3GPP TSG CN Plenary Meeting #25 **NP-040407**
8th – 10th August 2004 Palm Springs, US.

Source: TSG CN WG4

Title: Corrections on TEI6 pre-paging

Agenda item: 9.21

Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level N4-04	Phase	Subject	Cat	Ver_C
23.018	141	1	0926	Rel-6	Pre-Paging Resource Optimization	B	6.2.0
29.002	732	2	1128	Rel-6	Pre-Paging Resource Optimization	B	6.6.0

3GPP TSG CN WG4 Meeting #24 ***N4-040926***
Sophia Antipolis, FRANCE, 16th – 20th AUGUST 2004

CR-Form-v7

CHANGE REQUEST

⌘ **23.018** **CR** **141** ⌘ **rev** **1** ⌘ Current version: **6.2.0** ⌘

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

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

Title:	⌘	Pre-Paging Resource Optimization
Source:	⌘	CN4
Work item code:	⌘	TEI6
Date:	⌘	13/05/2004
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	To overcome the drawbacks introduced by "Pre-Paging" as described in 3GPP TR 23.908 Chapter 10, section "MSRN and Radio Resources in Failure Case"
Summary of change:	⌘	A new MAP service "Release Resources" is introduced. This service is used by the GMSC to request the VMSC to release resources associated with an MSRN.
Consequences if not approved:	⌘	The drawback as described in TR 23.908 persists.

Clauses affected:	⌘	5.2, 7.2.1.2, Figure 37b, Figure 37c, 7.3.1.1, Figure 76a, 8.1.4.4 (new), 8.8 (new)			
Other specs affected:	⌘	**Y** / **N**	Other core specifications	⌘	29.002 CR 732
		X /	Test specifications		
		X /	O&M Specifications		
Other comments:	⌘				

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

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

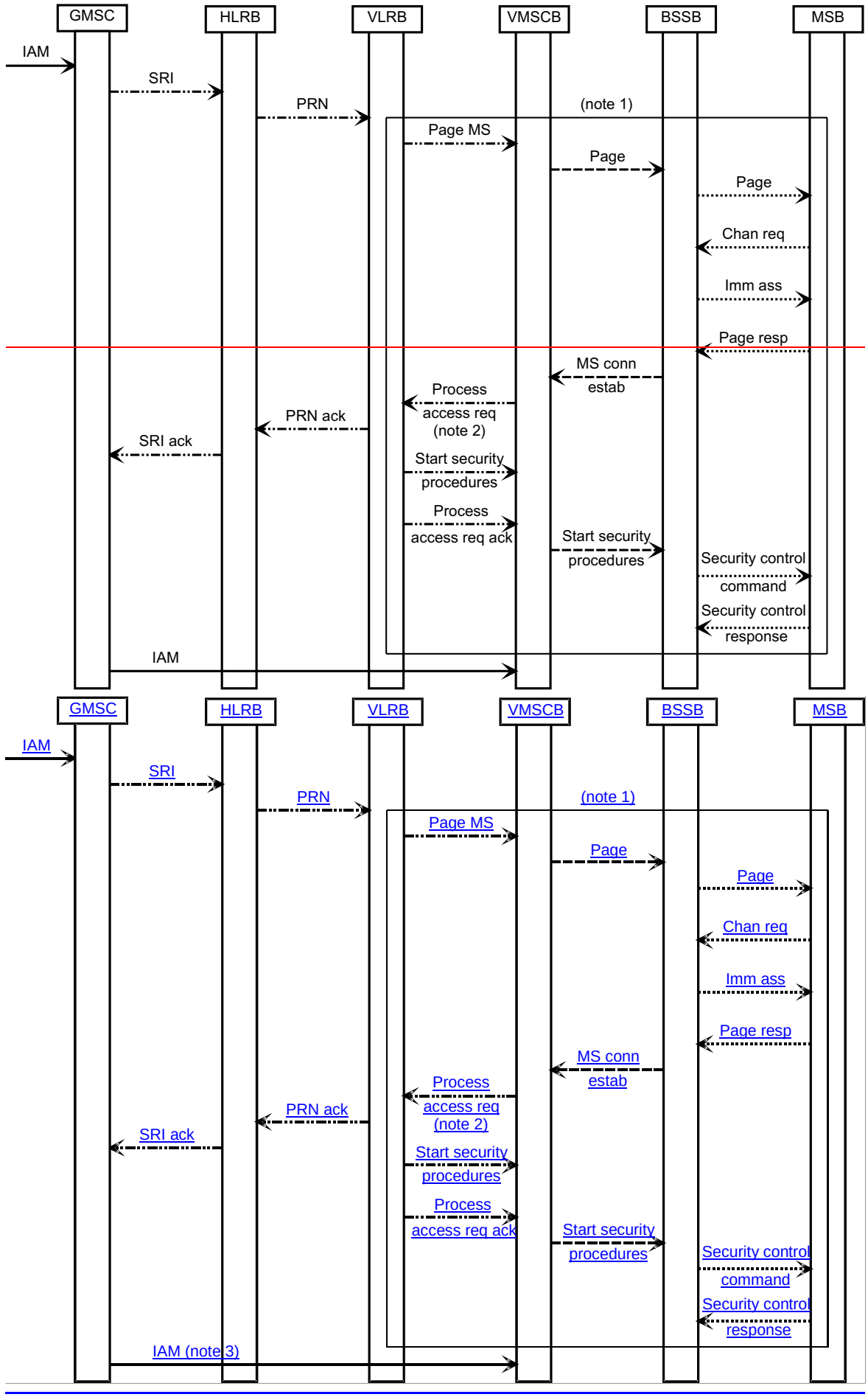
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

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

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

5.2 Information flow for retrieval of routeing information for an MT call

The information flow for retrieval of routeing information for an MT call is shown in figure 4. ISUP signalling between the originating exchange and GMSCB, and between GMSCB and VMSCB is shown by solid lines; signalling over the MAP interfaces between GMSCB and HLRB and between HLRB and VLRB, and over the B interface between VLRB and VMSCB is shown by chain lines; signalling over the Iu interface (for UMTS) or the A interface (for GSM) between VMSCB and BSSB is shown by dashed lines; and signalling over the radio interface between BSSB and MSB is shown by dotted lines.


GMSC
HLRB
VLRB
VMSCB
BSSB
MSB
IAM
SRI
PRN
(note 1)
Page MS
Page
Page
Chan req
Imm ass
Page resp
MS conn estab
Process access req (note 2)
PRN ack
SRI ack
Start security procedures
Process access req ack
Start security procedures
Security control command
Security control response
IAM
GMSC
HLRB
VLRB
VMSCB
BSSB
MSB
IAM
SRI
PRN
(note 1)
Page MS
Page
Page
Chan req
Imm ass
Page resp
MS conn estab
Process access req (note 2)
PRN ack
SRI ack
Start security procedures
Process access req ack
Start security procedures
Security control command
Security control response
IAM (note 3)

NOTE 1: If pre-paging is used, paging is initiated after VLRB has accepted the PRN message. The paging procedure is described in subclause 5.3.
NOTE 2: VMSCB starts the timer for the release of radio resources after it sends the Process Access Request message to VLRB. VMSCB releases the radio resource allocated for the MT call if the timer expires before the IAM is received, and when the MAP RELEASE_RESOURCES message is received from the GMSC.
NOTE 3: If an ISUP REL message is received at the GMSC between sending of SRI and receiving of SRI ack, the GMSC does not send IAM to the VMSC. Instead a MAP Release_Resources message may be sent to the VMSC.

Figure 4: Information flow for retrieval of routeing information for a basic mobile terminated call

When GMSCB receives an IAM, it analyses the called party address. If GMSCB can derive an HLR address from the B party address, it sends a request for routeing information (SRI) to HLRB. If GMSCB supports pre-paging (i.e. it is prepared to wait long enough for the SRI ack to allow pre-paging to be completed), it indicates this by an information element in the SRI message.

HLRB decides whether pre-paging is supported according to the following criteria:

- GMSCB has indicated that it supports pre-paging; and
- HLRB supports pre-paging (i.e. it is prepared to wait long enough for the PRN ack to allow pre-paging to be completed).

HLRB sends a request for a roaming number (PRN) to VLRB; if pre-paging is supported, it indicates this by an information element in the PRN message. VLRB returns the roaming number in the PRN ack, and HLRB relays the roaming number to GMSCB in the SRI ack. GMSCB constructs an IAM using the roaming number, and sends it to VMSCB.

**********next modification**********

7.2.1.2 Procedure Obtain_Routeing_Address

Sheet 1: the procedure MOBILE_NUMBER_PORTABILITY_IN_TQoD is specific to Mobile Number Portability; it is specified in 3GPP TS 23.066 [10].

Sheet 1: the procedure CCBS_MT_GMSC_Check_CCBS_Call is specific to CCBS; it is specified in 3GPP TS 23.093 [23].

Sheet 1: the procedure CLI_MT_GMSC is specific to Enhanced CLI Handling. It is specified in 3GPP TS 23.081 [14].

Sheet 1: for SCUDIF calls, the message Send Routeing Info shall include the ISDN BC of both the preferred and the less preferred service, as specified in 3GPP TS 23.172 [38].

Sheet 2: the procedure SCUDIF_Negative_SRI_Response_Handling is specific to SCUDIF; it is specified in 3GPP TS 23.172 [38]. If the GMSC does not support SCUDIF, processing continues from the "Fail" exit of the test "Result".

Sheet 2: the procedure OR_Handle_SRI_Negative_Response is specific to Support of Optimal Routeing. It is specified in 3GPP TS 23.079 [13]. If the GMSC does not support Optimal Routeing, processing continues from the "No" exit of the test "Result=Pass?".

Sheet 2: the test "Error=Unknown subscriber" refers to the negative response value received from the HLR.

Sheet 2: the procedure MOBILE_NUMBER_PORTABILITY_IN_QoHR is specific to Mobile Number Portability; it is specified in 3GPP TS 23.066 [10].

Sheet 3: the procedure SCUDIF_Check_Service_Availability is specific to SCUDIF; it is specified in 3GPP TS 23.172 [38]. If the GMSC does not support SCUDIF, processing continues from the "continue" exit of the test "Result ?".

Sheet 3: the procedure CAMEL_MT_GMSC_INIT is specific to CAMEL; it is specified in 3GPP TS 23.078 [12].

Sheet 3: the procedure SCUDIF_Check_Service_Compatibility is specific to SCUDIF; it is specified in 3GPP TS 23.172 [38].

Sheet 3: sending of "Release Resources" is an implementation option. If support of "Release Resources" by the VMSC is not indicated in Send Routing Info ack, "Release Resources" shall not be sent.

Sheet 4: the procedure SCUDIF_Check_Service_Compatibility is specific to SCUDIF; it is specified in 3GPP TS 23.172 [38].

Sheet 4: the procedure CCBS_MT_GMSC_Check_CCBS_Indicators is specific to CCBS; it is specified in 3GPP TS 23.093 [23].

Sheet 4: the task "Store Forwarding Interrogation Required indicator" is executed only if the GMSC supports Optimal Routeing.

Sheet 4: The test "MSRN contains a Routeing Number" is executed only if the SRF solution for call related MNP is used. If the SRF solution for call related MNP is not used, processing continues from the "No" exit of the test "MSRN contains a Routeing Number".

Sheet 4: the procedure MNP_MT_GMSC_Check_MNP_Indicators is specific to Mobile Number Portability; it is specified in 3GPP TS 23.066 [10].

Sheet 5: the procedure CAMEL_MT_GMSC_Notify_CF is specific to CAMEL phase 2 or later; it is specified in 3GPP TS 23.078 [12]. If the GMSC does not support CAMEL phase 2 or later, processing continues from the "Continue" exit of the test "Result".

Sheet 5: the procedure SCUDIF_Check_Service_Compatibility is specific to SCUDIF; it is specified in 3GPP TS 23.172 [38].

Sheet 6: the task "BOR:=OR" is executed only if the GMSC supports Optimal Routeing of mobile-to-mobile calls.

Sheet 6: the procedures CCBS_MT_GMSC_Remove_Indicators_Store_FWT is specific to CCBS; it is specified in 3GPP TS 23.093 [23].

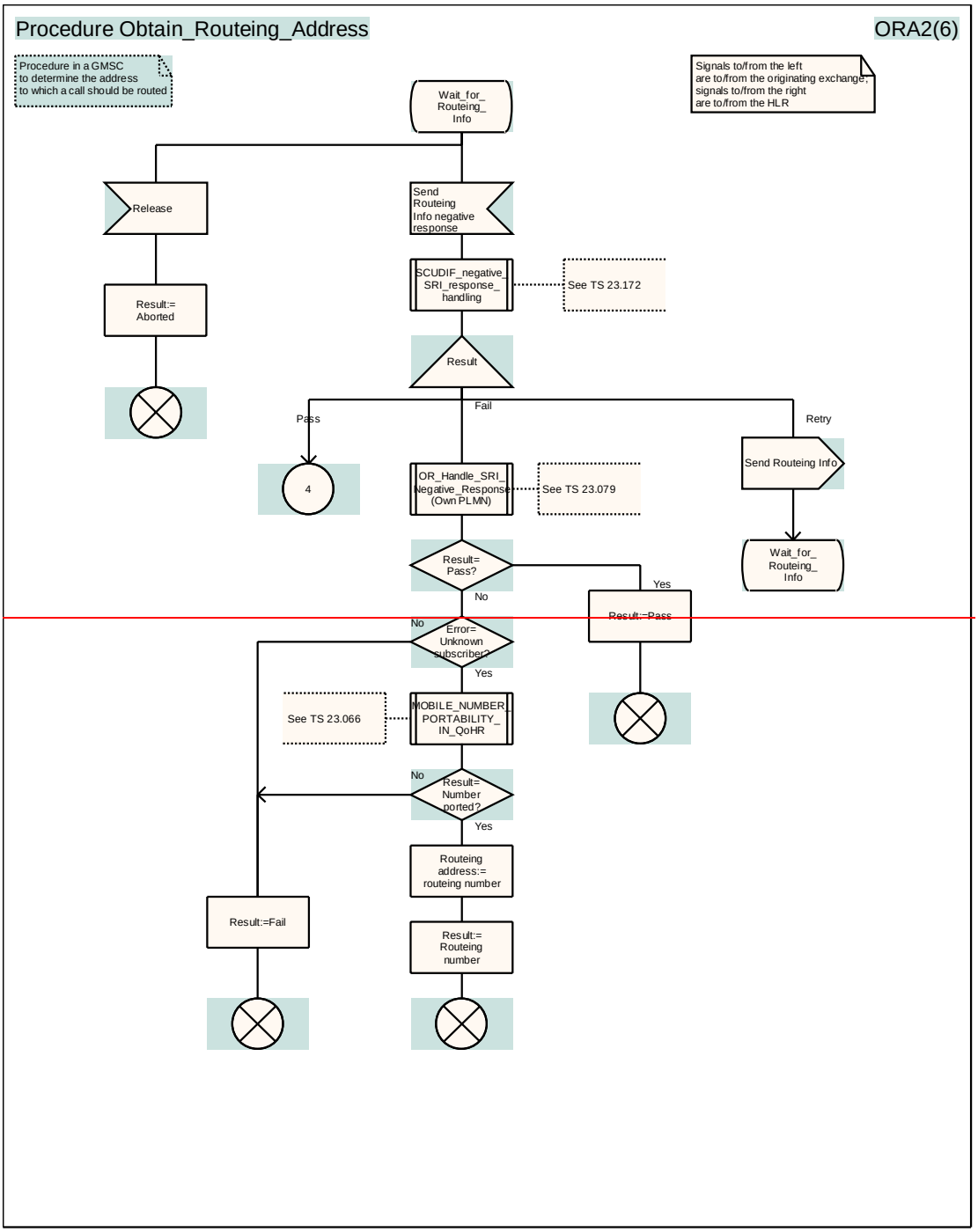
Sheet 6: the procedure Route_Permitted is specific to Support of Optimal Routeing. It is specified in 3GPP TS 23.079 [13]. If the GMSC does not support Optimal Routeing, processing continues from the "True" exit of the test "Route permitted".

Sheet 6: the procedure CAMEL_MT_MSC_DISC3 is specific to CAMEL phase 1; it is specified in 3GPP TS 23.078 [12].

Sheet 6: the procedure CAMEL_MT_GMSC_DISC4 is specific to CAMEL Phase 2 or later; it is specified in 3GPP TS 23.078 [12].

Sheet 6: the task "OR:= True" is executed only if the GMSC supports Optimal Routeing of mobile-to-mobile calls.

**********next modification**********


Procedure Obtain_Routeing_Address
ORA2(6)
Procedure in a GMSC to determine the address to which a call should be routed
Signals to/from the left are to/from the originating exchange; signals to/from the right are to/from the HLR
Wait_for_ Routeing_ Info
Release
Send Routeing Info negative response
Result:= Aborted
SCUDIF_negative_ SRI_response_ handling
See TS 23.172
Result
Pass
Fail
Retry
4
OR_Handle_SRI_ Negative_Response (Own PLMN)
See TS 23.079
Send Routeing Info
Wait_for_ Routeing_ Info
Result= Pass?
Yes
No
Result:=Pass
No
Error= Unknown subscriber?
Yes
See TS 23.066
MOBILE_NUMBER_ PORTABILITY_ IN_QoHR
No
Result= Number ported?
Yes
Routeing address:= routeing number
Result:=Fail
Result:= Routeing number

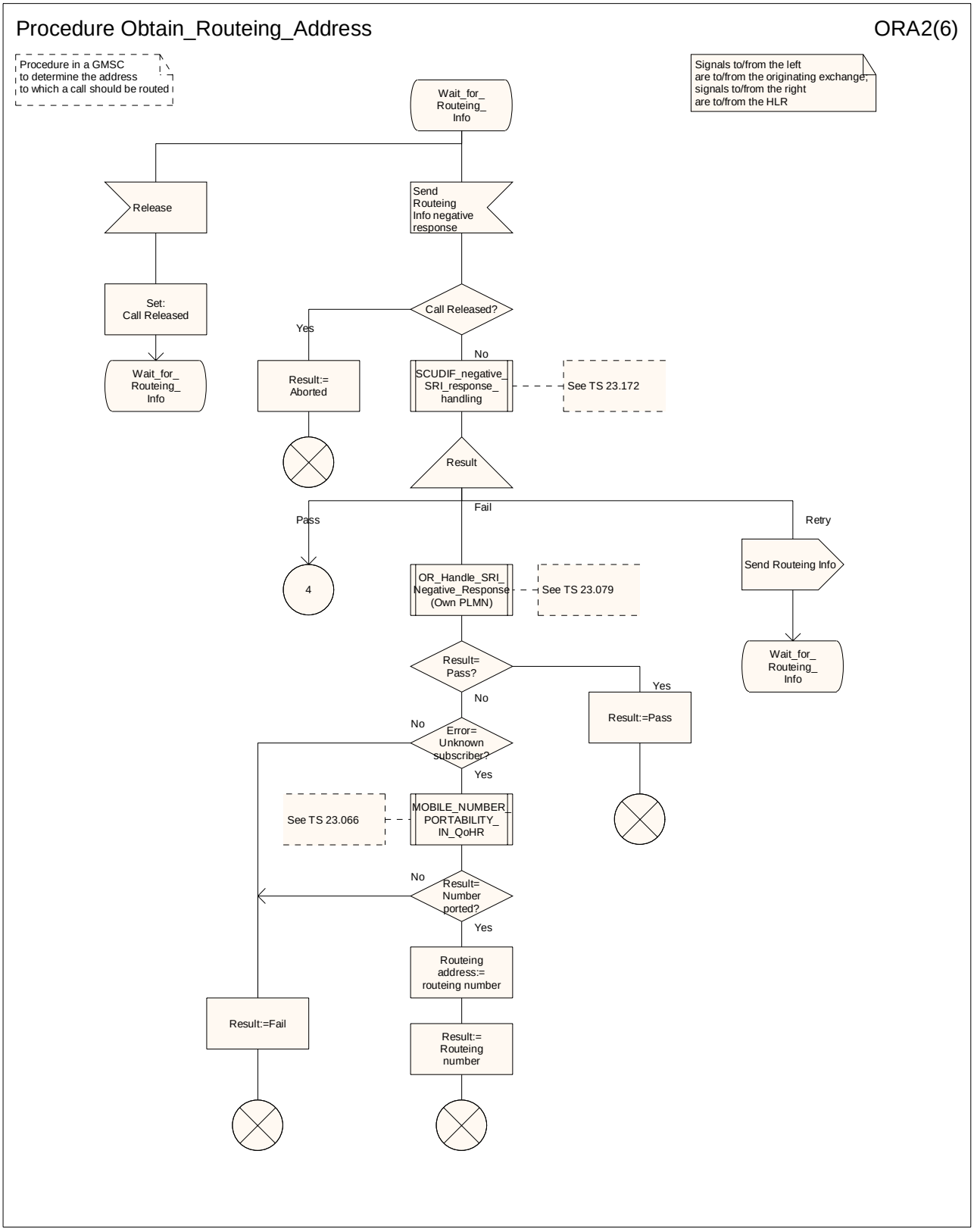
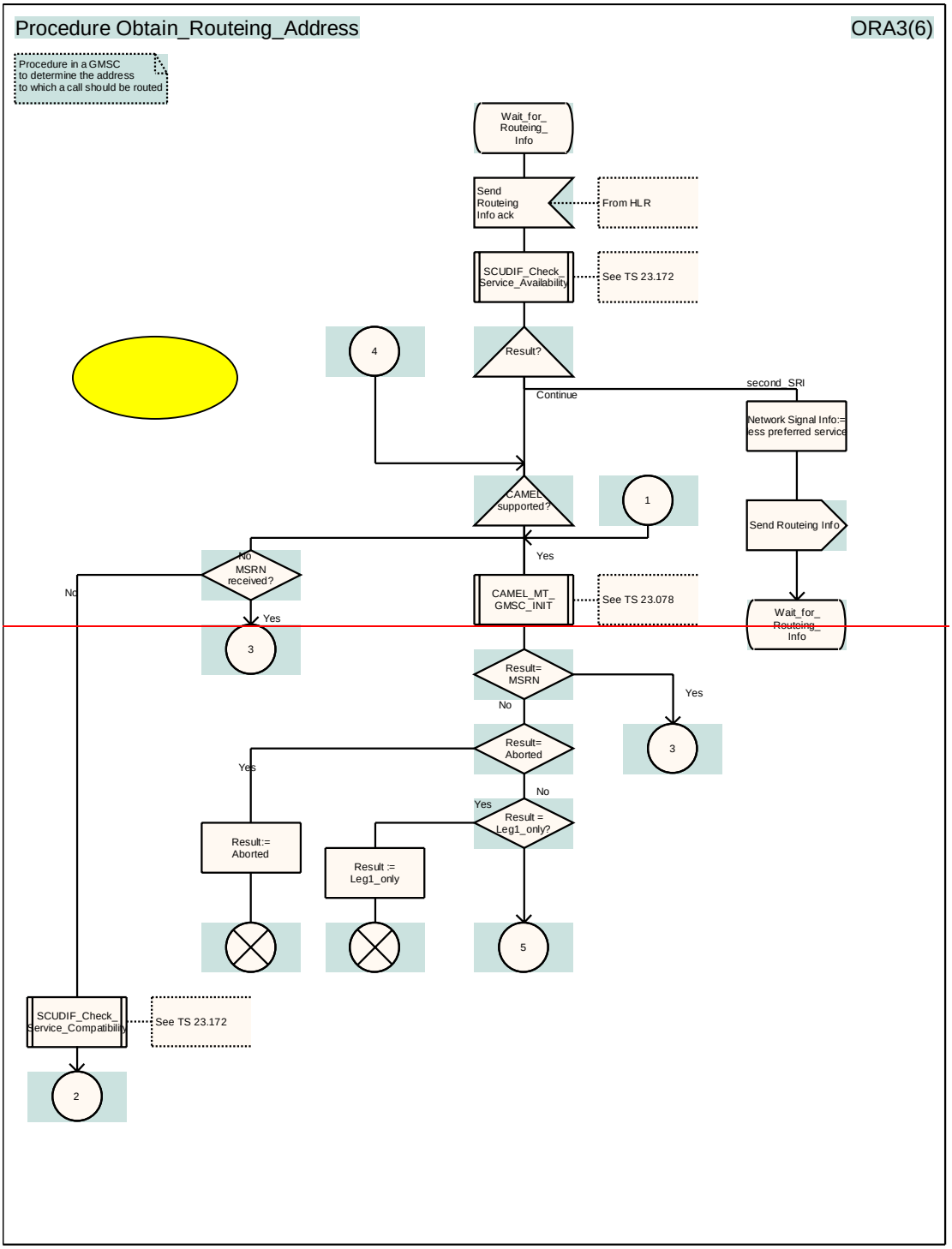


Figure 37b: Procedure Obtain_Routeing_Address (sheet 2)


Procedure Obtain_Routeing_Address
ORA3(6)
Procedure in a GMSC to determine the address to which a call should be routed
Wait_for_ Routeing_ Info
Send Routeing Info ack
From HLR
SCUDIF_Check_ Service_Availability
See TS 23.172
4
Result?
Continue
second_SRI
Network Signal Info:= less preferred service
CAMEL supported?
1
Send Routeing Info
No MSRN received?
Yes
No
CAMEL_MT_ GMSC_INIT
See TS 23.078
Wait_for_ Routeing_ Info
3
Result= MSRN
Yes
No
3
Result= Aborted
Yes
No
Yes
Result = Leg1_only?
Result:= Aborted
Result := Leg1_only
5
SCUDIF_Check_ Service_Compatibility
See TS 23.172
2

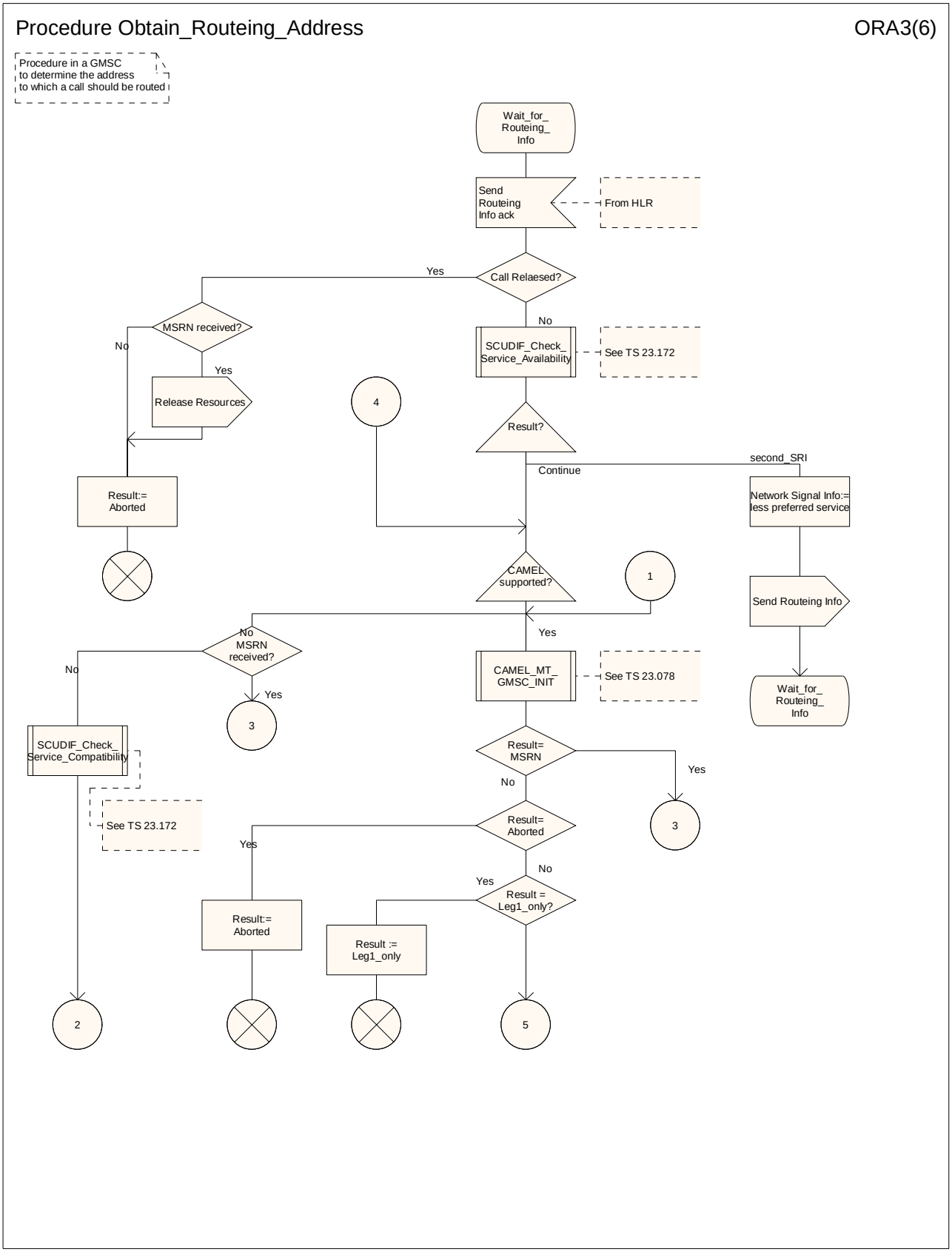


Figure 37c: Procedure Obtain_Routeing_Address (sheet 3)

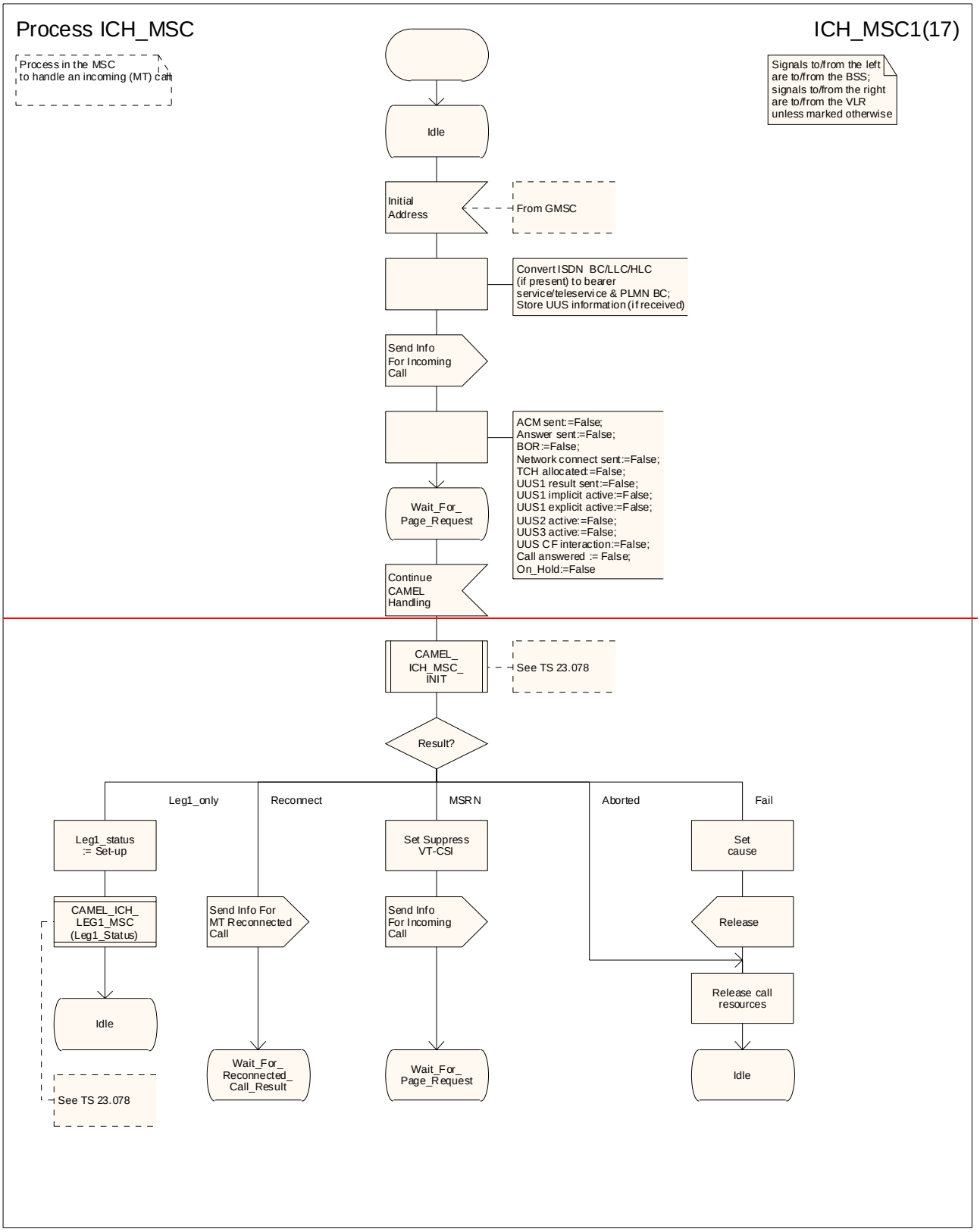
**********next modification**********

7.3.1.1 Process ICH_MSC

Sheet 1: the task "Release Resources" refers to any resources that may have been allocated for the call due to Pre-Paging.

Sheet 1: the rules for converting the ISDN BC/LLC/HLC to a bearer service or teleservice are specified in 3GPP TS 29.007 [30].

.....


Process ICH_MSC
ICH_MSC1(17)
Process in the MSC to handle an incoming (MT) call
Signals to/from the left are to/from the BSS; signals to/from the right are to/from the VLR unless marked otherwise
Idle
Initial Address
From GMSC
Convert ISDN BC/LLC/HLC (if present) to bearer service/teleservice & PLMN BC; Store UUS information (if received)
Send Info For Incoming Call
ACM sent:=False; Answer sent:=False; BOR:=False; Network connect sent:=False; TCH allocated:=False; UUS1 result sent:=False; UUS1 implicit active:=False; UUS1 explicit active:=False; UUS2 active:=False; UUS3 active:=False; UUS CF interaction:=False; Call answered := False; On_Hold:=False
Wait_For_ Page_Request
Continue CAMEL Handling
CAMEL_ ICH_MSC_ INIT
See TS 23.078
Result?
Leg1_only
Reconnect
MSRN
Aborted
Fail
Leg1_status := Set-up
CAMEL_ICH_ LEG1_MSC (Leg1_Status)
Idle
See TS 23.078
Send Info For MT Reconnected Call
Wait_For_ Reconnected_ Call_Result
Set Suppress VT-CSI
Send Info For Incoming Call
Wait_For_ Page_Request
Set cause
Release
Release call resources
Idle

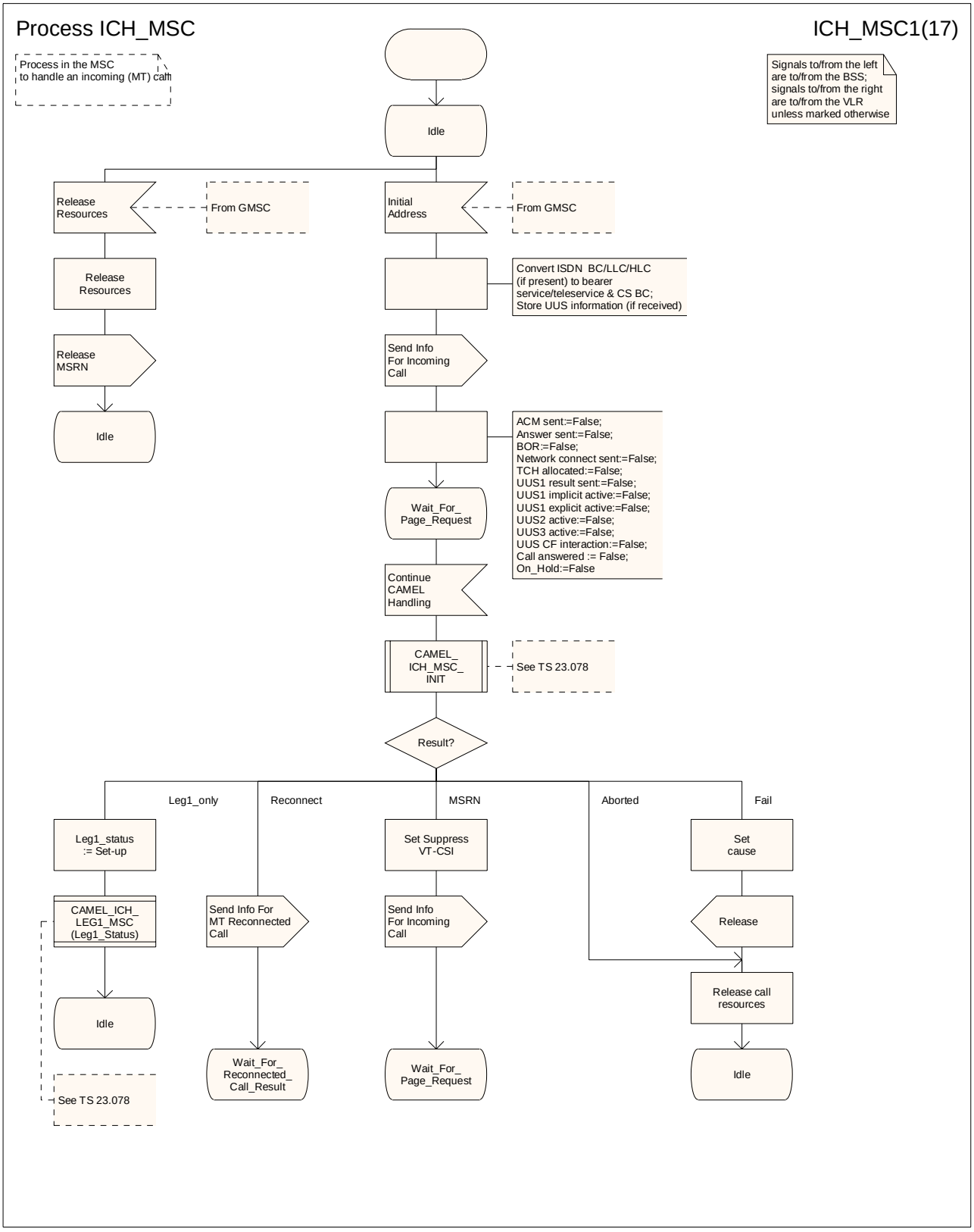
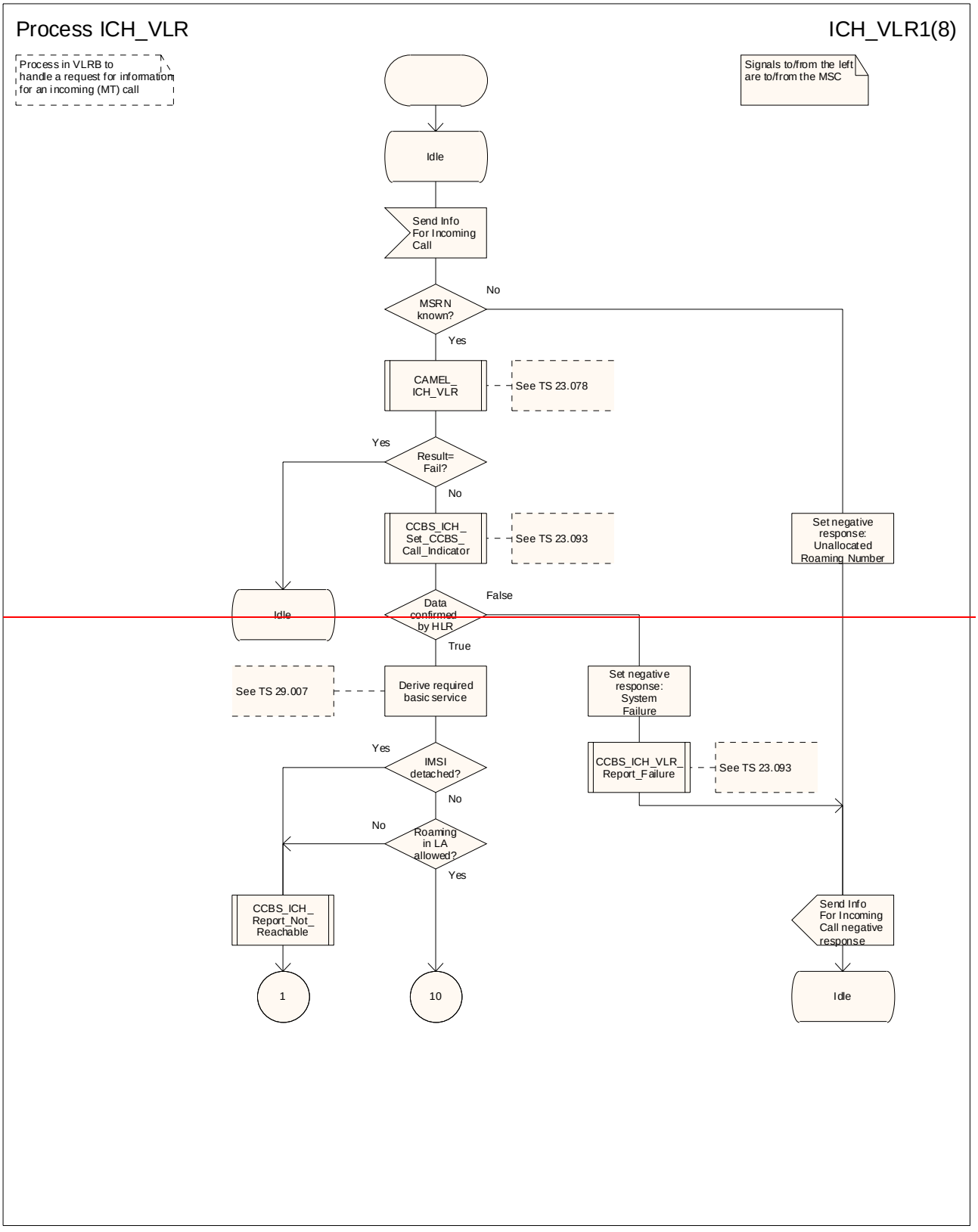


Figure 67a: Process ICH_MSC (sheet 1)

**********next modification**********


Process ICH_VLR
ICH_VLR1(8)
Process in VLRB to handle a request for information for an incoming (MT) call
Signals to/from the left are to/from the MSC
Idle
Send Info For Incoming Call
MSRN known?
No
Yes
CAMEL_ ICH_VLR
See TS 23.078
Result= Fail?
Yes
No
CCBS_ICH_ Set_CCBS_ Call_Indicator
See TS 23.093
Set negative response: Unallocated Roaming Number
Idle
Data confirmed by HLR
False
True
See TS 29.007
Derive required basic service
Set negative response: System Failure
IMSI detached?
Yes
No
CCBS_ICH_VLR_ Report_Failure
See TS 23.093
Roaming in LA allowed?
No
Yes
CCBS_ICH_ Report_Not_ Reachable
Send Info For Incoming Call negative response
1
10
Idle

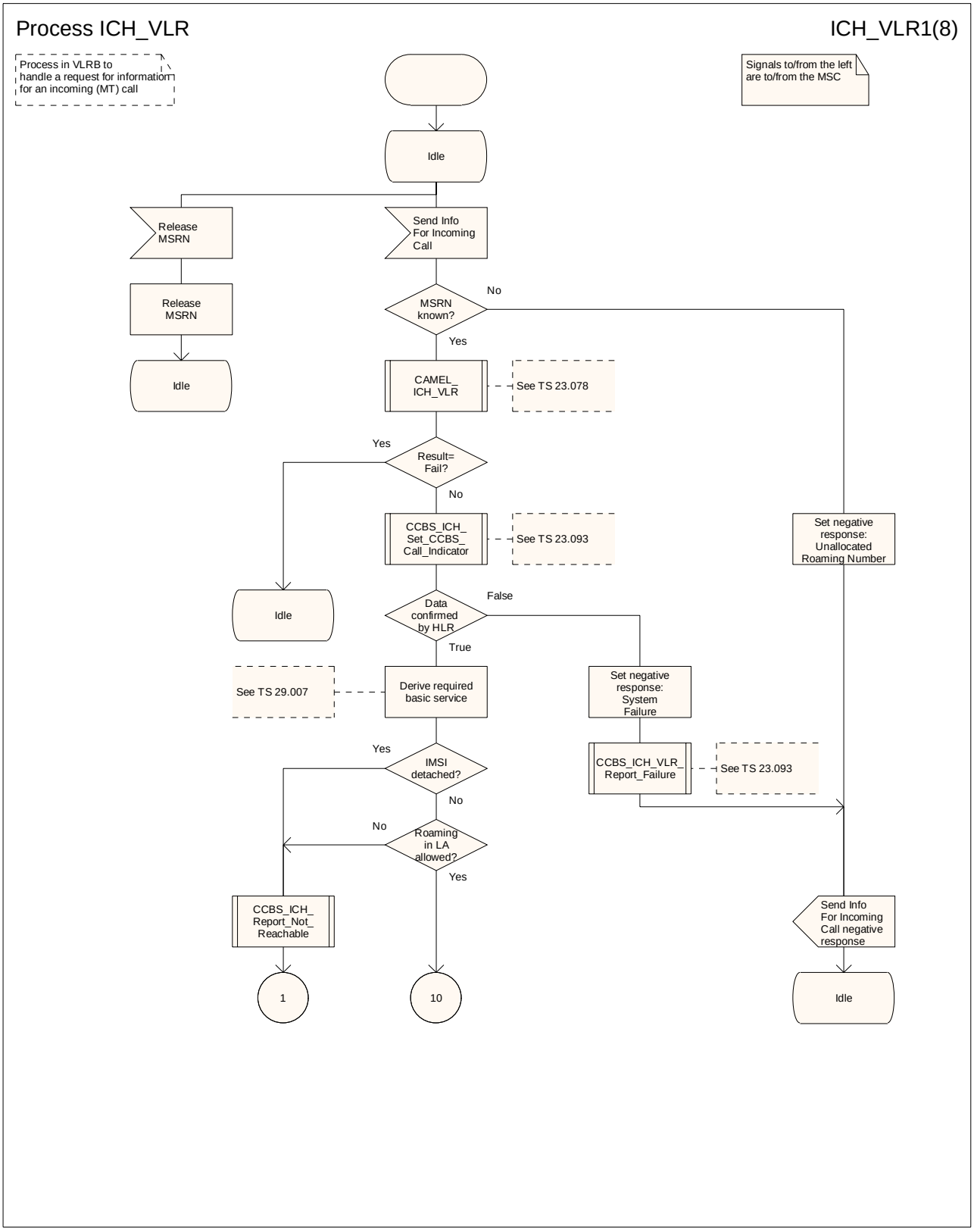


Figure 76a: Process ICH_VLR (sheet 1)

**********next modification**********

8.1.44 Release MSRN

The following information elements are required:

Information element name	Required	Description
MSRN	M	Mobile Station Roaming Number received with the message RELEASE RESOURCES.

**********next modification**********

8.8 Messages on the E interface (GMSC-VMSC)

8.8.1 Release Resources

The following information elements are required:

Information element name	Required	Description
MSRN	M	Mobile Station Roaming Number.

3GPP TSG CN WG4 Meeting #24 **N4-041128**
Sophia Antipolis, FRANCE, 16th – 20th AUGUST 2004

CR-Form-v7

CHANGE REQUEST

⌘ **29.002** **CR** **732** ⌘ **rev** **2** ⌘ Current version: **6.6.0** ⌘

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

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

Title:	⌘	Pre-Paging Resource Optimization
Source:	⌘	CN4
Work item code:	⌘	TEI6
Date:	⌘	16/08/2004
Category:	⌘	**B**
Release:	⌘	Rel-6

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R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	To overcome the drawbacks introduced by "Pre-Paging" as described in 3GPP TR 23.908 Chapter 10, section "MSRN and Radio Resources in Failure Case"
Summary of change:	⌘	A new MAP service "Release Resources" is introduced. This service is used by the GMSC to request the VMSC to release resources associated with an MSRN.
Consequences if not approved:	⌘	The drawback as described in TR 23.908 persists.

Clauses affected:	⌘	Table 5.1/2, 6.1.3.2.5, 6.1.3.11, 10.15 (new), 17.1.6, 17.2.2.55 (new), 17.3.2.50 (new), 17.3.3, 17.5, 17.6.3, 17.7.3, 21.1, 21.10 (new)

	Y	N			
Other specs affected: ⌘	X		Other core specifications	⌘	23.018 CR 141
		X	Test specifications		
		X	O&M Specifications		

Other comments:	⌘	

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

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

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

********next modification**********

10.1 MAP_SEND_ROUTING_INFORMATION service

10.1.1 Definition

This service is used between the Gateway MSC and the HLR. The service is invoked by the Gateway MSC to perform the interrogation of the HLR in order to route a call towards the called MS.

This is a confirmed service using the primitives listed in table 10.1/1.

This service is also used between the GMSC and the NPLR and between the gsmSCF and the HLR.

10.1.2 Service primitives

Table 10.1/1: MAP_SEND_ROUTING_INFORMATION parameters

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
Interrogation Type	M	M(=)		
GMSC or gsmSCF Address	M	M(=)		
MSISDN	M	M(=)	C	C(=)
OR Interrogation	C	C(=)		
OR Capability	C	C(=)		
CUG Interlock	C	C(=)	C	C(=)
CUG Outgoing Access	C	C(=)	C	C(=)
Number of Forwarding	C	C(=)		
Network Signal Info	C	C(=)		
Supported CAMEL Phases	C	C(=)	C	C(=)
Suppress T-CSI	C	C(=)		
Offered CAMEL 4 CSIs	C	C(=)		
Suppression of Announcement	C	C(=)		
Call Reference Number	C	C(=)		
Forwarding Reason	C	C(=)		
Basic Service Group	C	C(=)		
Basic Service Group 2	C	C(=)		
Alerting Pattern	C	C(=)		
CCBS Call	C	C(=)		
Supported CCBS Phase	C	C(=)		
Additional Signal Info	C	C(=)		
IST Support Indicator	C	C(=)		
Pre-paging supported	C	C(=)		
Call Diversion Treatment Indicator	C	C(=)		
Long FTN Supported	C	C(=)		
Suppress VT-CSI	C	C(=)		
Suppress Incoming Call Barring	C	C(=)		
gsmSCF Initiated Call	C	C(=)		
Network Signal Info 2	C	C(=)		
IMSI			C	C(=)
MSRN			C	C(=)
Forwarding Data			C	C(=)
Forwarding Interrogation Required			C	C(=)
VMSC address			C	C(=)
ReleaseResourcesSupported			C	C(=)
GMSC Camel Subscription Info			C	C(=)
Location Information			C	C(=)
Subscriber State			C	C(=)
Basic Service Code			C	C(=)
CUG Subscription Flag			C	C(=)

Parameter name	Request	Indication	Response	Confirm
North American Equal Access preferred Carrier Id			U	C(=)
User error			C	C(=)
SS-List			U	C(=)
CCBS Target			C	C(=)
Keep CCBS Call Indicator			C	C(=)
IST Alert Timer			C	C(=)
Number Portability Status			U	C(=)
Supported CAMEL Phases in VMSC			C	
Offered CAMEL 4 CSIs in VMSC			C	C(=)
MSRN 2			C	C(=)
Forwarding Data 2			C	C(=)
SS-List 2			C	C(=)
Basic Service Code 2			C	C(=)
Allowed Services			C	C(=)
Unavailability Cause			C	C(=)
Provider error				O

10.1.3 Parameter use

See clause 7.6 for a definition of the parameters used in addition to the following. Note that:

- a conditional parameter whose use is defined only in 3GPP TS 23.078 shall be absent if the sending entity does not support CAMEL;
- a conditional parameter whose use is defined only in 3GPP TS 23.079 [99] shall be absent if the sending entity does not support optimal routeing;
- a conditional parameter whose use is defined only in 3GPP TS 23.078 & 3GPP TS 23.079 [99] shall be absent if the sending entity supports neither CAMEL nor optimal routeing.

Interrogation Type

See 3GPP TS 23.079 [99] for the use of this parameter.

GMSC or gsmSCF address

The E.164 address of the GMSC or the gsmSCF. This parameter contains the gsmSCF address if the gsmSCF iniated call parameter is present, otherwise it is the GMSC address.

MSISDN

This is the Mobile Subscriber ISDN number assigned to the called subscriber. In the Request & Indication it is the number received by the GMSC in the ISUP IAM. If the call is to be forwarded and the HLR supports determination of the redirecting number, the HLR inserts the basic MSISDN in the Response.

See 3GPP TS 23.066 [108] for the use of this parameter and the conditions for its presence in the response.

OR Interrogation

See 3GPP TS 23.079 [99] for the use of this parameter and the conditions for its presence.

OR Capability

See 3GPP TS 23.079 [99] for the use of this parameter and the conditions for its presence.

CUG Interlock

See 3GPP TS 23.018 [97] for the use of this parameter and the conditions for its presence.

CUG Outgoing Access

See 3GPP TS 23.018 [97] for the use of this parameter and the conditions for its presence.

Number of Forwarding

See 3GPP TS 23.018 [97] for the use of this parameter and the conditions for its presence.

Network Signal Info

See 3GPP TS 23.018 [97] for the conditions for the presence of the components of this parameter.

Supported CAMEL Phases

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

T-CSI Suppression

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

Offered CAMEL 4 CSIs

This parameter indicates the CAMEL phase 4 CSIs offered in the GMSC/VLR (see clause 7.6.3.36D).

Suppression Of Announcement

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

Call Reference Number

The use of this parameter and the conditions for its presence are specified in 3GPP TS 23.078 [98] and 3GPP TS 23.079 [99].

Forwarding Reason

See 3GPP TS 23.079 [99] for the use of this parameter and the conditions for its presence.

Basic Service Group

See 3GPP TS 23.079 [99] for the use of this parameter and the conditions for its presence.

Basic Service Group 2

See 3GPP TS 23.079[99] for the use of this parameter and the conditions for its presence.

Alerting Pattern

See 3GPP TS 23.018 [97] and 3GPP TS 23.078 [98] for the use of this parameter and the conditions for its presence.

CCBS Call

See 3GPP TS 23.093 [107] for the use of this parameter and the conditions for its presence.

Supported CCBS Phase

This parameter indicates by its presence that CCBS is supported and the phase of CCBS which is supported.

Additional Signal Info

See 3GPP TS 23.081 [27] for the conditions for the presence of the components of this parameter.

IST Support Indicator

This parameter is used to indicate to the HLR that the GMSC supports basic IST functionality, that is, the GMSC is able to terminate the subscriber call activity that originated the IST Alert when it receives the IST Alert response indicating that the call(s) shall be terminated. If this parameter is not included in the Send Routing Information indication and the subscriber is marked as an IST subscriber, then the HLR may limit the service for the call (by barring the incoming call if it is not subject to forwarding, or suppressing Call Forwarding from the GMSC), or allow the call assuming the associated risk of not having the basic IST mechanism available.

This parameter can also indicate that the GMSC supports the IST Command, including the ability to terminate all calls being carried for the identified subscriber by using the IMSI as a key. If this additional capability is not included in the Send Routing Information indication and the subscriber is marked as an IST subscriber, then the HLR may limit the service for the subscriber (by barring the incoming calls if they are not subject to forwarding, or suppressing Call Forwarding from the GMSC), or allow the incoming calls assuming the associated risk of not having the IST Command mechanism available.

Pre-paging supported

See 3GPP TS 23.018 for the use of this parameter and the conditions for its presence.

Call Diversion Treatment Indicator

This parameter indicates whether or not call diversion is allowed.

Network Signal Info 2

See 3GPP TS 23.172 [126] for the conditions for the presence of the components of this parameter.

IMSI

See 3GPP TS 23.018 [97] and 3GPP TS 23.066 [108] for the use of this parameter and the conditions for its presence.

MSRN

See 3GPP TS 23.018 [97], 3GPP TS 23.066 [108] and 3GPP TS 23.079 [99] for the use of this parameter and the conditions for its presence. If the NPLR returns only the MSISDN-number without Routeing Number to the GMSC, the MSISDN-number shall be returned as MSRN.

Forwarding Data

This parameter includes a number to define the forwarded-to destination, the forwarding reason and the forwarding options Notification to calling party and Redirecting presentation, and can include the forwarded-to subaddress. See 3GPP TS 23.018 [97] and 3GPP TS 23.079 [99] for the conditions for the presence of its components.

Forwarding Interrogation Required

See 3GPP TS 23.079 [99] for the use of this parameter and the conditions for its presence.

Long FTN Supported

This parameter indicates that the GMSC supports Long Forwarded-to Numbers.

Suppress VT-CSI

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

Suppress Incoming Call Barring

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

gsmSCF Initiated Call

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

VMSC address

See 3GPP TS 23.079 [99] and 3GPP TS 23.078 [98] for the use of this parameter and the conditions for its presence. In addition this parameter shall be present if the ReleaseResourcesSupported parameter is present.

Release Resources Supported

This parameter indicates by its presence that the MAP_RELEASE_RESOURCES service is supported at the VMSC. It shall be present if so indicated by the VMSC with MAP_PROVIDE_ROAMING_NUMBER confirm.

GMSC CAMEL Subscription Info

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

Location Information

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

Subscriber State

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

CUG Subscription Flag

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

North American Equal Access preferred Carrier Id

This parameter is returned to indicate the preferred carrier identity to be used to set-up the call (i.e. forwarding the call or establishing the roaming leg).

SS-List

This parameter includes SS-codes and will be returned as an operator option. The HLR shall not send PLMN-specific SS-codes across PLMN boundaries. However if the GMSC receives PLMN-specific SS-codes from a foreign PLMN's HLR the GMSC may ignore it. If the GMSC attempts to process the PLMN- specific SS- codes, this may lead to unpredictable behaviour but the GMSC shall continue call processing.

Basic Service Code

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

If the CAMEL service is not involved, this parameter includes the basic service code and will be returned as an operator option. The HLR shall not send a PLMN-specific Basic Service Code across PLMN boundaries. However if the GMSC receives a PLMN-specific Basic Service Code from a foreign PLMN's HLR the GMSC may ignore it. If the GMSC attempts to process the PLMN specific Basic Service codes, this may lead to unpredictable behaviour but the GMSC shall continue call processing.

CCBS Target

See 3GPP TS 23.093 [107] for the use of this parameter and the conditions for its presence.

Keep CCBS Call Indicator

See 3GPP TS 23.093 [107] for the use of this parameter and the conditions for its presence.

IST Alert Timer

It includes the IST Alert timer value that must be used to inform the HLR about the call activities that the subscriber performs. This parameter is only sent to the GMSC in response to a Send Routing Information request which indicates the the GMSC supports IST.

Number Portability Status

This parameter indicates the number portability status of the subscriber. This parameter may be present if the sender of SRIack is NPLR.

Supported CAMEL Phases in VMSC

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078.

Offered CAMEL 4 CSIs in VMSC

This parameter is defined in clause 7.6.3.36F.

MSRN 2

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.172 [126].

Forwarding Data 2

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.172 [126].

SS-List 2

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.172 [126].

Basic Service Code 2

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.172 [126].

Allowed Services

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.172 [126].

Unavailability Cause

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.172 [126].

User error

This parameter is sent by the responder when an error is detected and if present, takes one of the following values:

- Unknown Subscriber;

  The diagnostic for the Unknown Subscriber error may indicate “NPDB Mismatch”.

- Number changed;

- Call Barred;

  This error will indicate that either incoming calls are barred for this MS or that calls are barred due to Operator Determined Barring (see 3GPP TS 22.041 [8] for a definition of this network feature);

- CUG Reject;

  The value of this error cause will indicate the reason for CUG Reject;

- Bearer Service Not Provisioned;

- Teleservice Not Provisioned;

  A subscription check has been performed and the call has not passed the check due to incompatibility with regard to the requested service. Depending on the nature of the incompatibility, either of these messages will be returned;

- Facility Not Supported;

- Absent Subscriber;

  This indicates that the location of the MS is not known (either the station is not registered and there is no location information available or the Provide Roaming Number procedure fails due to IMSI detached flag being set), or the GMSC requested forwarding information with a forwarding reason of not reachable, and the call forwarding on MS not reachable service is not active;

- Busy Subscriber;

  This indicates that Call Forwarding on Busy was not active for the specified basic service group when the GMSC requested forwarding information with a forwarding reason of busy;

  The error may also indicate that the subscriber is busy due to an outstanding CCBS recall. In the error data it may then be specified that CCBS is possible for the busy encountered call;

- No Subscriber Reply;

  This indicates that Call Forwarding on No Reply was not active for the specified basic service group when the GMSC requested forwarding information with a forwarding reason of no reply;

- OR Not Allowed;

  This indicates that the HLR is not prepared to accept an OR interrogation from the GMSC, or that calls to the specified subscriber are not allowed to be optimally routed;

- Forwarding Violation;

- System Failure;

- Data Missing;

- Unexpected Data Value.

See clause 7.6 for a definition of these errors.

Provider error

These are defined in clause 7.6.

10.2 MAP_PROVIDE_ROAMING_NUMBER service

10.2.1 Definition

This service is used between the HLR and VLR. The service is invoked by the HLR to request a VLR to send back a roaming number to enable the HLR to instruct the GMSC to route an incoming call to the called MS.

This is a confirmed service which uses the primitives described in table 10.2/1.

10.2.2 Service primitives

Table 10.2/1: MAP_PROVIDE_ROAMING_NUMBER parameters

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
IMSI	M	M(=)		
MSC Number	M	M(=)		
MSISDN	U	C(=)		
LMSI	C	C(=)		
GSM Bearer Capability	C	C(=)		
Network Signal Info	C	C(=)		
Suppression Of Announcement	C	C(=)		
Call Reference Number	C	C(=)		
GMSC Address	C	C(=)		
OR Interrogation	C	C(=)		
OR Not Supported in GMSC	C	C(=)		
Alerting Pattern	C	C(=)		
CCBS Call	C	C(=)		
Supported CAMEL Phases in interrogating node	C	C(=)		
Additional Signal Info	C	C(=)		
Pre-paging supported	C	C(=)		
Long FTN Supported	C	C(=)		
Suppress VT-CSI	C	C(=)		
~~Roaming Number~~			~~C~~	~~C(=)~~
Offered CAMEL 4 CSIs in interrogating node	C	C(=)		
Roaming Number			C	C(=)
ReleaseResourcesSupported			U	C(=)
User error			C	C(=)
Provider error				O

10.2.3 Parameter use

See clause 7.6 for a definition of the parameters used, in addition to the following. Note that:

- a conditional parameter whose use is defined only in 3GPP TS 23.078 [98] shall be absent if the sending entity does not support CAMEL;
- a conditional parameter whose use is defined only in 3GPP TS 23.079 [99] shall be absent if the sending entity does not support optimal routeing;
- a conditional parameter whose use is defined only in 3GPP TS 23.078 [98] & 3GPP TS 23.079 [99] shall be absent if the sending entity supports neither CAMEL nor optimal routeing.

IMSI

This is the IMSI of the called Subscriber.

MSC Number

This is the ISDN number assigned to the MSC currently serving the MS. The MSC number will have been stored in the HLR as provided at location updating.

MSISDN

See 3GPP TS 23.018 [97] for the use of this parameter and the conditions for its presence.

LMSI

See 3GPP TS 23.018 [97] for the use of this parameter and the conditions for its presence.

GSM Bearer Capability

See 3GPP TS 23.018 [97] for the use of this parameter and the conditions for its presence.

This information is passed according to the rules specified in TS 3GPP TS 29.007 [56].

There may be two GSM Bearer Capabilities supplied.

Network Signal Info

See 3GPP TS 23.018 [97] for the conditions for the presence of the components of this parameter.

Suppression Of Announcement

The use of this parameter and the requirements for its presence are specified in 3GPP TS 23.078 [98].

Call Reference Number

The use of this parameter and the conditions for its presence are specified in 3GPP TS 23.078 [98] and 3GPP TS 23.079 [99].

GMSC Address

The use of this parameter and the conditions for its presence are specified in 3GPP TS 23.078 [98] and 3GPP TS 23.079 [99].

OR Interrogation

See 3GPP TS 23.079 [99] for the use of this parameter and the conditions for its presence.

OR Not Supported in GMSC

See 3GPP TS 23.079 [99] for the use of this parameter and the conditions for its presence.

Supported CAMEL Phases in interrogating node

This parameter is defined in clause 7.6.3.36I.Alerting Pattern

See 3GPP TS 23.078 [98] for the use of this parameter and the conditions for its presence.

CCBS Call

See 3GPP TS 23.093 [107] for the use of this parameter and the conditions for its presence.

Additional Signal Info

See 3GPP TS 23.081 [27] for the conditions for the presence of the components of this parameter.

Pre-paging supported

See 3GPP TS 23.018 for the use of this parameter and the conditions for its presence.

Long FTN supported

See 3GPP TS 23.082 for the use of this parameter and the conditions for its presence.

Suppress VT-CSI

See 3GPP TS 23.078 for the use of this parameter and the conditions for its presence.

Offered CAMEL 4 CSIs in interrogating node

This parameter is defined in clause 7.6.3.36E.

Roaming Number

See 3GPP TS 23.018 [97] for the use of this parameter and the conditions for its presence.

ReleaseResourcesSupported

This parameter indicates by its presence that the MAP_RELEASE_RESOURCES service is supported at the VMSC.

User error

This parameter is sent by the responder when an error is detected and if present, takes one of the following values:

- Absent Subscriber;

  This error will be returned if the IMSI detach flag is set.

- No Roaming Number Available;
- OR Not Allowed;

  This indicates that the MAP_PROVIDE_ROAMING_NUMBER indication included the OR interrogation indicator, but the VLR does not support optimal routeing.

- Facility Not Supported;
- System Failure;
- Data Missing;
- Unexpected Data Value.

See clause 7.6 for a definition of these reasons.

Provider error

These are defined in clause 7.6.

********next modification**********

10.15 MAP_RELEASE_RESOURCES service

10.15.1 Definition

This service is used between the GMSC and the terminating VMSC. The service is invoked by the GMSC to request the VMSC to release the resources associated with the specified MSRN.

This is a confirmed service which uses the Primitives listed in table 10.15/1.

10.15.2 Service primitives

Table 10.15/1: MAP_RELEASE_RESOURCES parameters

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
MSRN	M	M(=)		
User error			C	C(=)
Provider error				O

10.15.3 Parameter use

MSRN

See 3GPP TS 23.018 [97] for the use of this parameter.

User error

This parameter is sent by the responder when an error is detected and if present, takes one of the following values:

- System Failure;
- Unexpected Data Value;

Provider error

These are defined in clause 7.6.

********next modification**********

17.1.6 Application Contexts

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

AC Name	AC Version	Operations Used	Comments
locationCancellationContext	v3	cancelLocation	
equipmentMngtContext	V3	checkIMEI	
imsiRetrievalContext	v2	sendIMSI	
infoRetrievalContext	v3	sendAuthenticationInfo	
interVlrInfoRetrievalContext	v3	sendIdentification	
handoverControlContext	v3	prepareHandover forwardAccessSignalling sendEndSignal processAccessSignalling prepareSubsequentHandover	the syntax of this operation has been extended in comparison with release 98 version
mwdMngtContext	v3	readyForSM	
msPurgingContext	v3	purgeMS	
shortMsgAlertContext	v2	alertServiceCentre	
resetContext	v2	reset	
networkUnstructuredSsContext	v2	processUnstructuredSS-Request unstructuredSS-Request unstructuredSS-Notify	
tracingContext	v3	activateTraceMode deactivateTraceMode	
networkFunctionalSsContext	v2	registerSS eraseSS activateSS deactivateSS registerPassword interrogateSS getPassword	
shortMsgMO-RelayContext	v3	mo-forwardSM	
shortMsgMT-RelayContext	v3	mt-forwardSM	
shortMsgGatewayContext	v3	sendRoutingInfoForSM reportSM-DeliveryStatus InformServiceCentre	the syntax of this operation has been extended in comparison with release 96 version
networkLocUpContext	v3	updateLocation forwardCheckSs-Indication restoreData insertSubscriberData activateTraceMode	the syntax is the same in v1 & v2
gprsLocationUpdateContext	v3	updateGprsLocation insertSubscriberData activateTraceMode	
subscriberDataMngtContext	v3	insertSubscriberData deleteSubscriberData	
roamingNumberEnquiryContext	v3	provideRoamingNumber	
locationInfoRetrievalContext	v3	sendRoutingInfo	
gprsNotifyContext	v3	noteMsPresentForGprs	
gprsLocationInfoRetrievalContext	v4	sendRoutingInfoForGprs	
failureReportContext	v3	failureReport	
callControlTransferContext	v4	resumeCallHandling	
subscriberInfoEnquiryContext	v3	provideSubscriberInfo	
anyTimeEnquiryContext	v3	anyTimeInterrogation	
anyTimeInfoHandlingContext	v3	anyTimeSubscriptionInterrogation anyTimeModification	
ss-InvocationNotificationContext	v3	ss-InvocationNotification	
groupCallControlContext	v3	prepareGroupCall processGroupCallSignalling forwardGroupCallSignalling sendGroupCallEndSignal	
reportingContext	v3	setReportingState statusReport remoteUserFree	
callCompletionContext	v3	registerCC-Entry	

AC Name	AC Version	Operations Used	Comments
		eraseCC-Entry	
istAlertingContext	v3	istAlert	
ServiceTerminationContext	v3	istCommand	
locationSvcEnquiryContext	v3	provideSubscriberLocation subscriberLocationReport	
locationSvcGatewayContext	v3	sendRoutingInfoForLCS	
mm-EventReportingContext	v3	noteMM-Event	
subscriberDataModificationNotificationContext	v3	noteSubscriberDataModified	
authenticationFailureReportContext	v3	authenticationFailureReport	
secureTransportHandlingContext	v3	secureTransportClass1 secureTransportClass2 secureTransportClass3 secureTransportClass4	
resourceManagementContext	v3	releaseResources	

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

********next modification**********

17.2.2.55 Resource Management

This operation package includes the operation required for procedures between GMSC and VMSC for resource management purpose.

```
resourceManagementPackage-v3  OPERATION-PACKAGE ::= {
    -- Supplier is VMSC if Consumer is GMSC
    CONSUMER INVOKES {
        releaseResources} }
```

This package is v3 only.

********next modification**********

17.3.2.50 Resource Management

This application context is used between GMSC and VMSC for resource management purpose.

```
resourceManagementContext-v3 APPLICATION-CONTEXT ::= {
    -- Responder is VMSC if Initiator is GMSC
    INITIATOR CONSUMER OF {
        resourceManagementPackage-v3 }
    ID   {map-ac resourceManagement(xx) version3(3)} }
```

This application-context is v3 only.

********next modification**********

17.3.3 ASN.1 Module for application-context-names

```
.....

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

resourceManagementContext-v3  OBJECT IDENTIFIER ::=
     {map-ac resourceManagement(xx) 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)
-- sIWFSAllocationContext-v3            map-ac sIWFSAllocation (12)                  version3 (3)
-- equipmentMngtContext-v1              map-ac equipmentMngt (13)                    version1 (1)
-- equipmentMngtContext-v2              map-ac equipmentMngt (13)                    version2 (2)
-- infoRetrievalContext-v1              map-ac infoRetrieval (14)                    version1 (1)
-- infoRetrievalContext-v2              map-ac infoRetrieval (14)                    version2 (2)
-- interVlrInfoRetrievalContext-v2      map-ac interVlrInfoRetrieval (15)            version2 (2)
-- subscriberDataMngtContext-v1         map-ac subscriberDataMngt (16)               version1 (1)
-- subscriberDataMngtContext-v2         map-ac subscriberDataMngt (16)               version2 (2)
-- tracingContext-v1                    map-ac tracing (17)                          version1 (1)
-- tracingContext-v2                    map-ac tracing (17)                          version2 (2)
-- networkFunctionalSsContext-v1        map-ac networkFunctionalSs (18)              version1 (1)
-- shortMsgGatewayContext-v1            map-ac shortMsgGateway (20)                  version1 (1)
-- shortMsgGatewayContext-v2            map-ac shortMsgGateway (20)                  version2 (2)
-- shortMsgRelayContext-v1              map-ac shortMsgRelay (21)                    version1 (1)
-- shortMsgAlertContext-v1              map-ac shortMsgAlert (23)                    version1 (1)
-- mwdMngtContext-v1                    map-ac mwdMngt (24)                          version1 (1)
-- mwdMngtContext-v2                    map-ac mwdMngt (24)                          version2 (2)
-- shortMsgMT-RelayContext-v2           map-ac shortMsgMT-Relay (25)                 version2 (2)
-- msPurgingContext-v2                  map-ac msPurging (27)                        version2 (2)
-- callControlTransferContext-v3        map-ac callControlTransferContext (6)        version3 (3)
-- gprsLocationInfoRetrievalContext-v3  map-ac gprsLocationInfoRetrievalContext (33) version3 (3)

END
```

********next modification**********

17.5 MAP operation and error codes

```
MAP-Protocol {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-Protocol (4) version9 (9)}

DEFINITIONS

::=
```

```
BEGIN

IMPORTS
   OPERATION
FROM Remote-Operations-Information-Objects {
   joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)}

   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 {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MobileServiceOperations (5)
   version9 (9)}

   activateTraceMode,
   deactivateTraceMode,
   sendIMSI
FROM MAP-OperationAndMaintenanceOperations {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-OperationAndMaintenanceOperations (6)
   version9 (9)}

   sendRoutingInfo,
   provideRoamingNumber,
   resumeCallHandling,
   setReportingState,
   statusReport,
   remoteUserFree,
   ist-Alert,
   ist-Command,
   releaseResources
FROM MAP-CallHandlingOperations {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CallHandlingOperations (7)
   version9 (9)}

   registerSS,
   eraseSS,
   activateSS,
   deactivateSS,
   interrogateSS,
   processUnstructuredSS-Request,
   unstructuredSS-Request,
   unstructuredSS-Notify,
   registerPassword,
   getPassword,
   ss-InvocationNotification,
   registerCC-Entry,
   eraseCC-Entry
FROM MAP-SupplementaryServiceOperations {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SupplementaryServiceOperations (8)
```

```
   version9 (9)}

   sendRoutingInfoForSM,
   mo-ForwardSM,
   mt-ForwardSM,
   reportSM-DeliveryStatus,
   alertServiceCentre,
   informServiceCentre,
   readyForSM
FROM MAP-ShortMessageServiceOperations {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ShortMessageServiceOperations (9)
   version9 (9)}

   prepareGroupCall,
   processGroupCallSignalling,
   forwardGroupCallSignalling,
   sendGroupCallEndSignal
FROM MAP-Group-Call-Operations {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-Group-Call-Operations (22)
   version9 (9)}

   provideSubscriberLocation,
   sendRoutingInfoForLCS,
   subscriberLocationReport
FROM MAP-LocationServiceOperations {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-LocationServiceOperations (24)
   version9 (9)}

secureTransportClass1,
secureTransportClass2,
secureTransportClass3,
secureTransportClass4

FROM MAP-SecureTransportOperations {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SecureTransportOperations (26)
   version9 (9)}

;
Supported-MAP-Operations OPERATION ::= {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 | activateTraceMode | deactivateTraceMode | sendIMSI |
   sendRoutingInfo | provideRoamingNumber | resumeCallHandling | setReportingState | statusReport |
remoteUserFree | ist-Alert |
   ist-Command | registerSS | eraseSS | activateSS | deactivateSS | interrogateSS |
   processUnstructuredSS-Request | unstructuredSS-Request | unstructuredSS-Notify |
   registerPassword | getPassword | ss-InvocationNotification | registerCC-Entry | eraseCC-Entry |
   sendRoutingInfoForSM | mo-ForwardSM | mt-ForwardSM | reportSM-DeliveryStatus |
   alertServiceCentre | informServiceCentre | readyForSM | prepareGroupCall |
   processGroupCallSignalling | forwardGroupCallSignalling | sendGroupCallEndSignal |
   provideSubscriberLocation | sendRoutingInfoForLCS | subscriberLocationReport |
   secureTransportClass1 |secureTransportClass2 | secureTransportClass3 | secureTransportClass4 |
   releaseResources}


-- 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)	local:9
-- processUnstructuredSS-Data	map-ac networkFunctionalSs (18) version1 (1)	local:19
-- performHandover	map-ac handoverControl (11) version1 (1)	local:28
-- performSubsequentHandover	map-ac handoverControl (11) version1 (1)	local:30
-- provideSIWFSNumber	map-ac sIWFSAllocation (12) version3 (3)	local:31
-- siwfs-SignallingModify	map-ac sIWFSAllocation (12) version3 (3)	local:32
-- noteInternalHandover	map-ac handoverControl (11) version1 (1)	local:35
-- noteSubscriberPresent	map-ac mwdMngt (24) version1 (1)	local:48
-- alertServiceCentreWithoutResult	map-ac shortMsgAlert (23) version1 (1)	local:49
-- traceSubscriberActivity	map-ac handoverControl (11) version1 (1)	local:52
-- beginSubscriberActivity	map-ac networkFunctionalSs (18) version1 (1)	local: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)	local:2
-- invalidTargetBaseStation	map-ac handoverControl (11) version1 (1)	local:23
-- noRadioResourceAvailable	map-ac handoverControl (11) version1 (1)	local:24

```
END
```

********next modification**********

17.6.3 Call Handling Operations

```
MAP-CallHandlingOperations {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CallHandlingOperations (7)
   version9 (9)}

DEFINITIONS

::=

BEGIN

EXPORTS
   sendRoutingInfo,
   provideRoamingNumber,
   resumeCallHandling,
   setReportingState,
   statusReport,
   remoteUserFree,
   ist-Alert,
   ist-Command,
   releaseResources
;

IMPORTS
   OPERATION
FROM Remote-Operations-Information-Objects {
   joint-iso-itu-t remote-operations(4)
  informationObjects(5) version1(0)}

   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 {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-Errors (10) version9 (9)}
   SendRoutingInfoArg,
   SendRoutingInfoRes,
   ProvideRoamingNumberArg,
   ProvideRoamingNumberRes,
   ResumeCallHandlingArg,
   ResumeCallHandlingRes,
   SetReportingStateArg,
   SetReportingStateRes,
   StatusReportArg,
   StatusReportRes,
   RemoteUserFreeArg,
   RemoteUserFreeRes,
   IST-AlertArg,
   IST-AlertRes,
   IST-CommandArg,
   IST-CommandRes,
   ReleaseResourcesArg,
   ReleaseResourcesRes
FROM MAP-CH-DataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CH-DataTypes (13) version9 (9)}

;
```

```
sendRoutingInfo  OPERATION ::= {                                    --Timer m
-- The timer is set to the upper limit of the range if the GMSC supports pre-paging.
     ARGUMENT
          SendRoutingInfoArg
     RESULT
          SendRoutingInfoRes
     ERRORS {
          systemFailure |
          dataMissing |
          unexpectedDataValue |
          facilityNotSupported |
          or-NotAllowed |
          unknownSubscriber |
          numberChanged |
          bearerServiceNotProvisioned |
          teleserviceNotProvisioned |
          absentSubscriber |
          busySubscriber |
          noSubscriberReply |
          callBarred |
          cug-Reject |
          forwardingViolation}
     CODE local:22 }
```

```
provideRoamingNumber  OPERATION ::= {                               --Timer m
-- The timer is set to the upper limit of the range if the HLR supports pre-paging.
     ARGUMENT
          ProvideRoamingNumberArg
     RESULT
          ProvideRoamingNumberRes
     ERRORS {
          systemFailure |
          dataMissing |
          unexpectedDataValue |
          facilityNotSupported |
          or-NotAllowed |
          absentSubscriber |
          noRoamingNumberAvailable}
     CODE local:4 }
```

```
resumeCallHandling  OPERATION ::= {                                    --Timer m
     ARGUMENT
          ResumeCallHandlingArg
     RESULT
          ResumeCallHandlingRes
          -- optional
     ERRORS {
          forwardingFailed |
          or-NotAllowed |
          unexpectedDataValue |
          dataMissing }
     CODE local:6 }
```

```
setReportingState  OPERATION ::= {                                     --Timer m
     ARGUMENT
          SetReportingStateArg
     RESULT
          SetReportingStateRes
          -- optional
     ERRORS {
          systemFailure |
          unidentifiedSubscriber |
          unexpectedDataValue |
          dataMissing |
          resourceLimitation |
          facilityNotSupported}
     CODE local:73 }
```

```
statusReport  OPERATION ::= {                                          --Timer m
     ARGUMENT
          StatusReportArg
     RESULT
          StatusReportRes
          -- optional
     ERRORS {
          unknownSubscriber |
          systemFailure |
          unexpectedDataValue |
          dataMissing}
     CODE local:74 }
```

```
remoteUserFree  OPERATION ::= {                                        --Timer ml
     ARGUMENT
          RemoteUserFreeArg
     RESULT
          RemoteUserFreeRes
     ERRORS {
          unexpectedDataValue |
          dataMissing |
          incompatibleTerminal |
          absentSubscriber |
          systemFailure |
          busySubscriber}
     CODE local:75 }
```

```
ist-Alert  OPERATION ::= {                                             --Timer m
     ARGUMENT
          IST-AlertArg
     RESULT
          IST-AlertRes
          -- optional
     ERRORS {
          unexpectedDataValue |
          resourceLimitation |
          unknownSubscriber |
          systemFailure |
          facilityNotSupported}
     CODE local:87 }
```

```
ist-Command  OPERATION::= {                                          --Timer m
     ARGUMENT
          IST-CommandArg
     RESULT
          IST-CommandRes
          -- optional
     ERRORS {
          unexpectedDataValue |
          resourceLimitation |
          unknownSubscriber |
          systemFailure |
          facilityNotSupported}
     CODE local:88 }
```

```
releaseResources  OPERATION::= {                                     --Timer m
     ARGUMENT
          ReleaseResourcesArg
     RESULT
          ReleaseResourcesRes
          -- optional
     ERRORS {
          unexpectedDataValue |
          systemFailure }
     CODE local:xx }
```

```
END
```

********next modification**********

17.7.3 Call handling data types

```
MAP-CH-DataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CH-DataTypes (13) version9 (9)}

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS
   SendRoutingInfoArg,
   SendRoutingInfoRes,
   ProvideRoamingNumberArg,
   ProvideRoamingNumberRes,
   ResumeCallHandlingArg,
   ResumeCallHandlingRes,
   NumberOfForwarding,
   SuppressionOfAnnouncement,
   CallReferenceNumber,
   SetReportingStateArg,
   SetReportingStateRes,
   StatusReportArg,
   StatusReportRes,
   RemoteUserFreeArg,
   RemoteUserFreeRes,
   IST-AlertArg,
   IST-AlertRes,
   IST-CommandArg,
   IST-CommandRes,
   ReleaseResourcesArg,
   ReleaseResourcesRes
;

IMPORTS
   SubscriberInfo,
   SupportedCamelPhases,
   OfferedCamel4CSIs,
   CUG-Interlock,
   O-CSI,
   D-CSI,
```

```
   O-BcsmCamelTDPCriteriaList,
   T-BCSM-CAMEL-TDP-CriteriaList,
   IST-SupportIndicator,
   IST-AlertTimerValue,
   T-CSI,
   NumberPortabilityStatus
FROM MAP-MS-DataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MS-DataTypes (11) version9 (9)}

   ForwardingOptions,
   SS-List,
   CCBS-Feature
FROM MAP-SS-DataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SS-DataTypes (14) version9 (9)}

   ISDN-AddressString,
   ISDN-SubaddressString,
   FTN-AddressString,
   ExternalSignalInfo,
   Ext-ExternalSignalInfo,
   IMSI,
   LMSI,
   Ext-BasicServiceCode,
   AlertingPattern,
   NAEA-PreferredCI
FROM MAP-CommonDataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version9 (9)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   itu-t identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version9 (9)}
;
```

```
CUG-CheckInfo ::= SEQUENCE {
     cug-Interlock                  CUG-Interlock,
     cug-OutgoingAccess             NULL                          OPTIONAL,
     extensionContainer             ExtensionContainer            OPTIONAL,
     ...}
```

```
NumberOfForwarding ::= 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,
     basicServiceGroup2                 [25] Ext-BasicServiceCode          OPTIONAL,
     networkSignalInfo2                 [26] ExternalSignalInfo            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,
     supportedCamelPhasesInVMSC          [15] SupportedCamelPhases         OPTIONAL,
     offeredCamel4CSIsInVMSC             [16] OfferedCamel4CSIs            OPTIONAL,
     routingInfo2                        [17] RoutingInfo                  OPTIONAL,
     ss-List2                            [18] SS-List                      OPTIONAL,
     basicService2                       [19] Ext-BasicServiceCode         OPTIONAL,
     allowedServices                     [20] AllowedServices              OPTIONAL,
     unavailabilityCause                 [21] UnavailabilityCause          OPTIONAL,
     releaseResourcesSupported           [22] NULL                         OPTIONAL
     }
```

```
AllowedServices ::= BIT STRING {
     firstServiceAllowed                 (0),
     secondServiceAllowed                (1) } (SIZE (2..8))
     --   firstService is the service indicated in the networkSignalInfo
     --   secondService is the service indicated in the networkSignalInfo2
     --   Other bits than listed above shall be discarded
```

```
UnavailabilityCause ::= ENUMERATED {
     bearerServiceNotProvisioned         (1),
     teleserviceNotProvisioned           (2),
     absentSubscriber                    (3),
     busySubscriber                      (4),
     callBarred                          (5),
     cug-Reject                          (6),
     ...}
     --   exception handling:
     --   Reception of other values than the ones listed shall result in the service
     --   being unavailable for that call.
```

```
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,
     supportedCamelPhasesInInterrogatingNode  [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,
     offeredCamel4CSIsInInterrogatingNode [20] OfferedCamel4CSIs         OPTIONAL
      }
```

```
ProvideRoamingNumberRes ::= SEQUENCE {
     roamingNumber                    ISDN-AddressString,
     extensionContainer               ExtensionContainer                 OPTIONAL,
     ...,
     releaseResourcesSupported        NULL                               OPTIONAL}
```

```
ResumeCallHandlingArg ::= 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,
     o-BcsmCamelTDPCriteriaList       [13] O-BcsmCamelTDPCriteriaList    OPTIONAL,
     basicServiceGroup2               [14] Ext-BasicServiceCode          OPTIONAL
      }
```

```
UU-Data ::= SEQUENCE {
     uuIndicator                      [0] UUIndicator                    OPTIONAL,
     uui                              [1] UUI                            OPTIONAL,
     uusCFInteraction                 [2] NULL                           OPTIONAL,
     extensionContainer               [3] ExtensionContainer             OPTIONAL,
     ...}
```

```
UUIndicator ::= OCTET STRING (SIZE (1))
```

```
    -- Octets are coded according to ETS 300 356
```

```
UUI  ::= OCTET STRING (SIZE (1..131))
    -- Octets are coded according to ETS 300 356
```

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

```
CamelInfo ::= SEQUENCE {
    supportedCamelPhases                SupportedCamelPhases,
    suppress-T-CSI                      NULL                            OPTIONAL,
    extensionContainer                  ExtensionContainer              OPTIONAL,
    ... ,
    offeredCamel4CSIs                   [0] OfferedCamel4CSIs           OPTIONAL }
```

```
ExtendedRoutingInfo ::= CHOICE {
    routingInfo                         RoutingInfo,
    camelRoutingInfo                    [8] CamelRoutingInfo}
```

```
CamelRoutingInfo ::= SEQUENCE {
    forwardingData                      ForwardingData                  OPTIONAL,
    gmscCamelSubscriptionInfo           [0] GmscCamelSubscriptionInfo,
    extensionContainer                  [1] ExtensionContainer          OPTIONAL,
    ...}
```

```
GmscCamelSubscriptionInfo ::= 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}
```

```
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 '
```

```
ReleaseResourcesArg ::= SEQUENCE{
    msrn                                ISDN-AddressString,
    extensionContainer                  ExtensionContainer               OPTIONAL,
    ...}
```

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

```
END
```

********next modification**********

21.1 General

The MAP call handling procedures are used:

- to retrieve routeing information to handle a mobile terminating call;
- to transfer control of a call back to the GMSC if the call is to be forwarded;
- to retrieve and transfer information between anchor MSC and relay MSC for inter MSC group calls / broadcast calls;
- to handle the reporting of MS status for call completion services;
- to handle the notification of remote user free for CCBS;
- to handle the alerting and termination of ongoing call activities for a specific subscriber;
- to handle early release of no longer needed resources.

The procedures to handle a mobile originating call and a mobile terminating call after the call has arrived at the destination MSC do not require any signalling over a MAP interface. These procedures are specified in 3GPP TS 23.018 [97].

The stage 2 specification for the retrieval of routeing information to handle a mobile terminating call is in 3GPP TS 23.018 [97]; modifications to this procedure for CAMEL are specified in 3GPP TS 23.078 [98], for optimal routeing of a basic mobile-to-mobile call in 3GPP TS 23.079 [99] and for CCBS in 3GPP TS 23.093 [107]. The interworking between the MAP signalling procedures and the call handling procedures for each entity (GMSC, HLR and VLR) is shown by the transfer of signals between these procedures.

The stage 2 specification for the transfer of control of a call back to the GMSC if the call is to be forwarded is in 3GPP TS 23.079 [99]. The interworking between the MAP signalling procedures and the call handling procedures for each entity (VMSC and GMSC) is shown by the transfer of signals between these procedures.

The stage 2 specifications for inter MSC group calls / broadcast calls are in 3GPP TS 43.068 [100] and 3GPP TS 43.069 [101]. The interworking between the MAP signalling procedures and the group call /broadcast call procedures for each entity (Anchor MSC and Relay MSC) is shown by the transfer of signals between these procedures.

The interworking between the call handling procedures and signalling protocols other than MAP are shown in 3GPP TS 23.018, 3GPP TS 23.078 and 3GPP TS 23.079 [99].

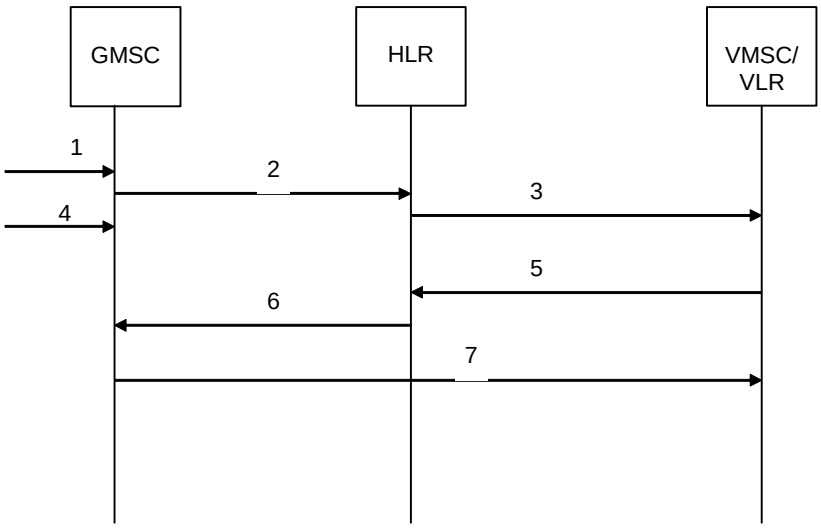
The stage 2 specification for the handling of reporting of MS status for call completion services and notification of remote user free for CCBS is in 3GPP TS 23.093 [107].

********next modification**********

21.10 Resource Management

21.10.1 General

The message flow for successful release of resources is shown in figure 21.10/1.



1) I_IAM (Note 1)
2) MAP_SEND_ROUTING_INFORMATION_req/ind
3) MAP_PROVIDE_ROAMING_NUMBER_req/ind
4) I_REL (Note 1)
5) MAP_PROVIDE_ROAMING_NUMBER_rsp/cnf
6) MAP_SEND_ROUTING_INFORMATION_rsp/cnf
7) MAP_RELEASE_RESOURCES (Note 2)

NOTE 1: TUP or ISUP may be used in signalling between MSCs, depending on the network type between the MSCs. For further details on the TUP and ISUP procedures refer to the following ITU-T Recommendations & ETSI specification:
- Q.721-725 - Telephone User Part (TUP);
- ETS 300 356-1 - Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 1: Basic services.

NOTE 2: Services printed in *italics* are optional.

Figure 21.10/1: Message flow for early release of resources

21.3.2 Process in the GMSC

The MAP process in the GMSC to release resources is shown in figure 21.10/2. The MAP process invokes macros not defined in this clause; the definitions of these macros can be found as follows:

Receive_Open_Cnf see subclause 25.1.2;

Check_Confirmation see subclause 25.2.2.

21.3.3 Process in the VMSC

The MAP process in the VMSC to handle a request for the GMSC to release resources is shown in figure 21.10/3. The MAP process invokes a macro not defined in this clause; the definition of this macro can be found as follows:

Receive_Open_Ind see subclause 25.1.1;

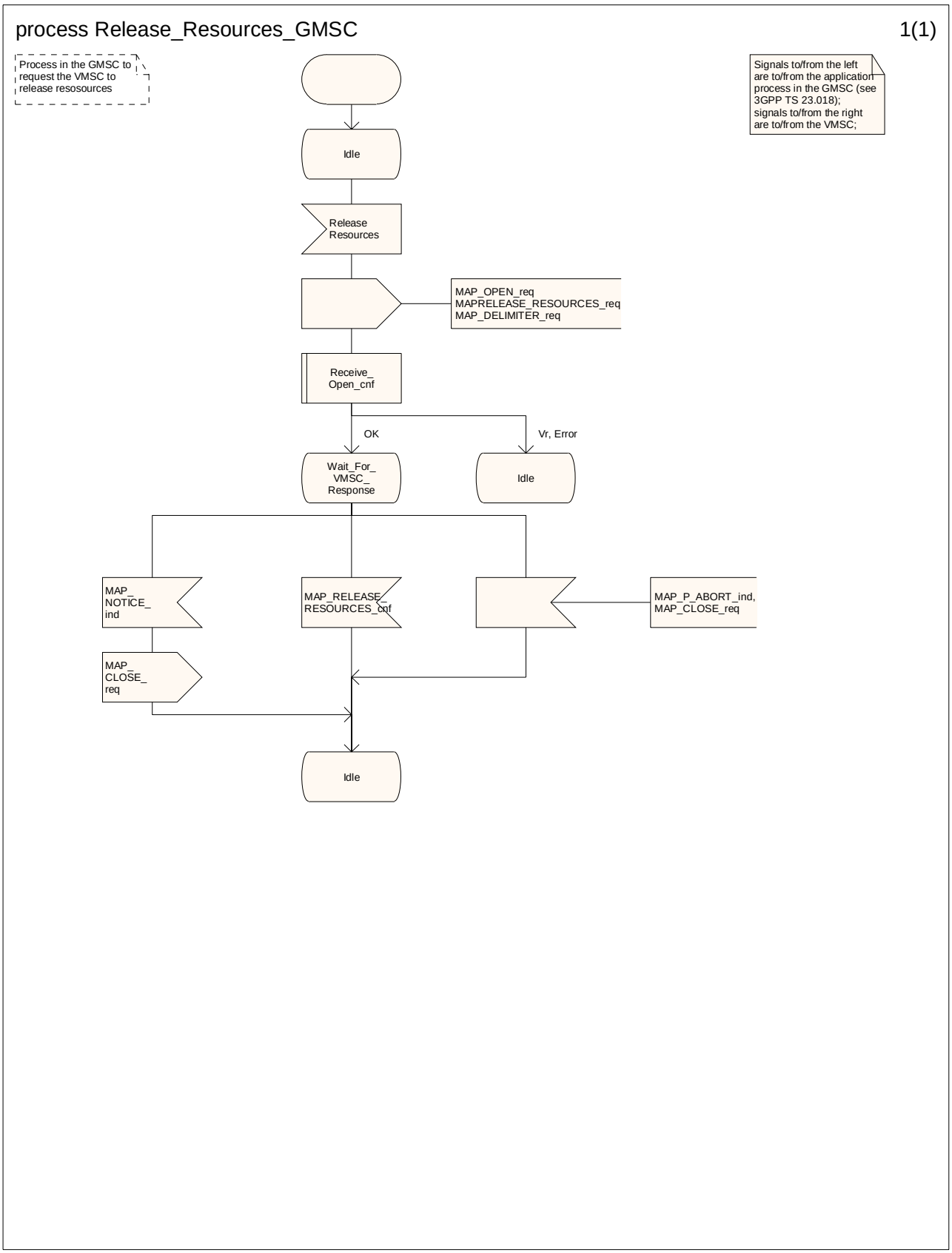


Figure 21.10/2: Process Release Resources_GMSC

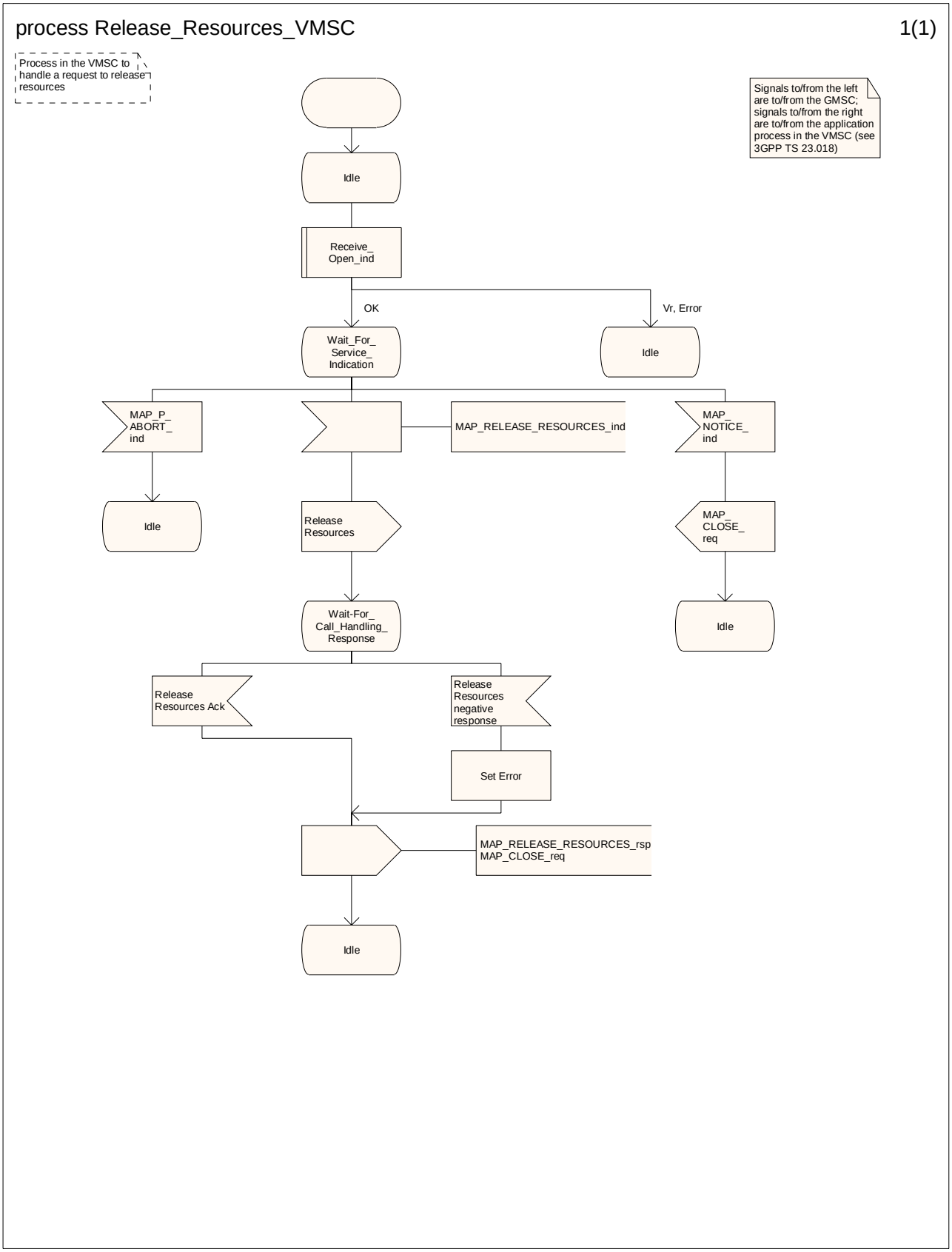


Figure 21.10/3: Process Release Resources_VMSC