS-ErrorStatus,
  SS-NotAvailable,
  SS-SubscriptionViolation,
  SS-Incompatibility,
  UnknownAlphabet,
  USSD-Busy,
  PW-RegistrationFailure,
  NegativePW-Check,
  NumberOfPW-AttemptsViolation,
  ShortTermDenial,
  LongTermDenial,

  -- short message service errors
  SubscriberBusyForMT-SMS,
  SM-DeliveryFailure,
  MessageWaitingListFull,
```

```

AbsentSubscriberSM,

-- Group Call errors
NoGroupCallNumberAvailable,

-- location service errors
UnauthorizedRequestingNetwork,
UnauthorizedLCSCClient,
PositionMethodFailure,
UnknownOrUnreachableLCSCClient,

-- Mobility Management errors
MM-EventNotSupported,

-- Secure transport errors
SecureTransportError

```

```
;
```

```
IMPORTS
```

```
ERROR
```

```
FROM TCAPMessages {
  ciitt recommendation q 773 modules (2) messages (1) version2 (2)}

```

```
SS-Status
```

```
FROM MAP-SS-DataTypes {
  ciitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-SS-DataTypes (14) version7 (7)version8 (8)}

```

```

SS-IncompatibilityCause,
PW-RegistrationFailureCause,
SM-DeliveryFailureCause,
SystemFailureParam,
DataMissingParam,
UnexpectedDataParam,
FacilityNotSupParam,
UnknownSubscriberParam,
NumberChangedParam,
UnidentifiedSubParam,
RoamingNotAllowedParam,
IllegalSubscriberParam,
IllegalEquipmentParam,
BearerServNotProvParam,
TeleservNotProvParam,
TracingBufferFullParam,
NoRoamingNbParam,
OR-NotAllowedParam,
AbsentSubscriberParam,
BusySubscriberParam,
NoSubscriberReplyParam,
CallBarredParam,
ForwardingViolationParam,
ForwardingFailedParam,
CUG-RejectParam,
ATI-NotAllowedParam,
SubBusyForMT-SMS-Param,
MessageWaitListFullParam,
AbsentSubscriberSM-Param,
ResourceLimitationParam,
NoGroupCallNbParam,
IncompatibleTerminalParam,
ShortTermDenialParam,
LongTermDenialParam,
UnauthorizedRequestingNetwork-Param,
UnauthorizedLCSCClient-Param,
PositionMethodFailure-Param,
UnknownOrUnreachableLCSCClient-Param,
MM-EventNotSupported-Param,
ATSI-NotAllowedParam,
ATM-NotAllowedParam,
IllegalSS-OperationParam,
SS-NotAvailableParam,
SS-SubscriptionViolationParam,
InformationNotAvailableParam,
TargetCellOutsideGCA-Param,
SecureTransportErrorParam

```

```
FROM MAP-ER-DataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-ER-DataTypes (17) version7 (7)version8 (8)}
;
```

```
-- generic errors
```

```
SystemFailure ::= ERROR
  PARAMETER
    systemFailureParam          SystemFailureParam
  -- optional
```

```
DataMissing ::= ERROR
  PARAMETER
    dataMissingParam           DataMissingParam
  -- optional
  -- dataMissingParam must not be used in version <3
```

```
UnexpectedDataValue ::= ERROR
  PARAMETER
    unexpectedDataParam        UnexpectedDataParam
  -- optional
  -- unexpectedDataParam must not be used in version <3
```

```
FacilityNotSupported ::= ERROR
  PARAMETER
    facilityNotSupParam        FacilityNotSupParam
  -- optional
  -- facilityNotSupParam must not be used in version <3
```

```
IncompatibleTerminal ::= ERROR
  PARAMETER
    incompatibleTerminalParam   IncompatibleTerminalParam
  -- optional
```

```
ResourceLimitation ::= ERROR
  PARAMETER
    resourceLimitationParam     ResourceLimitationParam
  -- optional
```

```
-- identification and numbering errors
```

```
UnknownSubscriber ::= ERROR
  PARAMETER
    unknownSubscriberParam      UnknownSubscriberParam
  -- optional
  -- unknownSubscriberParam must not be used in version <3
```

```
NumberChanged ::= ERROR
  PARAMETER
    numberChangedParam         NumberChangedParam
  -- optional
```

```
UnknownMSC ::= ERROR
```

```
UnidentifiedSubscriber ::= ERROR
  PARAMETER
    unidentifiedSubParam        UnidentifiedSubParam
  -- optional
  -- unidentifiedSubParam must not be used in version <3
```

```
UnknownEquipment ::= ERROR
```

```
-- subscription errors
```

```
RoamingNotAllowed ::= ERROR
  PARAMETER
    roamingNotAllowedParam      RoamingNotAllowedParam
```

```
IllegalSubscriber ::= ERROR
  PARAMETER
    illegalSubscriberParam      IllegalSubscriberParam
```

```
-- optional
-- illegalSubscriberParam must not be used in version <3
```

```
IllegalEquipment ::= ERROR
PARAMETER
    illegalEquipmentParam          IllegalEquipmentParam
-- optional
-- illegalEquipmentParam must not be used in version <3
```

```
BearerServiceNotProvisioned ::= ERROR
PARAMETER
    bearerServNotProvParam          BearerServNotProvParam
-- optional
-- bearerServNotProvParam must not be used in version <3
```

```
TeleserviceNotProvisioned ::= ERROR
PARAMETER
    teleservNotProvParam            TeleservNotProvParam
-- optional
-- teleservNotProvParam must not be used in version <3
```

-- handover errors

```
NoHandoverNumberAvailable ::= ERROR
```

```
SubsequentHandoverFailure ::= ERROR
```

```
TargetCellOutsideGroupCallArea ::= ERROR
PARAMETER
    targetCellOutsideGCA-Param      TargetCellOutsideGCA-Param
-- optional
```

-- operation and maintenance errors

```
TracingBufferFull ::= ERROR
PARAMETER
    tracingBufferFullParam          TracingBufferFullParam
-- optional
```

-- call handling errors

```
NoRoamingNumberAvailable ::= ERROR
PARAMETER
    noRoamingNbParam                NoRoamingNbParam
-- optional
```

```
AbsentSubscriber ::= ERROR
PARAMETER
    absentSubscriberParam            AbsentSubscriberParam
-- optional
-- absentSubscriberParam must not be used in version <3
```

```
BusySubscriber ::= ERROR
PARAMETER
    busySubscriberParam              BusySubscriberParam
-- optional
```

```
NoSubscriberReply ::= ERROR
PARAMETER
    noSubscriberReplyParam           NoSubscriberReplyParam
-- optional
```

```
CallBarred ::= ERROR
PARAMETER
    callBarredParam                  CallBarredParam
-- optional
```

```
ForwardingViolation ::= ERROR
PARAMETER
    forwardingViolationParam          ForwardingViolationParam
-- optional
```



```

ForwardingFailed ::= ERROR
    PARAMETER
        forwardingFailedParam          ForwardingFailedParam
        -- optional
    
```

```

CUG-Reject ::= ERROR
    PARAMETER
        cug-RejectParam                CUG-RejectParam
        -- optional
    
```

```

OR-NotAllowed ::= ERROR
    PARAMETER
        or-NotAllowedParam             OR-NotAllowedParam
        -- optional
    
```

-- any time interrogation errors

```

ATI-NotAllowed ::= ERROR
    PARAMETER
        ati-NotAllowedParam            ATI-NotAllowedParam
        -- optional
    
```

-- any time information handling errors

```

ATSI-NotAllowed ::= ERROR
    PARAMETER
        atsi-NotAllowedParam           ATSI-NotAllowedParam
        -- optional
    
```

```

ATM-NotAllowed ::= ERROR
    PARAMETER
        atm-NotAllowedParam            ATM-NotAllowedParam
        -- optional
    
```

```

InformationNotAvailable ::= ERROR
    PARAMETER
        informationNotAvailableParam    InformationNotAvailableParam
        -- optional
    
```

-- supplementary service errors

```

IllegalSS-Operation ::= ERROR
    PARAMETER
        illegalSS-OperationParam        IllegalSS-OperationParam
        -- optional
        -- illegalSS-OperationParam must not be used in version <3
    
```

```

SS-ErrorStatus ::= ERROR
    PARAMETER
        ss-Status                       SS-Status
        -- optional
    
```

```

SS-NotAvailable ::= ERROR
    PARAMETER
        ss-NotAvailableParam            SS-NotAvailableParam
        -- optional
        -- ss-NotAvailableParam must not be used in version <3
    
```

```

SS-SubscriptionViolation ::= ERROR
    PARAMETER
        ss-SubscriptionViolationParam    SS-SubscriptionViolationParam
        -- optional
        -- ss-NotAvailableParam must not be used in version <3
    
```

```

SS-Incompatibility ::= ERROR
    PARAMETER
        ss-IncompatibilityCause         SS-IncompatibilityCause
        -- optional
    
```

```

UnknownAlphabet ::= ERROR
    
```

```

USSD-Busy ::= ERROR
    
```

```

PW-RegistrationFailure ::= ERROR
    PARAMETER
        pw-RegistrationFailureCause    PW-RegistrationFailureCause
    
```

```

NegativePW-Check ::= ERROR
    
```

```

NumberOfPW-AttemptsViolation ::= ERROR
    
```

```

ShortTermDenial ::= ERROR
    PARAMETER
        shortTermDenialParam          ShortTermDenialParam
        -- optional
    
```

```

LongTermDenial ::= ERROR
    PARAMETER
        longTermDenialParam           LongTermDenialParam
        -- optional
    
```

-- short message service errors

```

SubscriberBusyForMT-SMS ::= ERROR
    PARAMETER
        subBusyForMT-SMS-Param        SubBusyForMT-SMS-Param
        -- optional
    
```

```

SM-DeliveryFailure ::= ERROR
    PARAMETER
        sm-DeliveryFailureCause        SM-DeliveryFailureCause
    
```

```

MessageWaitingListFull ::= ERROR
    PARAMETER
        messageWaitListFullParam      MessageWaitListFullParam
        -- optional
    
```

```

AbsentSubscriberSM ::= ERROR
    PARAMETER
        absentSubscriberSM-Param       AbsentSubscriberSM-Param
        -- optional
    
```

-- Group Call errors

```

NoGroupCallNumberAvailable ::= ERROR
    PARAMETER
        noGroupCallNbParam            NoGroupCallNbParam
        -- optional
    
```

-- location service errors

```

UnauthorizedRequestingNetwork ::= ERROR
    PARAMETER
        unauthorizedRequestingNetwork-Param  UnauthorizedRequestingNetwork-Param
        -- optional
    
```

```

UnauthorizedLCSCClient ::= ERROR
    PARAMETER
        unauthorizedLCSCClient-Param        UnauthorizedLCSCClient-Param
        -- optional
    
```

```

PositionMethodFailure ::= ERROR
    PARAMETER
        positionMethodFailure-Param        PositionMethodFailure-Param
        -- optional
    
```

```

UnknownOrUnreachableLCSCClient ::= ERROR
    PARAMETER
        unknownOrUnreachableLCSCClient-Param  UnknownOrUnreachableLCSCClient-Param
        -- optional
    
```

```

MM-EventNotSupported ::= ERROR
    PARAMETER
        mm-EventNotSupported-Param        MM-EventNotSupported-Param
        -- optional
    
```

-- Secure transport errors

```
SecureTransportError ::= ERROR
    PARAMETER
        secureTransportErrorParam          SecureTransportErrorParam
```

END

## 17.6.7 Group Call operations

```
MAP-Group-Call-Operations {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-Group-Call-Operations (22)
    version7 (7)version8 (8)}

DEFINITIONS

 ::=

BEGIN

EXPORTS
    PrepareGroupCall,
    SendGroupCallEndSignal,
    ForwardGroupCallSignalling,
    ProcessGroupCallSignalling
;

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

    SystemFailure,
    UnexpectedDataValue,
    NoGroupCallNumberAvailable
FROM MAP-Errors {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-Errors (10) version7 (7)version8 (8)}

    PrepareGroupCallArg,
    PrepareGroupCallRes,
    SendGroupCallEndSignalArg,
    SendGroupCallEndSignalRes,
    ForwardGroupCallSignallingArg,
    ProcessGroupCallSignallingArg
FROM MAP-GR-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-GR-DataTypes (23) version7 (7)version8 (8)}

;

```

```
PrepareGroupCall ::= OPERATION --Timer m
    ARGUMENT
        prepareGroupCallArg          PrepareGroupCallArg
    RESULT
        prepareGroupCallRes          PrepareGroupCallRes
    ERRORS {
        SystemFailure,
        NoGroupCallNumberAvailable,
        UnexpectedDataValue}
```

```
SendGroupCallEndSignal ::= OPERATION --Timer l
    ARGUMENT
        sendGroupCallEndSignalArg    SendGroupCallEndSignalArg
    RESULT
        sendGroupCallEndSignalRes    SendGroupCallEndSignalRes
```

```
ProcessGroupCallSignalling ::= OPERATION --Timer s
    ARGUMENT
        processGroupCallSignallingArg ProcessGroupCallSignallingArg
```

```

ForwardGroupCallSignalling ::= OPERATION --Timer s
    ARGUMENT
        forwardGroupCallSignallingArg ForwardGroupCallSignallingArg

```

END

## 17.6.8 Location service operations

```

1  MAP-LocationServiceOperations {
2      ccitt identified-organization (4) etsi (0) mobileDomain (0)
3      gsm-Network (1) modules (3) map-LocationServiceOperations (24)
4      version7 (7)version8 (8)}
5
6  DEFINITIONS
7
8  ::=
9
10 BEGIN
11
12 EXPORTS
13     ProvideSubscriberLocation,
14     SendRoutingInfoForLCS,
15     SubscriberLocationReport
16 ;
17
18 IMPORTS
19     OPERATION
20 FROM TCAPMessages {
21     ccitt recommendation q 773 modules (2) messages (1) version2 (2)}
22
23     SystemFailure,
24     DataMissing,
25     UnexpectedDataValue,
26     FacilityNotSupported,
27     UnknownSubscriber,
28     AbsentSubscriber,
29     UnauthorizedRequestingNetwork,
30     UnauthorizedLCSCClient,
31     PositionMethodFailure,
32     ResourceLimitation,
33     UnknownOrUnreachableLCSCClient,
34     UnidentifiedSubscriber,
35     IllegalEquipment,
36     IllegalSubscriber
37 FROM MAP-Errors {
38     ccitt identified-organization (4) etsi (0) mobileDomain (0)
39     gsm-Network (1) modules (3) map-Errors (10) version7 (7)version8 (8)}
40
41     RoutingInfoForLCS-Arg,
42     RoutingInfoForLCS-Res,
43     ProvideSubscriberLocation-Arg,
44     ProvideSubscriberLocation-Res,
45     SubscriberLocationReport-Arg,
46     SubscriberLocationReport-Res
47 FROM MAP-LCS-DataTypes {
48     ccitt identified-organization (4) etsi (0) mobileDomain (0)
49     gsm-Network (1) modules (3) map-LCS-DataTypes (25) version7 (7)version8 (8)}
50 ;
51

```

```

52 SendRoutingInfoForLCS ::= OPERATION --Timer m
53     ARGUMENT
54         routingInfoForLCS-Arg RoutingInfoForLCS-Arg
55     RESULT
56         routingInfoForLCS-Res RoutingInfoForLCS-Res
57     ERRORS {
58         SystemFailure,
59         DataMissing,
60         UnexpectedDataValue,
61         FacilityNotSupported,
62         UnknownSubscriber,
63         AbsentSubscriber,
64         UnauthorizedRequestingNetwork }
65

```

```

66 ProvideSubscriberLocation ::= OPERATION --Timer ml
67 ARGUMENT
68     provideSubscriberLocation-Arg ProvideSubscriberLocation-Arg
69 RESULT
70     provideSubscriberLocation-Res ProvideSubscriberLocation-Res
71 ERRORS {
72     SystemFailure,
73     DataMissing,
74     UnexpectedDataValue,
75     FacilityNotSupported,
76     UnidentifiedSubscriber,
77     IllegalSubscriber,
78     IllegalEquipment,
79     AbsentSubscriber,
80     UnauthorizedRequestingNetwork,
81     UnauthorizedLCSCClient,
82     PositionMethodFailure }
83
84 SubscriberLocationReport ::= OPERATION --Timer m
85 ARGUMENT
86     subscriberLocationReport-Arg SubscriberLocationReport-Arg
87 RESULT
88     subscriberLocationReport-Res SubscriberLocationReport-Res
89 ERRORS {
90     SystemFailure,
91     DataMissing,
92     ResourceLimitation,
93     UnexpectedDataValue,
94     UnknownSubscriber,
95     UnauthorizedRequestingNetwork,
96     UnknownOrUnreachableLCSCClient}
97
98
99 END
1

```

## 17.6.9 Secure transport operations

```

MAP-SecureTransportOperations {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-SecureTransportOperations (26)
    version7 (7)version8 (8)}

DEFINITIONS

 ::=

BEGIN

EXPORTS
    SecureTransportClass1,
    SecureTransportClass2,
    SecureTransportClass3,
    SecureTransportClass4
;

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

    DataMissing,
    SecureTransportError,
    UnexpectedDataValue

FROM MAP-Errors {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-Errors (10) version7 (7)version8 (8)}

    SecureTransportArg,
    SecureTransportRes

FROM MAP-ST-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-ST-DataTypes (27) version7 (7)version8 (8)}
;

```

```
SecureTransportClass1 ::= OPERATION --Timer shall be the same as for the
                                --securely transported operation
    ARGUMENT
        secureTransportArg          SecureTransportArg
    RESULT
        secureTransportRes          SecureTransportRes
    ERRORS {
        SecureTransportError,
        DataMissing,
        UnexpectedDataValue}
```

```
SecureTransportClass2 ::= OPERATION --Timer shall be the same as for the
                                --securely transported operation
    ARGUMENT
        secureTransportArg          SecureTransportArg
    ERRORS {
        SecureTransportError,
        DataMissing,
        UnexpectedDataValue}
```

```
SecureTransportClass3 ::= OPERATION --Timer shall be the same as for the
                                --securely transported operation
    ARGUMENT
        secureTransportArg          SecureTransportArg
    RESULT
        secureTransportRes          SecureTransportRes
```

```
SecureTransportClass4 ::= OPERATION --Timer shall be the same as for the
                                --securely transported operation
    ARGUMENT
        secureTransportArg          SecureTransportArg
```

END

## 17.7 MAP constants and data types

### 17.7.1 Mobile Service data types

```
MAP-MS-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-MS-DataTypes (11) version7 (7)version8 (8)}
```

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

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

-- gprs location registration types
GSN-Address,

-- handover types
ForwardAccessSignalling-Arg,
PrepareHO-Arg,
```

```
PrepareHO-Res,  
PrepareSubsequentHO-Arg,  
PrepareSubsequentHO-Res,  
ProcessAccessSignalling-Arg,  
SendEndSignal-Arg,  
SendEndSignal-Res,  
  
-- authentication management types  
SendAuthenticationInfoArg,  
SendAuthenticationInfoRes,  
AuthenticationFailureReportArg,  
AuthenticationFailureReportRes,  
  
-- security management types  
EquipmentStatus,  
Kc,  
  
-- subscriber management types  
InsertSubscriberDataArg,  
InsertSubscriberDataRes,  
LSAIdentity,  
DeleteSubscriberDataArg,  
DeleteSubscriberDataRes,  
Ext-QoS-Subscribed,  
SubscriberData,  
ODB-Data,  
SubscriberStatus,  
ZoneCodeList,  
maxNumOfZoneCodes,  
O-CSI,  
D-CSI,  
O-BcsmCamelTDPCriteriaList,  
T-BCSM-CAMEL-TDP-CriteriaList,  
SS-CSI,  
ServiceKey,  
DefaultCallHandling,  
CamelCapabilityHandling,  
BasicServiceCriteria,  
SupportedCamelPhases,  
maxNumOfCamelTDPData,  
CUG-Index,  
CUG-Info,  
CUG-Interlock,  
InterCUG-Restrictions,  
IntraCUG-Options,  
NotificationToMSUser,  
QoS-Subscribed,  
IST-AlertTimerValue,  
T-CSI,  
T-BcsmTriggerDetectionPoint,  
APN,  
  
-- fault recovery types  
ResetArg,  
RestoreDataArg,  
RestoreDataRes,  
  
-- provide subscriber info types  
GeographicalInformation,  
  
-- subscriber information enquiry types  
ProvideSubscriberInfoArg,  
ProvideSubscriberInfoRes,  
SubscriberInfo,  
LocationInformation,  
LocationInformationGPRS,  
RAIdentity,  
SubscriberState,  
GPRSChargingID,  
  
-- any time information enquiry types  
AnyTimeInterrogationArg,  
AnyTimeInterrogationRes,  
  
-- any time information handling types  
AnyTimeSubscriptionInterrogationArg,  
AnyTimeSubscriptionInterrogationRes,
```

```

AnyTimeModificationArg,
AnyTimeModificationRes,

-- subscriber data modification notification types
NoteSubscriberDataModifiedArg,
NoteSubscriberDataModifiedRes,

-- gprs location information retrieval types
SendRoutingInfoForGprsArg,
SendRoutingInfoForGprsRes,

-- failure reporting types
FailureReportArg,
FailureReportRes,

-- gprs notification types
NoteMsPresentForGprsArg,
NoteMsPresentForGprsRes,

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

;

IMPORTS
    maxNumOfSS,
    SS-SubscriptionOption,
    SS-List,
    SS-ForBS-Code,
    Password
FROM MAP-SS-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    |   gsm-Network (1) modules (3) map-SS-DataTypes (14) version7 (7)version8 \(8\)}

    SS-Code
FROM MAP-SS-Code {
    |   ccitt identified-organization (4) etsi (0) mobileDomain (0)
    |   gsm-Network (1) modules (3) map-SS-Code (15) version7 (7)version8 \(8\)}

    Ext-BearerServiceCode
FROM MAP-BS-Code {
    |   ccitt identified-organization (4) etsi (0) mobileDomain (0)
    |   gsm-Network (1) modules (3) map-BS-Code (20) version7 (7)version8 \(8\)}

    Ext-TeleserviceCode
FROM MAP-TS-Code {
    |   ccitt identified-organization (4) etsi (0) mobileDomain (0)
    |   gsm-Network (1) modules (3) map-TS-Code (19) version7 (7)version8 \(8\)}

    AddressString,
    ISDN-AddressString,
    ISDN-SubaddressString,
    FTN-AddressString,
    AccessNetworkSignalInfo,
    IMSI,
    TMSI,
    HLR-List,
    LMSI,
    Identity,
    GlobalCellId,
    CellGlobalIdOrServiceAreaIdOrLAI,
    Ext-BasicServiceCode,
    NAEA-PreferredCI,
    EMLPP-Info,
    MC-SS-Info,
    SubscriberIdentity,
    AgeOfLocationInformation,
    LCSClientExternalID,
    LCSClientInternalID,
    Ext-SS-Status

FROM MAP-CommonDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)

```



```

gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 (8)
ExtensionContainer
FROM MAP-ExtensionDataTypes {
ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 (8)

AbsentSubscriberDiagnosticSM
FROM MAP-ER-DataTypes {
ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-ER-DataTypes (17) version7 (7)version8 (8)
;

```

-- location registration types

<b>UpdateLocationArg</b> ::= SEQUENCE {			
imsi	IMSI,		
msc-Number	[1] ISDN-AddressString,		
vlr-Number	ISDN-AddressString,		
lmsi	[10] LMSI OPTIONAL,		
extensionContainer	ExtensionContainer	OPTIONAL,	
...	,		
vlr-Capability	[6] VLR-Capability	OPTIONAL,	
informPreviousNetworkEntity	[11] NULL	OPTIONAL,	
cs-LCS-NotSupportedByUE	[12] NULL	OPTIONAL }	

<b>VLR-Capability</b> ::= SEQUENCE{			
supportedCamelPhases	[0] SupportedCamelPhases	OPTIONAL,	
extensionContainer	ExtensionContainer	OPTIONAL,	
...	,		
solsaSupportIndicator	[2] NULL	OPTIONAL,	
istSupportIndicator	[1] IST-SupportIndicator	OPTIONAL,	
superChargerSupportedInServingNetworkEntity	[3] SuperChargerInfo	OPTIONAL,	
longFTN-Supported	[4] NULL	OPTIONAL,	
supportedLCS-CapabilitySets	[5] SupportedLCS-CapabilitySets	OPTIONAL }	

<b>SuperChargerInfo</b> ::= CHOICE {			
sendSubscriberData	[0] NULL,		
subscriberDataStored	[1] AgeIndicator }		

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

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

<b>SupportedLCS-CapabilitySets</b> ::= BIT STRING {			
lcsCapabilitySet1	(0),		
lcsCapabilitySet2	(1) } (SIZE (2..16))		
-- Core network signalling capability set1 indicates LCS Release98 or Release99 version.			
-- Core network signalling capability set2 indicates LCS Release4 or later version.			
-- A node shall mark in the BIT STRING all LCS capability sets it supports.			
-- If no bit is set then the sending node does not support LCS.			
-- If the parameter is not sent by an VLR then the VLR may support at most capability set1.			
-- If the parameter is not sent by an SGSN then no support for LCS is assumed.			
-- An SGSN is not allowed to indicate support of capability set1.			
-- Other bits than listed above shall be discarded.			

<b>UpdateLocationRes</b> ::= SEQUENCE {			
hlr-Number	ISDN-AddressString,		
extensionContainer	ExtensionContainer	OPTIONAL,	
...	}		

```

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

```

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

```

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

```

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

```

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

```

SendIdentificationArg ::= SEQUENCE {
    tmsi                    TMSI,
    numberOfRequestedVectors NumberOfRequestedVectors OPTIONAL,
    -- if segmentation is used, numberOfRequestedVectors shall be present in
    -- the first segment and shall not be present in subsequent segments. If received
    -- in a subsequent segment it shall be discarded.
    segmentationProhibited NULL                    OPTIONAL,
    -- if segmentation is prohibited the previous VLR shall not send the result
    -- within a TC-CONTINUE message.
    extensionContainer       ExtensionContainer       OPTIONAL,
    ...}
    
```

```

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

-- authentication management types

```

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

```

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

```

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

```

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

```

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

```

```

CurrentSecurityContext ::= CHOICE {
    gsm-SecurityContextData    [0] GSM-SecurityContextData,
    umts-SecurityContextData   [1] UMTS-SecurityContextData }

```

```

GSM-SecurityContextData ::= SEQUENCE {
    kc                  Kc,
    cksn                Cksn,
    ... }

```

```

UMTS-SecurityContextData ::= SEQUENCE {
    ck                  CK,
    ik                  IK,
    ksi                 KSI,
    ... }

```

```

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

```

```

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

```

```

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

```

```

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

```

```

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

```

```

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

```

```

AUTN ::= OCTET STRING (SIZE (16))

```

```

AUTS ::= OCTET STRING (SIZE (14))

```

```

Cksn ::= OCTET STRING (SIZE (1))
-- The internal structure is defined in 3G TS 24.008

```

```

KSI ::= OCTET STRING (SIZE (1))
-- The internal structure is defined in 3G TS 24.008

```

```

AuthenticationFailureReportArg ::= SEQUENCE {
    imsi                IMSI,
    failureCause        FailureCause,
    extensionContainer  ExtensionContainer                OPTIONAL,
    ... ,
    re-attempt          BOOLEAN                        OPTIONAL,
    accessType          AccessType                    OPTIONAL,
    rand                RAND                          OPTIONAL,
    vlr-Number          [0] ISDN-AddressString        OPTIONAL,
    sgsn-Number         [1] ISDN-AddressString        OPTIONAL }

```

```

AccessType ::= ENUMERATED {
    call (0),
    emergencyCall (1),
    locationUpdating (2),
    supplementaryService (3),
    shortMessage (4),
    gprsAttach (5),
    routingAreaUpdating (6),
    serviceRequest (7),
    pdpContextActivation (8),
    pdpContextDeactivation (9),
    ... }
-- exception handling:
-- received values greater than 9 shall be ignored.

```

```

AuthenticationFailureReportRes ::= SEQUENCE {
    extensionContainer  ExtensionContainer                OPTIONAL,
    ... }

```

```

FailureCause ::= ENUMERATED {

```

```
wrongUserResponse (0),
wrongNetworkSignature (1)}
```

-- gprs location registration types

```
UpdateGprsLocationArg ::= SEQUENCE {
    imsi                IMSI,
    sgsn-Number         ISDN-AddressString,
    sgsn-Address        GSN-Address,
    extensionContainer  ExtensionContainer OPTIONAL,
    ... ,
    sgsn-Capability     [0] SGSN-Capability OPTIONAL,
    informPreviousNetworkEntity [1] NULL OPTIONAL,
    ps-LCS-NotSupportedByUE [2] NULL OPTIONAL }
```

```
SGSN-Capability ::= SEQUENCE{
    solsaSupportIndicator      NULL OPTIONAL,
    extensionContainer         [1] ExtensionContainer OPTIONAL,
    ... ,
    superChargerSupportedInServingNetworkEntity [2] SuperChargerInfo OPTIONAL,
    gprsEnhancementsSupportIndicator [3] NULL OPTIONAL,
    supportedCamelPhases         [4] SupportedCamelPhases OPTIONAL,
    supportedLCS-CapabilitySets [5] SupportedLCS-CapabilitySets OPTIONAL }
```

```
GSN-Address ::= OCTET STRING (SIZE (5..17))
-- Octets are coded according to TS 3GPP TS 23.003 [17]
```

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

-- handover types

```
ForwardAccessSignalling-Arg ::= [3] SEQUENCE {
    an-APDU                AccessNetworkSignalInfo,
    integrityProtectionInfo [0] IntegrityProtectionInformation OPTIONAL,
    encryptionInfo         [1] EncryptionInformation OPTIONAL,
    keyStatus              [2] KeyStatus OPTIONAL,
    allowedGSM-Algorithms  [4] AllowedGSM-Algorithms OPTIONAL,
    allowedUMTS-Algorithms [5] AllowedUMTS-Algorithms OPTIONAL,
    radioResourceInformation [6] RadioResourceInformation OPTIONAL,
    extensionContainer     [3] ExtensionContainer OPTIONAL,
    ... }
```

```
AllowedGSM-Algorithms ::= OCTET STRING (SIZE (1))
-- internal structure is coded as Algorithm identifier octet from
-- Permitted Algorithms defined in 3G TS 48.008
-- A node shall mark all GSM algorithms that are allowed in MSC-B
```

```
AllowedUMTS-Algorithms ::= SEQUENCE {
    integrityProtectionAlgorithms [0] PermittedIntegrityProtectionAlgorithms
    OPTIONAL,
    encryptionAlgorithms         [1] PermittedEncryptionAlgorithms OPTIONAL,
    extensionContainer           [2] ExtensionContainer OPTIONAL,
    ... }
```

```
PermittedIntegrityProtectionAlgorithms ::=
    OCTET STRING (SIZE (1..maxPermittedIntegrityProtectionAlgorithmsLength))
-- Octets contain a complete PermittedIntegrityProtectionAlgorithms data type
-- as defined in 3G TS 25.413, encoded according to the encoding scheme
-- mandated by 3G TS 25.413.
-- Padding bits are included, if needed, in the least significant bits of the
-- last octet of the octet string.
```

```
maxPermittedIntegrityProtectionAlgorithmsLength INTEGER ::= 9
```

```
PermittedEncryptionAlgorithms ::=
    OCTET STRING (SIZE (1..maxPermittedEncryptionAlgorithmsLength))
-- Octets contain a complete PermittedEncryptionAlgorithms data type
-- as defined in 3G TS 25.413, encoded according to the encoding scheme
-- mandated by 3G TS 25.413
-- Padding bits are included, if needed, in the least significant bits of the
-- last octet of the octet string.
```

```
maxPermittedEncryptionAlgorithmsLength INTEGER ::= 9
```

```
KeyStatus ::= ENUMERATED {
  old (0),
  new (1),
  ...}
-- exception handling:
-- received values in range 2-31 shall be treated as "old"
-- received values greater than 31 shall be treated as "new"
```

```
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 }
```

```
RadioResourceList ::= SEQUENCE SIZE (2.. maxNumOfRadioResources) OF
  RadioResource
```

```
RadioResource ::= SEQUENCE {
  radioResourceInformation    RadioResourceInformation,
  rab-Id                      RAB-Id,
  -- RAB Identity is needed to relate the radio resources with the radio access bearers.
  ...}
```

```
maxNumOfRadioResources INTEGER ::= 7
```

```
PrepareHO-Res ::= [3] SEQUENCE {
  handoverNumber              [0] ISDN-AddressString        OPTIONAL,
  relocationNumberList        [1] RelocationNumberList      OPTIONAL,
  an-APDU                     [2] AccessNetworkSignalInfo    OPTIONAL,
  multicallBearerInfo        [3] MulticallBearerInfo        OPTIONAL,
  multipleBearerNotSupported  NULL                        OPTIONAL,
  selectedUMTS-Algorithms     [5] SelectedUMTS-Algorithms   OPTIONAL,
  chosenRadioResourceInformation [6] ChosenRadioResourceInformation OPTIONAL,
  extensionContainer          [4] ExtensionContainer          OPTIONAL,
  ...}
```

```
SelectedUMTS-Algorithms ::= SEQUENCE {
  integrityProtectionAlgorithm [0] ChosenIntegrityProtectionAlgorithm OPTIONAL,
  encryptionAlgorithm         [1] ChosenEncryptionAlgorithm  OPTIONAL,
  extensionContainer          [2] ExtensionContainer          OPTIONAL,
  ...}
```

```
ChosenIntegrityProtectionAlgorithm ::= OCTET STRING (SIZE (1))
-- Octet contains a complete IntegrityProtectionAlgorithm data type
-- as defined in 3G TS 25.413, encoded according to the encoding scheme
-- mandated by 3G TS 25.413
-- Padding bits are included in the least significant bits.
```

```
ChosenEncryptionAlgorithm ::= OCTET STRING (SIZE (1))
-- Octet contains a complete EncryptionAlgorithm data type
-- as defined in 3G TS 25.413, encoded according to the encoding scheme
-- mandated by 3G TS 25.413
-- Padding bits are included in the least significant bits.
```

```
ChosenRadioResourceInformation ::= SEQUENCE {
  chosenChannelInfo          [0] ChosenChannelInfo          OPTIONAL,
  chosenSpeechVersion        [1] ChosenSpeechVersion        OPTIONAL,
  ...}
```

```

ChosenChannelInfo ::= OCTET STRING (SIZE (1))
  -- Octets are coded according the Chosen Channel information element in 3G TS 48.008

```

```

ChosenSpeechVersion ::= OCTET STRING (SIZE (1))
  -- Octets are coded according the Speech Version (chosen) information element in 3G TS
  -- 48.008

```

```

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,
  ...}

```

```

PrepareSubsequentHO-Res ::= [3] SEQUENCE {
  an-APDU                AccessNetworkSignalInfo,
  extensionContainer      [0] ExtensionContainer     OPTIONAL,
  ...}

```

```

ProcessAccessSignalling-Arg ::= [3] SEQUENCE {
  an-APDU                AccessNetworkSignalInfo,
  selectedUMTS-Algorithms [1] SelectedUMTS-Algorithms OPTIONAL,
  selectedGSM-Algorithm  [2] SelectedGSM-Algorithm  OPTIONAL,
  chosenRadioResourceInformation [3] ChosenRadioResourceInformation OPTIONAL,
  selectedRab-Id         [4] RAB-Id                 OPTIONAL,
  extensionContainer      [0] ExtensionContainer     OPTIONAL,
  ...}

```

```

SelectedGSM-Algorithm ::= OCTET STRING (SIZE (1))
  -- internal structure is coded as Algorithm identifier octet from Chosen Encryption
  -- Algorithm defined in 3G TS 48.008
  -- A node shall mark only the selected GSM algorithm

```

```

SendEndSignal-Arg ::= [3] SEQUENCE {
  an-APDU                AccessNetworkSignalInfo,
  extensionContainer      [0] ExtensionContainer     OPTIONAL,
  ...}

```

```

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

```

```

RNCId ::= OCTET STRING (SIZE (7))
  -- The internal structure is defined as follows:
  -- octet 1 bits 4321      Mobile Country Code 1st digit
  -- bits 8765             Mobile Country Code 2nd digit
  -- octet 2 bits 4321      Mobile Country Code 3rd digit
  -- bits 8765             Mobile Network Code 3rd digit
  --                       or filler (1111) for 2 digit MNCs
  -- octet 3 bits 4321      Mobile Network Code 1st digit
  -- bits 8765             Mobile Network Code 2nd digit
  -- octets 4 and 5        Location Area Code according to 3G TS 24.008
  -- octets 6 and 7        RNC Id value according to 3G TS 25.413

```

```

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

```

```

MulticallBearerInfo ::= INTEGER (1..maxNumOfRelocationNumber)

```

```

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

```

```

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

```

```

maxNrOfRABs INTEGER ::= 255

```

```

maxNumOfRelocationNumber INTEGER ::= 7

```

```
RadioResourceInformation ::= OCTET STRING (SIZE (3..13))
-- Octets are coded according the Channel Type information element in 3G TS 48.008
```

```
IntegrityProtectionInformation ::= OCTET STRING (SIZE (18..maxNumOfIntegrityInfo))
-- Octets contain a complete IntegrityProtectionInformation data type
-- as defined in 3G TS 25.413, encoded according to the encoding scheme
-- mandated by 3G TS 25.413
-- Padding bits are included, if needed, in the least significant bits of the
-- last octet of the octet string.
```

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

```
EncryptionInformation ::= OCTET STRING (SIZE (18..maxNumOfEncryptionInfo))
-- Octets contain a complete EncryptionInformation data type
-- as defined in 3G TS 25.413, encoded according to the encoding scheme
-- mandated by 3G TS 25.413
-- Padding bits are included, if needed, in the least significant bits of the
-- last octet of the octet string.
```

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

```
-- authentication management types
```

```
SendAuthenticationInfoArg ::= SEQUENCE {
    imsi [0] IMSI,
    numberOfRequestedVectors NumberOfRequestedVectors,
    segmentationProhibited NULL OPTIONAL,
    -- if segmentation is prohibited the HLR shall not send the result within
    -- a TC-CONTINUE message.
    immediateResponsePreferred [1] NULL OPTIONAL,
    -- if present, the HLR may send an immediate response with the available authentication
    -- vectors (see § 8.5.2 for more information).
    re-synchronisationInfo Re-synchronisationInfo OPTIONAL,
    extensionContainer [2] ExtensionContainer OPTIONAL,
    ...,
    requestingNodeType [3] RequestingNodeType OPTIONAL}
```

```
NumberOfRequestedVectors ::= INTEGER (1..5)
```

```
Re-synchronisationInfo ::= SEQUENCE {
    rand RAND,
    auts AUTS,
    ...}
```

```
SendAuthenticationInfoRes ::= [3] SEQUENCE {
    authenticationSetList AuthenticationSetList OPTIONAL,
    extensionContainer ExtensionContainer OPTIONAL,
    ...}
```

```
RequestingNodeType ::= ENUMERATED {
    vlr (0),
    sgsn (1),
    ...}
-- exception handling:
-- received values in the range 2-15 shall be treated as "vlr"
-- received values greater than 15 shall be treated as "sgsn"
```

```
-- security management types
```

```
EquipmentStatus ::= ENUMERATED {
    whiteListed (0),
    blackListed (1),
    greyListed (2)}
```

```
-- subscriber management types
```

```

InsertSubscriberDataArg ::= SEQUENCE {
    imsi [0] IMSI OPTIONAL,
    COMPONENTS OF
    extensionContainer [14] ExtensionContainer OPTIONAL,
    ... ,
    naea-PreferredCI [15] NAEA-PreferredCI OPTIONAL,
    -- naea-PreferredCI is included at the discretion of the HLR operator.
    gprsSubscriptionData [16] GPRSSubscriptionData OPTIONAL,
    roamingRestrictedInSgsnDueToUnsupportedFeature [23]
    NULL
    OPTIONAL,
    networkAccessMode [24] NetworkAccessMode OPTIONAL,
    lsaInformation [25] LSAInformation OPTIONAL,
    lmu-Indicator [21] NULL OPTIONAL,
    lcsInformation [22] LCSInformation OPTIONAL,
    istAlertTimer [26] IST-AlertTimerValue OPTIONAL,
    superChargerSupportedInHLR [27] AgeIndicator OPTIONAL,
    mc-SS-Info [28] MC-SS-Info OPTIONAL,
    cs-AllocationRetentionPriority [29] CS-AllocationRetentionPriority OPTIONAL,
    sgsn-CAMEL-SubscriptionInfo [17] SGSN-CAMEL-SubscriptionInfo OPTIONAL,
    chargingCharacteristics [18] ChargingCharacteristics OPTIONAL
}
-- If the Network Access Mode parameter is sent, it shall be present only in
-- the first sequence if segmentation is used

```

```

CS-AllocationRetentionPriority ::= OCTET STRING (SIZE (1))
-- This data type encodes each priority level defined in TS 23.107 as the binary value
-- of the priority level.

```

```

IST-AlertTimerValue ::= INTEGER (15..255)

```

```

LCSInformation ::= SEQUENCE {
    gmlc-List [0] GMLC-List OPTIONAL,
    lcs-PrivacyExceptionList [1] LCS-PrivacyExceptionList OPTIONAL,
    molr-List [2] MOLR-List OPTIONAL,
    ...}

```

```

GMLC-List ::= SEQUENCE SIZE (1..maxNumOfGMLC) OF
    ISDN-AddressString
-- if segmentation is used, the complete GMLC-List shall be sent in one segment

```

```

maxNumOfGMLC INTEGER ::= 5

```

```

NetworkAccessMode ::= ENUMERATED {
    bothMSCAndSGSN (0),
    onlyMSC (1),
    onlySGSN (2),
    ...}
-- if unknown values are received in NetworkAccessMode
-- they shall be discarded.

```

```

GPRSDataList ::= SEQUENCE SIZE (1..maxNumOfPDP-Contexts) OF
    PDP-Context

```

```

maxNumOfPDP-Contexts INTEGER ::= 50

```

```

PDP-Context ::= SEQUENCE {
    pdp-ContextId ContextId,
    pdp-Type [16] PDP-Type,
    pdp-Address [17] PDP-Address OPTIONAL,
    qos-Subscribed [18] QoS-Subscribed,
    vplmnAddressAllowed [19] NULL OPTIONAL,
    apn [20] APN,
    extensionContainer [21] ExtensionContainer OPTIONAL,
    ... ,
    ext-QoS-Subscribed [0] Ext-QoS-Subscribed OPTIONAL,
    pdp-ChargingCharacteristics [1] ChargingCharacteristics OPTIONAL }
-- qos-Subscribed shall be discarded if ext-QoS-Subscribed is received and supported

```

```

ContextId ::= INTEGER (1..maxNumOfPDP-Contexts)

```



```

GPRSSubscriptionData ::= SEQUENCE {
    completeDataListIncluded          NULL          OPTIONAL,
    -- If segmentation is used, completeDataListIncluded may only be present in the
    -- first segment.
    gprsDataList                     [1] GPRSDataList,
    extensionContainer                [2] ExtensionContainer OPTIONAL,
    ... }

```

```

SGSN-CAMEL-SubscriptionInfo ::= SEQUENCE {
    gprs-CSI                          [0] GPRS-CSI          OPTIONAL,
    mo-sms-CSI                        [1] SMS-CSI           OPTIONAL,
    extensionContainer                [2] ExtensionContainer OPTIONAL,
    ...,
    mt-sms-CSI                       [3] SMS-CSI           OPTIONAL,
    mt-smsCAMELTDP-CriteriaList      [4] MT-smsCAMELTDP-CriteriaList OPTIONAL,
    mg-csi                            [5] MG-CSI           OPTIONAL
}

```

```

GPRS-CSI ::= SEQUENCE {
    gprs-CamelTDPDataList            [0] GPRS-CamelTDPDataList    OPTIONAL,
    camelCapabilityHandling          [1] CamelCapabilityHandling    OPTIONAL,
    extensionContainer                [2] ExtensionContainer        OPTIONAL,
    notificationToCSE                [3] NULL                     OPTIONAL,
    csi-Active                       [4] NULL                     OPTIONAL,
    ...}
-- notificationToCSE and csi-Active shall not be present when GPRS-CSI is sent to SGSN.
-- They may only be included in ATSI/ATM ack/NSDC message.
-- GPRS-CamelTDPData and camelCapabilityHandling shall be present in
-- the GPRS-CSI sequence.
-- If GPRS-CSI is segmented, gprs-CamelTDPDataList and camelCapabilityHandling shall be
-- present in the first segment

```

```

GPRS-CamelTDPDataList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
    GPRS-CamelTDPData
-- GPRS-CamelTDPDataList shall not contain more than one instance of
-- GPRS-CamelTDPData containing the same value for gprs-TriggerDetectionPoint.

```

```

GPRS-CamelTDPData ::= SEQUENCE {
    gprs-TriggerDetectionPoint        [0] GPRS-TriggerDetectionPoint,
    serviceKey                       [1] ServiceKey,
    gsmSCF-Address                   [2] ISDN-AddressString,
    defaultSessionHandling            [3] DefaultGPRS-Handling,
    extensionContainer                [4] ExtensionContainer        OPTIONAL,
    ...
}

```

```

DefaultGPRS-Handling ::= ENUMERATED {
    continueTransaction (0) ,
    releaseTransaction (1) ,
    ...}
-- exception handling:
-- reception of values in range 2-31 shall be treated as "continueTransaction"
-- reception of values greater than 31 shall be treated as "releaseTransaction"

```

```

GPRS-TriggerDetectionPoint ::= ENUMERATED {
    attach                            (1),
    attachChangeOfPosition            (2),
    pdp-ContextEstablishment          (11),
    pdp-ContextEstablishmentAcknowledgement (12),
    pdp-ContextChangeOfPosition      (14),
    ... }
-- exception handling:
-- For GPRS-CamelTDPData sequences containing this parameter with any
-- other value than the ones listed the receiver shall ignore the whole
-- GPRS-CamelTDPData sequence.

```

```

APN ::= OCTET STRING (SIZE (2..63))
-- Octets are coded according to TS 3GPP TS 23.003 [17]

```

```

PDP-Type ::= OCTET STRING (SIZE (2))
-- Octets are coded according to TS 3GPP TS 29.060 [105]

```

```

PDP-Address ::= OCTET STRING (SIZE (1..16))
  -- Octets are coded according to TS 3GPP TS 29.060 [105]

  -- The possible size values are:
  -- 1-7 octets X.25 address type
  -- 4 octets IPv4 address type
  -- 16 octets Ipv6 address type

```

```

QoS-Subscribed ::= OCTET STRING (SIZE (3))
  -- Octets are coded according to TS 3GPP TS 24.008 [35].

```

```

Ext-QoS-Subscribed ::= OCTET STRING (SIZE (1..9))
  -- OCTET 1:
  -- Allocation/Retention Priority (This octet encodes each priority level defined in
  -- 23.107 as the binary value of the priority level, declaration in 29.060)
  -- Octets 2-9 are coded according to 3G TS 24.008 Quality of Service Octets
  -- 6-13.

```

```

ChargingCharacteristics ::= OCTET STRING (SIZE (2))
  -- Octets are coded according to 3G TS 32.015.

```

```

LSAOnlyAccessIndicator ::= ENUMERATED {
  accessOutsideLSAsAllowed (0),
  accessOutsideLSAsRestricted (1)}

```

```

LSADataList ::= SEQUENCE SIZE (1..maxNumOfLSAs) OF
  LSAData

```

```

maxNumOfLSAs INTEGER ::= 20

```

```

LSAData ::= SEQUENCE {
  lsaIdentity [0] LSAIdentity,
  lsaAttributes [1] LSAAttributes,
  lsaActiveModeIndicator [2] NULL OPTIONAL,
  extensionContainer [3] ExtensionContainer OPTIONAL,
  ...}

```

```

LSAInformation ::= SEQUENCE {
  completeDataListIncluded NULL OPTIONAL,
  -- If segmentation is used, completeDataListIncluded may only be present in the
  -- first segment.
  lsaOnlyAccessIndicator [1] LSAOnlyAccessIndicator OPTIONAL,
  lsaDataList [2] LSADataList OPTIONAL,
  extensionContainer [3] ExtensionContainer OPTIONAL,
  ...}

```

```

LSAIdentity ::= OCTET STRING (SIZE (3))
  -- Octets are coded according to TS 3GPP TS 23.003 [17]

```

```

LSAAttributes ::= OCTET STRING (SIZE (1))
  -- Octets are coded according to TS 3GPP TS 48.008 [49]

```

```

SubscriberData ::= SEQUENCE {
  msisdn [1] ISDN-AddressString OPTIONAL,
  category [2] Category OPTIONAL,
  subscriberStatus [3] SubscriberStatus OPTIONAL,
  bearerServiceList [4] BearerServiceList OPTIONAL,
  -- The exception handling for reception of unsupported / not allocated
  -- bearerServiceCodes is defined in section 8.8.1
  teleserviceList [6] TeleserviceList OPTIONAL,
  -- The exception handling for reception of unsupported / not allocated
  -- teleserviceCodes is defined in section 8.8.1
  provisionedSS [7] Ext-SS-InfoList OPTIONAL,
  odb-Data [8] ODB-Data OPTIONAL,
  roamingRestrictionDueToUnsupportedFeature [9] NULL OPTIONAL,
  regionalSubscriptionData [10] ZoneCodeList OPTIONAL,
  vbsSubscriptionData [11] VBSDataList OPTIONAL,
  vgcsSubscriptionData [12] VGCSDataList OPTIONAL,
  vlrCamelSubscriptionInfo [13] VlrCamelSubscriptionInfo OPTIONAL
}

```

```

Category ::= OCTET STRING (SIZE (1))
  -- The internal structure is defined in CCITT Rec Q.763.

```

```

SubscriberStatus ::= ENUMERATED {
  serviceGranted (0),
  operatorDeterminedBarring (1)}

```

```

BearerServiceList ::= SEQUENCE SIZE (1..maxNumOfBearerServices) OF
  Ext-BearerServiceCode

```

```

maxNumOfBearerServices INTEGER ::= 50

```

```

TeleserviceList ::= SEQUENCE SIZE (1..maxNumOfTeleservices) OF
  Ext-TeleserviceCode

```

```

maxNumOfTeleservices INTEGER ::= 20

```

```

ODB-Data ::= SEQUENCE {
  odb-GeneralData                ODB-GeneralData,
  odb-HPLMN-Data                 ODB-HPLMN-Data           OPTIONAL,
  extensionContainer             ExtensionContainer        OPTIONAL,
  ...}

```

```

ODB-GeneralData ::= BIT STRING {
  alIog-CallsBarred (0),
  internationalOGCallsBarred (1),
  internationalOGCallsNotToHPLMN-CountryBarred (2),
  interzonalOGCallsBarred (6),
  interzonalOGCallsNotToHPLMN-CountryBarred (7),
  interzonalOGCallsAndInternationalOGCallsNotToHPLMN-CountryBarred (8),
  premiumRateInformationOGCallsBarred (3),
  premiumRateEntertainmentOGCallsBarred (4),
  ss-AccessBarred (5),
  allECT-Barred (9),
  chargeableECT-Barred (10),
  internationalECT-Barred (11),
  interzonalECT-Barred (12),
  doublyChargeableECT-Barred (13),
  multipleECT-Barred (14),
  allPacketOrientedServicesBarred (15),
  roamerAccessToHPLMN-AP-Barred (16),
  roamerAccessToVPLMN-AP-Barred (17),
  roamingOutsidePLMNOG-CallsBarred (18),
  allIC-CallsBarred (19),
  roamingOutsidePLMNIC-CallsBarred (20),
  roamingOutsidePLMNICCountryIC-CallsBarred (21),
  roamingOutsidePLMN-Barred (22),
  roamingOutsidePLMN-CountryBarred (23),
  registrationAllCF-Barred (24),
  registrationCFNotToHPLMN-Barred (25),
  registrationInterzonalCF-Barred (26),
  registrationInterzonalCFNotToHPLMN-Barred (27)} (SIZE (15..32))
  -- exception handling: reception of unknown bit assignments in the
  -- ODB-GeneralData type shall be treated like unsupported ODB-GeneralData
  -- When the ODB-GeneralData type is removed from the HLR for a given subscriber,
  -- in NoteSubscriberDataModified operation sent toward the gsmSCF
  -- all bits shall be set to "0".

```

```

ODB-HPLMN-Data ::= BIT STRING {
  plmn-SpecificBarringType1 (0),
  plmn-SpecificBarringType2 (1),
  plmn-SpecificBarringType3 (2),
  plmn-SpecificBarringType4 (3)} (SIZE (4..32))
  -- exception handling: reception of unknown bit assignments in the
  -- ODB-HPLMN-Data type shall be treated like unsupported ODB-HPLMN-Data
  -- When the ODB-HPLMN-Data type is removed from the HLR for a given subscriber,
  -- in NoteSubscriberDataModified operation sent toward the gsmSCF
  -- all bits shall be set to "0".

```

```

Ext-SS-InfoList ::= SEQUENCE SIZE (1..maxNumOfSS) OF
  Ext-SS-Info

```

```

Ext-SS-Info ::= CHOICE {
    forwardingInfo                [0] Ext-ForwInfo,
    callBarringInfo               [1] Ext-CallBarInfo,
    cug-Info                      [2] CUG-Info,
    ss-Data                      [3] Ext-SS-Data,
    emlpp-Info                   [4] EMLPP-Info}

```

```

Ext-ForwInfo ::= SEQUENCE {
    ss-Code                      SS-Code,
    forwardingFeatureList        Ext-ForwFeatureList,
    extensionContainer           [0] ExtensionContainer OPTIONAL,
    ...}

```

```

Ext-ForwFeatureList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
    Ext-ForwFeature

```

```

Ext-ForwFeature ::= SEQUENCE {
    basicService                 Ext-BasicServiceCode OPTIONAL,
    ss-Status                   [4] Ext-SS-Status,
    forwardedToNumber           [5] ISDN-AddressString OPTIONAL,
    -- When this data type is sent from an HLR which supports CAMEL Phase 2
    -- to a VLR that supports CAMEL Phase 2 the VLR shall not check the
    -- format of the number
    forwardedToSubaddress       [8] ISDN-SubaddressString OPTIONAL,
    forwardingOptions           [6] Ext-ForwOptions OPTIONAL,
    noReplyConditionTime       [7] Ext-NoRepCondTime OPTIONAL,
    extensionContainer          [9] ExtensionContainer OPTIONAL,
    ...,
    longForwardedToNumber      [10] FTN-AddressString OPTIONAL }

```

```

Ext-ForwOptions ::= OCTET STRING (SIZE (1..5))

```

```

-- OCTET 1:

-- bit 8: notification to forwarding party
-- 0 no notification
-- 1 notification

-- bit 7: redirecting presentation
-- 0 no presentation
-- 1 presentation

-- bit 6: notification to calling party
-- 0 no notification
-- 1 notification

-- bit 5: 0 (unused)

-- bits 4:3: forwarding reason
-- 00 ms not reachable
-- 01 ms busy
-- 10 no reply
-- 11 unconditional

-- bits 2:1: 00 (unused)

-- OCTETS 2-5: reserved for future use. They shall be discarded if
-- received and not understood.

```

```

Ext-NoRepCondTime ::= INTEGER (1..100)
-- Only values 5-30 are used.
-- Values in the ranges 1-4 and 31-100 are reserved for future use
-- If received:
--     values 1-4 shall be mapped on to value 5
--     values 31-100 shall be mapped on to value 30

```

```

Ext-CallBarInfo ::= SEQUENCE {
    ss-Code                      SS-Code,
    callBarringFeatureList       Ext-CallBarFeatureList,
    extensionContainer           ExtensionContainer OPTIONAL,
    ...}

```

```

Ext-CallBarFeatureList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
    Ext-CallBarringFeature

```

```

Ext-CallBarringFeature ::= SEQUENCE {
    basicService                Ext-BasicServiceCode                OPTIONAL,
    ss-Status                   [4] Ext-SS-Status,
    extensionContainer          ExtensionContainer                OPTIONAL,
    ...}

```

```

CUG-Info ::= SEQUENCE {
    cug-SubscriptionList        CUG-SubscriptionList,
    cug-FeatureList            CUG-FeatureList                OPTIONAL,
    extensionContainer          [0] ExtensionContainer                OPTIONAL,
    ...}

```

```

CUG-SubscriptionList ::= SEQUENCE SIZE (0..maxNumOfCUG) OF
    CUG-Subscription

```

```

CUG-Subscription ::= SEQUENCE {
    cug-Index CUG-Index,
    cug-Interlock                CUG-Interlock,
    intraCUG-Options            IntraCUG-Options,
    basicServiceGroupList       Ext-BasicServiceGroupList    OPTIONAL,
    extensionContainer          [0] ExtensionContainer                OPTIONAL,
    ...}

```

```

CUG-Index ::= INTEGER (0..32767)
-- The internal structure is defined in ETS 300 138.

```

```

CUG-Interlock ::= OCTET STRING (SIZE (4))

```

```

IntraCUG-Options ::= ENUMERATED {
    noCUG-Restrictions (0),
    cugIC-CallBarred (1),
    cugOG-CallBarred (2)}

```

```

maxNumOfCUG INTEGER ::= 10

```

```

CUG-FeatureList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
    CUG-Feature

```

```

Ext-BasicServiceGroupList ::= SEQUENCE SIZE (1..maxNumOfExt-BasicServiceGroups) OF
    Ext-BasicServiceCode

```

```

maxNumOfExt-BasicServiceGroups INTEGER ::= 32

```

```

CUG-Feature ::= SEQUENCE {
    basicService                Ext-BasicServiceCode                OPTIONAL,
    preferentialCUG-Indicator    CUG-Index OPTIONAL,
    interCUG-Restrictions        InterCUG-Restrictions,
    extensionContainer          ExtensionContainer                OPTIONAL,
    ...}

```

```

InterCUG-Restrictions ::= OCTET STRING (SIZE (1))

-- bits 876543: 000000 (unused)
-- Exception handling:
-- bits 876543 shall be ignored if received and not understood

-- bits 21
-- 00 CUG only facilities
-- 01 CUG with outgoing access
-- 10 CUG with incoming access
-- 11 CUG with both outgoing and incoming access

```

```

Ext-SS-Data ::= SEQUENCE {
    ss-Code                    SS-Code,
    ss-Status [4] Ext-SS-Status,
    ss-SubscriptionOption      SS-SubscriptionOption        OPTIONAL,
    basicServiceGroupList       Ext-BasicServiceGroupList    OPTIONAL,
    extensionContainer          [5] ExtensionContainer                OPTIONAL,
    ...}

```

```

LCS-PrivacyExceptionList ::= SEQUENCE SIZE (1..maxNumOfPrivacyClass) OF
    LCS-PrivacyClass

```

```

maxNumOfPrivacyClass INTEGER ::= 4

```

```

LCS-PrivacyClass ::= SEQUENCE {
    ss-Code                SS-Code,
    ss-Status              Ext-SS-Status,
    notificationToMSUser  [0] NotificationToMSUser      OPTIONAL,
    -- notificationToMSUser may be sent only for SS-codes callrelated
    -- and callunrelated. If not received for SS-codes callrelated and callunrelated,
    -- the default values according to 3G TS 23.271 shall be assumed.
    externalClientList    [1] ExternalClientList        OPTIONAL,
    -- externalClientList may be sent only for SS-code callunrelated to a
    -- visited node that does not support LCS Release 4 or later versions.
    -- externalClientList may be sent only for SS-codes callunrelated and
    -- callrelated to a visited node that supports LCS Release 4 or later versions.
    plmnClientList        [2] PLMNClientList            OPTIONAL,
    -- plmnClientList may be sent only for SS-code plmnoperator.
    extensionContainer     [3] ExtensionContainer        OPTIONAL,
    ...,
    ext-externalClientList [4] Ext-ExternalClientList    OPTIONAL
    -- Ext-externalClientList may be sent only if the visited node supports LCS Release 4 or
    -- later versions, the user did specify more than 5 clients, and White Book SCCP is used.
    -- if segmentation is used, the complete LCS-PrivacyClass shall be sent in one segment
}

```

```

ExternalClientList ::= SEQUENCE SIZE (0..maxNumOfExternalClient) OF
    ExternalClient

```

```

maxNumOfExternalClient INTEGER ::= 5

```

```

PLMNClientList ::= SEQUENCE SIZE (1..maxNumOfPLMNClient) OF
    LCSCClientInternalID

```

```

maxNumOfPLMNClient INTEGER ::= 5

```

```

Ext-ExternalClientList ::= SEQUENCE SIZE (1..maxNumOfExt-ExternalClient) OF
    ExternalClient

```

```

maxNumOfExt-ExternalClient INTEGER ::= 35

```

```

ExternalClient ::= SEQUENCE {
    clientIdentity          LCSCClientExternalID,
    gmlc-Restriction       [0] GMLC-Restriction          OPTIONAL,
    notificationToMSUser   [1] NotificationToMSUser      OPTIONAL,
    -- If notificationToMSUser is not received, the default value according to
    -- 3G TS 23.271 shall be assumed.
    extensionContainer     [2] ExtensionContainer        OPTIONAL,
    ... }

```

```

GMLC-Restriction ::= ENUMERATED {
    gmlc-List              (0),
    home-Country           (1),
    ... }
-- exception handling:
-- At reception of any other value than the ones listed the receiver shall ignore
-- GMLC-Restriction.

```

```

NotificationToMSUser ::= ENUMERATED {
    notifyLocationAllowed      (0),
    notifyAndVerify-LocationAllowedIfNoResponse (1),
    notifyAndVerify-LocationNotAllowedIfNoResponse (2),
    ...,
    locationNotAllowed (3) }
-- exception handling:
-- At reception of any other value than the ones listed the receiver shall ignore
-- NotificationToMSUser.

```

```

MOLR-List ::= SEQUENCE SIZE (1..maxNumOfMOLR-Class) OF
    MOLR-Class

```

```

maxNumOfMOLR-Class INTEGER ::= 3

```

```

MOLR-Class ::= SEQUENCE {
    ss-Code                SS-Code,
    ss-Status              Ext-SS-Status,
    extensionContainer     [0] ExtensionContainer        OPTIONAL,
    ... }

```

```
ZoneCodeList ::= SEQUENCE SIZE (1..maxNumOfZoneCodes)
                OF ZoneCode
```

```
ZoneCode ::= OCTET STRING (SIZE (2))
-- internal structure is defined in TS 3GPP TS 23.003 [17]
```

```
maxNumOfZoneCodes INTEGER ::= 10
```

```
InsertSubscriberDataRes ::= SEQUENCE {
    teleserviceList          [1] TeleserviceList          OPTIONAL,
    bearerServiceList       [2] BearerServiceList         OPTIONAL,
    ss-List                  [3] SS-List                   OPTIONAL,
    odb-GeneralData         [4] ODB-GeneralData           OPTIONAL,
    regionalSubscriptionResponse [5] RegionalSubscriptionResponse OPTIONAL,
    supportedCamelPhases    [6] SupportedCamelPhases      OPTIONAL,
    extensionContainer      [7] ExtensionContainer        OPTIONAL,
    ...}
```

```
RegionalSubscriptionResponse ::= ENUMERATED {
    networkNode-AreaRestricted (0),
    tooManyZoneCodes          (1),
    zoneCodesConflict          (2),
    regionalSubscNotSupported (3)}
```

```
DeleteSubscriberDataArg ::= SEQUENCE {
    imsi                [0] IMSI,
    basicServiceList   [1] BasicServiceList          OPTIONAL,
    -- The exception handling for reception of unsupported/not allocated
    -- basicServiceCodes is defined in section 6.8.2
    ss-List             [2] SS-List                   OPTIONAL,
    roamingRestrictionDueToUnsupportedFeature [4] NULL          OPTIONAL,
    regionalSubscriptionIdentifier [5] ZoneCode          OPTIONAL,
    vbsGroupIndication [7] NULL                       OPTIONAL,
    vgcsGroupIndication [8] NULL OPTIONAL,
    camelSubscriptionInfoWithdraw [9] NULL OPTIONAL,
    extensionContainer [6] ExtensionContainer OPTIONAL,
    ...,
    gprsSubscriptionDataWithdraw [10] GPRSSubscriptionDataWithdraw OPTIONAL,
    roamingRestrictedInSgsnDueToUnsupportedFeature [11] NULL          OPTIONAL,
    lsaInformationWithdraw [12] LSAInformationWithdraw OPTIONAL,
    gmlc-ListWithdraw [13] NULL                       OPTIONAL,
    istInformationWithdraw [14] NULL                   OPTIONAL,
    specificCSI-Withdraw [15] SpecificCSI-Withdraw    OPTIONAL }
```

```
SpecificCSI-Withdraw ::= BIT STRING {
    o-csi (0),
    ss-csi (1),
    tif-csi (2),
    d-csi (3),
    vt-csi (4),
    mo-sms-csi (5),
    m-csi (6),
    gprs-csi (7),
    t-csi (8),
    mt-sms-csi (9),
    mg-csi (10)} (SIZE(8..32))
-- exception handling:
-- bits 11 to 31 shall be ignored if received.
-- Bit 8 is only applicable for the NoteSubscriberDataModified operation.
```

```
GPRSSubscriptionDataWithdraw ::= CHOICE {
    allGPRSData          NULL,
    contextIdList       ContextIdList}
```

```
ContextIdList ::= SEQUENCE SIZE (1..maxNumOfPDP-Contexts) OF
                ContextId
```

```
LSAInformationWithdraw ::= CHOICE {
    allLSAData          NULL,
    lsaIdentityList     LSAIdentityList }
```

```
LSAIdentityList ::= SEQUENCE SIZE (1..maxNumOfLSAs) OF
                LSAIdentity
```

```
BasicServiceList ::= SEQUENCE SIZE (1..maxNumOfBasicServices) OF
                    Ext-BasicServiceCode
```

**maxNumOfBasicServices** INTEGER ::= 70

**DeleteSubscriberDataRes** ::= SEQUENCE {  
     regionalSubscriptionResponse [0] RegionalSubscriptionResponse OPTIONAL,  
     extensionContainer ExtensionContainer OPTIONAL,  
     ... }

**VlrCamelSubscriptionInfo** ::= SEQUENCE {  
     o-CSI [0] O-CSI OPTIONAL,  
     extensionContainer [1] ExtensionContainer OPTIONAL,  
     ... ,  
     ss-CSI [2] SS-CSI OPTIONAL,  
     o-BcsmCamelTDP-CriteriaList [4] O-BcsmCamelTDPCriteriaList OPTIONAL,  
     tif-CSI [3] NULL OPTIONAL,  
     m-CSI [5] M-CSI OPTIONAL,  
     mo-sms-CSI [6] SMS-CSI OPTIONAL,  
     vt-CSI [7] T-CSI OPTIONAL,  
     t-BCSM-CAMEL-TDP-CriteriaList [8] T-BCSM-CAMEL-TDP-CriteriaList OPTIONAL,  
     d-CSI [9] D-CSI OPTIONAL,  
     mt-sms-CSI [10] SMS-CSI OPTIONAL,  
     mt-smsCAMELTDP-CriteriaList [11] MT-smsCAMELTDP-CriteriaList OPTIONAL  
     }

**MT-smsCAMELTDP-CriteriaList** ::= SEQUENCE SIZE (1.. maxNumOfCamelTDPData) OF  
     MT-smsCAMELTDP-Criteria

**MT-smsCAMELTDP-Criteria** ::= SEQUENCE {  
     sms-TriggerDetectionPoint SMS-TriggerDetectionPoint,  
     tpdu-TypeCriterion [0] TPDU-TypeCriterion OPTIONAL,  
     ... }

**TPDU-TypeCriterion** ::= SEQUENCE SIZE (1..maxNumOfTPDUTypes) OF  
     MT-SMS-TPDU-Type

**maxNumOfTPDUTypes** INTEGER ::= 5

**MT-SMS-TPDU-Type** ::= ENUMERATED {  
     sms-DELIVER (0),  
     sms-SUBMIT-REPORT (1),  
     sms-STATUS-REPORT (2),  
     ... }  
 -- exception handling:  
 -- For TPDU-TypeCriterion sequences containing this parameter with any  
 -- other value than the ones listed above the receiver shall ignore  
 -- the whole TPDU-TypeCriterion sequence.  
 -- In CAMEL phase 4, sms-SUBMIT-REPORT shall not be used.

**D-CSI** ::= SEQUENCE {  
     dp-AnalysedInfoCriteriaList [0] DP-AnalysedInfoCriteriaList OPTIONAL,  
     camelCapabilityHandling [1] CamelCapabilityHandling OPTIONAL,  
     extensionContainer [2] ExtensionContainer OPTIONAL,  
     notificationToCSE [3] NULL OPTIONAL,  
     csi-Active [4] NULL OPTIONAL,  
     ... }  
 -- notificationToCSE and csi-Active shall not be present when D-CSI is sent to VLR/GMSC.  
 -- They may only be included in ATSI/ATM ack/NSDC message.  
 -- DP-AnalysedInfoCriteria and camelCapabilityHandling shall be present in  
 -- the D-CSI sequence.  
 -- If D-CSI is segmented, dp-AnalysedInfoCriteriaList and camelCapabilityHandling shall be  
 -- present in the first segment

**DP-AnalysedInfoCriteriaList** ::= SEQUENCE SIZE (1..maxNumOfDP-AnalysedInfoCriteria) OF  
     DP-AnalysedInfoCriterium

**maxNumOfDP-AnalysedInfoCriteria** INTEGER ::= 10

**DP-AnalysedInfoCriterium** ::= SEQUENCE {  
     dialledNumber ISDN-AddressString,  
     serviceKey ServiceKey,  
     gsmSCF-Address ISDN-AddressString,  
     defaultCallHandling DefaultCallHandling,  
     extensionContainer ExtensionContainer OPTIONAL,  
     ... }



```

SS-CSI ::= SEQUENCE {
    ss-CamelData                SS-CamelData,
    extensionContainer           ExtensionContainer           OPTIONAL,
    ...,
    notificationToCSE           [0] NULL                  OPTIONAL,
    csi-Active                   [1] NULL                  OPTIONAL
-- notificationToCSE and csi-Active shall not be present when SS-CSI is sent to VLR.
-- They may only be included in ATSI/ATM ack/NSDC message.
}

```

```

SS-CamelData ::= SEQUENCE {
    ss-EventList                SS-EventList,
    gsmSCF-Address              ISDN-AddressString,
    extensionContainer           [0] ExtensionContainer     OPTIONAL,
    ...}

```

```

SS-EventList ::= SEQUENCE SIZE (1..maxNumOfCamelSSEvents) OF SS-Code
-- Actions for the following SS-Code values are defined in CAMEL Phase 3:
-- ect                SS-Code ::= '00110001'B
-- multiPTY          SS-Code ::= '01010001'B
-- cd                SS-Code ::= '00100100'B
-- ccbs              SS-Code ::= '01000100'B
-- all other SS codes shall be ignored
-- When SS-CSI is sent to the VLR, it shall not contain a marking for ccbs.
-- If the VLR receives SS-CSI containing a marking for ccbs, the VLR shall discard the
-- ccbs marking in SS-CSI.

```

```

maxNumOfCamelSSEvents INTEGER ::= 10

```

```

O-CSI ::= SEQUENCE {
    o-BcsmCamelTDPDataList      O-BcsmCamelTDPDataList,
    extensionContainer           ExtensionContainer           OPTIONAL,
    ...,
    camelCapabilityHandling     [0] CamelCapabilityHandling   OPTIONAL,
    notificationToCSE           [1] NULL                      OPTIONAL,
    csiActive                   [2] NULL                      OPTIONAL}
-- notificationtoCSE and csiActive shall not be present when O-CSI is sent to VLR/GMSC.
-- They may only be included in ATSI/ATM ack/NSDC message.

```

```

O-BcsmCamelTDPDataList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
O-BcsmCamelTDPData
-- O-BcsmCamelTDPDataList shall not contain more than one instance of
-- O-BcsmCamelTDPData containing the same value for o-BcsmTriggerDetectionPoint.
-- For CAMEL Phase 2, this means that only one instance of O-BcsmCamelTDPData is allowed
-- with o-BcsmTriggerDetectionPoint being equal to DP2.

```

```

maxNumOfCamelTDPData INTEGER ::= 10

```

```

O-BcsmCamelTDPData ::= SEQUENCE {
    o-BcsmTriggerDetectionPoint O-BcsmTriggerDetectionPoint,
    serviceKey                  ServiceKey,
    gsmSCF-Address              [0] ISDN-AddressString,
    defaultCallHandling         [1] DefaultCallHandling,
    extensionContainer           [2] ExtensionContainer     OPTIONAL,
    ...}

```

```

ServiceKey ::= INTEGER (0..2147483647)

```

```

O-BcsmTriggerDetectionPoint ::= ENUMERATED {
    collectedInfo (2),
    ...,
    routeSelectFailure (4) }
-- exception handling:
-- For O-BcsmCamelTDPData sequences containing this parameter with any
-- other value than the ones listed the receiver shall ignore the whole
-- O-BcsmCamelTDPData sequence.
-- For O-BcsmCamelTDP-Criteria sequences containing this parameter with any
-- other value than the ones listed the receiver shall ignore the whole
-- O-BcsmCamelTDP-Criteria sequence.

```

```

O-BcsmCamelTDPCriteriaList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
O-BcsmCamelTDP-Criteria

```

```

T-BCSM-CAMEL-TDP-CriteriaList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
T-BCSM-CAMEL-TDP-Criteria

```

```

O-BcsmCamelTDP-Criteria ::= SEQUENCE {
  o-BcsmTriggerDetectionPoint      O-BcsmTriggerDetectionPoint,
  destinationNumberCriteria        [0] DestinationNumberCriteria  OPTIONAL,
  basicServiceCriteria             [1] BasicServiceCriteria          OPTIONAL,
  callTypeCriteria                 [2] CallTypeCriteria              OPTIONAL,
  ...,
  o-CauseValueCriteria             [3] O-CauseValueCriteria          OPTIONAL,
  extensionContainer                [4] ExtensionContainer            OPTIONAL }

```

```

T-BCSM-CAMEL-TDP-Criteria ::= SEQUENCE {
  t-BCSM-TriggerDetectionPoint      T-BcsmTriggerDetectionPoint,
  basicServiceCriteria              [0] BasicServiceCriteria          OPTIONAL,
  t-CauseValueCriteria              [1] T-CauseValueCriteria          OPTIONAL,
  ... }

```

```

DestinationNumberCriteria ::= SEQUENCE {
  matchType                        [0] MatchType,
  destinationNumberList            [1] DestinationNumberList          OPTIONAL,
  destinationNumberLengthList     [2] DestinationNumberLengthList    OPTIONAL,
  -- one or both of destinationNumberList and destinationNumberLengthList
  -- shall be present
  ... }

```

```

DestinationNumberList ::= SEQUENCE SIZE (1..maxNumOfCamelDestinationNumbers) OF
  ISDN-AddressString
  -- The receiving entity shall not check the format of a number in
  -- the dialled number list

```

```

DestinationNumberLengthList ::= SEQUENCE SIZE (1..maxNumOfCamelDestinationNumberLengths)
  OF
  INTEGER(1..maxNumOfISDN-AddressDigits)

```

```

BasicServiceCriteria ::= SEQUENCE SIZE(1..maxNumOfCamelBasicServiceCriteria) OF
  Ext-BasicServiceCode

```

```

maxNumOfISDN-AddressDigits INTEGER ::= 15

```

```

maxNumOfCamelDestinationNumbers INTEGER ::= 10

```

```

maxNumOfCamelDestinationNumberLengths INTEGER ::= 3

```

```

maxNumOfCamelBasicServiceCriteria INTEGER ::= 5

```

```

CallTypeCriteria ::= ENUMERATED {
  forwarded (0),
  notForwarded (1) }

```

```

MatchType ::= ENUMERATED {
  inhibiting (0),
  enabling (1) }

```

```

O-CauseValueCriteria ::= SEQUENCE SIZE(1..maxNumOfCAMEL-O-CauseValueCriteria) OF
  CauseValue

```

```

T-CauseValueCriteria ::= SEQUENCE SIZE(1..maxNumOfCAMEL-T-CauseValueCriteria) OF
  CauseValue

```

```

maxNumOfCAMEL-O-CauseValueCriteria INTEGER ::= 5

```

```

maxNumOfCAMEL-T-CauseValueCriteria INTEGER ::= 5

```

```

CauseValue ::= OCTET STRING (SIZE(1))
  -- Type extracted from Cause parameter in ITU-T Recommendation Q.763.
  -- For the use of cause value refer to ITU-T Recommendation Q.850.

```

```

DefaultCallHandling ::= ENUMERATED {
  continueCall (0) ,
  releaseCall (1) ,
  ... }
  -- exception handling:
  -- reception of values in range 2-31 shall be treated as "continueCall"
  -- reception of values greater than 31 shall be treated as "releaseCall"

```

```

CamelCapabilityHandling ::= INTEGER(1..16)
  -- value 1 = CAMEL phase 1,
  -- value 2 = CAMEL phase 2,
  -- value 3 = CAMEL Phase 3,
  -- value 4 = CAMEL phase 4:
  -- reception of values greater than 4 shall be treated as CAMEL phase 4.

```

```

SupportedCamelPhases ::= BIT STRING {
  phase1 (0),
  phase2 (1),
  phase3 (2),
  phase4 (3)} (SIZE (1..16))
-- A node shall mark in the BIT STRING all CAMEL Phases it supports.
-- Other values than listed above shall be discarded.

```

```

SMS-CSI ::= SEQUENCE {
  sms-CAMEL-TDP-DataList          [0] SMS-CAMEL-TDP-DataList          OPTIONAL,
  camelCapabilityHandling         [1] CamelCapabilityHandling         OPTIONAL,
  extensionContainer              [2] ExtensionContainer              OPTIONAL,
  notificationToCSE               [3] NULL                          OPTIONAL,
  csi-Active                      [4] NULL                          OPTIONAL,
  ...}
-- notificationToCSE and csi-Active shall not be present
-- when MO-SMS-CSI or MT-SMS-CSI is sent to VLR or SGSN.
-- They may only be included in ATSI/ATM ack/NSDC message.
-- SMS-CAMEL-TDP-Data and camelCapabilityHandling shall be present in
-- the SMS-CSI sequence.
-- If SMS-CSI is segmented, sms-CAMEL-TDP-DataList and camelCapabilityHandling shall be
-- present in the first segment

```

```

SMS-CAMEL-TDP-DataList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
  SMS-CAMEL-TDP-Data
-- SMS-CAMEL-TDP-DataList shall not contain more than one instance of
-- SMS-CAMEL-TDP-Data containing the same value for sms-TriggerDetectionPoint.

```

```

SMS-CAMEL-TDP-Data ::= SEQUENCE {
  sms-TriggerDetectionPoint      [0] SMS-TriggerDetectionPoint,
  serviceKey                     [1] ServiceKey,
  gsmSCF-Address                 [2] ISDN-AddressString,
  defaultSMS-Handling            [3] DefaultSMS-Handling,
  extensionContainer              [4] ExtensionContainer              OPTIONAL,
  ...
}

```

```

SMS-TriggerDetectionPoint ::= ENUMERATED {
  sms-CollectedInfo (1),
  ...,
  sms-DeliveryRequest (2)
}
-- exception handling:
-- For SMS-CAMEL-TDP-Data sequences containing this parameter with any
-- other value than the ones listed the receiver shall ignore the whole
-- SMS-CAMEL-TDP-Data sequence.

```

```

DefaultSMS-Handling ::= ENUMERATED {
  continueTransaction (0) ,
  releaseTransaction (1) ,
  ...}
-- exception handling:
-- reception of values in range 2-31 shall be treated as "continueTransaction"
-- reception of values greater than 31 shall be treated as "releaseTransaction"

```

```

M-CSI ::= SEQUENCE {
  mobilityTriggers                MobilityTriggers,
  serviceKey                      ServiceKey,
  gsmSCF-Address                  [0] ISDN-AddressString,
  extensionContainer               [1] ExtensionContainer              OPTIONAL,
  notificationToCSE               [2] NULL                          OPTIONAL,
  csi-Active                      [3] NULL                          OPTIONAL,
  ...}
-- notificationToCSE and csi-Active shall not be present when M-CSI is sent to VLR.
-- They may only be included in ATSI/ATM ack/NSDC message.

```

```

MG-CSI ::= SEQUENCE {
    mobilityTriggers           MobilityTriggers,
    serviceKey                 ServiceKey,
    gsmSCF-Address             [0] ISDN-AddressString,
    extensionContainer         [1] ExtensionContainer           OPTIONAL,
    notificationToCSE         [2] NULL                       OPTIONAL,
    csi-Active                 [3] NULL                       OPTIONAL,
    ...}
-- notificationToCSE and csi-Active shall not be present when MG-CSI is sent to SGSN.
-- They may only be included in ATSI/ATM ack/NSDC message.

```

```

MobilityTriggers ::= SEQUENCE SIZE (1..maxNumOfMobilityTriggers) OF
MM-Code

```

```

maxNumOfMobilityTriggers INTEGER ::= 10

```

```

MM-Code ::= OCTET STRING (SIZE (1))
-- This type is used to indicate a Mobility Management event.
-- Actions for the following MM-Code values are defined in CAMEL Phase 4:
--
-- CS domain MM events:
-- Location-update-in-same-VLR           MM-Code ::= '00000000'B
-- Location-update-to-other-VLR         MM-Code ::= '00000001'B
-- IMSI-Attach                          MM-Code ::= '00000010'B
-- MS-initiated-IMSI-Detach             MM-Code ::= '00000011'B
-- Network-initiated-IMSI-Detach       MM-Code ::= '00000100'B
--
-- PS domain MM events:
-- Routeing-Area-update-in-same-SGSN    MM-Code ::= '10000000'B
-- Routeing-Area-update-to-other-SGSN  MM-Code ::= '10000001'B
-- GPRS-Attach                          MM-Code ::= '10000010'B
-- MS-initiated-GPRS-Detach             MM-Code ::= '10000011'B
-- Network-initiated-GPRS-Detach       MM-Code ::= '10000100'B
-- Network-initiated-transfer-to-MS-not-reachable-for-paging
--                                     MM-Code ::= '10000101'B
--
-- If the MSC receives any other MM-code than the ones listed above for the
-- CS domain, then the MSC shall ignore that MM-code.
-- If the SGSN receives any other MM-code than the ones listed above for the
-- PS domain, then the SGSN shall ignore that MM-code.

```

```

T-CSI ::= SEQUENCE {
    t-BcsmCamelTDPDataList      T-BcsmCamelTDPDataList,
    extensionContainer          ExtensionContainer           OPTIONAL,
    ...,
    camelCapabilityHandling     [0] CamelCapabilityHandling  OPTIONAL,
    notificationToCSE           [1] NULL                       OPTIONAL,
    csi-Active                  [2] NULL                       OPTIONAL}
-- notificationToCSE and csi-Active shall not be present when VT-CSI/T-CSI is sent
-- to VLR/GMSC.
-- They may only be included in ATSI/ATM ack/NSDC message.

```

```

T-BcsmCamelTDPDataList ::= SEQUENCE SIZE (1..maxNumOfCamelTDPData) OF
T-BcsmCamelTDPData
--- T-BcsmCamelTDPDataList shall not contain more than one instance of
--- T-BcsmCamelTDPData containing the same value for t-BcsmTriggerDetectionPoint.
--- For CAMEL Phase 2, this means that only one instance of T-BcsmCamelTDPData is
allowed
--- with t-BcsmTriggerDetectionPoint being equal to DP12.
--- For CAMEL Phase 3, more TDP's are allowed.

```

```

T-BcsmCamelTDPData ::= SEQUENCE {
    t-BcsmTriggerDetectionPoint T-BcsmTriggerDetectionPoint,
    serviceKey                  ServiceKey,
    gsmSCF-Address              [0] ISDN-AddressString,
    defaultCallHandling         [1] DefaultCallHandling,
    extensionContainer          ExtensionContainer           OPTIONAL,
    ...}

```

```

T-BcsmTriggerDetectionPoint ::= ENUMERATED {
    termAttemptAuthorized (12),
    ... ,
    tBusy (13),
    tNoAnswer (14)}
-- exception handling:
-- For T-BcsmCamelTDPData sequences containing this parameter with any other
-- value than the ones listed above, the receiver shall ignore the whole
-- T-BcsmCamelTDPData sequence.

```

-- gprs location information retrieval types

```

SendRoutingInfoForGprsArg ::= SEQUENCE {
    imsi [0] IMSI,
    ggsn-Address [1] GSN-Address OPTIONAL,
    ggsn-Number [2] ISDN-AddressString,
    extensionContainer [3] ExtensionContainer OPTIONAL,
    ...}

```

```

SendRoutingInfoForGprsRes ::= SEQUENCE {
    sgsn-Address [0] GSN-Address,
    ggsn-Address [1] GSN-Address OPTIONAL,
    mobileNotReachableReason [2] AbsentSubscriberDiagnosticSM OPTIONAL,
    extensionContainer [3] ExtensionContainer OPTIONAL,
    ...}

```

-- failure report types

```

FailureReportArg ::= SEQUENCE {
    imsi [0] IMSI,
    ggsn-Number [1] ISDN-AddressString ,
    ggsn-Address [2] GSN-Address OPTIONAL,
    extensionContainer [3] ExtensionContainer OPTIONAL,
    ...}

```

```

FailureReportRes ::= SEQUENCE {
    ggsn-Address [0] GSN-Address OPTIONAL,
    extensionContainer [1] ExtensionContainer OPTIONAL,
    ...}

```

-- gprs notification types

```

NoteMsPresentForGprsArg ::= SEQUENCE {
    imsi [0] IMSI,
    sgsn-Address [1] GSN-Address,
    ggsn-Address [2] GSN-Address OPTIONAL,
    extensionContainer [3] ExtensionContainer OPTIONAL,
    ...}

```

```

NoteMsPresentForGprsRes ::= SEQUENCE {
    extensionContainer [0] ExtensionContainer OPTIONAL,
    ...}

```

-- fault recovery types

```

ResetArg ::= SEQUENCE {
    hlr-Number ISDN-AddressString,
    hlr-List HLR-List OPTIONAL,
    ...}

```

```

RestoreDataArg ::= SEQUENCE {
    imsi IMSI,
    lmsi LMSI OPTIONAL,
    extensionContainer ExtensionContainer OPTIONAL,
    ... ,
    vlr-Capability [6] VLR-Capability OPTIONAL }

```

```

RestoreDataRes ::= SEQUENCE {
    hlr-Number ISDN-AddressString,
    msNotReachable NULL OPTIONAL,
    extensionContainer ExtensionContainer OPTIONAL,
    ...}

```

-- VBS/VGCS types

```
VBSDataList ::= SEQUENCE SIZE (1..maxNumOfVBSGroupIds) OF
                VoiceBroadcastData
```

```
VGCSDataList ::= SEQUENCE SIZE (1..maxNumOfVGCSGroupIds) OF
                VoiceGroupCallData
```

```
maxNumOfVBSGroupIds INTEGER ::= 50
```

```
maxNumOfVGCSGroupIds INTEGER ::= 50
```

```
VoiceGroupCallData ::= SEQUENCE {
    groupId                GroupId,
    extensionContainer     ExtensionContainer OPTIONAL,
    ...}

```

```
VoiceBroadcastData ::= SEQUENCE {
    groupid                GroupId,
    broadcastInitEntitlement NULL,
    extensionContainer     ExtensionContainer OPTIONAL,
    ...}

```

```
GroupId ::= OCTET STRING (SIZE (3))
-- Refers to the Group Identification as specified in GSM TS 03.03
-- and 03.68/ 03.69
```

```
-- provide subscriber info types
```

```
ProvideSubscriberInfoArg ::= SEQUENCE {
    imsi      [0] IMSI,
    lmsi      [1] LMSI OPTIONAL,
    requestedInfo [2] RequestedInfo,
    extensionContainer [3] ExtensionContainer OPTIONAL,
    ...}

```

```
ProvideSubscriberInfoRes ::= SEQUENCE {
    subscriberInfo SubscriberInfo,
    extensionContainer ExtensionContainer OPTIONAL,
    ...}

```

```
SubscriberInfo ::= SEQUENCE {
    locationInformation [0] LocationInformation OPTIONAL,
    subscriberState [1] SubscriberState OPTIONAL,
    extensionContainer [2] ExtensionContainer OPTIONAL,
    ... ,
    locationInformationGPRS [3] LocationInformationGPRS OPTIONAL,
    ps-SubscriberState [4] PS-SubscriberState OPTIONAL}

```

```
-- locationInformation shall be present only in a response to a request for
-- information from the CS domain.
-- locationInformationGPRS shall be present only in a response to a request
-- for information from the PS domain.
-- subscriberState shall be present only in a response to a request for
-- information from the CS domain.
-- ps-Subscriber state shall be present only in a response to a request
-- for information from the PS domain.}
```

```
RequestedInfo ::= SEQUENCE {
    locationInformation [0] NULL OPTIONAL,
    subscriberState [1] NULL OPTIONAL,
    extensionContainer [2] ExtensionContainer OPTIONAL,
    ...,
    currentLocation [3] NULL OPTIONAL }
-- currentLocation shall not be present if locationInformation
-- is not present in the RequestedInfo parameter
```

```

LocationInformation ::= SEQUENCE {
    ageOfLocationInformation      AgeOfLocationInformation      OPTIONAL,
    geographicalInformation        [0] GeographicalInformation    OPTIONAL,
    vlr-number                    [1] ISDN-AddressString            OPTIONAL,
    locationNumber                [2] LocationNumber                OPTIONAL,
    cellGlobalIdOrServiceAreaIdOrLAI [3] CellGlobalIdOrServiceAreaIdOrLAI OPTIONAL,
    extensionContainer            [4] ExtensionContainer            OPTIONAL,
    . . . ,
    selectedLSA-Id               [5] LSAIdentity                OPTIONAL,
    msc-Number                   [6] ISDN-AddressString            OPTIONAL,
    geodeticInformation          [7] GeodeticInformation          OPTIONAL,
    currentLocationRetrieved      [8] NULL                      OPTIONAL,
    sai-Present                  [9] NULL                      OPTIONAL }
-- sai-Present indicates that the cellGlobalIdOrServiceAreaIdOrLAI parameter contains
-- a Service Area Identity.
-- currentLocationRetrieved shall be present
-- if the location information were retrieved after a successful paging.

```

```

LocationInformationGPRS ::= SEQUENCE {
    cellGlobalIdOrServiceAreaIdOrLAI [0] CellGlobalIdOrServiceAreaIdOrLAI OPTIONAL,
    routingAreaIdentity              [1] RAIdentity                OPTIONAL,
    geographicalInformation            [2] GeographicalInformation    OPTIONAL,
    sgsn-Number                      [3] ISDN-AddressString            OPTIONAL,
    selectedLSAIdentity              [4] LSAIdentity                OPTIONAL,
    extensionContainer                [5] ExtensionContainer            OPTIONAL,
    . . . ,
    sai-Present                      [6] NULL                      OPTIONAL,
    geodeticInformation              [7] GeodeticInformation          OPTIONAL,
    currentLocationRetrieved          [8] NULL                      OPTIONAL,
    ageOfLocationInformation          [9] AgeOfLocationInformation    OPTIONAL }
-- sai-Present indicates that the cellGlobalIdOrServiceAreaIdOrLAI parameter contains
-- a Service Area Identity.
-- currentLocationRetrieved shall be present if the location information
-- was retrieved after successful paging.

```

```

RAIdentity ::= OCTET STRING (SIZE (6))
-- Routing Area Identity is coded in accordance with 3GPP TS 29.060 [105].
-- It shall contain the value part defined in 3GPP TS 29.060 only. I.e. the 3GPP TS 29.060
-- type identifier octet shall not be included.

```

```

GeographicalInformation ::= OCTET STRING (SIZE (8))
-- Refers to geographical Information defined in 3GPP TS 23.032.
-- Only the description of an ellipsoid point with uncertainty circle
-- as specified in 3GPP TS 23.032 is allowed to be used
-- The internal structure according to 3GPP TS 23.032 is as follows:
--   Type of shape (ellipsoid point with uncertainty circle)      1 octet
--   Degrees of Latitude                                          3 octets
--   Degrees of Longitude                                         3 octets
--   Uncertainty code                                             1 octet

```

```

GeodeticInformation ::= OCTET STRING (SIZE (10))
-- Refers to Calling Geodetic Location defined in Q.763 (1999).
-- Only the description of an ellipsoid point with uncertainty circle
-- as specified in Q.763 (1999) is allowed to be used
-- The internal structure according to Q.763 (1999) is as follows:
--   Screening and presentation indicators                        1 octet
--   Type of shape (ellipsoid point with uncertainty circle)     1 octet
--   Degrees of Latitude                                         3 octets
--   Degrees of Longitude                                         3 octets
--   Uncertainty code                                           1 octet
--   Confidence                                                  1 octet

```

```

LocationNumber ::= OCTET STRING (SIZE (2..10))
-- the internal structure is defined in CCITT Rec Q.763

```

```

SubscriberState ::= CHOICE {
    assumedIdle                [0] NULL,
    camelBusy                  [1] NULL,
    netDetNotReachable         NotReachableReason,
    notProvidedFromVLR         [2] NULL}

```

```

PS-SubscriberState ::= CHOICE {
    notProvidedFromSGSN           [0] NULL,
    ps-Detached                   [1] NULL,
    ps-AttachedNotReachableForPaging [2] NULL,
    ps-AttachedReachableForPaging  [3] NULL,
    ps-ConnectedNotReachableForPaging [4] PDP-ContextInfoList,
    ps-ConnectedReachableForPaging  [5] PDP-ContextInfoList}

```

```

PDP-ContextInfoList ::= SEQUENCE SIZE (1..maxNumOfPDP-Contexts) OF
    PDP-ContextInfo

```

```

PDP-ContextInfo ::= SEQUENCE {
    pdp-ContextIdentifier           [0] ContextId,
    pdp-ContextActive               [1] NULL                                OPTIONAL,
    pdp-Type                       [2] PDP-Type,
    pdp-Address                    [3] PDP-Address                       OPTIONAL,
    apn-Subscribed                 [4] APN                                OPTIONAL,
    apn-InUse                      [5] APN                                OPTIONAL,
    nsapi                          [6] NSAPI                            OPTIONAL,
    transactionId                  [7] TransactionId                       OPTIONAL,
    teid-ForGnAndGp                [8] TEID                            OPTIONAL,
    teid-ForIu                     [9] TEID                            OPTIONAL,
    ggsn-Address                   [10] GSN-Address                       OPTIONAL,
    qos-Subscribed                 [11] Ext-QoS-Subscribed                 OPTIONAL,
    qos-Requested                  [12] Ext-QoS-Subscribed                 OPTIONAL,
    qos-Negotiated                 [13] Ext-QoS-Subscribed                 OPTIONAL,
    chargingId                    [14] GPRSChargingID                       OPTIONAL,
    chargingCharacteristics         [15] ChargingCharacteristics           OPTIONAL,
    rnc-Address                    [16] GSN-Address                       OPTIONAL,
    extensionContainer              [17] ExtensionContainer                 OPTIONAL,
    ...}

```

```

NSAPI ::= INTEGER (0..15)
-- This type is used to indicate the Network layer Service Access Point

```

```

TransactionId ::= OCTET STRING (SIZE (1..2))
-- This type carries the value part of the transaction identifier which is used in the
-- session management messages on the access interface. The encoding is defined in
-- 3GPP TS 24.008

```

```

TEID ::= OCTET STRING (SIZE (4))
-- This type carries the value part of the Tunnel Endpoint Identifier which is used to
-- distinguish between different tunnels between the same pair of entities which communicate
-- using the GPRS Tunnelling Protocol The encoding is defined in 3GPP TS 29.060.

```

```

GPRSChargingID ::= OCTET STRING (SIZE (4))
-- The Charging ID is a unique four octet value generated by the GGSN when
-- a PDP Context is activated. A Charging ID is generated for each activated context.
-- The encoding is defined in 3GPP TS 29.060.

```

```

NotReachableReason ::= ENUMERATED {
    msPurged (0),
    imsiDetached (1),
    restrictedArea (2),
    notRegistered (3)}

```

-- any time interrogation info types

```

AnyTimeInterrogationArg ::= SEQUENCE {
    subscriberIdentity             [0] SubscriberIdentity,
    requestedInfo                  [1] RequestedInfo,
    gsmSCF-Address                 [3] ISDN-AddressString,
    extensionContainer              [2] ExtensionContainer                 OPTIONAL,
    ...}

```

```

AnyTimeInterrogationRes ::= SEQUENCE {
    subscriberInfo                 SubscriberInfo,
    extensionContainer              ExtensionContainer                 OPTIONAL,
    ...}

```

-- any time information handling types



```

AnyTimeSubscriptionInterrogationArg ::= SEQUENCE {
    subscriberIdentity          [0] SubscriberIdentity,
    requestedSubscriptionInfo    [1] RequestedSubscriptionInfo,
    gsmSCF-Address              [2] ISDN-AddressString,
    extensionContainer           [3] ExtensionContainer           OPTIONAL,
    longFTN-Supported           [4] NULL                       OPTIONAL,
    ...}

```

```

AnyTimeSubscriptionInterrogationRes ::= SEQUENCE {
    callForwardingData          [1] CallForwardingData           OPTIONAL,
    callBarringData             [2] CallBarringData           OPTIONAL,
    odb-Info                    [3] ODB-Info                   OPTIONAL,
    camel-SubscriptionInfo       [4] CAMEL-SubscriptionInfo     OPTIONAL,
    supportedVLR-CAMEL-Phases    [5] SupportedCamelPhases      OPTIONAL,
    supportedSGSN-CAMEL-Phases  [6] SupportedCamelPhases      OPTIONAL,
    extensionContainer           [7] ExtensionContainer         OPTIONAL,
    ...}

```

```

RequestedSubscriptionInfo ::= SEQUENCE {
    requestedSS-Info            [1] SS-ForBS-Code              OPTIONAL,
    odb                        [2] NULL                       OPTIONAL,
    requestedCAMEL-SubscriptionInfo [3] RequestedCAMEL-SubscriptionInfo OPTIONAL,
    supportedVLR-CAMEL-Phases  [4] NULL                       OPTIONAL,
    supportedSGSN-CAMEL-Phases [5] NULL                       OPTIONAL,
    extensionContainer         [6] ExtensionContainer         OPTIONAL,
    ...,
    additionalRequestedCAMEL-SubscriptionInfo
                                [7] AdditionalRequestedCAMEL-SubscriptionInfo
                                    OPTIONAL }

```

```

RequestedCAMEL-SubscriptionInfo ::= ENUMERATED {
    o-csi          (0),
    t-csi          (1),
    vt-csi         (2),
    tif-csi        (3),
    gprs-csi       (4),
    mo-sms-csi     (5),
    ss-csi         (6),
    m-csi          (7),
    d-csi          (8)}

```

```

AdditionalRequestedCAMEL-SubscriptionInfo ::= ENUMERATED {
    mt-sms-csi     (0),
    mg-csi         (1),
    ...}
-- exception handling: unknown values shall be discarded by the receiver.

```

```

CallForwardingData ::= SEQUENCE {
    forwardingFeatureList      Ext-ForwFeatureList,
    notificationToCSE          NULL                       OPTIONAL,
    extensionContainer         [0] ExtensionContainer         OPTIONAL,
    ...}

```

```

CallBarringData ::= SEQUENCE {
    callBarringFeatureList     Ext-CallBarFeatureList,
    password                   Password                   OPTIONAL,
    wrongPasswordAttemptsCounter WrongPasswordAttemptsCounter OPTIONAL,
    notificationToCSE          NULL                       OPTIONAL,
    extensionContainer         ExtensionContainer         OPTIONAL,
    ...}

```

```

WrongPasswordAttemptsCounter ::= INTEGER (0..4)

```

```

ODB-Info ::= SEQUENCE {
    odb-Data                  ODB-Data,
    notificationToCSE         NULL                       OPTIONAL,
    extensionContainer         ExtensionContainer         OPTIONAL,
    ...}

```

```

CAMEL-SubscriptionInfo ::= SEQUENCE {
  o-CSI [0] O-CSI OPTIONAL,
  o-BcsmCamelTDP-CriteriaList [1] O-BcsmCamelTDPCriteriaList OPTIONAL,
  d-CSI [2] D-CSI OPTIONAL,
  t-CSI [3] T-CSI OPTIONAL,
  t-BCSM-CAMEL-TDP-CriteriaList [4] T-BCSM-CAMEL-TDP-CriteriaList OPTIONAL,
  vt-CSI [5] T-CSI OPTIONAL,
  vt-BCSM-CAMEL-TDP-CriteriaList [6] T-BCSM-CAMEL-TDP-CriteriaList OPTIONAL,
  tif-CSI [7] NULL OPTIONAL,
  tif-CSI-NotificationToCSE [8] NULL OPTIONAL,
  gprs-CSI [9] GPRS-CSI OPTIONAL,
  mo-sms-CSI [10] SMS-CSI OPTIONAL,
  ss-CSI [11] SS-CSI OPTIONAL,
  m-CSI [12] M-CSI OPTIONAL,
  extensionContainer [13] ExtensionContainer OPTIONAL,
  ...,
  specificCSIDeletedList [14] SpecificCSI-Withdraw OPTIONAL,
  mt-sms-CSI [15] SMS-CSI OPTIONAL,
  mt-smsCAMELTDP-CriteriaList [16] MT-smsCAMELTDP-CriteriaList OPTIONAL,
  mg-csi [17] MG-CSI OPTIONAL
}

```

```

AnyTimeModificationArg ::= SEQUENCE {
  subscriberIdentity [0] SubscriberIdentity,
  gsmSCF-Address [1] ISDN-AddressString,
  modificationRequestFor-CF-Info [2] ModificationRequestFor-CF-Info OPTIONAL,
  modificationRequestFor-CB-Info [3] ModificationRequestFor-CB-Info OPTIONAL,
  modificationRequestFor-CSI [4] ModificationRequestFor-CSI OPTIONAL,
  extensionContainer [5] ExtensionContainer OPTIONAL,
  longFTN-Supported [6] NULL OPTIONAL,
  ...,
  modificationRequestFor-ODB-data [7] ModificationRequestFor-ODB-data OPTIONAL
}

```

```

AnyTimeModificationRes ::= SEQUENCE {
  ss-InfoFor-CSE [0] Ext-SS-InfoFor-CSE OPTIONAL,
  camel-SubscriptionInfo [1] CAMEL-SubscriptionInfo OPTIONAL,
  extensionContainer [2] ExtensionContainer OPTIONAL,
  ...,
  odb-Info [3] ODB-Info OPTIONAL
}

```

```

ModificationRequestFor-CF-Info ::= SEQUENCE {
  ss-Code [0] SS-Code,
  basicService [1] Ext-BasicServiceCode OPTIONAL,
  ss-Status [2] Ext-SS-Status OPTIONAL,
  forwardedToNumber [3] AddressString OPTIONAL,
  forwardedToSubaddress [4] ISDN-SubaddressString OPTIONAL,
  noReplyConditionTime [5] Ext-NoRepCondTime OPTIONAL,
  modifyNotificationToCSE [6] ModificationInstruction OPTIONAL,
  extensionContainer [7] ExtensionContainer OPTIONAL,
  ...
}

```

```

ModificationRequestFor-CB-Info ::= SEQUENCE {
  ss-Code [0] SS-Code,
  basicService [1] Ext-BasicServiceCode OPTIONAL,
  ss-Status [2] Ext-SS-Status OPTIONAL,
  password [3] Password OPTIONAL,
  wrongPasswordAttemptsCounter [4] WrongPasswordAttemptsCounter OPTIONAL,
  modifyNotificationToCSE [5] ModificationInstruction OPTIONAL,
  extensionContainer [6] ExtensionContainer OPTIONAL,
  ...
}

```

```

ModificationRequestFor-ODB-data ::= SEQUENCE {
  odb-data [0] ODB-Data OPTIONAL,
  modifyNotificationToCSE [1] ModificationInstruction OPTIONAL,
  extensionContainer [2] ExtensionContainer OPTIONAL,
  ...
}

```

```

ModificationRequestFor-CSI ::= SEQUENCE {
  requestedCamel-SubscriptionInfo [0] RequestedCAMEL-SubscriptionInfo,
  modifyNotificationToCSE [1] ModificationInstruction OPTIONAL,
  modifyCSI-State [2] ModificationInstruction OPTIONAL,
  extensionContainer [3] ExtensionContainer OPTIONAL,
  ...,
  additionalRequestedCAMEL-SubscriptionInfo [4] AdditionalRequestedCAMEL-SubscriptionInfo OPTIONAL
}

```

```
ModificationInstruction ::= ENUMERATED {
    deactivate                (0),
    activate                  (1)}
```

-- subscriber data modification notification types

```
NoteSubscriberDataModifiedArg ::= SEQUENCE {
    imsi                IMSI,
    msisdn              ISDN-AddressString,
    forwardingInfoFor-CSE [0] Ext-ForwardingInfoFor-CSE    OPTIONAL,
    callBarringInfoFor-CSE [1] Ext-CallBarringInfoFor-CSE  OPTIONAL,
    odb-Info            [2] ODB-Info                      OPTIONAL,
    camel-SubscriptionInfo [3] CAMEL-SubscriptionInfo     OPTIONAL,
    allInformationSent  [4] NULL                          OPTIONAL,
    extensionContainer  ExtensionContainer                OPTIONAL,
    ...}
```

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

-- mobility management event notification info types

```
NoteMM-EventArg ::= SEQUENCE {
    serviceKey          ServiceKey,
    eventMet            [0] MM-Code,
    imsi                [1] IMSI,
    msisdn              [2] ISDN-AddressString,
    locationInformation [3] LocationInformation           OPTIONAL,
    supportedCAMELPhases [5] SupportedCamelPhases        OPTIONAL,
    extensionContainer  [6] ExtensionContainer            OPTIONAL,
    ...}
```

```
NoteMM-EventRes ::= SEQUENCE {
    extensionContainer  ExtensionContainer                OPTIONAL,
    ...}
```

```
Ext-SS-InfoFor-CSE ::= CHOICE {
    forwardingInfoFor-CSE [0] Ext-ForwardingInfoFor-CSE,
    callBarringInfoFor-CSE [1] Ext-CallBarringInfoFor-CSE
}
```

```
Ext-ForwardingInfoFor-CSE ::= SEQUENCE {
    ss-Code            [0] SS-Code,
    forwardingFeatureList [1] Ext-ForwFeatureList,
    notificationToCSE  [2] NULL                          OPTIONAL,
    extensionContainer  [3] ExtensionContainer            OPTIONAL,
    ...}
```

```
Ext-CallBarringInfoFor-CSE ::= SEQUENCE {
    ss-Code            [0] SS-Code,
    callBarringFeatureList [1] Ext-CallBarFeatureList,
    password           [2] Password                      OPTIONAL,
    wrongPasswordAttemptsCounter [3] WrongPasswordAttemptsCounter OPTIONAL,
    notificationToCSE  [4] NULL                          OPTIONAL,
    extensionContainer  [5] ExtensionContainer            OPTIONAL,
    ...}
```

END

## 17.7.2 Operation and maintenance data types

```
MAP-OM-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-OM-DataTypes (12) version7 (7)version8 (8)}
```

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

ActivateTraceModeArg,

```

    ActivateTraceModeRes,
    DeactivateTraceModeArg,
    DeactivateTraceModeRes
;

IMPORTS
    AddressString,
    IMSI
FROM MAP-CommonDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 (8)}

    ExtensionContainer
FROM MAP-ExtensionDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 (8)}

;

```

<b>ActivateTraceModeArg</b> ::= SEQUENCE {		
imsi	[0] IMSI	OPTIONAL,
traceReference	[1] TraceReference,	
traceType	[2] TraceType,	
omc-Id	[3] AddressString	OPTIONAL,
extensionContainer	[4] ExtensionContainer	OPTIONAL,
...}		

<b>TraceReference</b> ::= OCTET STRING (SIZE (1..2))
--

<b>TraceType</b> ::= INTEGER (0..255) <i>-- Trace types are fully defined in TS GSM 12.08.</i>
--

<b>ActivateTraceModeRes</b> ::= SEQUENCE {		
extensionContainer	[0] ExtensionContainer	OPTIONAL,
...}		

<b>DeactivateTraceModeArg</b> ::= SEQUENCE {		
imsi	[0] IMSI	OPTIONAL,
traceReference	[1] TraceReference,	
extensionContainer	[2] ExtensionContainer	OPTIONAL,
...}		

<b>DeactivateTraceModeRes</b> ::= SEQUENCE {		
extensionContainer	[0] ExtensionContainer	OPTIONAL,
...}		

END

### 17.7.3 Call handling data types

```

MAP-CH-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-CH-DataTypes (13) version7 (7)version8 (8)}

```

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

```

    SendRoutingInfoArg,
    SendRoutingInfoRes,
    ProvideRoamingNumberArg,
    ProvideRoamingNumberRes,
    ResumeCallHandlingArg,
    ResumeCallHandlingRes,
    NumberOfForwarding,
    SuppressionOfAnnouncement,
    CallReferenceNumber,
    ProvideSIWFSNumberArg,
    ProvideSIWFSNumberRes,

```

```

SIWFSSignallingModifyArg,
SIWFSSignallingModifyRes,
SetReportingStateArg,
SetReportingStateRes,
StatusReportArg,
StatusReportRes,
RemoteUserFreeArg,
RemoteUserFreeRes,
IST-AlertArg,
IST-AlertRes,
IST-CommandArg,
IST-CommandRes
;

```

IMPORTS

```

SubscriberInfo,
SupportedCamelPhases,
CUG-Interlock,
O-CSI,
D-CSI,
O-BcsmCamelTDPCriteriaList,
T-BCSM-CAMEL-TDP-CriteriaList,
IST-SupportIndicator,
IST-AlertTimerValue,
T-CSI

```

```

FROM MAP-MS-DataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  |  gsm-Network (1) modules (3) map-MS-DataTypes (11) version7 (7)version8 \(8\)

```

```

ForwardingOptions,
SS-List,
CCBS-Feature

```

```

FROM MAP-SS-DataTypes {
  |  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  |  gsm-Network (1) modules (3) map-SS-DataTypes (14) version7 (7)version8 \(8\)

```

```

ISDN-AddressString,
ISDN-SubaddressString,
FTN-AddressString,
ExternalSignalInfo,
Ext-ExternalSignalInfo,
IMSI,
LMSI,
Ext-BasicServiceCode,
AlertingPattern,
NAEA-PreferredCI

```

```

FROM MAP-CommonDataTypes {
  |  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  |  gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 \(8\)

```

```

ExtensionContainer

```

```

FROM MAP-ExtensionDataTypes {
  |  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  |  gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 \(8\)
;

```

<b>CUG-CheckInfo</b> ::= SEQUENCE {		
cug-Interlock	CUG-Interlock,	
cug-OutgoingAccess	NULL	OPTIONAL,
extensionContainer	ExtensionContainer	OPTIONAL,
...		

<b>NumberOfForwarding</b> ::= INTEGER (1..5)
--

```

SendRoutingInfoArg ::= SEQUENCE {
    msisdn [0] ISDN-AddressString,
    cug-CheckInfo [1] CUG-CheckInfo OPTIONAL,
    numberOfForwarding [2] NumberOfForwarding OPTIONAL,
    interrogationType [3] InterrogationType,
    or-Interrogation [4] NULL OPTIONAL,
    or-Capability [5] OR-Phase OPTIONAL,
    gmsc-OrGsmSCF-Address [6] ISDN-AddressString,
    callReferenceNumber [7] CallReferenceNumber OPTIONAL,
    forwardingReason [8] ForwardingReason OPTIONAL,
    basicServiceGroup [9] Ext-BasicServiceCode OPTIONAL,
    networkSignalInfo [10] ExternalSignalInfo OPTIONAL,
    camelInfo [11] CamelInfo OPTIONAL,
    suppressionOfAnnouncement [12] SuppressionOfAnnouncement OPTIONAL,
    extensionContainer [13] ExtensionContainer OPTIONAL,
    . . .
    alertingPattern [14] AlertingPattern OPTIONAL,
    ccbs-Call [15] NULL OPTIONAL,
    supportedCCBS-Phase [16] SupportedCCBS-Phase OPTIONAL,
    additionalSignalInfo [17] Ext-ExternalSignalInfo OPTIONAL,
    istSupportIndicator [18] IST-SupportIndicator OPTIONAL,
    pre-pagingSupported [19] NULL OPTIONAL,
    callDiversionTreatmentIndicator [20] CallDiversionTreatmentIndicator OPTIONAL,
    longFTN-Supported [21] NULL OPTIONAL,
    suppress-VT-CSI [22] NULL OPTIONAL,
    suppressIncomingCallBarring [23] NULL OPTIONAL,
    gsmSCF-InitiatedCall [24] NULL OPTIONAL
}
    
```

```

SuppressionOfAnnouncement ::= NULL
    
```

```

InterrogationType ::= ENUMERATED {
    basicCall (0),
    forwarding (1)}
    
```

```

OR-Phase ::= INTEGER (1..127)
    
```

```

CallReferenceNumber ::= OCTET STRING (SIZE (1..8))
    
```

```

ForwardingReason ::= ENUMERATED {
    notReachable (0),
    busy (1),
    noReply (2)}
    
```

```

SupportedCCBS-Phase ::= INTEGER (1..127)
-- exception handling:
-- Only value 1 is used.
-- Values in the ranges 2-127 are reserved for future use.
-- If received values 2-127 shall be mapped on to value 1.
    
```

```

CallDiversionTreatmentIndicator ::= OCTET STRING (SIZE(1))
-- callDiversionAllowed (xxxx xx01)
-- callDiversionNotAllowed (xxxx xx10)
-- network default is call diversion allowed
    
```

```

SendRoutingInfoRes ::= [3] SEQUENCE {
    imsi [9] IMSI OPTIONAL,
    -- IMSI must be present if SendRoutingInfoRes is not segmented.
    -- If the TC-Result-NL segmentation option is taken the IMSI must be
    -- present in one segmented transmission of SendRoutingInfoRes.
    extendedRoutingInfo ExtendedRoutingInfo OPTIONAL,
    cug-CheckInfo [3] CUG-CheckInfo OPTIONAL,
    cugSubscriptionFlag [6] NULL OPTIONAL,
    subscriberInfo [7] SubscriberInfo OPTIONAL,
    ss-List [1] SS-List OPTIONAL,
    basicService [5] Ext-BasicServiceCode OPTIONAL,
    forwardingInterrogationRequired [4] NULL OPTIONAL,
    vmsc-Address [2] ISDN-AddressString OPTIONAL,
    extensionContainer [0] ExtensionContainer OPTIONAL,
    ... ,
    naea-PreferredCI [10] NAEA-PreferredCI OPTIONAL,
    -- naea-PreferredCI is included at the discretion of the HLR operator.
    ccbs-Indicators [11] CCBS-Indicators OPTIONAL,
    msisdn [12] ISDN-AddressString OPTIONAL,
    numberPortabilityStatus [13] NumberPortabilityStatus OPTIONAL,
    istAlertTimer [14] IST-AlertTimerValue OPTIONAL,
    supportedCamelPhases [15] SupportedCamelPhases OPTIONAL
}
    
```

```

NumberPortabilityStatus ::= ENUMERATED {
    notKnownToBePorted (0),
    ownNumberPortedOut (1),
    foreignNumberPortedToForeignNetwork (2),
    ...}
    -- exception handling:
    -- reception of other values than the ones listed the receiver shall ignore the
    -- whole NumberPortabilityStatus
    
```

```

CCBS-Indicators ::= SEQUENCE {
    ccbs-Possible [0] NULL OPTIONAL,
    keepCCBS-CallIndicator [1] NULL OPTIONAL,
    extensionContainer [2] ExtensionContainer OPTIONAL,
    ...}
    
```

```

RoutingInfo ::= CHOICE {
    roamingNumber ISDN-AddressString,
    forwardingData ForwardingData}
    
```

```

ForwardingData ::= SEQUENCE {
    forwardedToNumber [5] ISDN-AddressString OPTIONAL,
    -- When this datatype is sent from an HLR which supports CAMEL Phase 2
    -- to a GMSC which supports CAMEL Phase 2 the GMSC shall not check the
    -- format of the number
    forwardedToSubaddress [4] ISDN-SubaddressString OPTIONAL,
    forwardingOptions [6] ForwardingOptions OPTIONAL,
    extensionContainer [7] ExtensionContainer OPTIONAL,
    ... ,
    longForwardedToNumber [8] FTN-AddressString OPTIONAL}
    
```

```

ProvideRoamingNumberArg ::= SEQUENCE {
    imsi [0] IMSI,
    msc-Number [1] ISDN-AddressString,
    msisdn [2] ISDN-AddressString OPTIONAL,
    lmsi [4] LMSI OPTIONAL,
    gsm-BearerCapability [5] ExternalSignalInfo OPTIONAL,
    networkSignalInfo [6] ExternalSignalInfo OPTIONAL,
    suppressionOfAnnouncement [7] SuppressionOfAnnouncement OPTIONAL,
    gmsc-Address [8] ISDN-AddressString OPTIONAL,
    callReferenceNumber [9] CallReferenceNumber OPTIONAL,
    or-Interrogation [10] NULL OPTIONAL,
    extensionContainer [11] ExtensionContainer OPTIONAL,
    ... ,
    alertingPattern [12] AlertingPattern OPTIONAL,
    ccbs-Call [13] NULL OPTIONAL,
    supportedCamelPhasesInGMSC [15] SupportedCamelPhases OPTIONAL,
    additionalSignalInfo [14] Ext-ExternalSignalInfo OPTIONAL,
    orNotSupportedInGMSC [16] NULL OPTIONAL,
    pre-pagingSupported [17] NULL OPTIONAL,
    longFTN-Supported [18] NULL OPTIONAL,
    suppress-VT-CSI [19] NULL OPTIONAL
}
    
```

<b>ProvideRoamingNumberRes</b> ::= SEQUENCE {	roamingNumber	ISDN-AddressString,	
extensionContainer		ExtensionContainer	OPTIONAL,
...}			
<b>ResumeCallHandlingArg</b> ::= SEQUENCE {	callReferenceNumber	[0] CallReferenceNumber	OPTIONAL,
basicServiceGroup	[1] Ext-BasicServiceCode		OPTIONAL,
forwardingData	[2] ForwardingData		OPTIONAL,
imsi	[3] IMSI		OPTIONAL,
cug-CheckInfo	[4] CUG-CheckInfo		OPTIONAL,
o-CSI	[5] O-CSI		OPTIONAL,
extensionContainer	[7] ExtensionContainer		OPTIONAL,
ccbs-Possible	[8] NULL		OPTIONAL,
msisdn	[9] ISDN-AddressString		OPTIONAL,
uu-Data	[10] UU-Data		OPTIONAL,
allInformationSent	[11] NULL		OPTIONAL,
...,			
d-csi	[12] D-CSI		OPTIONAL}
<b>UU-Data</b> ::= SEQUENCE {	uuIndicator	[0] UUIndicator	OPTIONAL,
uui	[1] UUI		OPTIONAL,
uusCFInteraction	[2] NULL		OPTIONAL,
extensionContainer	[3] ExtensionContainer		OPTIONAL,
...}			
<b>UUIndicator</b> ::= OCTET STRING (SIZE (1))	<i>-- Octets are coded according to ETS 300 356</i>		
<b>UUI</b> ::= OCTET STRING (SIZE (1..131))	<i>-- Octets are coded according to ETS 300 356</i>		
<b>ResumeCallHandlingRes</b> ::= SEQUENCE {	extensionContainer	ExtensionContainer	OPTIONAL,
...}			
<b>CamelInfo</b> ::= SEQUENCE {	supportedCamelPhases	SupportedCamelPhases,	
suppress-T-CSI	NULL		OPTIONAL,
extensionContainer	ExtensionContainer		OPTIONAL,
...}			
<b>ExtendedRoutingInfo</b> ::= CHOICE {	routingInfo	RoutingInfo,	
camelRoutingInfo	[8] CamelRoutingInfo}		
<b>CamelRoutingInfo</b> ::= SEQUENCE {	forwardingData	ForwardingData	OPTIONAL,
gmscCamelSubscriptionInfo	[0] GmscCamelSubscriptionInfo,		
extensionContainer	[1] ExtensionContainer		OPTIONAL,
...}			
<b>GmscCamelSubscriptionInfo</b> ::= SEQUENCE {	t-CSI	[0] T-CSI OPTIONAL,	
o-CSI	[1] O-CSI OPTIONAL,		
extensionContainer	[2] ExtensionContainer		OPTIONAL,
...,			
o-BcsmCamelTDP-CriteriaList	[3] O-BcsmCamelTDPCriteriaList		OPTIONAL,
t-BCSM-CAMEL-TDP-CriteriaList	[4] T-BCSM-CAMEL-TDP-CriteriaList		OPTIONAL,
d-csi	[5] D-CSI		OPTIONAL}
<b>ProvideSIWFSNumberArg</b> ::= SEQUENCE {	gsm-BearerCapability	[0] ExternalSignalInfo,	
isdn-BearerCapability	[1] ExternalSignalInfo,		
call-Direction	[2] CallDirection,		
b-Subscriber-Address	[3] ISDN-AddressString,		
chosenChannel	[4] ExternalSignalInfo,		
lowerLayerCompatibility	[5] ExternalSignalInfo		OPTIONAL,
highLayerCompatibility	[6] ExternalSignalInfo		OPTIONAL,
extensionContainer	[7] ExtensionContainer		OPTIONAL,
...}			



```

CallDirection ::= OCTET STRING (SIZE (1))
  -- OCTET 1

  -- bit 1 (direction of call)
  -- 0 Mobile Originated Call (MOC)
  -- 1 Mobile Terminated Call (MTC)

```

```

ProvideSIWFSNumberRes ::= SEQUENCE {
  siWFSNumber          [0] ISDN-AddressString,
  extensionContainer   [1] ExtensionContainer   OPTIONAL,
  ...}

```

```

SIWFSSignallingModifyArg ::= SEQUENCE {
  channelType          [0] ExternalSignalInfo   OPTIONAL,
  chosenChannel        [1] ExternalSignalInfo   OPTIONAL,
  extensionContainer   [2] ExtensionContainer   OPTIONAL,
  ...}

```

```

SIWFSSignallingModifyRes ::= SEQUENCE {
  chosenChannel        [0] ExternalSignalInfo   OPTIONAL,
  extensionContainer   [1] ExtensionContainer   OPTIONAL,
  ...}

```

```

SetReportingStateArg ::= SEQUENCE {
  imsi                 [0] IMSI                 OPTIONAL,
  lmsi                 [1] LMSI                 OPTIONAL,
  ccbs-Monitoring     [2] ReportingState       OPTIONAL,
  extensionContainer   [3] ExtensionContainer   OPTIONAL,
  ...}

```

```

ReportingState ::= ENUMERATED {
  stopMonitoring      (0),
  startMonitoring     (1),
  ...}
  -- exception handling:
  -- reception of values 2-10 shall be mapped to 'stopMonitoring'
  -- reception of values > 10 shall be mapped to 'startMonitoring'

```

```

SetReportingStateRes ::= SEQUENCE{
  ccbs-SubscriberStatus [0] CCBS-SubscriberStatus OPTIONAL,
  extensionContainer     [1] ExtensionContainer   OPTIONAL,
  ...}

```

```

CCBS-SubscriberStatus ::= ENUMERATED {
  ccbsNotIdle         (0),
  ccbsIdle             (1),
  ccbsNotReachable    (2),
  ...}
  -- exception handling:
  -- reception of values 3-10 shall be mapped to 'ccbsNotIdle'
  -- reception of values 11-20 shall be mapped to 'ccbsIdle'
  -- reception of values > 20 shall be mapped to 'ccbsNotReachable'

```

```

StatusReportArg ::= SEQUENCE{
  imsi                 [0] IMSI,
  eventReportData      [1] EventReportData     OPTIONAL,
  callReportdata       [2] CallReportData      OPTIONAL,
  extensionContainer    [3] ExtensionContainer   OPTIONAL,
  ...}

```

```

EventReportData ::= SEQUENCE{
  ccbs-SubscriberStatus [0] CCBS-SubscriberStatus OPTIONAL,
  extensionContainer     [1] ExtensionContainer   OPTIONAL,
  ...}

```

```

CallReportData ::= SEQUENCE{
  monitoringMode       [0] MonitoringMode      OPTIONAL,
  callOutcome          [1] CallOutcome         OPTIONAL,
  extensionContainer    [2] ExtensionContainer   OPTIONAL,
  ...}

```

```
MonitoringMode ::= ENUMERATED {
    a-side (0),
    b-side (1),
    ...}
-- exception handling:
-- reception of values 2-10 shall be mapped 'a-side'
-- reception of values > 10 shall be mapped to 'b-side'
```

```
CallOutcome ::= ENUMERATED {
    success (0),
    failure (1),
    busy (2),
    ...}
-- exception handling:
-- reception of values 3-10 shall be mapped to 'success'
-- reception of values 11-20 shall be mapped to 'failure'
-- reception of values > 20 shall be mapped to 'busy'
```

```
StatusReportRes ::= SEQUENCE {
    extensionContainer [0] ExtensionContainer OPTIONAL,
    ...}
```

```
RemoteUserFreeArg ::= SEQUENCE{
    imsi [0] IMSI,
    callInfo [1] ExternalSignalInfo,
    ccbs-Feature [2] CCBS-Feature,
    translatedB-Number [3] ISDN-AddressString,
    replaceB-Number [4] NULL OPTIONAL,
    alertingPattern [5] AlertingPattern OPTIONAL,
    extensionContainer [6] ExtensionContainer OPTIONAL,
    ...}
```

```
RemoteUserFreeRes ::= SEQUENCE{
    ruf-Outcome [0] RUF-Outcome,
    extensionContainer [1] ExtensionContainer OPTIONAL,
    ...}
```

```
RUF-Outcome ::= ENUMERATED{
    accepted (0),
    rejected (1),
    noResponseFromFreeMS (2), -- T4 Expiry
    noResponseFromBusyMS (3), -- T10 Expiry
    udubFromFreeMS (4),
    udubFromBusyMS (5),
    ...}
-- exception handling:
-- reception of values 6-20 shall be mapped to 'accepted'
-- reception of values 21-30 shall be mapped to 'rejected'
-- reception of values 31-40 shall be mapped to 'noResponseFromFreeMS'
-- reception of values 41-50 shall be mapped to 'noResponseFromBusyMS'
-- reception of values 51-60 shall be mapped to 'udubFromFreeMS'
-- reception of values > 60 shall be mapped to 'udubFromBusyMS'
```

```
IST-AlertArg ::= SEQUENCE{
    imsi [0] IMSI,
    extensionContainer [1] ExtensionContainer OPTIONAL,
    ...}
```

```
IST-AlertRes ::= SEQUENCE{
    istAlertTimer [0] IST-AlertTimerValue OPTIONAL,
    istInformationWithdraw [1] NULL OPTIONAL,
    callTerminationIndicator [2] CallTerminationIndicator OPTIONAL,
    extensionContainer [3] ExtensionContainer OPTIONAL,
    ...}
```

```
IST-CommandArg ::= SEQUENCE{
    imsi [0] IMSI,
    extensionContainer [1] ExtensionContainer OPTIONAL,
    ...}
```

```
IST-CommandRes ::= SEQUENCE{
    extensionContainer ExtensionContainer OPTIONAL,
    ...}
```

```

CallTerminationIndicator ::= ENUMERATED {
    terminateCallActivityReferred      (0),
    terminateAllCallActivities         (1),
    ...}
    -- exception handling:
    -- reception of values 2-10 shall be mapped to ' terminateCallActivityReferred '
    -- reception of values > 10 shall be mapped to ' terminateAllCallActivities '

    -- In MSCs not supporting linkage of all call activities, any value received shall
    -- be interpreted as ' terminateCallActivityReferred '

```

END

## 17.7.4 Supplementary service data types

```

MAP-SS-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-SS-DataTypes (14) version7 (7)version8 \(8\)}

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS
    RegisterSS-Arg,
    SS-Info,
    SS-Status,
    SS-SubscriptionOption,
    SS-ForBS-Code,
    InterrogateSS-Res,
    USSD-Arg,
    USSD-Res,
    USSD-DataCodingScheme,
    USSD-String,
    Password,
    GuidanceInfo,
    SS-List,
    SS-InfoList,
    OverrideCategory,
    CliRestrictionOption,
    NoReplyConditionTime,
    ForwardingOptions,
    maxNumOfSS,
    SS-Data,
    SS-InvocationNotificationArg,
    SS-InvocationNotificationRes,
    CCBS-Feature,
    RegisterCC-EntryArg,
    RegisterCC-EntryRes,
    EraseCC-EntryArg,
    EraseCC-EntryRes
;

IMPORTS
    AddressString,
    ISDN-AddressString,
    ISDN-SubaddressString,
    FTN-AddressString,
    IMSI,
    BasicServiceCode,
    AlertingPattern,
    EMLPP-Priority,
    MaxMC-Bearers,
    MC-Bearers,
    ExternalSignalInfo

FROM MAP-CommonDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 \(8\)}

    ExtensionContainer
FROM MAP-ExtensionDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 \(8\)}

```

```

SS-Code
FROM MAP-SS-Code {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  |  gsm-Network (1) modules (3) map-SS-Code (15) version7 (7)version8 (8)
  ;

```

<b>RegisterSS-Arg</b> ::= SEQUENCE {		
ss-Code	SS-Code,	
basicService	BasicServiceCode	OPTIONAL,
forwardedToNumber	[4] AddressString	OPTIONAL,
forwardedToSubaddress	[6] ISDN-SubaddressString	OPTIONAL,
noReplyConditionTime	[5] NoReplyConditionTime	OPTIONAL,
...		
defaultPriority	[7] EMLPP-Priority	OPTIONAL,
nbrUser	[8] MC-Bearers	OPTIONAL,
longFTN-Supported	[9] NULL	OPTIONAL }

<b>NoReplyConditionTime</b> ::= INTEGER (5..30)
---

<b>SS-Info</b> ::= CHOICE {	
forwardingInfo	[0] ForwardingInfo,
callBarringInfo	[1] CallBarringInfo,
ss-Data	[3] SS-Data}

<b>ForwardingInfo</b> ::= SEQUENCE {		
ss-Code	SS-Code	OPTIONAL,
forwardingFeatureList	ForwardingFeatureList,	
...		

<b>ForwardingFeatureList</b> ::=	
SEQUENCE SIZE (1..maxNumOfBasicServiceGroups) OF	ForwardingFeature

<b>ForwardingFeature</b> ::= SEQUENCE {		
basicService	BasicServiceCode	OPTIONAL,
ss-Status	[4] SS-Status	OPTIONAL,
forwardedToNumber	[5] ISDN-AddressString	OPTIONAL,
forwardedToSubaddress	[8] ISDN-SubaddressString	OPTIONAL,
forwardingOptions	[6] ForwardingOptions	OPTIONAL,
noReplyConditionTime	[7] NoReplyConditionTime	OPTIONAL,
...		
longForwardedToNumber	[9] FTN-AddressString	OPTIONAL }

<b>SS-Status</b> ::= OCTET STRING (SIZE (1))	
-- bits 8765: 0000 (unused)	
-- bits 4321: Used to convey the "P bit", "R bit", "A bit" and "Q bit",	
-- representing supplementary service state information	
-- as defined in TS 3GPP TS 23.011 [22]	
-- bit 4: "Q bit"	
-- bit 3: "P bit"	
-- bit 2: "R bit"	
-- bit 1: "A bit"	

```

ForwardingOptions ::= OCTET STRING (SIZE (1))

-- bit 8: notification to forwarding party
-- 0 no notification
-- 1 notification

-- bit 7: redirecting presentation
-- 0 no presentation
-- 1 presentation

-- bit 6: notification to calling party
-- 0 no notification
-- 1 notification

-- bit 5: 0 (unused)

-- bits 43: forwarding reason
-- 00 ms not reachable
-- 01 ms busy
-- 10 no reply
-- 11 unconditional when used in a SRI Result,
-- or call deflection when used in a RCH Argument
-- bits 21: 00 (unused)
    
```

```

CallBarringInfo ::= SEQUENCE {
    ss-Code SS-Code OPTIONAL,
    callBarringFeatureList CallBarringFeatureList,
    ...}
    
```

```

CallBarringFeatureList ::= SEQUENCE SIZE (1..maxNumOfBasicServiceGroups) OF
    CallBarringFeature
    
```

```

CallBarringFeature ::= SEQUENCE {
    basicService BasicServiceCode OPTIONAL,
    ss-Status [4] SS-Status OPTIONAL,
    ...}
    
```

```

SS-Data ::= SEQUENCE {
    ss-Code SS-Code OPTIONAL,
    ss-Status [4] SS-Status OPTIONAL,
    ss-SubscriptionOption SS-SubscriptionOption OPTIONAL,
    basicServiceGroupList BasicServiceGroupList OPTIONAL,
    ...,
    defaultPriority EMLPP-Priority OPTIONAL,
    nbrUser [5] MC-Bearers OPTIONAL
}
    
```

```

SS-SubscriptionOption ::= CHOICE {
    cliRestrictionOption [2] CliRestrictionOption,
    overrideCategory [1] OverrideCategory}
    
```

```

CliRestrictionOption ::= ENUMERATED {
    permanent (0),
    temporaryDefaultRestricted (1),
    temporaryDefaultAllowed (2)}
    
```

```

OverrideCategory ::= ENUMERATED {
    overrideEnabled (0),
    overrideDisabled (1)}
    
```

```

SS-ForBS-Code ::= SEQUENCE {
    ss-Code SS-Code,
    basicService BasicServiceCode OPTIONAL,
    ...,
    longFTN-Supported [4] NULL OPTIONAL }
    
```

```

GenericServiceInfo ::= SEQUENCE {
    ss-Status SS-Status,
    cliRestrictionOption CliRestrictionOption OPTIONAL,
    ...,
    maximumEntitledPriority [0] EMLPP-Priority OPTIONAL,
    defaultPriority [1] EMLPP-Priority OPTIONAL,
    ccbs-FeatureList [2] CCBS-FeatureList OPTIONAL,
    nbrSB [3] MaxMC-Bearers OPTIONAL,
    nbrUser [4] MC-Bearers OPTIONAL,
    nbrSN [5] MC-Bearers OPTIONAL }
    
```

<b>CCBS-FeatureList</b> ::= SEQUENCE SIZE (1..maxNumOfCCBS-Requests) OF CCBS-Feature
<b>maxNumOfCCBS-Requests</b> INTEGER ::= 5
<b>CCBS-Feature</b> ::= SEQUENCE { ccbs-Index [0] CCBS-Index OPTIONAL, b-subscriberNumber [1] ISDN-AddressString OPTIONAL, b-subscriberSubaddress [2] ISDN-SubaddressString OPTIONAL, basicServiceGroup [3] BasicServiceCode OPTIONAL, ...}
<b>CCBS-Index</b> ::= INTEGER (1..maxNumOfCCBS-Requests)
<b>InterrogateSS-Res</b> ::= CHOICE { ss-Status [0] SS-Status, basicServiceGroupList [2] BasicServiceGroupList, forwardingFeatureList [3] ForwardingFeatureList, genericServiceInfo [4] GenericServiceInfo }
<b>USSD-Arg</b> ::= SEQUENCE { ussd-DataCodingScheme USSD-DataCodingScheme, ussd-String USSD-String, ... , alertingPattern AlertingPattern OPTIONAL, msisdn [0] ISDN-AddressString OPTIONAL }
<b>USSD-Res</b> ::= SEQUENCE { ussd-DataCodingScheme USSD-DataCodingScheme, ussd-String USSD-String, ...}
<b>USSD-DataCodingScheme</b> ::= OCTET STRING (SIZE (1)) -- The structure of the USSD-DataCodingScheme is defined by -- the Cell Broadcast Data Coding Scheme as described in -- TS 3GPP TS 23.038 [25]
<b>USSD-String</b> ::= OCTET STRING (SIZE (1..maxUSSD-StringLength)) -- The structure of the contents of the USSD-String is dependent -- on the USSD-DataCodingScheme as described in TS 3GPP TS 23.038 [25].
<b>maxUSSD-StringLength</b> INTEGER ::= 160
<b>Password</b> ::= NumericString (FROM ("0" "1" "2" "3" "4" "5" "6" "7" "8" "9")) (SIZE (4))
<b>GuidanceInfo</b> ::= ENUMERATED { enterPW (0), enterNewPW (1), enterNewPW-Again (2)} -- How this information is really delivered to the subscriber -- (display, announcement, ...) is not part of this -- specification.
<b>SS-List</b> ::= SEQUENCE SIZE (1..maxNumOfSS) OF SS-Code
<b>maxNumOfSS</b> INTEGER ::= 30
<b>SS-InfoList</b> ::= SEQUENCE SIZE (1..maxNumOfSS) OF SS-Info
<b>BasicServiceGroupList</b> ::= SEQUENCE SIZE (1..maxNumOfBasicServiceGroups) OF BasicServiceCode
<b>maxNumOfBasicServiceGroups</b> INTEGER ::= 13

```

SS-InvocationNotificationArg ::= SEQUENCE {
    imsi [0] IMSI,
    msisdn [1] ISDN-AddressString,
    ss-Event [2] SS-Code,
    -- The following SS-Code values are allowed :
    -- ect SS-Code ::= '00110001'B
    -- multiPTY SS-Code ::= '01010001'B
    -- cd SS-Code ::= '00100100'B
    -- ccbs SS-Code ::= '01000100'B
    ss-EventSpecification [3] SS-EventSpecification OPTIONAL,
    extensionContainer [4] ExtensionContainer OPTIONAL,
    ...,
    b-subscriberNumber [5] ISDN-AddressString OPTIONAL,
    ccbs-RequestState [6] CCBS-RequestState OPTIONAL
}

```

```

CCBS-RequestState ::= ENUMERATED {
    request (0),
    recall (1),
    active (2),
    completed (3),
    suspended (4),
    frozen (5),
    deleted (6)
}

```

```

SS-InvocationNotificationRes ::= SEQUENCE {
    extensionContainer ExtensionContainer OPTIONAL,
    ...
}

```

```

SS-EventSpecification ::= SEQUENCE SIZE (1..maxEventSpecification) OF
    AddressString

```

```

maxEventSpecification INTEGER ::= 2

```

```

RegisterCC-EntryArg ::= SEQUENCE {
    ss-Code [0] SS-Code,
    ccbs-Data [1] CCBS-Data OPTIONAL,
    ...
}

```

```

CCBS-Data ::= SEQUENCE {
    ccbs-Feature [0] CCBS-Feature,
    translatedB-Number [1] ISDN-AddressString,
    serviceIndicator [2] ServiceIndicator OPTIONAL,
    callInfo [3] ExternalSignalInfo,
    networkSignalInfo [4] ExternalSignalInfo,
    ...
}

```

```

ServiceIndicator ::= BIT STRING {
    clir-invoked (0),
    camel-invoked (1)} (SIZE(2..32))
    -- exception handling:
    -- bits 2 to 31 shall be ignored if received and not understood

```

```

RegisterCC-EntryRes ::= SEQUENCE {
    ccbs-Feature [0] CCBS-Feature OPTIONAL,
    ...
}

```

```

EraseCC-EntryArg ::= SEQUENCE {
    ss-Code [0] SS-Code,
    ccbs-Index [1] CCBS-Index OPTIONAL,
    ...
}

```

```

EraseCC-EntryRes ::= SEQUENCE {
    ss-Code [0] SS-Code,
    ss-Status [1] SS-Status OPTIONAL,
    ...
}

```

END

## 17.7.5 Supplementary service codes

```

MAP-SS-Code {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-SS-Code (15) version7 (7)version8 (8)}

```

DEFINITIONS

::=

BEGIN

```

SS-Code ::= OCTET STRING (SIZE (1))
    -- This type is used to represent the code identifying a single
    -- supplementary service, a group of supplementary services, or
    -- all supplementary services. The services and abbreviations
    -- used are defined in TS 3GPP TS 22.004 [5]. The internal structure is
    -- defined as follows:
    --
    -- bits 87654321: group (bits 8765), and specific service
    -- (bits 4321)
    
```

```

allSS SS-Code ::= '00000000'B
    -- reserved for possible future use
    -- all SS
    
```

```

allLineIdentificationSS SS-Code ::= '00010000'B
    -- reserved for possible future use
    -- all line identification SS
clip SS-Code ::= '00010001'B
    -- calling line identification presentation
clir SS-Code ::= '00010010'B
    -- calling line identification restriction
colp SS-Code ::= '00010011'B
    -- connected line identification presentation
colr SS-Code ::= '00010100'B
    -- connected line identification restriction
mci SS-Code ::= '00010101'B
    -- reserved for possible future use
    -- malicious call identification

allNameIdentificationSS SS-Code ::= '00011000'B
    -- all name identification SS
cnap SS-Code ::= '00011001'B
    -- calling name presentation

    -- SS-Codes '00011010'B to '00011111'B are reserved for future
    -- NameIdentification Supplementary Service use.
    
```

```

allForwardingSS SS-Code ::= '00100000'B
    -- all forwarding SS
cfu SS-Code ::= '00100001'B
    -- call forwarding unconditional
allCondForwardingSS SS-Code ::= '00101000'B
    -- all conditional forwarding SS
cfb SS-Code ::= '00101001'B
    -- call forwarding on mobile subscriber busy
cfnry SS-Code ::= '00101010'B
    -- call forwarding on no reply
cfnrc SS-Code ::= '00101011'B
    -- call forwarding on mobile subscriber not reachable
cd SS-Code ::= '00100100'B
    -- call deflection
    
```

```

allCallOfferingSS SS-Code ::= '00110000'B
    -- reserved for possible future use
    -- all call offering SS includes also all forwarding SS
ect SS-Code ::= '00110001'B
    -- explicit call transfer
mah SS-Code ::= '00110010'B
    -- reserved for possible future use
    -- mobile access hunting
    
```



<b>allCallCompletionSS</b>	SS-Code ::= '01000000'B
-- reserved for possible future use	
-- all Call completion SS	
<b>cw</b>	SS-Code ::= '01000001'B
-- call waiting	
<b>hold</b>	SS-Code ::= '01000010'B
-- call hold	
<b>ccbs-A</b>	SS-Code ::= '01000011'B
-- completion of call to busy subscribers, originating side	
<b>ccbs-B</b>	SS-Code ::= '01000100'B
-- completion of call to busy subscribers, destination side	
-- this SS-Code is used only in InsertSubscriberData and DeleteSubscriberData	
<b>mc</b>	SS-Code ::= '01000101'B
-- multical	

<b>allMultiPartySS</b>	SS-Code ::= '01010000'B
-- reserved for possible future use	
-- all multiparty SS	
<b>multiPTY</b>	SS-Code ::= '01010001'B
-- multiparty	

<b>allCommunityOfInterest-SS</b>	SS-Code ::= '01100000'B
-- reserved for possible future use	
-- all community of interest SS	
<b>cug</b>	SS-Code ::= '01100001'B
-- closed user group	

<b>allChargingSS</b>	SS-Code ::= '01110000'B
-- reserved for possible future use	
-- all charging SS	
<b>aoci</b>	SS-Code ::= '01110001'B
-- advice of charge information	
<b>aocc</b>	SS-Code ::= '01110010'B
-- advice of charge charging	

<b>allAdditionalInfoTransferSS</b>	SS-Code ::= '10000000'B
-- reserved for possible future use	
-- all additional information transfer SS	
<b>uus1</b>	SS-Code ::= '10000001'B
-- UUS1 user-to-user signalling	
<b>uus2</b>	SS-Code ::= '10000010'B
-- UUS2 user-to-user signalling	
<b>uus3</b>	SS-Code ::= '10000011'B
-- UUS3 user-to-user signalling	

<b>allBarringSS</b>	SS-Code ::= '10010000'B
-- all barring SS	
<b>barringOfOutgoingCalls</b>	SS-Code ::= '10010001'B
-- barring of outgoing calls	
<b>baoc</b>	SS-Code ::= '10010010'B
-- barring of all outgoing calls	
<b>boic</b>	SS-Code ::= '10010011'B
-- barring of outgoing international calls	
<b>boicExHC</b>	SS-Code ::= '10010100'B
-- barring of outgoing international calls except those directed to the home PLMN	
<b>barringOfIncomingCalls</b>	SS-Code ::= '10011001'B
-- barring of incoming calls	
<b>baic</b>	SS-Code ::= '10011010'B
-- barring of all incoming calls	
<b>bicRoam</b>	SS-Code ::= '10011011'B
-- barring of incoming calls when roaming outside home PLMN	
-- Country	

<b>allPLMN-specificSS</b>	SS-Code ::= '11110000'B
<b>plmn-specificSS-1</b>	SS-Code ::= '11110001'B
<b>plmn-specificSS-2</b>	SS-Code ::= '11110010'B
<b>plmn-specificSS-3</b>	SS-Code ::= '11110011'B
<b>plmn-specificSS-4</b>	SS-Code ::= '11110100'B
<b>plmn-specificSS-5</b>	SS-Code ::= '11110101'B
<b>plmn-specificSS-6</b>	SS-Code ::= '11110110'B
<b>plmn-specificSS-7</b>	SS-Code ::= '11110111'B
<b>plmn-specificSS-8</b>	SS-Code ::= '11111000'B
<b>plmn-specificSS-9</b>	SS-Code ::= '11111001'B
<b>plmn-specificSS-A</b>	SS-Code ::= '11111010'B
<b>plmn-specificSS-B</b>	SS-Code ::= '11111011'B
<b>plmn-specificSS-C</b>	SS-Code ::= '11111100'B
<b>plmn-specificSS-D</b>	SS-Code ::= '11111101'B
<b>plmn-specificSS-E</b>	SS-Code ::= '11111110'B
<b>plmn-specificSS-F</b>	SS-Code ::= '11111111'B

<b>allCallPrioritySS</b>	SS-Code ::= '10100000'B
-- reserved for possible future use	
-- all call priority SS	
<b>emlpp</b>	SS-Code ::= '10100001'B
-- enhanced Multilevel Precedence Pre-emption (EMLPP) service	

<b>allLCSPrivacyException</b>	SS-Code ::= '10110000'B
-- all LCS Privacy Exception Classes	
<b>universal</b>	SS-Code ::= '10110001'B
-- allow location by any LCS client	
<b>callrelated</b>	SS-Code ::= '10110010'B
-- allow location by any value added LCS client to which a call	
-- is established from the target MS	
<b>callunrelated</b>	SS-Code ::= '10110011'B
-- allow location by designated external value added LCS clients	
<b>plmoperator</b>	SS-Code ::= '10110100'B
-- allow location by designated PLMN operator LCS clients	

<b>allMOLR-SS</b>	SS-Code ::= '11000000'B
-- all Mobile Originating Location Request Classes	
<b>basicSelfLocation</b>	SS-Code ::= '11000001'B
-- allow an MS to request its own location	
<b>autonomousSelfLocation</b>	SS-Code ::= '11000010'B
-- allow an MS to perform self location without interaction	
-- with the PLMN for a predetermined period of time	
<b>transferToThirdParty</b>	SS-Code ::= '11000011'B
-- allow an MS to request transfer of its location to another LCS client	

END

## 17.7.6 Short message data types

```
MAP-SM-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-SM-DataTypes (16) version7 (7)version8 (8)}

```

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

```
RoutingInfoForSM-Arg,
RoutingInfoForSM-Res,
MO-ForwardSM-Arg,
MO-ForwardSM-Res,
MT-ForwardSM-Arg,
MT-ForwardSM-Res,
ReportSM-DeliveryStatusArg,
ReportSM-DeliveryStatusRes,
AlertServiceCentreArg,
InformServiceCentreArg,
ReadyForSM-Arg,
ReadyForSM-Res,
SM-DeliveryOutcome,
AlertReason,
Additional-Number
```

```

;

IMPORTS
  AddressString,
  ISDN-AddressString,
  SignalInfo,
  IMSI,
  LMSI
FROM MAP-CommonDataTypes {
  ccitt-identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 (8)}

  AbsentSubscriberDiagnosticSM
FROM MAP-ER-DataTypes {
  | ccitt-identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-ER-DataTypes (17) version7 (7)version8 (8)}

  ExtensionContainer
FROM MAP-ExtensionDataTypes {
  | ccitt-identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 (8)}
;

```

```

RoutingInfoForSM-Arg ::= SEQUENCE {
  msisdN                [0] ISDN-AddressString,
  sm-RP-PRI             [1] BOOLEAN,
  serviceCentreAddress  [2] AddressString,
  extensionContainer    [6] ExtensionContainer          OPTIONAL,
  ... ,
  gprsSupportIndicator [7] NULL                        OPTIONAL,
  -- gprsSupportIndicator is set only if the SMS-GMSC supports
  -- receiving of two numbers from the HLR
  sm-RP-MTI             [8] SM-RP-MTI                  OPTIONAL,
  sm-RP-SMEA           [9] SM-RP-SMEA                  OPTIONAL }

```

```

SM-RP-MTI ::= INTEGER (0..10)
  -- 0 SMS Deliver
  -- 1 SMS Status Report
  -- other values are reserved for future use and shall be discarded if
  -- received

```

```

SM-RP-SMEA ::= OCTET STRING (SIZE (1..12))
  -- this parameter contains an address field which is encoded
  -- as defined in 3GPP TS 23.140. An address field contains 3 elements :
  --   address-length
  --   type-of-address
  --   address-value

```

```

RoutingInfoForSM-Res ::= SEQUENCE {
  imsi                IMSI,
  locationInfoWithLMSI [0] LocationInfoWithLMSI,
  extensionContainer  [4] ExtensionContainer          OPTIONAL,
  ... }

```

```

LocationInfoWithLMSI ::= SEQUENCE {
  networkNode-Number [1] ISDN-AddressString,
  lmsi                LMSI                        OPTIONAL,
  extensionContainer  ExtensionContainer          OPTIONAL,
  ... ,
  gprsNodeIndicator [5] NULL                        OPTIONAL,
  -- gprsNodeIndicator is set only if the SGSN number is sent as the
  -- Network Node Number
  additional-Number [6] Additional-Number          OPTIONAL
  -- NetworkNode-number can be either msc-number or sgsn-number
}

```

```

Additional-Number ::= CHOICE {
  msc-Number          [0] ISDN-AddressString,
  sgsn-Number         [1] ISDN-AddressString}
  -- additional-number can be either msc-number or sgsn-number
  -- if received networkNode-number is msc-number then the
  -- additional number is sgsn-number
  -- if received networkNode-number is sgsn-number then the
  -- additional number is msc-number

```

```

MO-ForwardSM-Arg ::= SEQUENCE {
    sm-RP-DA                SM-RP-DA,
    sm-RP-OA                SM-RP-OA,
    sm-RP-UI                SignalInfo,
    extensionContainer      ExtensionContainer      OPTIONAL,
    ... ,
    imsi                    IMSI                    OPTIONAL }
    
```

```

MO-ForwardSM-Res ::= SEQUENCE {
    sm-RP-UI                SignalInfo            OPTIONAL,
    extensionContainer      ExtensionContainer      OPTIONAL,
    ... }
    
```

```

MT-ForwardSM-Arg ::= SEQUENCE {
    sm-RP-DA                SM-RP-DA,
    sm-RP-OA                SM-RP-OA,
    sm-RP-UI                SignalInfo,
    moreMessagesToSend     NULL                OPTIONAL,
    extensionContainer      ExtensionContainer      OPTIONAL,
    ... }
    
```

```

MT-ForwardSM-Res ::= SEQUENCE {
    sm-RP-UI                SignalInfo            OPTIONAL,
    extensionContainer      ExtensionContainer      OPTIONAL,
    ... }
    
```

```

SM-RP-DA ::= CHOICE {
    imsi                    [0] IMSI,
    lmsi                    [1] LMSI,
    serviceCentreAddressDA [4] AddressString,
    noSM-RP-DA             [5] NULL}
    
```

```

SM-RP-OA ::= CHOICE {
    msisdn                  [2] ISDN-AddressString,
    serviceCentreAddressOA [4] AddressString,
    noSM-RP-OA             [5] NULL}
    
```

```

ReportSM-DeliveryStatusArg ::= SEQUENCE {
    msisdn                  ISDN-AddressString,
    serviceCentreAddress    AddressString,
    sm-DeliveryOutcome      SM-DeliveryOutcome,
    absentSubscriberDiagnosticSM [0] AbsentSubscriberDiagnosticSM
    extensionContainer      [1] ExtensionContainer      OPTIONAL,
    ... ,
    gprsSupportIndicator    [2] NULL                OPTIONAL,
    -- gprsSupportIndicator is set only if the SMS-GMSC supports
    -- handling of two delivery outcomes
    deliveryOutcomeIndicator [3] NULL                OPTIONAL,
    -- DeliveryOutcomeIndicator is set when the SM-DeliveryOutcome
    -- is for GPRS
    additionalSM-DeliveryOutcome [4] SM-DeliveryOutcome OPTIONAL,
    -- If received, additionalSM-DeliveryOutcome is for GPRS
    -- If DeliveryOutcomeIndicator is set, then AdditionalSM-DeliveryOutcome shall be absent
    additionalAbsentSubscriberDiagnosticSM [5] AbsentSubscriberDiagnosticSM OPTIONAL
    -- If received additionalAbsentSubscriberDiagnosticSM is for GPRS
    -- If DeliveryOutcomeIndicator is set, then AdditionalAbsentSubscriberDiagnosticSM
    -- shall be absent
}
    
```

```

SM-DeliveryOutcome ::= ENUMERATED {
    memoryCapacityExceeded (0),
    absentSubscriber (1),
    successfulTransfer (2)}
    
```

```

ReportSM-DeliveryStatusRes ::= SEQUENCE {
    storedMSISDN           ISDN-AddressString      OPTIONAL,
    extensionContainer      ExtensionContainer      OPTIONAL,
    ... }
    
```

```

AlertServiceCentreArg ::= SEQUENCE {
    msisdn                  ISDN-AddressString,
    serviceCentreAddress    AddressString,
    ... }
    
```

```

InformServiceCentreArg ::= SEQUENCE {
    storedMSISDN                ISDN-AddressString                OPTIONAL,
    mw-Status MW-Status          OPTIONAL,
    extensionContainer           ExtensionContainer                OPTIONAL,
    ... ,
    absentSubscriberDiagnosticSM AbsentSubscriberDiagnosticSM    OPTIONAL }

```

```

MW-Status ::= BIT STRING {
    sc-AddressNotIncluded (0),
    mnrf-Set (1),
    mcef-Set (2),
    mnrg-Set (3)} (SIZE (6..16))
-- exception handling:
-- bits 4 to 15 shall be ignored if received and not understood

```

```

ReadyForSM-Arg ::= SEQUENCE {
    imsi                        [0] IMSI,
    alertReason                 AlertReason,
    alertReasonIndicator        NULL                                OPTIONAL,
    -- alertReasonIndicator is set only when the alertReason
    -- sent to HLR is for GPRS
    extensionContainer           ExtensionContainer                OPTIONAL,
    ...}

```

```

ReadyForSM-Res ::= SEQUENCE {
    extensionContainer           ExtensionContainer                OPTIONAL,
    ...}

```

```

AlertReason ::= ENUMERATED {
    ms-Present (0),
    memoryAvailable (1)}

```

END

## 17.7.7 Error data types

```

MAP-ER-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-ER-DataTypes (17) version7 (7)version8 \(8\)}

```

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

```

    RoamingNotAllowedParam,
    CallBarredParam,
    CUG-RejectParam,
    SS-IncompatibilityCause,
    PW-RegistrationFailureCause,
    SM-DeliveryFailureCause,
    SystemFailureParam,
    DataMissingParam,
    UnexpectedDataParam,
    FacilityNotSupParam,
    OR-NotAllowedParam,
    UnknownSubscriberParam,
    NumberChangedParam,
    UnidentifiedSubParam,
    IllegalSubscriberParam,
    IllegalEquipmentParam,
    BearerServNotProvParam,
    TeleservNotProvParam,
    TracingBufferFullParam,
    NoRoamingNbParam,
    AbsentSubscriberParam,
    BusySubscriberParam,
    NoSubscriberReplyParam,
    ForwardingViolationParam,
    ForwardingFailedParam,
    ATI-NotAllowedParam,
    SubBusyForMT-SMS-Param,

```

```

MessageWaitListFullParam,
AbsentSubscriberSM-Param,
AbsentSubscriberDiagnosticSM,
ResourceLimitationParam,
NoGroupCallNbParam,
IncompatibleTerminalParam,
ShortTermDenialParam,
LongTermDenialParam,
UnauthorizedRequestingNetwork-Param,
UnauthorizedLCSCClient-Param,
PositionMethodFailure-Param,
UnknownOrUnreachableLCSCClient-Param,
MM-EventNotSupported-Param,
SecureTransportErrorParam,
ATSI-NotAllowedParam,
ATM-NotAllowedParam,
IllegalSS-OperationParam,
SS-NotAvailableParam,
SS-SubscriptionViolationParam,
InformationNotAvailableParam,
TargetCellOutsideGCA-Param
    
```

;

IMPORTS

SS-Status

FROM MAP-SS-DataTypes {

ccitt identified-organization (4) etsi (0) mobileDomain (0)

gsm-Network (1) modules (3) map-SS-DataTypes (14) ~~version7 (7)~~version8 (8)}

SignalInfo,

BasicServiceCode,

NetworkResource

FROM MAP-CommonDataTypes {

ccitt identified-organization (4) etsi (0) mobileDomain (0)

gsm-Network (1) modules (3) map-CommonDataTypes (18) ~~version7 (7)~~version8 (8)}

SecurityHeader,

ProtectedPayload

FROM MAP-ST-DataTypes {

ccitt identified-organization (4) etsi (0) mobileDomain (0)

gsm-Network (1) modules (3) map-ST-DataTypes (27) ~~version7 (7)~~version8 (8)}

SS-Code

FROM MAP-SS-Code {

ccitt identified-organization (4) etsi (0) mobileDomain (0)

gsm-Network (1) modules (3) map-SS-Code (15) ~~version7 (7)~~version8 (8)}

ExtensionContainer

FROM MAP-ExtensionDataTypes {

ccitt identified-organization (4) etsi (0) mobileDomain (0)

gsm-Network (1) modules (3) map-ExtensionDataTypes (21) ~~version7 (7)~~version8 (8)}

;

<pre> RoamingNotAllowedParam ::= SEQUENCE {     roamingNotAllowedCause      RoamingNotAllowedCause,     extensionContainer           ExtensionContainer     ...}                 </pre>	<p>OPTIONAL,</p>
---	------------------

<pre> RoamingNotAllowedCause ::= ENUMERATED {     plmnRoamingNotAllowed (0),     operatorDeterminedBarring (3)}                 </pre>
--

<pre> CallBarredParam ::= CHOICE {     callBarringCause           CallBarringCause,     -- call BarringCause must not be used in version 3 and higher     extensibleCallBarredParam  ExtensibleCallBarredParam     -- extensibleCallBarredParam must not be used in version &lt;3 }                 </pre>
--

<pre> CallBarringCause ::= ENUMERATED {     barringServiceActive (0),     operatorBarring (1)}                 </pre>
---

```

ExtensibleCallBarredParam ::= SEQUENCE {
    callBarringCause          CallBarringCause          OPTIONAL,
    extensionContainer        ExtensionContainer        OPTIONAL,
    ... ,
    unauthorisedMessageOriginator [1] NULL          OPTIONAL }

```

```

CUG-RejectParam ::= SEQUENCE {
    cug-RejectCause          CUG-RejectCause          OPTIONAL,
    extensionContainer        ExtensionContainer        OPTIONAL,
    ... }

```

```

CUG-RejectCause ::= ENUMERATED {
    incomingCallsBarredWithinCUG (0),
    subscriberNotMemberOfCUG (1),
    requestedBasicServiceViolatesCUG-Constraints (5),
    calledPartySS-InteractionViolation (7)}

```

```

SS-IncompatibilityCause ::= SEQUENCE {
    ss-Code                  [1] SS-Code              OPTIONAL,
    basicService             BasicServiceCode        OPTIONAL,
    ss-Status                [4] SS-Status            OPTIONAL,
    ... }

```

```

PW-RegistrationFailureCause ::= ENUMERATED {
    undetermined (0),
    invalidFormat (1),
    newPasswordsMismatch (2)}

```

```

SM-EnumeratedDeliveryFailureCause ::= ENUMERATED {
    memoryCapacityExceeded (0),
    equipmentProtocolError (1),
    equipmentNotSM-Equipped (2),
    unknownServiceCentre (3),
    sc-Congestion (4),
    invalidSME-Address (5),
    subscriberNotSC-Subscriber (6)}

```

```

SM-DeliveryFailureCause ::= SEQUENCE {
    sm-EnumeratedDeliveryFailureCause SM-EnumeratedDeliveryFailureCause,
    diagnosticInfo                    SignalInfo          OPTIONAL,
    extensionContainer                ExtensionContainer    OPTIONAL,
    ... }

```

```

AbsentSubscriberSM-Param ::= SEQUENCE {
    absentSubscriberDiagnosticSM      AbsentSubscriberDiagnosticSM  OPTIONAL,
    -- AbsentSubscriberDiagnosticSM can be either for non-GPRS
    -- or for GPRS
    extensionContainer                ExtensionContainer    OPTIONAL,
    ... ,
    additionalAbsentSubscriberDiagnosticSM [0] AbsentSubscriberDiagnosticSM OPTIONAL }
    -- if received, additionalAbsentSubscriberDiagnosticSM
    -- is for GPRS and absentSubscriberDiagnosticSM is
    -- for non-GPRS

```

```

AbsentSubscriberDiagnosticSM ::= INTEGER (0..255)
    -- AbsentSubscriberDiagnosticSM values are defined in ETS 300 536 (3GPP TS 23.140)

```

```

SystemFailureParam ::= CHOICE {
    networkResource                NetworkResource,
    -- networkResource must not be used in version 3
    extensibleSystemFailureParam    ExtensibleSystemFailureParam
    -- extensibleSystemFailureParam must not be used in version <3
}

```

```

ExtensibleSystemFailureParam ::= SEQUENCE {
    networkResource                NetworkResource        OPTIONAL,
    extensionContainer              ExtensionContainer    OPTIONAL,
    ... }

```

```

DataMissingParam ::= SEQUENCE {
    extensionContainer              ExtensionContainer    OPTIONAL,
    ... }

```

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

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

```
OR-NotAllowedParam ::= SEQUENCE {
    extensionContainer      ExtensionContainer      OPTIONAL,
    ...}
```

```
UnknownSubscriberParam ::= SEQUENCE {
    extensionContainer      ExtensionContainer      OPTIONAL,
    ...,
    unknownSubscriberDiagnostic      UnknownSubscriberDiagnostic      OPTIONAL}
```

```
UnknownSubscriberDiagnostic ::= ENUMERATED {
    imsiUnknown (0),
    gprsSubscriptionUnknown (1),
    ...,
    npdbMismatch (2)}
-- if unknown values are received in
-- unknownSubscriberDiagnostic they shall be discarded
```

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

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

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

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

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

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

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

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

```
AbsentSubscriberParam ::= SEQUENCE {
    extensionContainer      ExtensionContainer      OPTIONAL,
    ...,
    absentSubscriberReason      [0] AbsentSubscriberReason      OPTIONAL}
```



```

AbsentSubscriberReason ::= ENUMERATED {
    imsiDetach (0),
    restrictedArea (1),
    noPageResponse (2),
    ... ,
    purgedMS (3)}
-- exception handling: at reception of other values than the ones listed the
-- AbsentSubscriberReason shall be ignored.
-- The AbsentSubscriberReason: purgedMS is defined for the Super-Charger feature
-- (see TS 23.116). If this value is received in a Provide Roaming Number response
-- it shall be mapped to the AbsentSubscriberReason: imsiDetach in the Send Routing
-- Information response
    
```

```

BusySubscriberParam ::= SEQUENCE {
    extensionContainer          ExtensionContainer          OPTIONAL,
    ... ,
    ccbs-Possible               [0] NULL                 OPTIONAL,
    ccbs-Busy                   [1] NULL                 OPTIONAL}
    
```

```

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

```

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

```

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

```

ATI-NotAllowedParam ::= SEQUENCE {
    extensionContainer          ExtensionContainer          OPTIONAL,
    ...}
    
```

```

ATSI-NotAllowedParam ::= SEQUENCE {
    extensionContainer          ExtensionContainer          OPTIONAL,
    ...}
    
```

```

ATM-NotAllowedParam ::= SEQUENCE {
    extensionContainer          ExtensionContainer          OPTIONAL,
    ...}
    
```

```

IllegalSS-OperationParam ::= SEQUENCE {
    extensionContainer          ExtensionContainer          OPTIONAL,
    ...}
    
```

```

SS-NotAvailableParam ::= SEQUENCE {
    extensionContainer          ExtensionContainer          OPTIONAL,
    ...}
    
```

```

SS-SubscriptionViolationParam ::= SEQUENCE {
    extensionContainer          ExtensionContainer          OPTIONAL,
    ...}
    
```

```

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

```

SubBusyForMT-SMS-Param ::= SEQUENCE {
    extensionContainer          ExtensionContainer          OPTIONAL,
    ... ,
    gprsConnectionSuspended   NULL                    OPTIONAL }
-- If GprsConnectionSuspended is not understood it shall
-- be discarded
    
```

```

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

```

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

<pre>NoGroupCallNbParam ::= SEQUENCE {   extensionContainer          ExtensionContainer          OPTIONAL,   ... }</pre>
<pre>IncompatibleTerminalParam ::= SEQUENCE {   extensionContainer          ExtensionContainer          OPTIONAL,   ... }</pre>
<pre>ShortTermDenialParam ::= SEQUENCE {   ... }</pre>
<pre>LongTermDenialParam ::= SEQUENCE {   ... }</pre>
<pre>UnauthorizedRequestingNetwork-Param ::= SEQUENCE {   extensionContainer          ExtensionContainer          OPTIONAL,   ... }</pre>
<pre>UnauthorizedLCSCClient-Param ::= SEQUENCE {   unauthorizedLCSCClient-Diagnostic  [0] UnauthorizedLCSCClient-Diagnostic  OPTIONAL,   extensionContainer                [1] ExtensionContainer                OPTIONAL,   ... }</pre>
<pre>UnauthorizedLCSCClient-Diagnostic ::= ENUMERATED {   noAdditionalInformation (0),   clientNotInMSPrivacyExceptionList (1),   callToClientNotSetup (2),   privacyOverrideNotApplicable (3),   disallowedByLocalRegulatoryRequirements (4),   ... } -- exception handling: -- any unrecognized value shall be ignored</pre>
<pre>PositionMethodFailure-Param ::= SEQUENCE {   positionMethodFailure-Diagnostic  [0] PositionMethodFailure-Diagnostic  OPTIONAL,   extensionContainer                [1] ExtensionContainer                OPTIONAL,   ... }</pre>
<pre>PositionMethodFailure-Diagnostic ::= ENUMERATED {   congestion (0),   insufficientResources (1),   insufficientMeasurementData (2),   inconsistentMeasurementData (3),   locationProcedureNotCompleted (4),   locationProcedureNotSupportedByTargetMS (5),   qosNotAttainable (6),   positionMethodNotAvailableInNetwork (7),   positionMethodNotAvailableInLocationArea (8),   ... } -- exception handling: -- any unrecognized value shall be ignored</pre>
<pre>UnknownOrUnreachableLCSCClient-Param ::= SEQUENCE {   extensionContainer          ExtensionContainer          OPTIONAL,   ... }</pre>
<pre>MM-EventNotSupported-Param ::= SEQUENCE {   extensionContainer          ExtensionContainer          OPTIONAL,   ... }</pre>
<pre>TargetCellOutsideGCA-Param ::= SEQUENCE {   extensionContainer          ExtensionContainer          OPTIONAL,   ... }</pre>
<pre>SecureTransportErrorParam ::= SEQUENCE {   securityHeader          SecurityHeader,   protectedPayload        ProtectedPayload          OPTIONAL } -- The protectedPayload carries the result of applying the security function -- defined in 3G TS 33.200 to the encoding of the securely transported error -- parameter</pre>

END

## 17.7.8 Common data types

```

MAP-CommonDataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 (8)}

DEFINITIONS

IMPLICIT TAGS

 ::=

BEGIN

EXPORTS

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

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

    -- data types for CAMEL
    CellGlobalIdOrServiceAreaIdOrLAI,

    -- data types for subscriber management
    BasicServiceCode,
    Ext-BasicServiceCode,
    EMLPP-Info,
    EMLPP-Priority,
    MC-SS-Info,
    MaxMC-Bearers,
    MC-Bearers,
    Ext-SS-Status,

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

IMPORTS
    TeleserviceCode,
    Ext-TeleserviceCode
FROM MAP-TS-Code {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-TS-Code (19) version7 (7)version8 (8)}

    BearerServiceCode,
    Ext-BearerServiceCode
FROM MAP-BS-Code {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-BS-Code (20) version7 (7)version8 (8)}

    SS-Code

```

```

FROM MAP-SS-Code {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-SS-Code (15) version7 (7)version8 (8)}

ExtensionContainer
FROM MAP-ExtensionDataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 (8)}
;

```

```
-- general data types
```

```

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

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

```

```

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

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

-- bit 8: 1 (no extension)

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

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

-- all other values are reserved.

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

```

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

```

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

```

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

```

FTN-AddressString ::=
    AddressString (SIZE (1..maxFTN-AddressLength))
    -- This type is used to represent forwarded-to numbers.
    -- For long forwarded-to numbers (longer than 15 digits) NPI shall be unknown;
    -- if NAI = international the first digits represent the country code (CC)
    -- and the network destination code (NDC) as for E.164.

```

```

maxFTN-AddressLength INTEGER ::= 15

```

```

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

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

    -- bit 8: 1 (no extension)

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

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

    -- bits 321: 000 (unused)

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

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

```

```

maxISDN-SubaddressLength INTEGER ::= 21

```

```

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

```

```

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

```

```

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

```

```

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

```

```

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

```

```

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

```

```

AccessNetworkSignalInfo ::= SEQUENCE {
    accessNetworkProtocolId AccessNetworkProtocolId,
    signalInfo              LongSignalInfo,
    -- Information about the internal structure is given in clause 7.6.9.1
    extensionContainer      ExtensionContainer          OPTIONAL,
    ...}

```

```

LongSignalInfo ::= OCTET STRING (SIZE (1..maxLongSignalInfoLength))

```

```

maxLongSignalInfoLength INTEGER ::= 2560
-- This Named Value represents the maximum number of octets which is available
-- to carry a single instance of the LongSignalInfo data type using
-- White Book SCCP with the maximum number of segments.
-- It takes account of the octets used by the lower layers of the protocol, and
-- other information elements which may be included in the same component.

```

```

AccessNetworkProtocolId ::= ENUMERATED {
    ts3G-48006 (1),
    ts3G-25413 (2),
    ...}
-- exception handling:
-- For AccessNetworkSignalInfo sequences containing this parameter with any
-- other value than the ones listed the receiver shall ignore the whole
-- AccessNetworkSignalInfo sequence.

```

```

AlertingPattern ::= OCTET STRING (SIZE (1) )
-- This type is used to represent Alerting Pattern

-- bits 8765 : 0000 (unused)

-- bits 43 : type of Pattern
-- 00 level
-- 01 category
-- 10 category
-- all other values are reserved.

-- bits 21 : type of alerting

alertingLevel-0 AlertingPattern ::= '00000000'B
alertingLevel-1 AlertingPattern ::= '00000001'B
alertingLevel-2 AlertingPattern ::= '00000010'B
-- all other values of Alerting level are reserved
-- Alerting Levels are defined in GSM 02.07

alertingCategory-1 AlertingPattern ::= '00000100'B
alertingCategory-2 AlertingPattern ::= '00000101'B
alertingCategory-3 AlertingPattern ::= '00000110'B
alertingCategory-4 AlertingPattern ::= '00000111'B
alertingCategory-5 AlertingPattern ::= '00001000'B
-- all other values of Alerting Category are reserved
-- Alerting categories are defined in GSM 02.07

```

```

-- data types for numbering and identification

```

```

IMSI ::= TBCD-STRING (SIZE (3..8))
-- digits of MCC, MNC, MSIN are concatenated in this order.

```

```
Identity ::= CHOICE {
    imsi                               IMSI,
    imsi-WithLMSI                      IMSI-WithLMSI}
```

```
IMSI-WithLMSI ::= SEQUENCE {
    imsi                               IMSI,
    lmsi                               LMSI,
    -- a special value 00000000 indicates that the LMSI is not in use
    ...}
```

```
ASCII-CallReference ::= TBCD-STRING (SIZE (1..8))
    -- digits of VGCS/VBC-area,Group-ID are concatenated in this order.
```

```
TMSI ::= OCTET STRING (SIZE (1..4))
```

```
SubscriberId ::= CHOICE {
    imsi                               [0] IMSI,
    tmsi                               [1] TMSI}
```

```
IMEI ::= TBCD-STRING (SIZE (8))
    -- Refers to International Mobile Station Equipment Identity
    -- and Software Version Number (SVN) defined in TS 3GPP TS 23.003 [17].
    -- If the SVN is not present the last octet shall contain the
    -- digit 0 and a filler.
    -- If present the SVN shall be included in the last octet.
```

```
HLR-Id ::= IMSI
    -- leading digits of IMSI, i.e. (MCC, MNC, leading digits of
    -- MSIN) forming HLR Id defined in TS 3GPP TS 23.003 [17].
```

```
HLR-List ::= SEQUENCE SIZE (1..maxNumOfHLR-Id) OF
    HLR-Id
```

```
maxNumOfHLR-Id INTEGER ::= 50
```

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

```
GlobalCellId ::= OCTET STRING (SIZE (5..7))
    -- Refers to Cell Global Identification defined in TS 3GPP TS 23.003 [17].
    -- The internal structure is defined as follows:
    -- octet 1 bits 4321           Mobile Country Code 1st digit
    -- bits 8765                 Mobile Country Code 2nd digit
    -- octet 2 bits 4321           Mobile Country Code 3rd digit
    -- bits 8765                 Mobile Network Code 3rd digit
    --                            or filler (1111) for 2 digit MNCs
    -- octet 3 bits 4321           Mobile Network Code 1st digit
    -- bits 8765                 Mobile Network Code 2nd digit
    -- octets 4 and 5             Location Area Code according to TS 3GPP TS 24.008
[35]
    -- octets 6 and 7             Cell Identity (CI) according to TS 3GPP TS 24.008
[35]
```

```
NetworkResource ::= ENUMERATED {
    plmn (0),
    hlr (1),
    vlr (2),
    pvlr (3),
    controllingMSC (4),
    vmsc (5),
    eir (6),
    rss (7)}
```

```
NAEA-PreferredCI ::= SEQUENCE {
    naea-PreferredCIC                 [0] NAEA-CIC,
    extensionContainer                 [1] ExtensionContainer           OPTIONAL,
    ...}
```

```
NAEA-CIC ::= OCTET STRING (SIZE (3))
    -- The internal structure is defined by the Carrier Identification
    -- parameter in ANSI T1.113.3. Carrier codes between "000" and "999" may
    -- be encoded as 3 digits using "000" to "999" or as 4 digits using
    -- "0000" to "0999". Carrier codes between "1000" and "9999" are encoded
    -- using 4 digits.
```

```

SubscriberIdentity ::= CHOICE {
    imsi                               [0] IMSI,
    msisdn                             [1] ISDN-AddressString
}

```

```

LCSCClientExternalID ::= SEQUENCE {
    externalAddress                    [0] AddressString           OPTIONAL,
    extensionContainer                 [1] ExtensionContainer       OPTIONAL,
    ... }

```

```

LCSCClientInternalID ::= ENUMERATED {
    broadcastService                   (0),
    o-andM-HPLMN                      (1),
    o-andM-VPLMN                      (2),
    anonymousLocation                  (3),
    targetMSsubscribedService          (4),
    ... }
-- for a CAMEL phase 3 PLMN operator client, the value targetMSsubscribedService shall be used

```

-- data types for CAMEL

```

CellGlobalIdOrServiceAreaIdOrLAI ::= CHOICE {
    cellGlobalIdOrServiceAreaIdFixedLength [0] CellGlobalIdOrServiceAreaIdFixedLength,
    laiFixedLength                         [1] LAIFixedLength}

```

```

CellGlobalIdOrServiceAreaIdFixedLength ::= OCTET STRING (SIZE (7))
-- Refers to Cell Global Identification or Service Area Identification
-- defined in 3G TS 23.003.
-- The internal structure is defined as follows:
-- octet 1 bits 4321      Mobile Country Code 1st digit
--          bits 8765      Mobile Country Code 2nd digit
-- octet 2 bits 4321      Mobile Country Code 3rd digit
--          bits 8765      Mobile Network Code 3rd digit
--                               or filler (1111) for 2 digit MNCs
-- octet 3 bits 4321      Mobile Network Code 1st digit
--          bits 8765      Mobile Network Code 2nd digit
-- octets 4 and 5        Location Area Code according to 3G TS 24.008
-- octets 6 and 7        Cell Identity (CI) value or
--                               Service Area Code (SAC) value
--                               according to 3G TS 23.003

```

```

LAIFixedLength ::= OCTET STRING (SIZE (5))
-- Refers to Location Area Identification defined in TS 3GPP TS 23.003 [17].
-- The internal structure is defined as follows:
-- octet 1 bits 4321      Mobile Country Code 1st digit
--          bits 8765      Mobile Country Code 2nd digit
-- octet 2 bits 4321      Mobile Country Code 3rd digit
--          bits 8765      Mobile Network Code 3rd digit
--                               or filler (1111) for 2 digit MNCs
-- octet 3 bits 4321      Mobile Network Code 1st digit
--          bits 8765      Mobile Network Code 2nd digit
-- octets 4 and 5        Location Area Code according to TS 3GPP TS 24.008

```

[35]

-- data types for subscriber management

```

BasicServiceCode ::= CHOICE {
    bearerService                     [2] BearerServiceCode,
    teleservice                       [3] TeleserviceCode}

```

```

Ext-BasicServiceCode ::= CHOICE {
    ext-BearerService                 [2] Ext-BearerServiceCode,
    ext-Teleservice                   [3] Ext-TeleserviceCode}

```

```

EMLPP-Info ::= SEQUENCE {
    maximumentitledPriority            EMLPP-Priority,
    defaultPriority                    EMLPP-Priority,
    extensionContainer                 ExtensionContainer           OPTIONAL,
    ... }

```

```

EMLPP-Priority ::= INTEGER (0..15)
-- The mapping from the values A,B,0,1,2,3,4 to the integer-value is
-- specified as follows where A is the highest and 4 is the lowest
-- priority level
-- the integer values 7-15 are spare and shall be mapped to value 4

```



<b>priorityLevelA</b>	EMLPP-Priority ::= 6
<b>priorityLevelB</b>	EMLPP-Priority ::= 5
<b>priorityLevel0</b>	EMLPP-Priority ::= 0
<b>priorityLevel1</b>	EMLPP-Priority ::= 1
<b>priorityLevel2</b>	EMLPP-Priority ::= 2
<b>priorityLevel3</b>	EMLPP-Priority ::= 3
<b>priorityLevel4</b>	EMLPP-Priority ::= 4

<b>MC-SS-Info</b> ::= SEQUENCE {		
ss-Code	[0] SS-Code,	
ss-Status	[1] Ext-SS-Status,	
nbrSB	[2] MaxMC-Bearers,	
nbrUser	[3] MC-Bearers,	
extensionContainer	[4] ExtensionContainer	OPTIONAL,
...}		

<b>MaxMC-Bearers</b> ::= INTEGER (2..maxNumOfMC-Bearers)
--

<b>MC-Bearers</b> ::= INTEGER (1..maxNumOfMC-Bearers)
---

<b>maxNumOfMC-Bearers</b> INTEGER ::= 7
---

<pre> <b>Ext-SS-Status</b> ::= OCTET STRING (SIZE (1..5))  -- OCTET 1: -- -- bits 8765: 0000 (unused) -- bits 4321: Used to convey the "P bit", "R bit", "A bit" and "Q bit", --             representing supplementary service state information --             as defined in TS 3GPP TS 23.011 [22]  -- bit 4: "Q bit"  -- bit 3: "P bit"  -- bit 2: "R bit"  -- bit 1: "A bit"  -- OCTETS 2-5: reserved for future use. They shall be discarded if -- received and not understood. </pre>
--

-- data types for geographic location

<pre> <b>AgeOfLocationInformation</b> ::= INTEGER (0..32767) -- the value represents the elapsed time in minutes since the last -- network contact of the mobile station (i.e. the actuality of the -- location information). -- value "0" indicates that the MS is currently in contact with the -- network -- value "32767" indicates that the location information is at least -- 32767 minutes old </pre>
---

END

## 17.7.9 Teleservice Codes

```

MAP-TS-Code {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-TS-Code (19) version7 (7)version8 (8)}

```

DEFINITIONS

::=

BEGIN

```

TeleserviceCode ::= OCTET STRING (SIZE (1))
    -- This type is used to represent the code identifying a single
    -- teleservice, a group of teleservices, or all teleservices. The
    -- services are defined in TS GSM 22.003 [4].
    -- The internal structure is defined as follows:

    -- bits 87654321: group (bits 8765) and specific service
    -- (bits 4321)
    
```

```

Ext-TeleserviceCode ::= OCTET STRING (SIZE (1..5))
    -- This type is used to represent the code identifying a single
    -- teleservice, a group of teleservices, or all teleservices. The
    -- services are defined in TS GSM 22.003 [4].
    -- The internal structure is defined as follows:

    -- OCTET 1:
    -- bits 87654321: group (bits 8765) and specific service
    -- (bits 4321)

    -- OCTETS 2-5: reserved for future use. If received the
    -- Ext-TeleserviceCode shall be
    -- treated according to the exception handling defined for the
    -- operation that uses this type.

    -- Ext-TeleserviceCode includes all values defined for TeleserviceCode.
    
```

<b>allTeleservices</b>	TeleserviceCode ::= '00000000'B
------------------------	---------------------------------

<b>allSpeechTransmissionServices</b>	TeleserviceCode ::= '00010000'B
<b>telephony</b>	TeleserviceCode ::= '00010001'B
<b>emergencyCalls</b>	TeleserviceCode ::= '00010010'B

<b>allShortMessageServices</b>	TeleserviceCode ::= '00100000'B
<b>shortMessageMT-PP</b>	TeleserviceCode ::= '00100001'B
<b>shortMessageMO-PP</b>	TeleserviceCode ::= '00100010'B

<b>allFacsimileTransmissionServices</b>	TeleserviceCode ::= '01100000'B
<b>facsimileGroup3AndAlterSpeech</b>	TeleserviceCode ::= '01100001'B
<b>automaticFacsimileGroup3</b>	TeleserviceCode ::= '01100010'B
<b>facsimileGroup4</b>	TeleserviceCode ::= '01100011'B

```

-- The following non-hierarchical Compound Teleservice Groups
-- are defined in TS 3GPP TS 22.030:
allDataTeleservices TeleserviceCode ::= '01110000'B
    -- covers Teleservice Groups 'allFacsimileTransmissionServices'
    -- and 'allShortMessageServices'
allTeleservices-ExeptSMS TeleserviceCode ::= '10000000'B
    -- covers Teleservice Groups 'allSpeechTransmissionServices' and
    -- 'allFacsimileTransmissionServices'
--
-- Compound Teleservice Group Codes are only used in call
-- independent supplementary service operations, i.e. they
-- are not used in InsertSubscriberData or in
-- DeleteSubscriberData messages.
    
```

<b>allVoiceGroupCallServices</b>	TeleserviceCode ::= '10010000'B
<b>voiceGroupCall</b>	TeleserviceCode ::= '10010001'B
<b>voiceBroadcastCall</b>	TeleserviceCode ::= '10010010'B

<b>allPLMN-specificTS</b>	TeleserviceCode ::= '11010000'B
<b>plmn-specificTS-1</b>	TeleserviceCode ::= '11010001'B
<b>plmn-specificTS-2</b>	TeleserviceCode ::= '11010010'B
<b>plmn-specificTS-3</b>	TeleserviceCode ::= '11010011'B
<b>plmn-specificTS-4</b>	TeleserviceCode ::= '11010100'B
<b>plmn-specificTS-5</b>	TeleserviceCode ::= '11010101'B
<b>plmn-specificTS-6</b>	TeleserviceCode ::= '11010110'B
<b>plmn-specificTS-7</b>	TeleserviceCode ::= '11010111'B
<b>plmn-specificTS-8</b>	TeleserviceCode ::= '11011000'B
<b>plmn-specificTS-9</b>	TeleserviceCode ::= '11011001'B
<b>plmn-specificTS-A</b>	TeleserviceCode ::= '11011010'B
<b>plmn-specificTS-B</b>	TeleserviceCode ::= '11011011'B
<b>plmn-specificTS-C</b>	TeleserviceCode ::= '11011100'B
<b>plmn-specificTS-D</b>	TeleserviceCode ::= '11011101'B
<b>plmn-specificTS-E</b>	TeleserviceCode ::= '11011110'B
<b>plmn-specificTS-F</b>	TeleserviceCode ::= '11011111'B

END

## 17.7.10 Bearer Service Codes

```
MAP-BS-Code {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    gsm-Network (1) modules (3) map-BS-Code (20) version7-(7)version8 (8)}
```

DEFINITIONS

::=

BEGIN

```
BearerServiceCode ::= OCTET STRING (SIZE (1))
-- This type is used to represent the code identifying a single
-- bearer service, a group of bearer services, or all bearer
-- services. The services are defined in TS 3GPP TS 22.002 [3].
-- The internal structure is defined as follows:
--
-- plmn-specific bearer services:
-- bits 87654321: defined by the HPLMN operator
--
-- rest of bearer services:
-- bit 8: 0 (unused)
-- bits 7654321: group (bits 7654), and rate, if applicable
-- (bits 321)
```

```
Ext-BearerServiceCode ::= OCTET STRING (SIZE (1..5))
-- This type is used to represent the code identifying a single
-- bearer service, a group of bearer services, or all bearer
-- services. The services are defined in TS 3GPP TS 22.002 [3].
-- The internal structure is defined as follows:
--
-- OCTET 1:
-- plmn-specific bearer services:
-- bits 87654321: defined by the HPLMN operator
--
-- rest of bearer services:
-- bit 8: 0 (unused)
-- bits 7654321: group (bits 7654), and rate, if applicable
-- (bits 321)
--
-- OCTETS 2-5: reserved for future use. If received the
-- Ext-TeleserviceCode shall be
-- treated according to the exception handling defined for the
-- operation that uses this type.
--
-- Ext-BearerServiceCode includes all values defined for BearerServiceCode.
```

<b>allBearerServices</b>	<b>BearerServiceCode</b> ::= '00000000'B
--------------------------	--

<b>allDataCDA-Services</b>	<b>BearerServiceCode</b> ::= '00010000'B
<b>dataCDA-300bps</b>	<b>BearerServiceCode</b> ::= '00010001'B
<b>dataCDA-1200bps</b>	<b>BearerServiceCode</b> ::= '00010010'B
<b>dataCDA-1200-75bps</b>	<b>BearerServiceCode</b> ::= '00010011'B
<b>dataCDA-2400bps</b>	<b>BearerServiceCode</b> ::= '00010100'B
<b>dataCDA-4800bps</b>	<b>BearerServiceCode</b> ::= '00010101'B
<b>dataCDA-9600bps</b>	<b>BearerServiceCode</b> ::= '00010110'B
<b>general-dataCDA</b>	<b>BearerServiceCode</b> ::= '00010111'B

<b>allDataCDS-Services</b>	<b>BearerServiceCode</b> ::= '00011000'B
<b>dataCDS-1200bps</b>	<b>BearerServiceCode</b> ::= '00011010'B
<b>dataCDS-2400bps</b>	<b>BearerServiceCode</b> ::= '00011100'B
<b>dataCDS-4800bps</b>	<b>BearerServiceCode</b> ::= '00011101'B
<b>dataCDS-9600bps</b>	<b>BearerServiceCode</b> ::= '00011110'B
<b>general-dataCDS</b>	<b>BearerServiceCode</b> ::= '00011111'B

<b>allPadAccessCA-<i>Services</i></b>	BearerServiceCode ::= '00100000'B
<b>padAccessCA-300bps</b>	BearerServiceCode ::= '00100001'B
<b>padAccessCA-1200bps</b>	BearerServiceCode ::= '00100010'B
<b>padAccessCA-1200-75bps</b>	BearerServiceCode ::= '00100011'B
<b>padAccessCA-2400bps</b>	BearerServiceCode ::= '00100100'B
<b>padAccessCA-4800bps</b>	BearerServiceCode ::= '00100101'B
<b>padAccessCA-9600bps</b>	BearerServiceCode ::= '00100110'B
<b>general-padAccessCA</b>	BearerServiceCode ::= '00100111'B

<b>allDataPDS-<i>Services</i></b>	BearerServiceCode ::= '00101000'B
<b>dataPDS-2400bps</b>	BearerServiceCode ::= '00101100'B
<b>dataPDS-4800bps</b>	BearerServiceCode ::= '00101101'B
<b>dataPDS-9600bps</b>	BearerServiceCode ::= '00101110'B
<b>general-dataPDS</b>	BearerServiceCode ::= '00101111'B

<b>allAlternateSpeech-DataCDA</b>	BearerServiceCode ::= '00110000'B
-----------------------------------	-----------------------------------

<b>allAlternateSpeech-DataCDS</b>	BearerServiceCode ::= '00111000'B
-----------------------------------	-----------------------------------

<b>allSpeechFollowedByDataCDA</b>	BearerServiceCode ::= '01000000'B
-----------------------------------	-----------------------------------

<b>allSpeechFollowedByDataCDS</b>	BearerServiceCode ::= '01001000'B
-----------------------------------	-----------------------------------

```

-- The following non-hierarchical Compound Bearer Service
-- Groups are defined in TS 3GPP TS 22.030:
allDataCircuitAsynchronous      BearerServiceCode ::= '01010000'B
  -- covers "allDataCDA-Services", "allAlternateSpeech-DataCDA" and
  -- "allSpeechFollowedByDataCDA"
allAsynchronousServices        BearerServiceCode ::= '01100000'B
  -- covers "allDataCDA-Services", "allAlternateSpeech-DataCDA",
  -- "allSpeechFollowedByDataCDA" and "allPadAccessCDA-Services"
allDataCircuitSynchronous      BearerServiceCode ::= '01011000'B
  -- covers "allDataCDS-Services", "allAlternateSpeech-DataCDS" and
  -- "allSpeechFollowedByDataCDS"
allSynchronousServices         BearerServiceCode ::= '01101000'B
  -- covers "allDataCDS-Services", "allAlternateSpeech-DataCDS",
  -- "allSpeechFollowedByDataCDS" and "allDataPDS-Services"
--
-- Compound Bearer Service Group Codes are only used in call
-- independent supplementary service operations, i.e. they
-- are not used in InsertSubscriberData or in
-- DeleteSubscriberData messages.

```

<b>allPLMN-specificBS</b>	BearerServiceCode ::= '11010000'B
<b>plmn-specificBS-1</b>	BearerServiceCode ::= '11010001'B
<b>plmn-specificBS-2</b>	BearerServiceCode ::= '11010010'B
<b>plmn-specificBS-3</b>	BearerServiceCode ::= '11010011'B
<b>plmn-specificBS-4</b>	BearerServiceCode ::= '11010100'B
<b>plmn-specificBS-5</b>	BearerServiceCode ::= '11010101'B
<b>plmn-specificBS-6</b>	BearerServiceCode ::= '11010110'B
<b>plmn-specificBS-7</b>	BearerServiceCode ::= '11010111'B
<b>plmn-specificBS-8</b>	BearerServiceCode ::= '11011000'B
<b>plmn-specificBS-9</b>	BearerServiceCode ::= '11011001'B
<b>plmn-specificBS-A</b>	BearerServiceCode ::= '11011010'B
<b>plmn-specificBS-B</b>	BearerServiceCode ::= '11011011'B
<b>plmn-specificBS-C</b>	BearerServiceCode ::= '11011100'B
<b>plmn-specificBS-D</b>	BearerServiceCode ::= '11011101'B
<b>plmn-specificBS-E</b>	BearerServiceCode ::= '11011110'B
<b>plmn-specificBS-F</b>	BearerServiceCode ::= '11011111'B

END

## 17.7.11 Extension data types

```

MAP-ExtensionDataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 (8)}

```

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

```
PrivateExtension,
ExtensionContainer;
```

```
-- IOC for private MAP extensions
```

```
MAP-EXTENSION ::= CLASS {
    &ExtensionType                                OPTIONAL,
    &extensionId                                OBJECT IDENTIFIER }
-- The length of the Object Identifier shall not exceed 16 octets and the
-- number of components of the Object Identifier shall not exceed 16
```

```
-- data types
```

```
ExtensionContainer ::= SEQUENCE {
    privateExtensionList [0]PrivateExtensionList OPTIONAL,
    pcs-Extensions [1]PCS-Extensions OPTIONAL,
    ...}
```

```
PrivateExtensionList ::= SEQUENCE SIZE (1..maxNumOfPrivateExtensions) OF
    PrivateExtension
```

```
PrivateExtension ::= SEQUENCE {
    extId                                MAP-EXTENSION.&extensionId
                                         ({ExtensionSet}),
    extType                                MAP-EXTENSION.&ExtensionType
                                         ({ExtensionSet}@extId) OPTIONAL}
```

```
maxNumOfPrivateExtensions INTEGER ::= 10
```

```
ExtensionSet                                MAP-EXTENSION ::=
    {...
    -- ExtensionSet is the set of all defined private extensions
    }
-- Unsupported private extensions shall be discarded if received.
```

```
PCS-Extensions ::= SEQUENCE {
    ...}
```

```
END
```

## 17.7.12 Group Call data types

```
MAP-GR-DataTypes {
    ccitt identified-organization (4) etsi (0) mobileDomain (0)
    | gsm-Network (1) modules (3) map-GR-DataTypes (23) version7 (7)version8 (8)}
```

```
DEFINITIONS
```

```
IMPLICIT TAGS
```

```
::=
```

```
BEGIN
```

```
EXPORTS
```

```
    PrepareGroupCallArg,
    PrepareGroupCallRes,
    SendGroupCallEndSignalArg,
    SendGroupCallEndSignalRes,
    ForwardGroupCallSignallingArg,
    ProcessGroupCallSignallingArg
;
```

```
IMPORTS
```

```
    ISDN-AddressString,
    IMSI,
    EMLPP-Priority,
    ASCII-CallReference
```

```
FROM MAP-CommonDataTypes {
```

```
ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 (8)}
```

Ext-TeleserviceCode

```
FROM MAP-TS-Code {
ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-TS-Code (19) version7 (7)version8 (8)}
```

Kc

```
FROM MAP-MS-DataTypes {
ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-MS-DataTypes (11) version7 (7)version8 (8)}
```

ExtensionContainer

```
FROM MAP-ExtensionDataTypes {
ccitt identified-organization (4) etsi (0) mobileDomain (0)
gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 (8)}
;
```

<b>PrepareGroupCallArg</b> ::= SEQUENCE {		
teleservice	Ext-TeleserviceCode,	
asciiCallReference	ASCII-CallReference,	
codec-Info	CODEC-Info,	
cipheringAlgorithm	CipheringAlgorithm,	
groupKeyNumber	[0]GroupKeyNumber	OPTIONAL,
groupKey	[1]Kc	OPTIONAL,
priority	[2]EMLPP-Priority	OPTIONAL,
uplinkFree	[3] NULL	OPTIONAL,
extensionContainer	[4] ExtensionContainer	OPTIONAL,
...		

<b>PrepareGroupCallRes</b> ::= SEQUENCE {		
groupCallNumber	ISDN-AddressString,	
extensionContainer	ExtensionContainer	OPTIONAL,
...		

<b>SendGroupCallEndSignalArg</b> ::= SEQUENCE {		
imsi	IMSI	OPTIONAL,
extensionContainer	ExtensionContainer	OPTIONAL,
...		

<b>SendGroupCallEndSignalRes</b> ::= SEQUENCE {		
extensionContainer	ExtensionContainer	OPTIONAL,
...		

<b>ForwardGroupCallSignallingArg</b> ::= SEQUENCE {		
imsi	IMSI	OPTIONAL,
uplinkRequestAck	[0] NULL	OPTIONAL,
uplinkReleaseIndication	[1] NULL	OPTIONAL,
uplinkRejectCommand	[2] NULL	OPTIONAL,
uplinkSeizedCommand	[3] NULL	OPTIONAL,
uplinkReleaseCommand	[4] NULL	OPTIONAL,
extensionContainer	ExtensionContainer	OPTIONAL,
...		
stateAttributes	[5] StateAttributes	OPTIONAL }

<b>ProcessGroupCallSignallingArg</b> ::= SEQUENCE {		
uplinkRequest	[0] NULL	OPTIONAL,
uplinkReleaseIndication	[1] NULL	OPTIONAL,
releaseGroupCall	[2] NULL	OPTIONAL,
extensionContainer	ExtensionContainer	OPTIONAL,
...		

<b>GroupKeyNumber</b> ::= INTEGER (0..15)
---

<b>CODEC-Info</b> ::= OCTET STRING (SIZE (5..10))
-- Refers to channel type
-- coded according to 3GPP TS 48.008 [49] and including Element identifier and Length

```

CipheringAlgorithm ::= OCTET STRING (SIZE (1))
  -- Refers to 'permitted algorithms' in 'encryption information'
  -- coded according to 3GPP TS 48.008 [49]:

  -- Bits 8-1
  -- 8765 4321
  -- 0000 0001          No encryption
  -- 0000 0010          GSM A5/1
  -- 0000 0100          GSM A5/2
  -- 0000 1000          GSM A5/3
  -- 0001 0000          GSM A5/4
  -- 0010 0000          GSM A5/5
  -- 0100 0000          GSM A5/6
  -- 1000 0000          GSM A5/7

```

```

StateAttributes ::= SEQUENCE {
  downlinkAttached          [5] NULL          OPTIONAL,
  uplinkAttached           [6] NULL          OPTIONAL,
  dualCommunication        [7] NULL          OPTIONAL,
  callOriginator           [8] NULL          OPTIONAL }

  -- Refers to 3GPP TS 44.068 for definitions of StateAttributes fields.

```

END

### 17.7.13 Location service data types

```

1  MAP-LCS-DataTypes {
2    ccitt identified-organization (4) etsi (0) mobileDomain (0)
3    gsm-Network (1) modules (3) map-LCS-DataTypes (25) version7 (7)version8 (8)}
4
5  DEFINITIONS
6  IMPLICIT TAGS
7  ::=
8  BEGIN
9
10 EXPORTS
11   RoutingInfoForLCS-Arg,
12   RoutingInfoForLCS-Res,
13   ProvideSubscriberLocation-Arg,
14   ProvideSubscriberLocation-Res,
15   SubscriberLocationReport-Arg,
16   SubscriberLocationReport-Res,
17   LocationType,
18   LCSClientName,
19   LCS-QoS,
20   Horizontal-Accuracy,
21   ResponseTime,
22   Ext-GeographicalInformation,
23   SupportedGADShapes,
24   Add-GeographicalInformation,
25   LCSRequestorID
26 ;
27
28 IMPORTS
29   AddressString,
30   ISDN-AddressString,
31   IMEI,
32   IMSI,
33   LMSI,
34   SubscriberIdentity,
35   AgeOfLocationInformation,
36   LCSClientExternalID,
37   LCSClientInternalID
38 FROM MAP-CommonDataTypes {
39   ccitt identified-organization (4) etsi (0) mobileDomain (0)
40   gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 (8)}
41

```

```

42   ExtensionContainer
43 FROM MAP-ExtensionDataTypes {
44   ccitt identified-organization (4) etsi (0) mobileDomain (0)
45   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version7 (7)version8 (8)}
46
47   USSD-DataCodingScheme,
48   USSD-String
49 FROM MAP-SS-DataTypes {
50   ccitt identified-organization (4) etsi (0) mobileDomain (0) gsm-Network (1) modules (3)
51   map-SS-DataTypes (14) version7 (7)version8 (8)}
52
53   APN
54 FROM MAP-MS-DataTypes {
55   ccitt identified-organization (4) etsi (0) mobileDomain (0)
56   gsm-Network (1) modules (3) map-MS-DataTypes (11) version7 (7)version8 (8)}
57
58   Additional-Number
59 FROM MAP-SM-DataTypes {
60   ccitt identified-organization (4) etsi (0) mobileDomain (0)
61   gsm-Network (1) modules (3) map-SM-DataTypes (16) version7 (7)version8 (8)}
62 ;
63
64

```

```

65 RoutingInfoForLCS-Arg ::= SEQUENCE {
66   mlcNumber                [0] ISDN-AddressString,
67   targetMS                 [1] SubscriberIdentity,
68   extensionContainer       [2] ExtensionContainer          OPTIONAL,
69   ... }

```

```

71 RoutingInfoForLCS-Res ::= SEQUENCE {
72   targetMS                 [0] SubscriberIdentity,
73   lcsLocationInfo         [1] LCSLocationInfo,
74   extensionContainer       [2] ExtensionContainer          OPTIONAL,
75   ... }

```

```

77 LCSLocationInfo ::= SEQUENCE {
78   networkNode-Number      ISDN-AddressString,
79   -- NetworkNode-number can be either msc-number or sgsn-number
80   lmsi                    [0] LMSI                        OPTIONAL,
81   extensionContainer       [1] ExtensionContainer          OPTIONAL,
82   ... ,
83   gprsNodeIndicator       [2] NULL                        OPTIONAL,
84   -- gprsNodeIndicator is set only if the SGSN number is sent as the Network Node Number
85   additional-Number       [3] Additional-Number           OPTIONAL
86 }

```

```

88 ProvideSubscriberLocation-Arg ::= SEQUENCE {
89   locationType             LocationType,
90   mlc-Number               ISDN-AddressString,
91   lcs-ClientID             [0] LCS-ClientID                OPTIONAL,
92   privacyOverride         [1] NULL                        OPTIONAL,
93   imsi                    [2] IMSI                        OPTIONAL,
94   msisdn                  [3] ISDN-AddressString           OPTIONAL,
95   lmsi                    [4] LMSI                        OPTIONAL,
96   imei                    [5] IMEI                        OPTIONAL,
97   lcs-Priority             [6] LCS-Priority                OPTIONAL,
98   lcs-QoS                 [7] LCS-QoS                      OPTIONAL,
99   extensionContainer       [8] ExtensionContainer          OPTIONAL,
100  ... ,
101  supportedGADShapes       [9] SupportedGADShapes          OPTIONAL}
102
103  -- one of imsi or msisdn is mandatory

```

```

105 LocationType ::= SEQUENCE {
106   locationEstimateType     [0] LocationEstimateType,
107   ... ,
108   deferredLocationEventType [1] DeferredLocationEventType OPTIONAL }

```

109



```

110 LocationEstimateType ::= ENUMERATED {
111     currentLocation                (0),
112     currentOrLastKnownLocation    (1),
113     initialLocation                (2),
114     ...,
115     activateDeferredLocation      (3),
116     cancelDeferredLocation        (4) }
117 -- exception handling:
118 -- a ProvideSubscriberLocation-Arg containing an unrecognized LocationEstimateType
119 -- shall be rejected by the receiver with a return error cause of unexpected data value
120
121 DeferredLocationEventType ::= BIT STRING {
122     msAvailable                    (0) } (SIZE (1..16))
123 -- exception handling
124 -- a ProvideSubscriberLocation-Arg containing other values than listed above in
125 -- DeferredLocationEventType shall be rejected by the receiver with a return error cause of
126 -- unexpected data value.
127
128 LCS-ClientID ::= SEQUENCE {
129     lcsClientType                  [0] LCSClientType,
130     lcsClientExternalID            [1] LCSClientExternalID           OPTIONAL,
131     lcsClientDialedByMS            [2] AddressString                OPTIONAL,
132     lcsClientInternalID            [3] LCSClientInternalID           OPTIONAL,
133     lcsClientName                  [4] LCSClientName                 OPTIONAL,
134     ...,
135     lcsAPN                         [5] APN                          OPTIONAL,
136     lcsRequestorID                 [6] LCSRequestorID               OPTIONAL }
137
138 LCSClientType ::= ENUMERATED {
139     emergencyServices              (0),
140     valueAddedServices             (1),
141     plmnOperatorServices           (2),
142     lawfulInterceptServices        (3),
143     ... }
144 -- exception handling:
145 -- unrecognized values may be ignored if the LCS client uses the privacy override
146 -- otherwise, an unrecognized value shall be treated as unexpected data by a receiver
147 -- a return error shall then be returned if received in a MAP invoke
148
149 LCSClientName ::= SEQUENCE {
150     dataCodingScheme                [0] USSD-DataCodingScheme,
151     nameString                      [2] NameString,
152     ...}
153
154 -- The USSD-DataCodingScheme shall indicate use of the default alphabet through the
155 -- following encoding
156 -- bit 7 6 5 4 3 2 1 0
157 --      0 0 0 0 1 1 1 1
158
159 NameString ::= USSD-String (SIZE (1..maxNameStringLength))
160
161 maxNameStringLength INTEGER ::= 63
162
163 LCSRequestorID ::= SEQUENCE {
164     dataCodingScheme                [0] USSD-DataCodingScheme,
165     requestorIDString               [1] RequestorIDString,
166     ...}
167
168 RequestorIDString ::= USSD-String (SIZE (0..maxRequestorIDStringLength))
169
170 maxRequestorIDStringLength INTEGER ::= 127
171
172 LCS-Priority ::= OCTET STRING (SIZE (1))
173 -- 0 = highest priority
174 -- 1 = normal priority
175 -- all other values treated as 1
176
177 LCS-QoS ::= SEQUENCE {
178     horizontal-accuracy              [0] Horizontal-Accuracy           OPTIONAL,
179     verticalCoordinateRequest         [1] NULL                          OPTIONAL,
180     vertical-accuracy                [2] Vertical-Accuracy             OPTIONAL,
181     responseTime                     [3] ResponseTime                 OPTIONAL,
182     extensionContainer                [4] ExtensionContainer           OPTIONAL,
183     ...}
184

```

```

185 Horizontal-Accuracy ::= OCTET STRING (SIZE (1))
186     -- bit 8 = 0
187     -- bits 7-1 = 7 bit Uncertainty Code defined in 3G TS 23.032. The horizontal location
188     -- error should be less than the error indicated by the uncertainty code with 67%
189     -- confidence.

```

```

191 Vertical-Accuracy ::= OCTET STRING (SIZE (1))
192     -- bit 8 = 0
193     -- bits 7-1 = 7 bit Vertical Uncertainty Code defined in 3G TS 23.032.
194     -- The vertical location error should be less than the error indicated
195     -- by the uncertainty code with 67% confidence.

```

```

197 ResponseTime ::= SEQUENCE {
198     responseTimeCategory          ResponseTimeCategory,
199     ... }
200 -- note: an expandable SEQUENCE simplifies later addition of a numeric response time.

```

```

202 ResponseTimeCategory ::= ENUMERATED {
203     lowdelay (0),
204     delaytolerant (1),
205     ... }
206 -- exception handling:
207 -- an unrecognized value shall be treated the same as value 1 (delaytolerant)

```

```

209 SupportedGADShapes ::= BIT STRING {
210     ellipsoidPoint (0),
211     ellipsoidPointWithUncertaintyCircle (1),
212     ellipsoidPointWithUncertaintyEllipse (2),
213     polygon (3),
214     ellipsoidPointWithAltitude (4),
215     ellipsoidPointWithAltitudeAndUncertaintyElipsoid (5),
216     ellipsoidArc (6) } (SIZE (7..16))
217 -- A node shall mark in the BIT STRING all Shapes defined in 3G TS 23.032 it supports.
218 -- exception handling: bits 7 to 15 shall be ignored if received.

```

```

220 ProvideSubscriberLocation-Res ::= SEQUENCE {
221     locationEstimate              Ext-GeographicalInformation,
222     ageOfLocationEstimate         [0] AgeOfLocationInformation      OPTIONAL,
223     extensionContainer            [1] ExtensionContainer           OPTIONAL,
224     ... ,
225     add-LocationEstimate         [2] Add-GeographicalInformation  OPTIONAL,
226     deferredmt-lrResponseIndicator [3] NULL                      OPTIONAL }
227
228 -- if deferredmt-lrResponseIndicator is set, locationEstimate is ignored.
229
230 -- the add-LocationEstimate parameter shall not be sent to a node that did not indicate the
231 -- geographic shapes supported in the ProvideSubscriberLocation-Arg

```

```

232 Ext-GeographicalInformation ::= OCTET STRING (SIZE (1..maxExt-GeographicalInformation))
233 -- Refers to geographical Information defined in 3G TS 23.032.
234 -- This is composed of 1 or more octets with an internal structure according to
235 -- 3G TS 23.032
236 -- Octet 1: Type of shape, only the following shapes in 3G TS 23.032 are allowed:
237 -- (a) Ellipsoid point with uncertainty circle
238 -- (b) Ellipsoid point with uncertainty ellipse
239 -- (c) Ellipsoid point with altitude and uncertainty ellipsoid
240 -- (d) Ellipsoid Arc
241 -- (e) Ellipsoid Point
242 -- Any other value in octet 1 shall be treated as invalid
243 -- Octets 2 to 8 for case (a) - Ellipsoid point with uncertainty circle
244 -- Degrees of Latitude 3 octets
245 -- Degrees of Longitude 3 octets
246 -- Uncertainty code 1 octet
247 -- Octets 2 to 11 for case (b) - Ellipsoid point with uncertainty ellipse:
248 -- Degrees of Latitude 3 octets
249 -- Degrees of Longitude 3 octets
250 -- Uncertainty semi-major axis 1 octet
251 -- Uncertainty semi-minor axis 1 octet
252 -- Angle of major axis 1 octet
253 -- Confidence 1 octet
254 -- Octets 2 to 14 for case (c) - Ellipsoid point with altitude and uncertainty ellipsoid
255 -- Degrees of Latitude 3 octets
256 -- Degrees of Longitude 3 octets
257 -- Altitude 2 octets
258 -- Uncertainty semi-major axis 1 octet
259 -- Uncertainty semi-minor axis 1 octet
260 -- Angle of major axis 1 octet
261 -- Uncertainty altitude 1 octet
262 -- Confidence 1 octet
263 -- Octets 2 to 13 for case (d) - Ellipsoid Arc
264 -- Degrees of Latitude 3 octets
265 -- Degrees of Longitude 3 octets
266 -- Inner radius 2 octets
267 -- Uncertainty radius 1 octet
268 -- Offset angle 1 octet
269 -- Included angle 1 octet
270 -- Confidence 1 octet
271 -- Octets 2 to 7 for case (e) - Ellipsoid Point
272 -- Degrees of Latitude 3 octets
273 -- Degrees of Longitude 3 octets
274 --
275 --
276 -- An Ext-GeographicalInformation parameter comprising more than one octet and
277 -- containing any other shape or an incorrect number of octets or coding according
278 -- to 3G TS 23.032 shall be treated as invalid data by a receiver.
279 --
280 -- An Ext-GeographicalInformation parameter comprising one octet shall be discarded
281 -- by the receiver if an Add-GeographicalInformation parameter is received
282 -- in the same message.
283 --
284 -- An Ext-GeographicalInformation parameter comprising one octet shall be treated as
285 -- invalid data by the receiver if an Add-GeographicalInformation parameter is not
286 -- received in the same message.

```

```

287
288 maxExt-GeographicalInformation INTEGER ::= 20
289 -- the maximum length allows for further shapes in 3G TS 23.032 to be included in later
290 -- versions of 3G TS 29.002

```

```

291
292 Add-GeographicalInformation ::= OCTET STRING (SIZE (1..maxAdd-GeographicalInformation))
293 -- Refers to geographical Information defined in 3G TS 23.032.
294 -- This is composed of 1 or more octets with an internal structure according to
295 -- 3G TS 23.032
296 -- Octet 1: Type of shape, all the shapes defined in 3G TS 23.032 are allowed:
297 -- Octets 2 to n (where n is the total number of octets necessary to encode the shape
298 -- according to 3G TS 23.032) are used to encode the shape itself in accordance with the
299 -- encoding defined in 3G TS 23.032
300 --
301 -- An Add-GeographicalInformation parameter, whether valid or invalid, received
302 -- together with a valid Ext-GeographicalInformation parameter in the same message
303 -- shall be discarded.
304 --
305 -- An Add-GeographicalInformation parameter containing any shape not defined in
306 -- 3G TS 23.032 or an incorrect number of octets or coding according to
307 -- 3G TS 23.032 shall be treated as invalid data by a receiver if not received
308 -- together with a valid Ext-GeographicalInformation parameter in the same message.

```

309

```

310 maxAdd-GeographicalInformation INTEGER ::= 91
311 -- the maximum length allows support for all the shapes currently defined in 3G TS 23.032
312
313 SubscriberLocationReport-Arg ::= SEQUENCE {
314     lcs-Event                LCS-Event,
315     lcs-ClientID             LCS-ClientID,
316     lcsLocationInfo          LCSLocationInfo,
317     msisdn                   [0] ISDN-AddressString      OPTIONAL,
318     imsi                     [1] IMSI                    OPTIONAL,
319     imei                     [2] IMEI                    OPTIONAL,
320     na-ESRD                  [3] ISDN-AddressString      OPTIONAL,
321     na-ESRK                  [4] ISDN-AddressString      OPTIONAL,
322     locationEstimate         [5] Ext-GeographicalInformation OPTIONAL,
323     ageOfLocationEstimate    [6] AgeOfLocationInformation OPTIONAL,
324     extensionContainer       [7] ExtensionContainer       OPTIONAL,
325     ... ,
326     add-LocationEstimate     [8] Add-GeographicalInformation OPTIONAL,
327     deferredmt-lrData       [9] Deferredmt-lrData        OPTIONAL }
328
329 -- one of msisdn or imsi is mandatory
330 -- a location estimate that is valid for the locationEstimate parameter should
331 -- be transferred in this parameter in preference to the add-LocationEstimate.
332 -- the deferredmt-lrData parameter shall be included if and only if the lcs-Event
333 -- indicates a deferredmt-lrResponse.
334
335 Deferredmt-lrData ::= SEQUENCE {
336     deferredLocationEventType DeferredLocationEventType,
337     terminationCause          [0] TerminationCause      OPTIONAL,
338     lcsLocationInfo           [1] LCSLocationInfo        OPTIONAL,
339     ... }
340 -- lcsLocationInfo may be included only if a terminationCause is present
341 -- indicating mt-lrRestart.
342
343 LCS-Event ::= ENUMERATED {
344     emergencyCallOrigination (0),
345     emergencyCallRelease (1),
346     mo-lr (2),
347     ... ,
348     deferredmt-lrResponse (3) }
349 -- exception handling:
350 -- a SubscriberLocationReport-Arg containing an unrecognized LCS-Event
351 -- shall be rejected by a receiver with a return error cause of unexpected data value
352
353 TerminationCause ::= ENUMERATED {
354     normal (0),
355     errorundefined (1),
356     internalTimeout (2),
357     congestion (3),
358     mt-lrRestart (4),
359     privacyViolation (5),
360     ... }
361 -- mt-lrRestart shall be used to trigger the GMLC to restart the location procedure,
362 -- either because the sending node knows that the terminal has moved under coverage
363 -- of another MSC or SGSN (e.g. Send Identification received), or because the subscriber
364 -- has been autonomously deregistered by the serving node (e.g implicit detach).
365 --
366 -- exception handling
367 -- an unrecognized value shall be treated the same as value 1 (errorundefined)
368
369 SubscriberLocationReport-Res ::= SEQUENCE {
370     extensionContainer        ExtensionContainer          OPTIONAL,
371     ... }
372
373
374
375 END
376

```

## 17.7.14 Secure transport data types

```

MAP-ST-DataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-ST-DataTypes (27) version7 (7)version8 (8)}

DEFINITIONS
IMPLICIT TAGS
 ::=
BEGIN

EXPORTS
  SecureTransportArg,
  SecureTransportRes,
  SecurityHeader,
  ProtectedPayload
;

IMPORTS
  IMSI

FROM MAP-CommonDataTypes {
  ccitt identified-organization (4) etsi (0) mobileDomain (0)
  | gsm-Network (1) modules (3) map-CommonDataTypes (18) version7 (7)version8 (8)}
;

```

```

SecureTransportArg ::= SEQUENCE {
  securityHeader          SecurityHeader,
  protectedPayload        ProtectedPayload          OPTIONAL
}
-- The protectedPayload carries the result of applying the security function
-- defined in 3G TS 33.200 to the encoding of the argument of the securely
-- transported operation

```

```

SecureTransportRes ::= SEQUENCE {
  securityHeader          SecurityHeader,
  protectedPayload        ProtectedPayload          OPTIONAL
}
-- The protectedPayload carries the result of applying the security function
-- defined in 3G TS 33.200 to the encoding of the result of the securely
-- transported operation

```

```

SecurityHeader ::= SEQUENCE {
  securityParametersIndex SecurityParametersIndex,
  originalComponentIdentifier OriginalComponentIdentifier,
  initialisationVector    InitialisationVector          OPTIONAL,
  ...}

```

```

ProtectedPayload ::= OCTET STRING(SIZE(1.. 3438))
-- In protection mode 0 (noProtection) the ProtectedPayload carries the transfer
-- syntax value of the component parameter identified by the
-- originalComponentIdentifier.
-- In protection mode 1 (integrityAuthenticity) the protectedPayload carries
-- the transfer syntax value of the component
-- parameter identified by the originalComponentIdentifier, followed by
-- the 32 bit integrity check value.
-- The integrity check value is the result of applying the hash algorithm
-- to the concatenation of the transfer syntax value of the SecurityHeader,
-- and the transfer syntax value of the component parameter.
-- In protection mode 2 (confidentialityIntegrityAuthenticity) the protected
-- payload carries the encrypted transfer syntax
-- value of the component parameter identified by the
-- originalComponentIdentifier, followed by the 32 bit integrity check value.
-- The integrity check value is the result of applying the hash algorithm
-- to the concatenation of the transfer syntax value of the SecurityHeader,
-- and the encrypted transfer syntax value of the component parameter.
-- See 33.200.
-- The length of the protectedPayload is adjusted according to the capabilities of
-- the lower protocol layers

```

```

SecurityParametersIndex ::= OCTET STRING (SIZE(4))

```

```
InitialisationVector ::= OCTET STRING (SIZE(14))
-- the internal structure is defined as follows:
-- Octets 1 to 4 : TVP. The TVP is a 32 bit time stamp. Its value is binary coded
-- and indicates the number of intervals of 100 milliseconds
-- elapsed since 1st January 2002, 0:00:00 UTC
-- Octets 5 to 10: NE-Id. The NE-Id uniquely identifies the sending network entity
-- within the PLMN. It is the entity's E.164 number without CC and
-- NDC. It is TBCD-coded, padded with zeros.
-- Octets 11 to 14: PROP. This 32 bit value is used to make the
-- InitialisationVector unique within the same TVP period.
-- The content is not standardized.
```

```
OriginalComponentIdentifier ::= CHOICE {
  operationCode      [0] OperationCode,
  errorCode          [1] ErrorCode,
  userInfo           [2] NULL}
```

```
OperationCode ::= CHOICE {
  localValue         INTEGER,
  globalValue        OBJECT IDENTIFIER}
```

```
ErrorCode ::= CHOICE {
  localValue         INTEGER,
  globalValue        OBJECT IDENTIFIER}
```

END

## CHANGE REQUEST

⌘ **29.060 CR 311** ⌘ rev  ⌘ Current version: **5.1.0** ⌘

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

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Clarification on create PDP context for existing PDP context		
<b>Source:</b>	⌘ CN4		
<b>Work item code:</b>	⌘ TEI5	<b>Date:</b>	⌘ April 8th, 2002
<b>Category:</b>	⌘ <b>F</b>	<b>Release:</b>	⌘ REL-5
	<i>Use <u>one</u> of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <u>TR 21.900</u> .		<i>Use <u>one</u> of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘ It is not clear whether a new session is started or not if the GGSN receives a Create PDP Context for an active context.. In addition, the cases for TEID = 0 and TEID != 0 have not been appropriately addressed.
<b>Summary of change:</b>	⌘ The handling of the create PDP context request for an existing PDP context has been clarified.
<b>Consequences if not approved:</b>	⌘ There may be non uniform behavior amongst nodes

<b>Clauses affected:</b>	⌘ 7.3.1		
<b>Other specs affected:</b>	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	
<b>Other comments:</b>	⌘		

### 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.

### 7.3.1 Create PDP Context Request

A Create PDP Context Request shall be sent from a SGSN node to a GGSN node as a part of the GPRS PDP Context Activation procedure. After sending the Create PDP Context Request message, the SGSN marks the PDP context as 'waiting for response'. In this state the SGSN shall accept G-PDUs from the GGSN but shall not send these G-PDUs to the MS. A valid request initiates the creation of a tunnel between a PDP Context in a SGSN and a PDP Context in a GGSN. If the procedure is not successfully completed, the SGSN repeats the Create PDP Context Request message to the next GGSN address in the list of IP addresses, if there is one. If the list is exhausted the activation procedure fails.

The Tunnel Endpoint Identifier Data I field specifies a downlink Tunnel Endpoint Identifier for G-PDUs which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink G-PDUs which are related to the requested PDP context.

The Tunnel Endpoint Identifier Control Plane field specifies a downlink Tunnel Endpoint Identifier for control plane messages which is chosen by the SGSN. The GGSN shall include this Tunnel Endpoint Identifier in the GTP header of all subsequent downlink control plane messages which are related to the requested PDP context. If the SGSN has already confirmed successful assignment of its Tunnel Endpoint Identifier Control Plane to the peer GGSN, this field shall not be present. The SGSN confirms successful assignment of its Tunnel Endpoint Identifier Control Plane the GGSN when it receives any message with its assigned Tunnel Endpoint Identifier Control Plane in the GTP header from the GGSN.

The MSISDN of the MS is passed to the GGSN inside the Create PDP Context Request; This additional information can be used when a secure access to a remote application residing on a server is needed. The GGSN would be in fact able to provide the user identity (i. e. the MSISDN) to the remote application server, providing it with the level of trust granted to users through successfully performing the GPRS authentication procedures, without having to re-authenticate the user at the application level.

If the MS requests a dynamic PDP address and a dynamic PDP address is allowed, then the PDP Address field in the End User Address information element shall be empty. If the MS requests a static PDP Address then the PDP Address field in the End User Address information element shall contain the static PDP Address. In case the PDP addresses carried in the End User Address and optionally in the Protocol Configuration Option information element contain contradicting information, the PDP address carried in the End User Address information element takes the higher precedence. The Quality of Service Profile information element shall be the QoS values to be negotiated between the MS and the SGSN at PDP Context activation.

The SGSN shall include an SGSN Address for control plane and an SGSN address for user traffic, which may differ from that provided by the underlying network service (e.g. IP). The GGSN shall store these SGSN Addresses and use them when sending control plane on this GTP tunnel or G-PDUs to the SGSN for the MS.

The SGSN shall include a Recovery information element into the Create PDP Context Request if the SGSN is in contact with the GGSN for the very first time or if the SGSN has restarted recently and the new Restart Counter value has not yet been indicated to the GGSN. The GGSN that receives a Recovery information element in the Create PDP Context Request message element shall handle it in the same way as when receiving an Echo Response message. The Create PDP Context Request message shall be considered as a valid activation request for the PDP context included in the message.

The SGSN shall include either the MS provided APN, a subscribed APN or an SGSN selected APN in the message; the Access Point Name may be used by the GGSN to differentiate accesses to different external networks. The Selection Mode information element shall indicate the origin of the APN in the message.

For contexts created by the Secondary PDP Context Activation Procedure the SGSN shall include the linked NSAPI. Linked NSAPI indicates the NSAPI assigned to any one of the already activated PDP contexts for this PDP address and APN.

The Secondary PDP Context Activation Procedure may be executed without providing a Traffic Flow Template (TFT) to the newly activated PDP context if all other active PDP contexts for this PDP address and APN already have an associated TFT, otherwise a TFT shall be provided. TFT is used for packet filtering in the GGSN.

When using the Secondary PDP Context Activation Procedure, the Selection mode, IMSI, MSISDN, End User Address, Access Point Name and Protocol Configuration Options information elements shall not be included in the message.

The optional Protocol Configuration Options information element is applicable for the end user protocol 'IP' only.



The SGSN shall select one GGSN based on the user provided or SGSN selected APN. The GGSN may have a logical name that is converted to an address. The conversion may be performed with any name-to-address function. The converted address shall be stored in the “GGSN Address in Use” field in the PDP context and be used during the entire lifetime of the PDP context.

NOTE: A DNS query may be used as the name-to-IP address mapping of the GGSN. The IP address returned in the DNS response is then stored in the “GGSN Address in Use” field in the PDP context.

The IMSI information element together with the NSAPI information element uniquely identifies the PDP context to be created.

~~The SGSN may send a Create PDP Context Request even if the PDP context is already active.~~

The SGSN shall not send a Create PDP Context Request for an already active context.

~~The GGSN shall check if the PDP context already exists for the MS identified in a new Create PDP Context Request (not result of retransmission by the SGSN side). If a new Create PDP Context Request is incoming on TEID 0 for an already active PDP context, this Create PDP Context Request must be considered related to a new session. The existing PDP context shall be torn down locally, and the associated PDP contexts deleted locally, before the new session is created. The existing parameters in the PDP context shall then be replaced with the parameters in the Create PDP Context Request message and if a dynamic PDP address has already been allocated for the existing context, this address should be used and copied to the Create PDP Context Response message. If a new Create PDP Context Request is incoming on a TEID which is different from 0 and this TEID is already allocated to one or more activated PDP contexts, and the NSAPI IE value in this message matches the NSAPI value of an active PDP context, the GGSN shall send back a Create PDP Context Response with a rejection cause code. It is implementation dependent deciding whether to teardown or keep the existing PDP context.~~

If the GGSN uses the MNRG flag and the flag is set, the GGSN should treat the Create PDP Context Request as a Note MS Present Request and clear the MNRG flag.

The SGSN shall determine Charging Characteristics from the Subscribed Charging Characteristics and/or PDP Context Charging Characteristics depending on the presence of the information in the Packet Domain Subscription Data as defined in 3G TS 23.060 [4].

The SGSN shall include Trace Reference, Trace Type, Trigger Id, and OMC Identity in the message if GGSN trace is activated. The SGSN shall copy Trace Reference, Trace Type, and OMC Identity from the trace request received from the HLR or OMC.

The optional Private Extension contains vendor or operator specific information.

## CHANGE REQUEST

⌘ **29.232 CR 030** ⌘ rev **1** ⌘ Current version: **5.1.0** ⌘

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

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ GTT enhancement on Mc		
<b>Source:</b>	⌘ CN4		
<b>Work item code:</b>	⌘ TEI5	<b>Date:</b>	⌘ 10.4.2002
<b>Category:</b>	⌘ <b>B</b>	<b>Release:</b>	⌘ REL-5
	<i>Use one of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		<i>Use one of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘ 3GPP TS 23.205 needs to be enhanced according to 3GPP TS 23.226 (Rel5) to support pooling mechanism of GTT feature, which is one alternative solution for CTM to V.18 conversion in Bearer independent core network. If CTM need is indicated by MT, MSC server has to have capability to create CTM channel.
<b>Summary of change:</b>	⌘ Call Discrimination and Text telephony are added to chapter 14.
<b>Consequences if not approved:</b>	⌘ GTT does not work like specified in 3GPP TS 23.226.

<b>Clauses affected:</b>	⌘ 14	
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘
<b>Other comments:</b>	⌘	

### How to create CRs using this form:

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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.

**\*\*\* Modified Section \*\*\***

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## 14 H.248 standard packages

The following H.248 packages are used by this UMTS Capability Set:

- Generic v1 (see [10] Annex E.1);
- Base Root Package v1 (see [10] Annex E.2);
- Tone Generator Package v1 (see [10] Annex E.3);
- Tone Detection Package v1 (see [10] Annex E.4);
- Basic DTMF Generator Package v1 (see [10] Annex E.5);
- DTMF Detection Package v1 (see [10] Annex E.6);
- Call Progress Tones Generator Package v1 (see [10] Annex E.7);
- Generic Announcement Package v1 (see [10] Annex K);
- TDM Circuit Package v1 (see [10] Annex E.13);
- Media Gateway Resource Congestion Handling Package v1 (see [15] Annex M.2).
- Text Telephony Package (see [10] Annex F.87).
- Call Discrimination package (see [10] Annex F.98).

**\*\*\* End of modifications\*\*\***

## CHANGE REQUEST

⌘ **29.232 CR 032** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

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

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ Update to TFO package to explicitly reference TS 26.103 for 3GPP codecs		
<b>Source:</b>	⌘ CN4		
<b>Work item code:</b>	⌘ TEI5	<b>Date:</b>	⌘ 20-03-02
<b>Category:</b>	⌘ <b>D</b>	<b>Release:</b>	⌘ REL-5
	<i>Use one of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.	<i>Use one of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)	

<b>Reason for change:</b>	⌘ Currently the speech codecs are referenced to ITU Q.765.5 which subsequently references 26.103. It was raised during an SA4 meeting that this referencing was misleading.
<b>Summary of change:</b>	⌘ Include reference to TS 26.103 (Speech Codecs List) in TFO package.
<b>Consequences if not approved:</b>	⌘ Misleading reference to speech codecs from the TFO package.

<b>Clauses affected:</b>	⌘ 15.1.3.1, 15.1.3.2		
<b>Other specs affected:</b>	⌘ <input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> Test specifications ⌘ <input type="checkbox"/> O&M Specifications		
<b>Other comments:</b>	⌘		

### 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:

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- 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.

### 15.1.3 TFO package

**The addition of text encoding for the TFO codec list is for further study.**

PackageID: threegtfo (0x0031)

Version: 1

Extends: None

This package defines events and properties for Tandem Free Operation (TFO) control. TFO uses inband signalling and procedures for Transcoders to enable compressed speech to be maintained between a tandem pair of transcoders. This package allows an MGW which has inserted a transcoder to support TFO.

#### 15.1.3.1 Properties

TFO Activity Control

PropertyID: tfoenable (0x0001)

Description: Defines if TFO is enabled or not.

Type: Enumeration

Possible Values:

"On" (0x0001): TFO is enabled, TFO protocol is supported

"Off" (0x0002): TFO is not enabled, TFO protocol is not initiated or terminated

Defined in: Local Control descriptor

Characteristics: Read/Write

TFO Codec List

PropertyID: codeclist (0x0002)

Description: List of codecs for use in TFO protocol, the active codec is always the first entry in the list.

Type: Octet string

Possible Values:

List of codec types; each entry:

As defined in Q.765.5, for single codec information (Figure 14/Q.765.5), where the Codec Information is defined either in Q.765.5 or in another specification for the given Organisation Identifier. For 3GPP codecs these are defined in TS 26.103.

Defined in: Local Control descriptor

Characteristics: Read/Write

#### 15.1.3.2 Events

Optimal Codec Event

EventID: codec\_modify (0x0010)

Description:

The event is used to notify the MGC that TFO negotiation has resulted in an optimal codec type being proposed.

EventsDescriptor Parameters: None

ObservedEventsDescriptor Parameters:

Optimal Codec Type

ParameterID: optimalcodec (0x0011)

Description: indicates which is the proposed codec type for TFO

Type: Octet string

Possible Values:

Codec Type:

As defined in Q.765.5, for single codec information (Figure 14/Q.765.5), where the Codec Information is defined either in Q.765.5 or in another specification for the given Organisation Identifier. For 3GPP codecs these are defined in TS 26.103.

Codec List Event

EventID: distant\_codec\_list (0x0012)

Description: The event is used to notify the MGC of the distant TFO partner's supported codec list..

EventsDescriptor Parameters: None

ObservedEventsDescriptor Parameters:

Distant Codec List

ParameterID: distlist(0x0013)

Description: indicates the codec list for TFO

Type: Octet string

Possible Values:

List of codecs of type Codec Type:

As defined in Q.765.5, for single codec information (Figure 14/Q.765.5), where the Codec Information is defined either in Q.765.5 or in another specification for the given Organisation Identifier. For 3GPP codecs these are defined in TS 26.103.

The first Codec Type in the list is the one proposed for use (Optimal Codec Type).

### 15.1.3.3 Signals

None

### 15.1.3.4 Statistics

None

### 15.1.3.5 Procedures

For the procedures for TFO see 3GPP TS 28.062 [5].

The use of the properties in this package is applicable only when the MGW Termination to which the package properties are applied has the media stream property for Codec Type set to ITU-T G.711 (see Annex C of ITU-T Recommendation H.248). Furthermore, the package properties are applicable only if the Codec Type property of the media stream at the opposing MGW Termination is not set to ITU G.711.



## CHANGE REQUEST

⌘ **29.232 CR 033** ⌘ rev **2** ⌘ Current version: **5.1.0** ⌘

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

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

<b>Title:</b>	⌘ CTM Text Transport package		
<b>Source:</b>	⌘ CN4		
<b>Work item code:</b>	⌘ TEI5	<b>Date:</b>	⌘ 10.04.2002
<b>Category:</b>	⌘ <b>B</b>	<b>Release:</b>	⌘ REL-5
	<i>Use one of the following categories:</i> <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.	<i>Use one of the following releases:</i> <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)	

<b>Reason for change:</b>	⌘ In order to complete the protocol details (stage 3) of the GTT specified in 3GPP TS 23.226 and more specifically for the support of the pooling mechanism (in annex B) the following procedures are needed: If CTM need is indicated by MT, MSC server has to have capability to specify a CTM channel using this new package.
<b>Summary of change:</b>	⌘ Introduction of a new package to indicate CTM text transport.
<b>Consequences if not approved:</b>	⌘ GTT feature will not work as specified in 3GPP TS 23.226.

<b>Clauses affected:</b>	⌘ 2 and 15.1.6 (new)		
<b>Other specs affected:</b>	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	
<b>Other comments:</b>	⌘		

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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 Modified Section \*\*\***

## 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 23.153: "3rd Generation Partnership Project; Technical Specification Group Core Network; Out of Band Transcoder Control - Stage 2"
- [2] 3GPP TS 23.205: "3rd Generation Partnership Project; Technical Specification Group Core Network; Bearer Independent CS Core Network – Stage 2"
- [3] 3GPP TS 24.008: "3rd Generation Partnership Project; Technical Specification Group Core Network; Mobile radio interface layer 3 specification"
- [4] 3GPP TS 25.415: "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; UTRAN Iu interface user plane protocols".
- [5] 3GPP TS 28.062: "3rd Generation Partnership Project; Technical Specification Group Services & System Aspects; In-band Tandem Free Operation (TFO) of Speech Codecs; Stage 3 – Service Description"
- [6] 3GPP TS 29.007: "3rd Generation Partnership Project; Technical Specification Group Core Network; General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN)"
- [7] 3GPP TS 29.205: "3rd Generation Partnership Project; Technical Specification Group Core Network; Application of Q.1900 series to Bearer Independent CS Network architecture; Stage 3"
- [8] 3GPP TS 29.415: "3rd Generation Partnership Project; Technical Specification Group Core Network; CN Nb interface user plane protocols".
- [9] 3GPP TS 48.008: "3rd Generation Partnership Project; Technical Specification Group GSM EDGE Radio Access Network; Mobile-services Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".
- [10] ITU-T Recommendation H.248 (06/00): "Media Gateway Control Protocol"
- [11] ITU-T Recommendation Q.2210 (07/96): "Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140"
- [12] RFC 2960 "Stream Control Transmission Protocol"
- [13] 3G TS 29.202: "SS7 signalling transport in core network"
- [14] ITU-U Recommendation H.248 Annex L, "Error Codes and Service Change Reason Description"
- [15] ITU-U Recommendation H.248 Annex M.2, "Media Gateway Resource Congestion Handling Package"

- [16] ITU-U Recommendation H.248 Annex F, "Facsimile, Text Conversation and Call Discrimination Packages"
- [17] 3GPP TS 26.226: "3<sup>rd</sup> Generation Partnership Project; Technical Specification Group Services and System Aspects; Cellular Text Telephone Modem; General Description"
- [18] ITU-T Recommendation T.140: "Text conversation protocol for multimedia application"

**\*\*\* New Section \*\*\***

## 15.1.6 Cellular Text telephone Modem Text Transport

PackageName: CTM Text Transport

PackageID: threegctm (0x00??) [Editor's note: This needs to be registered with IANA]

Description:

The CTM text transport package is intended for enabling robust real time text conversation through a voice channel primarily intended for communication over mobile networks. This package includes the mechanisms needed to transport T.140 text conversation streams [18] in a voice channel environment, using the CTM Cellular Text Telephone Modem specified in 3GPP TS 26.226 [17]. The transport mechanism allows for alternating transport of voice and text.

Version: 1

Extends: None

### 15.1.6.1 Properties

Text termination connection state

PropertyID: connstate (0x0001)

Description: The connection state property is used to reflect details of the achieved text connection. For each new session connstate should be reset to "Prepare".

Type: Enumeration

Possible values:

"Idle" (0x0001) meaning that CTM availability negotiation has failed; CTM is disabled except for monitoring the incoming line for CTM signals.

"Prepare" (0x0002) for CTM being enabled, monitoring for CTM signals and ready to send CTM signals.

"Connected" (0x0006) for CTM being enabled and to have detected CTM availability in the current session.

Defined in: TerminationState

Characteristics: Read/Write

Text Transport

PropertyID: trpt (0x0002)

Description:

The transport parameter reflects the transport mechanism selected for the Text Conversation termination. In 3GPP, one possible transport mechanism is the Cellular Text Telephone Modem as in 3GPP TS 26.226 [17]. It is

used when it is desired to transport the text conversation in a voice channel. CTM enables alternating use of the voice channel for voice and text during the call.

Type: Enumeration

Possible values:

"ctm" (0x0008) for text transport in mobile voice channel as in 3GPP TS 26.226 [17].

Defined in: LocalControl

Characteristics: Read/Write

#### Text Protocol Version

PropertyID: textproto (0x0003)

Description:

The version of the T.140 protocol used in the connection.

Type: Integer

Possible values:

Any integer corresponding to a T.140 version number (currently 1) as in H.248 Annex F [16]

Defined in: LocalControl

Characteristics: Read/Write

### 15.1.6.2 Events

#### Connection State Change

EventID: connchange (0x0001)

Description:

This event will occur when the text connection state for the termination has changed.

The parameter values are the same as the Connection State property.

If a CTM availability request timed out, the state is returned to Idle.

EventDescriptorParameters:

None

ObservedEventDescriptorParameters

ParameterName: Connection Change

ParameterID: connchnng (0x0001)

Type: Enumeration

Possible Values: As property threegctm/connstate

### 15.1.6.3 Signals

None

#### 15.1.6.4 Statistics

##### Characters Transferred

StatisticsID: chartrans (0x0001)

Description:

Number of bytes of T.140 data transferred through the termination.

Units: count

#### 15.1.6.5 Procedures

If the MGC detects a CTM indication it shall send a request (Add/Modify/Move) with the CTM Transport property. Upon receipt of it, the MGW shall allocate a termination with CTM capabilities. Normal usage is that the CTM enabled termination handles one text stream and one voice stream and alternates between transporting voice and text in the voice channel according to the functionality of CTM. This termination could for example be combined in a context with a termination with the txp and ctyp packages for gateway functionality between PSTN text telephony and mobile CTM based text telephony. These packages are described in H.248 Annex F [16].

The CTM algorithm has states. The states defined in the text termination connection state property are mapped into CTM states in the following way:

- Idle: CTM disabled because of an unsuccessful CTM availability negotiation
- Prepare: normal initial state with CTM monitoring active
- Connected: CTM negotiation is completed

For each new call, the CTM termination shall be put in the Prepare state.

When the CTM availability negotiation is completed, the state is Connected.

The state transitions are automatic, except for setting Prepare state as described above.

**\*\*\*\* End of modifications\*\*\*\***

## CHANGE REQUEST

⌘ **29.232 CR 034** ⌘ rev **-** ⌘ Current version: **5.1.0** ⌘

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

**Proposed change affects:** ⌘ (U)SIM  ME/UE  Radio Access Network  Core Network

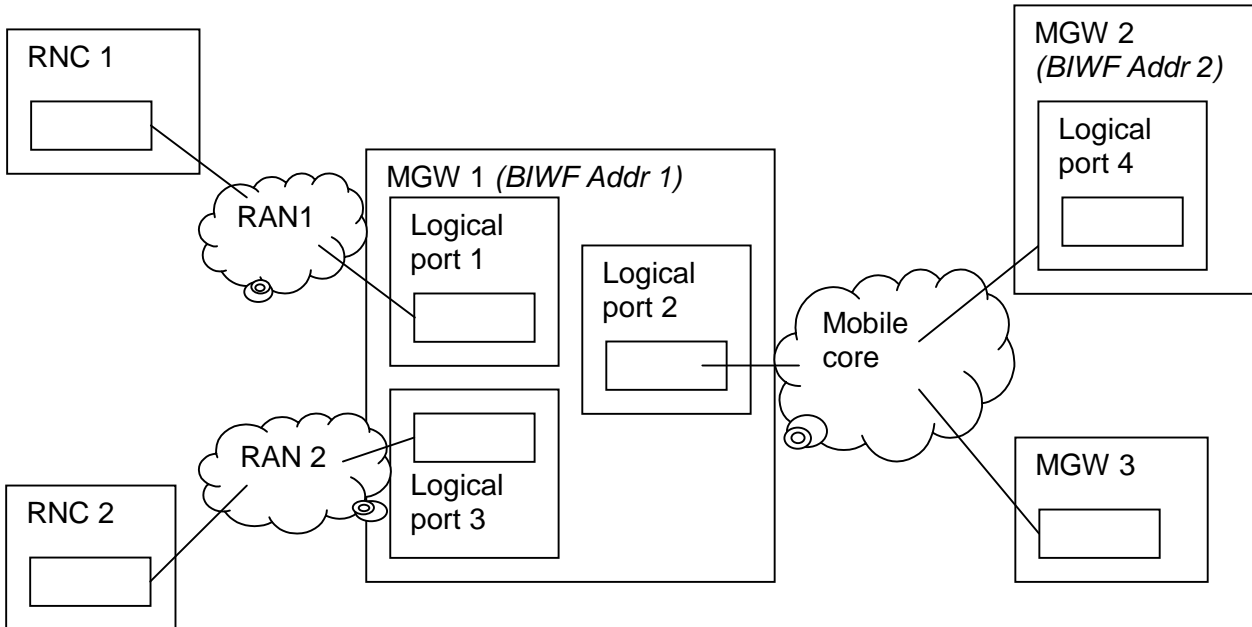
<b>Title:</b>	⌘ Allow the usage of logical port		
<b>Source:</b>	⌘ CN4		
<b>Work item code:</b>	⌘ TEI5	<b>Date:</b>	⌘ 2/5/02
<b>Category:</b>	⌘ <b>C</b>	<b>Release:</b>	⌘ REL-5
	Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> 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)

<b>Reason for change:</b>	⌘ Support certain not fully-meshed topologies of RAN and core IP network		
<b>Summary of change:</b>	⌘ The parameter "logical port" is made optional		
<b>Consequences if not approved:</b>	⌘ Certain IP network topologies, e.g. a direct connection of an RNC and a MGW with several IP interfaces, are not supported.		

<b>Clauses affected:</b>	⌘ 14.2.4, 14.2.5		
<b>Other specs affected:</b>	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	
<b>Other comments:</b>	⌘		

# Discussion

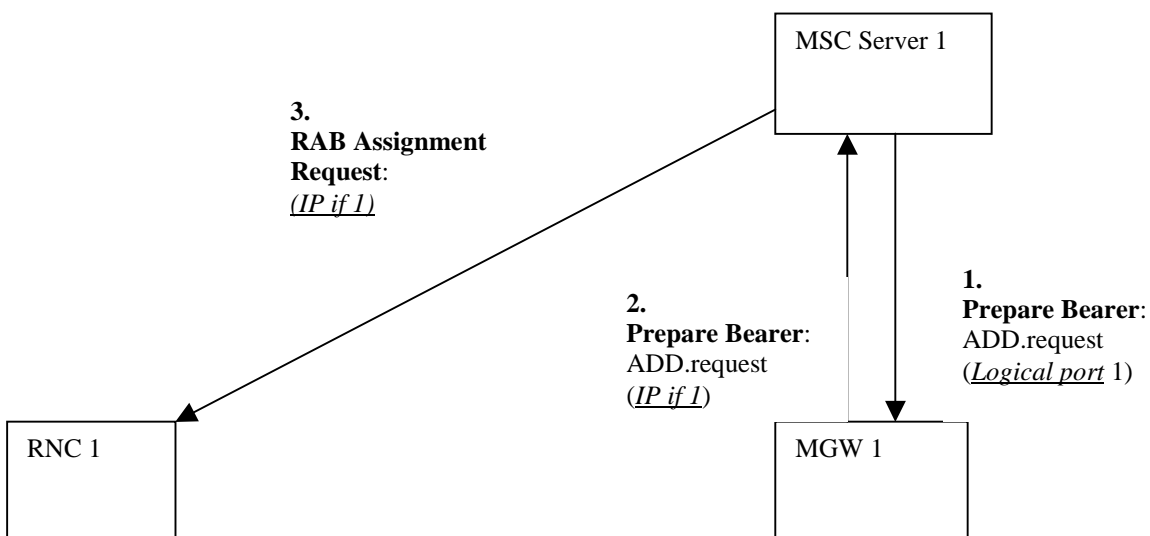
## Example Network Topology



Consider MGW1, which features three IP interfaces with separate IP addresses. The IP interfaces are connected to different network elements RNC1, RNC2, MGW1, MGW2. The connections may be separated IP networks, or IP point-to-point connections, or secure tunnels, or MPLS paths.

## Use of “logical port” on RAN side

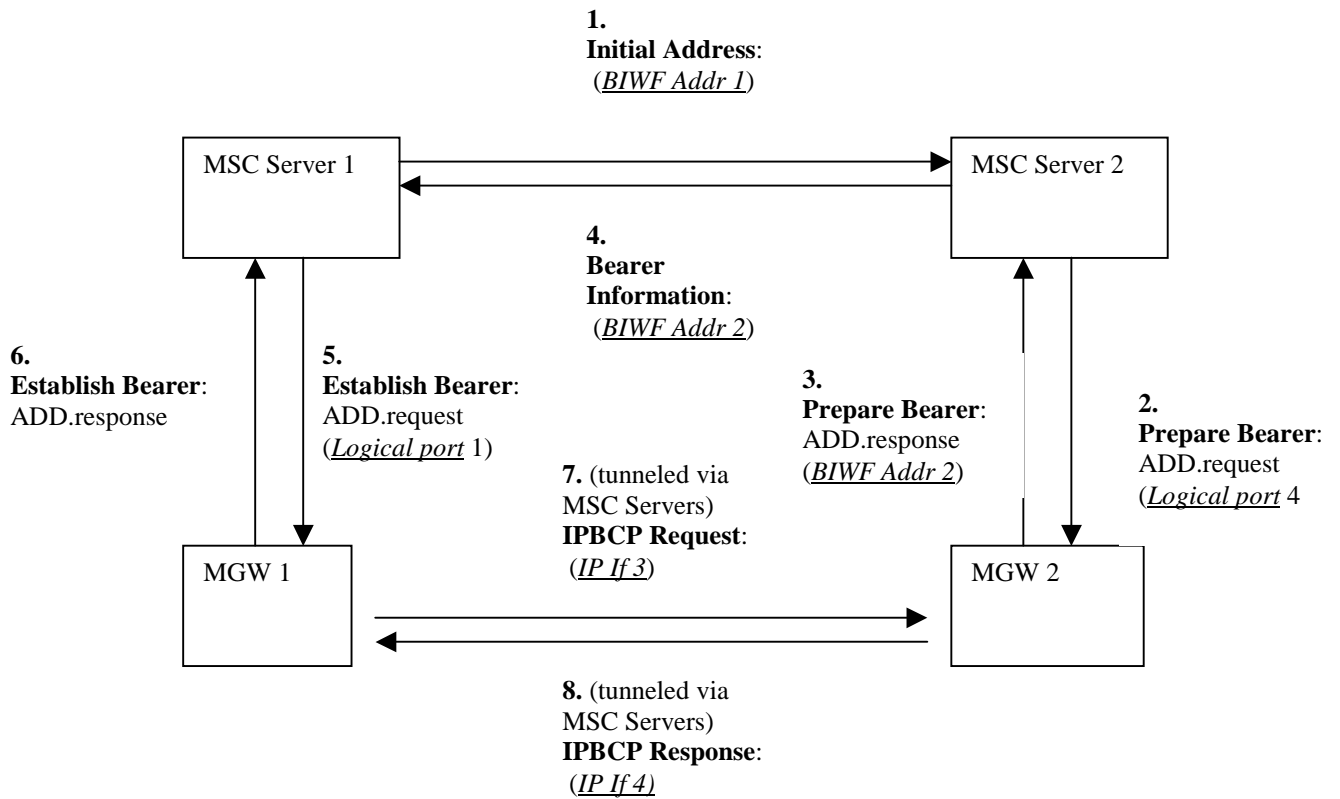
As outlined in the incoming LS from RAN3, several methods are currently to exchange IP Addresses for the Iu interface are currently under discussion. One of them is outlined in the picture below:



The MGW 1 selects an IP interface. It requires information from the MSC Server 1 to select an IP interface with connection to RNC1. This information is provided via the “logical port” parameter.

## Use of “logical port” on Core side

Consider e.g. the forward bearer establishment of a mobile originating call:



MGW 1 has to select an IP interface with suitable connectivity before sending the IPBCP Request (7). For this purpose, it uses information contained in the “Logical port” parameter of the “Establish Bearer” procedure (5).

MGW 2 may select an IP interface with the help of the “logical Port” parameter in the “Prepare Bearer” procedure (2), or it may defer this selection until the IPBCP Request (7) arrives and use the contained “IP if” parameter.

## Proposed modification

### 14.2.4 Establish Bearer

This procedure is the same as that defined in the subclause "Establish BNC\_notify" in ITU-T Recommendation Q.1950 (see 3GPP TS 29.205 [7]) with additions as shown below.

Address Information	Control information	Bearer information
	UP mode = Mode UP version = version Delivery of erroneous SDUs = value Interface = interface Initdirerection = initdirection  If indication on Protocol Negotiation Result requested: NotificationRequested (Event ID = x, "Prot Negotiation Result")  If indication on Rate Change requested: NotificationRequested (Event ID = x, "RateChange")	PLMN bearer capability = PLMN capability  GSM channel coding = coding

The parameter logical port is not used.

### 14.2.5 Prepare Bearer

This procedure is the same as that defined in the subclause "Prepare\_BNC\_notify" in ITU-T Recommendation Q.1950 (see 3GPP TS 29.205 [7]) with additions as shown below:

Address Information	Control information	Bearer information
	UP mode = mode UP version = version Delivery of erroneous SDUs = value Interface = interface Initdirerection = initdirection  If indication on Protocol Negotiation Result requested: NotificationRequested (Event ID = x, "Prot Negotiation Result")  If indication on Rate Change requested: NotificationRequested (Event ID = x, "RateChange") If indication on Bearer Modification requested: NotificationRequested (Event ID = x, "Bearer Modification Support")	PLMN bearer capability = PLMN capability  GSM channel coding = coding

The parameter logical port is not used.