3GPP TSG CN Plenary Meeting #21 **NP-030393**
17th – 19th September 2003 Frankfurt, GERMANY.

Source: TSG CN WG4

Title: Corrections on mobile number portability

Agenda item: 8.9

Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
29.002	596	1	N4-030804	Rel-5	SRF-based solution for correct charging of calls to ported or non-ported subscribers originated by pre-paid subscribers	F	5.6.2
29.002	597	1	N4-030805	Rel-6	SRF-based solution for correct charging of calls to ported or non-ported subscribers originated by pre-paid subscribers	A	6.2.0
23.066	024	2	N4-030987	Rel-5	SRF-based solution for correct charging of calls to ported or non-ported subscribers originated by pre-paid subscribers	F	5.1.0

3GPP TSG CN WG4 Meeting #20 **N4-030987**
Sophia Antipolis, FRANCE, 25th – 29th August 2003

CR-Form-v7

CHANGE REQUEST

⌘ **23.066** **CR** **024** ⌘ **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: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	SRF-based solution for correct charging of calls to ported or non-ported subscribers originated by pre-paid subscribers
Source:	⌘	CN4
Work item code:	⌘	MNP
Date:	⌘	24/04/2003
Category:	⌘	**F**
Release:	⌘	Rel-5

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

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

Reason for change:	⌘	A pre-paid subscriber may be charged with different rates depending on the porting status of the called subscriber.
Summary of change:	⌘	The option to use an SRF-based query between gsmSCF and NPDB is added.
Consequences if not approved:	⌘	Pre-paid subscribers cannot be charged depending on the subscription network of the called party.

Clauses affected:	⌘	4.3, Annex C			
		Y	**N**		
Other specs	⌘	**X**		Other core specifications	⌘ 22.115 CR 012 (Rel-5) 22.115 CR 013 (Rel-6) 22.066 CR 005 (Rel-5) 22.066 CR 006 (Rel-6) 29.002 CR 596 (Rel-5) 29.002 CR 597 (Rel-6)
affected:			**X**	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

4.3 Common Functionality of the MNP-SRF

In a PLMN that supports mobile number portability, SCCP messages sent to an HLR may be relayed by an MNP-SRF. Depending on the implemented solution (IN-based or MNP-SRF-based), on the type of message (call-related or non-call-related or MNP info query) and on the porting status of the called subscriber, the MNP-SRF may modify the SCCP called party address and route the message to a different HLR or to the subscription network, or terminate the dialogue and response to the INE.

Figure 1 shows the general steering functionality for SCCP message routeing. It shows the SCCP routeing principle for mobile number portability within a network.

Note that call related messages in the IN-based solution are not routed to the MNP-SRF. Therefore Normative Annex A of the present document does not mention the MNP-SRF.
However, the usage of the IN-based solution for the call-related messages should allow operators to have the routeing of the non call-related messages determined in the same database. See [7] for the description of the access of the MNP-SRF (node with relay capability) to the NPDB (external database).

In order to guard against the possibility that the porting data for an MSISDN is inconsistent between PLMNs in a porting domain, the SCCP hop counter may be used to prevent indefinite looping of messages between PLMNs. The MNP-SRF would then decrement the SCCP hop counter for every message that is relayed. It should be noted that the use of the SCCP hop counter requires the use of non segmented SCCP XUDT messages as defined in ITU-T 1996 SCCP recommendations or in the ANSI T1.112-1996 SCCP recommendations for North America, reference [11].

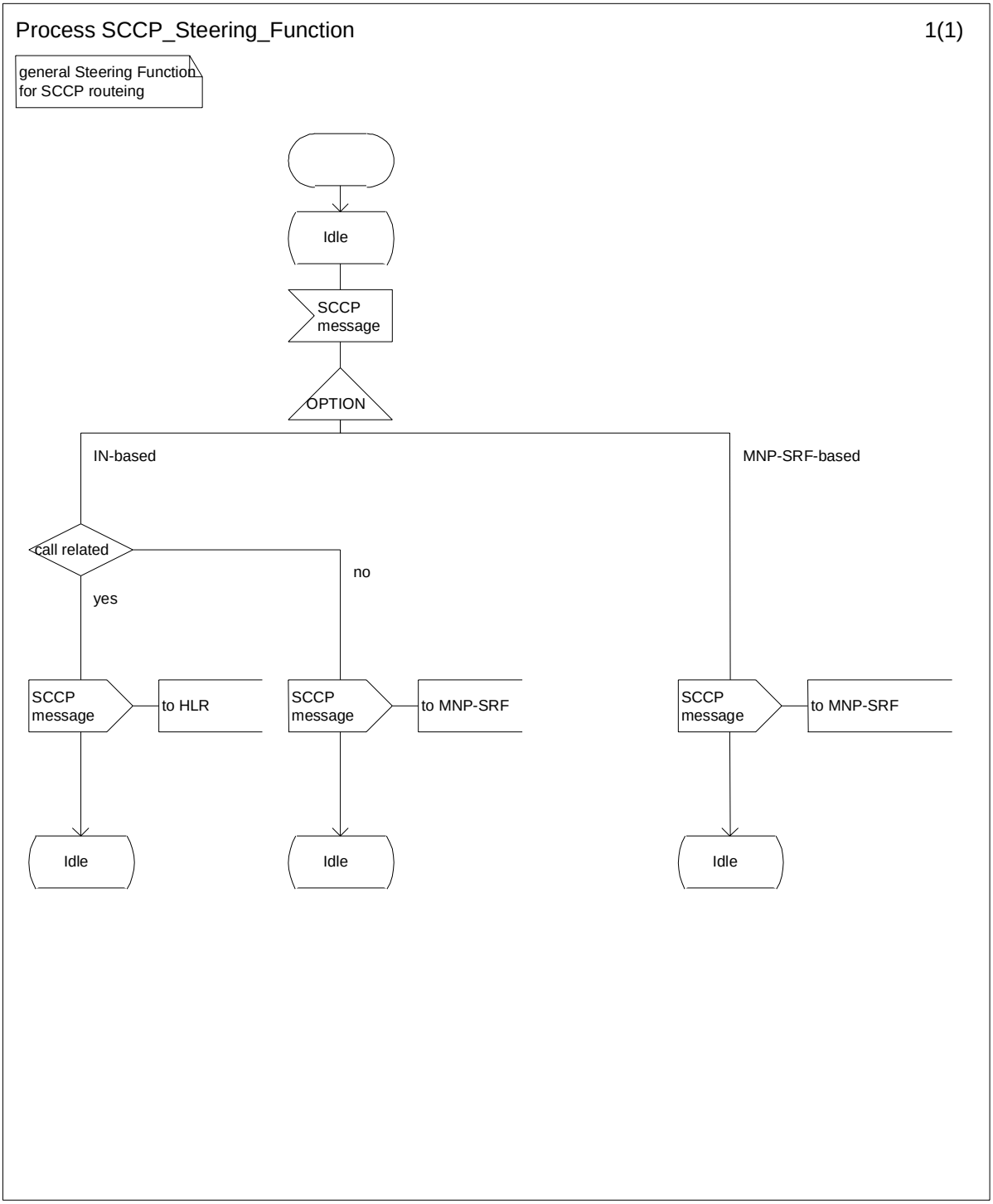
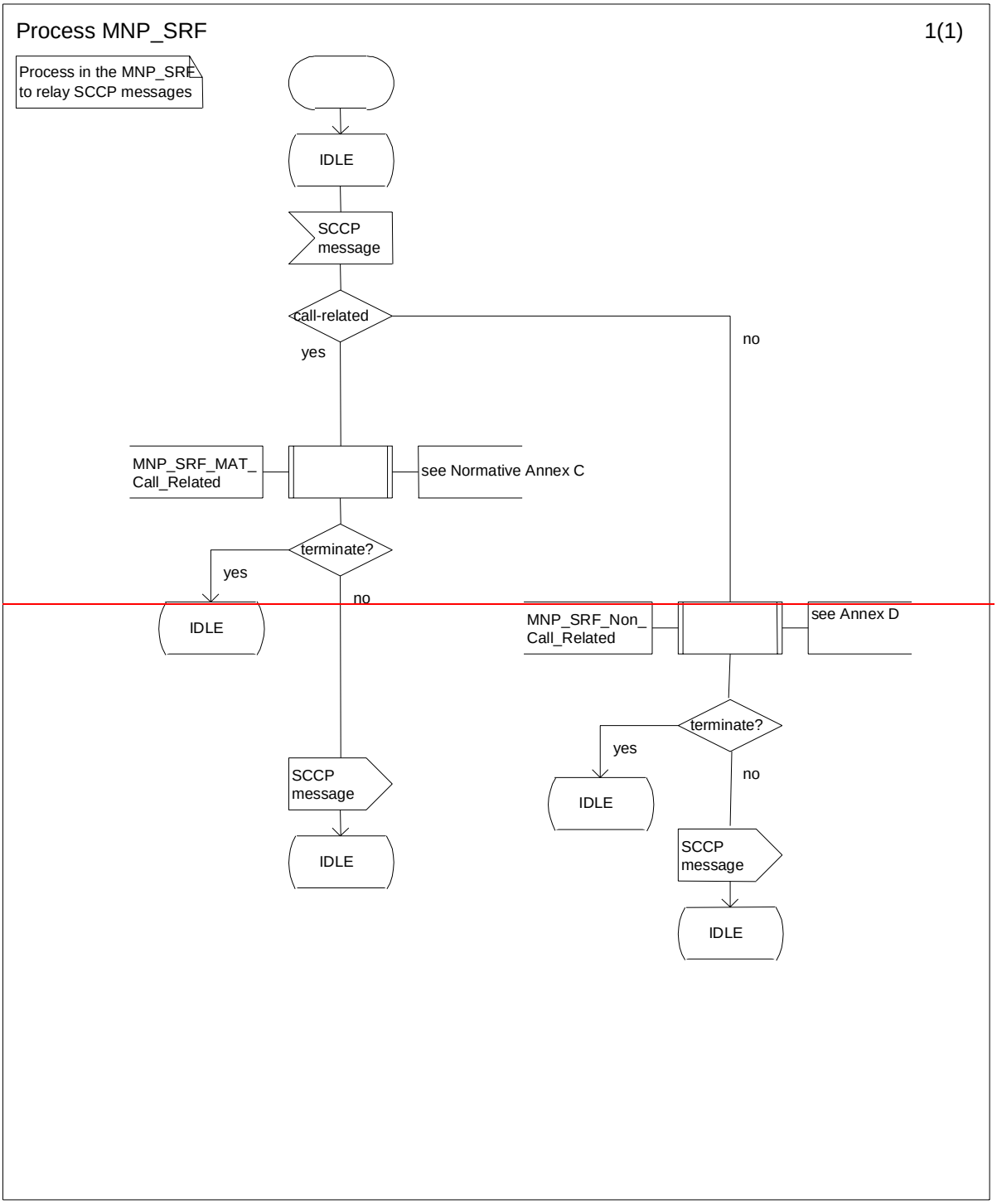


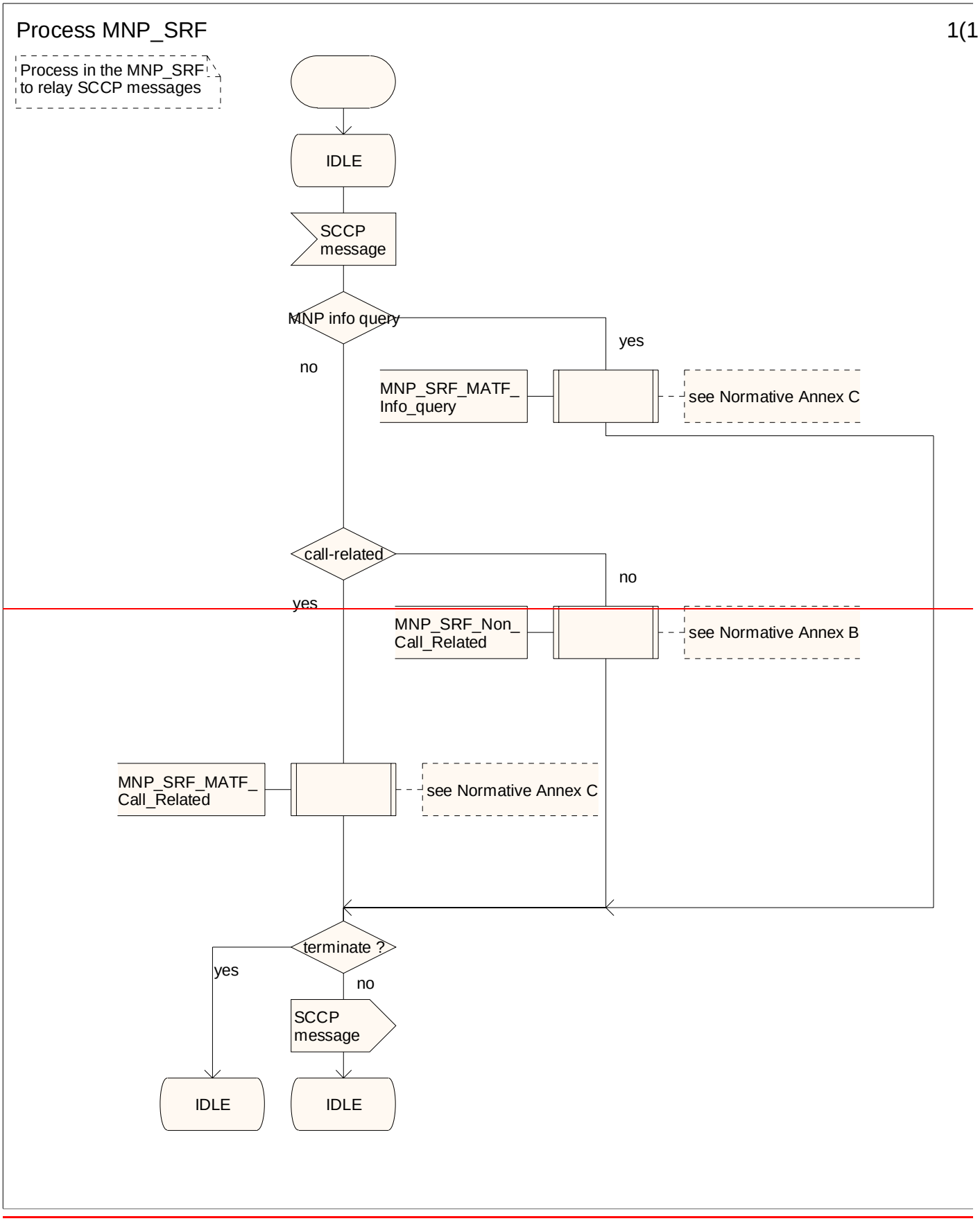
Figure 1: Steering Function for SCCP Message routeing

Figure 2 shows the process MNP_SRF in the MNP-SRF. The procedures MNP_SRF_MATF_Call_Related and~~, and~~ MNP_SRF_Non_Call_Related~~, and MNP_SRF_MATF_Info_query~~ are described in Normative Annex C and Normative Annex B of the present document. Note that in networks which support the IN-based solution for call related signalling, a distinction on SCCP level for call related and non-call related messages is needed and that the MNP-SRF does not require to include a MATF since call related messages are not routed to the MNP-SRF.

The test "MNP info query" is a test on the SCCP Translation Type if a dedicated Translation Type value for explicit MNP info query is used in the network. The handling of SCCP messages in the MNP-SRF in networks which do not make use of a dedicated Translation Type value for MNP info query is for further study.

The test "call-related" is a test on the SCCP Translation Type if a dedicated Translation Type value for call related messages is used in the network. The handling of SCCP messages in the MNP-SRF in networks which do not make use of a dedicated Translation Type value for call related messages is for further study.


Process MNP_SRF
1(1)
Process in the MNP_SRF to relay SCCP messages
IDLE
SCCP message
call-related
yes
no
MNP_SRF_MAT_ Call_Related
see Normative Annex C
terminate?
yes
no
IDLE
SCCP message
IDLE
MNP_SRF_Non_ Call_Related
see Annex D
terminate?
yes
no
IDLE
SCCP message
IDLE


Process MNP_SRF
1(1
Process in the MNP_SRF to relay SCCP messages
IDLE
SCCP message
MNP info query
yes
no
MNP_SRF_MATF_ Info_query
see Normative Annex C
call-related
no
yes
MNP_SRF_Non_ Call_Related
see Normative Annex B
MNP_SRF_MATF_ Call_Related
see Normative Annex C
terminate ?
yes
no
SCCP message
IDLE
IDLE

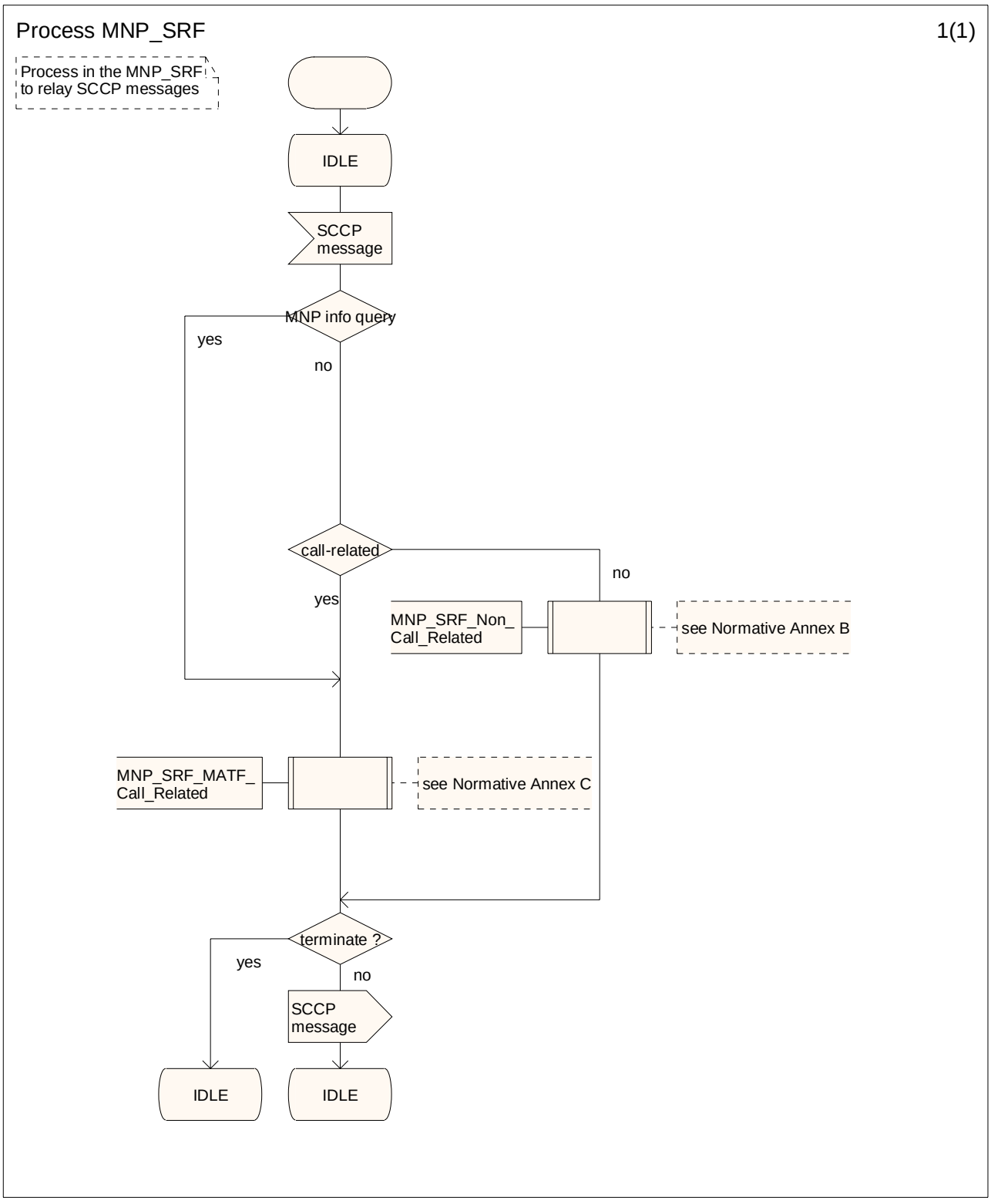


Figure 2: Process MNP_SRF

Annex C (normative): MNP Signalling Relay Function - Call Related Signalling

C.1 Handling of Call Related Signalling

The only call related MAP message affected by MNP is the MAP_ SEND_ROUTING_INFORMATION (SRI) message without OR parameter set sent to the HLR.

In a PLMN supporting MNP with direct routeing using signalling relay, all incoming calls and calls originated in the network for which the called party number is within the ranges owned by any network in the portability domain, the gateway MSCs and gsmSCF will send an SRI such that it will be handled by the MNP-SRF in that network.

In a PLMN supporting MNP with indirect routeing using signalling relay, all incoming calls and calls originating in the network for which the called party number is within the range owned by the network, the gateway MSCs and gsmSCF will send SRI such that it will be handled by the MNP-SRF in that network.

The MNP-SRF obtains routeing information from the NP database to identify the subscription network associated with a particular national MSISDN. The interface between the MNP-SRF and the NP database is considered implementation dependent and is not detailed further.

From the perspective of the PLMN in which the MNP-SRF resides, the CdPA represents one of:

1. An own number ported out.
2. An own number not ported out.
3. A foreign number ported in.
4. A foreign number ported to a foreign network.
5. A foreign number not known to be ported.

Cases 4 and 5 are applicable only for direct routeing.

If the SRI does not contain an explicit indication for MNP query the following applies:

In case 1, the MNP-SRF may perform one of the following depending on agreements within the number portability domain.

a. An SRI response is sent containing the necessary routeing information to route the call to the subscription network. This is performed by an internal MAP Application Termination Function (MATF) known as the Number Portability Location Register (NPLR).

b. If indirect routeing of calls with reference to the subscription network is used, the message is relayed to the MNP-SRF in the subscription network, whose NPLR provides the necessary routeing information in an SRI response. The use of an NPLR in the subscription network can only be by agreement within the number portability domain.

In cases 2 and 3, the MNP-SRF relays the message to the HLR. For further details of the signalling relay function, the reader is referred to [7].

In case 4, an SRI response is sent, containing the necessary routeing information to route the call to the subscription network.

In case 5, an SRI response is sent, containing the necessary routeing information to route the call to the number range holder network.

If the SRI contains an explicit indication for MNP query the following applies:

In all cases the MNP-SRF reacts as follows.

An SRI response ~~is sent~~ containing the necessary routeing information to route the call to the subscription network is sent. This is performed by an internal MAP Application Termination Function (MATF) known as the Number Portability Location Register (NPLR).

C.2 Functional Requirements of Network Entities

C.2.1 Procedure MNP_SRF_MATF_Call_Related

Figure C.2.2.2 shows the procedure MNP_SRF_MATF_Call_Related. This procedure handles call-related signalling messages. It is called from the process MNP_SRF (see clause 4.3).

The check “message has been relayed” identifies all call related signalling messages which are relayed from the number range holder network towards the subscription network in the case of Indirect Routeing with reference to subscription network implementation. These messages only refer to numbers ported into the network.

The check “own number not ported out” identifies all mobile numbers from number ranges allocated to the network the MNP-SRF/MATF is located in and which are not ported to other networks. In this case the call related message is relayed to the HLR in the network.

The check “foreign number ported in” identifies all mobile numbers from the number ranges not allocated to the network the MNP-SRF/MATF is located in and which are served by the network the MNP-SRF/MATF is located in. In this case the call related message is relayed to the HLR in the network.

The check “foreign number not known to be ported” identifies all mobile numbers from the number ranges not allocated to the network the MNP-SRF/MATF is located in and which are also not served by the network the MNP-SRF/MATF is located in. In this case the call is sent to the SRF_MATF procedure for handling.

The check “foreign number ported to foreign network” identifies all mobile numbers from the number ranges not allocated to the network the MNP-SRF/MATF is located in and which are not served by the network the MNP-SRF is located in and not served by the network the number range is allocated to, i.e. the number is ported between two other networks. In this case the call related message is sent to the SRF_MATF procedure for handling.

The remaining cases “own number ported out” are mobile numbers allocated to the network the MNP-SRF/MATF is located in and which are served by other networks, i.e. the number is ported out to another network. In this case the call is relayed to the MATF in the subscription network if this option is the one used by the operator, or sent to the SRF_MATF procedure for handling if not.

C.2.2 Process SRI_NPLR

Figure C.2.2.2 shows the process SRI_NPLR.

The check “unknown subscriber” identifies a subscriber without any associated available information.

If the GMSC is in the database own network then a routeing number is provided to route to the number range holder network.

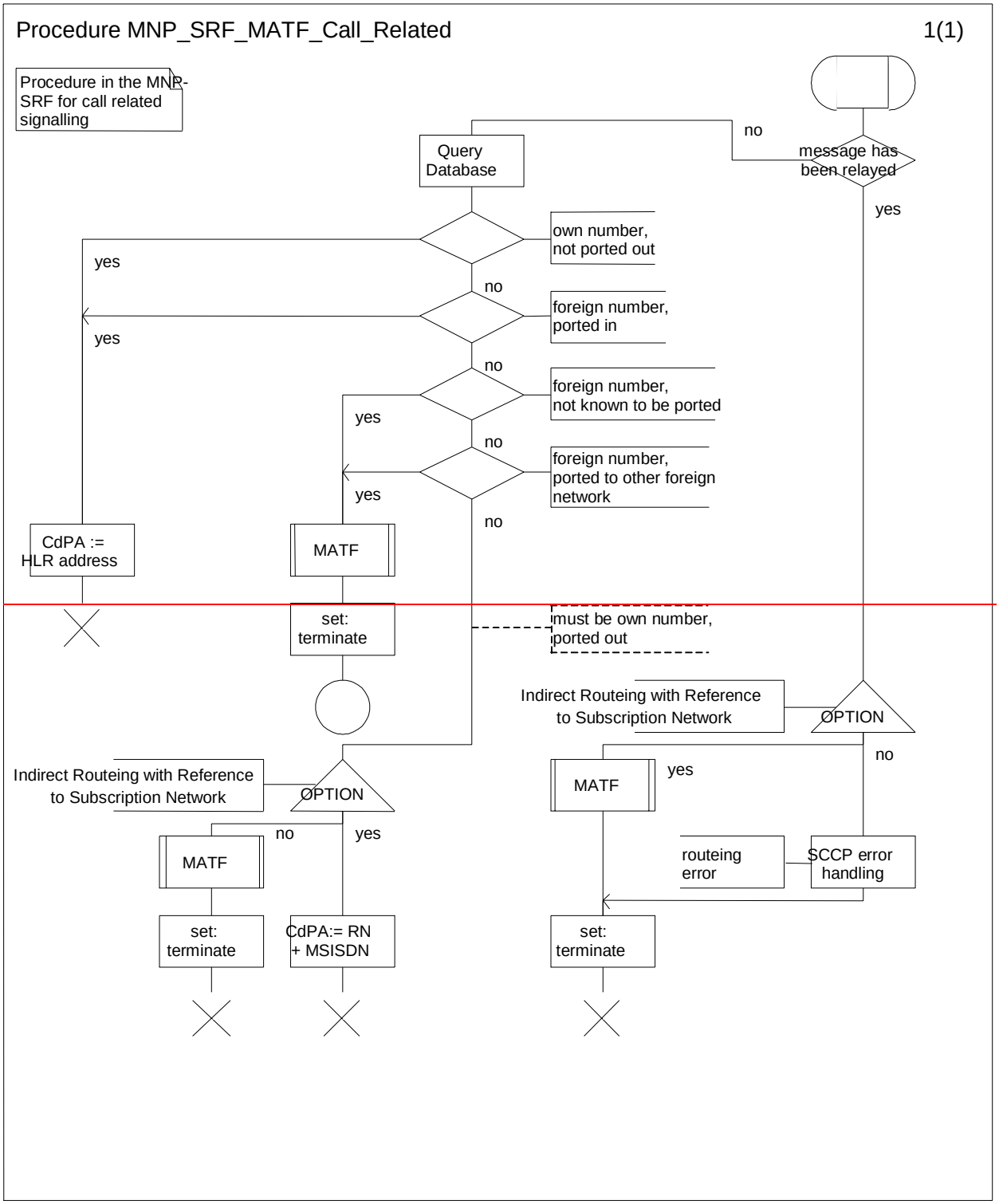
If the GMSC is not in the database own network then the enquiry has been routed from the number range holder network, so the call should fail.

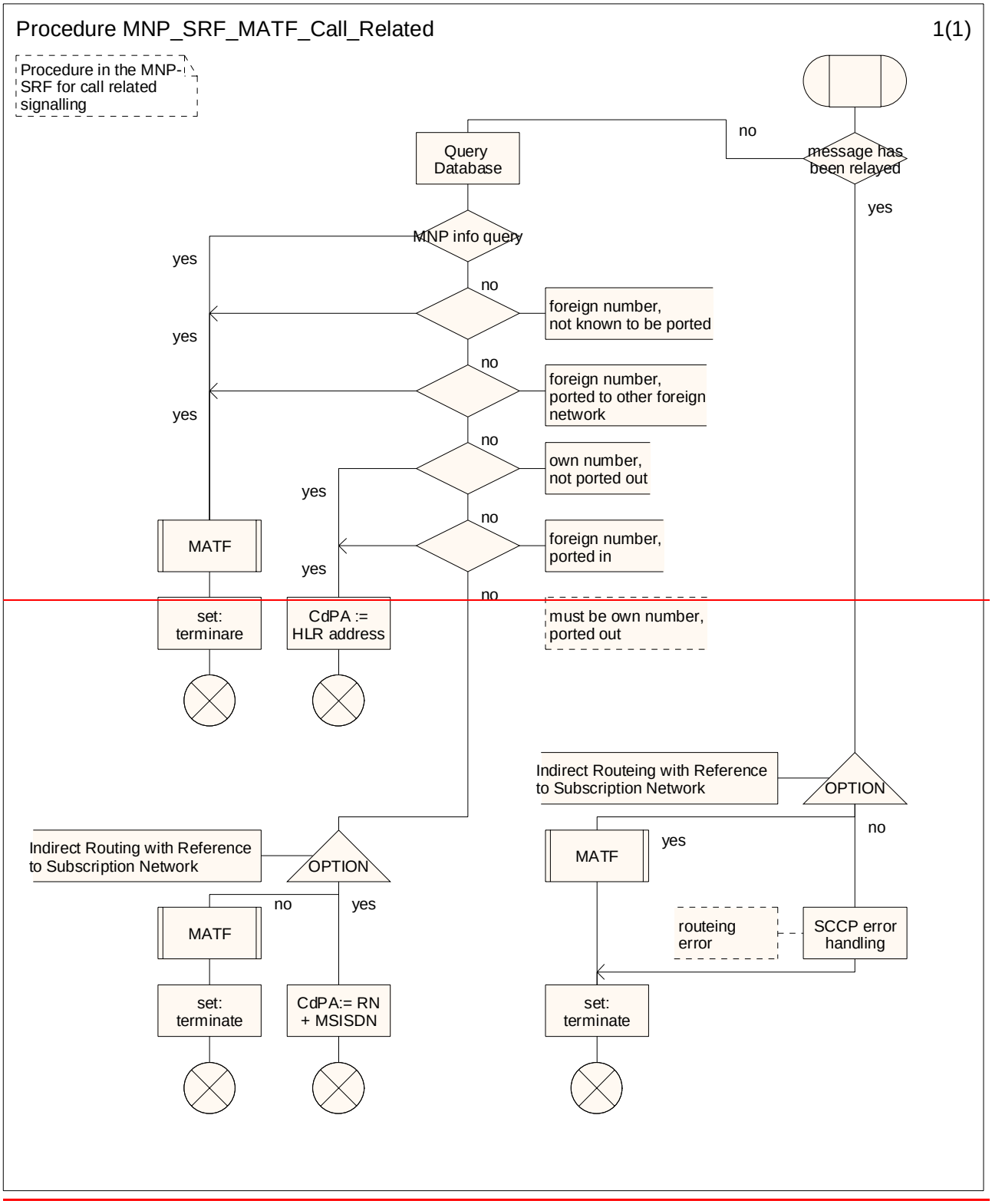
The database query uses the MSISDN received at the application level in the SRI, rather then the CdPA of the SCCP level.

If an error must be set as a result of the check “terminate”, the user error “unknown subscriber” shall be used. If version 3 or higher of the MAP protocol is in use, then the diagnostic “NPDB mismatch” may be used.

The check “HPLMN MSISDN Range” identifies if the MSISDN received in the SRI exists in a MSISDN Range owned by the HPLMN. This is a North American Network implementation option and allows a MAP Error “Unknown Subscriber” to be sent to the GMSC instead of the MSISDN.

The check “HPLMN RN Range” identifies if the Routeing Number assigned to the MSISDN within the SRI_NPLR is assigned to the HPLMN. This is a North American Network implementation option and allows a MAP Error “Unknown Subscriber” to be sent to the GMSC instead of the RN+MSISDN.


Procedure MNP_SRF_MATF_Call_Related
1(1)
Procedure in the MNP-SRF for call related signalling
Query Database
message has been relayed
no
yes
own number, not ported out
yes
no
foreign number, ported in
yes
no
foreign number, not known to be ported
yes
no
foreign number, ported to other foreign network
yes
no
CdPA := HLR address
MATF
set: terminate
must be own number, ported out
Indirect Routeing with Reference to Subscription Network
OPTION
no
MATF
yes
routeing error
SCCP error handling
Indirect Routeing with Reference to Subscription Network
OPTION
no
yes
MATF
set: terminate
CdPA:= RN + MSISDN
set: terminate


Procedure MNP_SRF_MATF_Call_Related
1(1)
Procedure in the MNP-SRF for call related signalling
Query Database
message has been relayed
no
yes
MNP info query
yes
no
foreign number, not known to be ported
yes
no
foreign number, ported to other foreign network
yes
no
own number, not ported out
yes
no
foreign number, ported in
yes
no
must be own number, ported out
MATF
set: terminare
CdPA := HLR address
Indirect Routeing with Reference to Subscription Network
OPTION
no
yes
MATF
routeing error
SCCP error handling
set: terminate
Indirect Routing with Reference to Subscription Network
OPTION
no
yes
MATF
set: terminate
CdPA:= RN + MSISDN

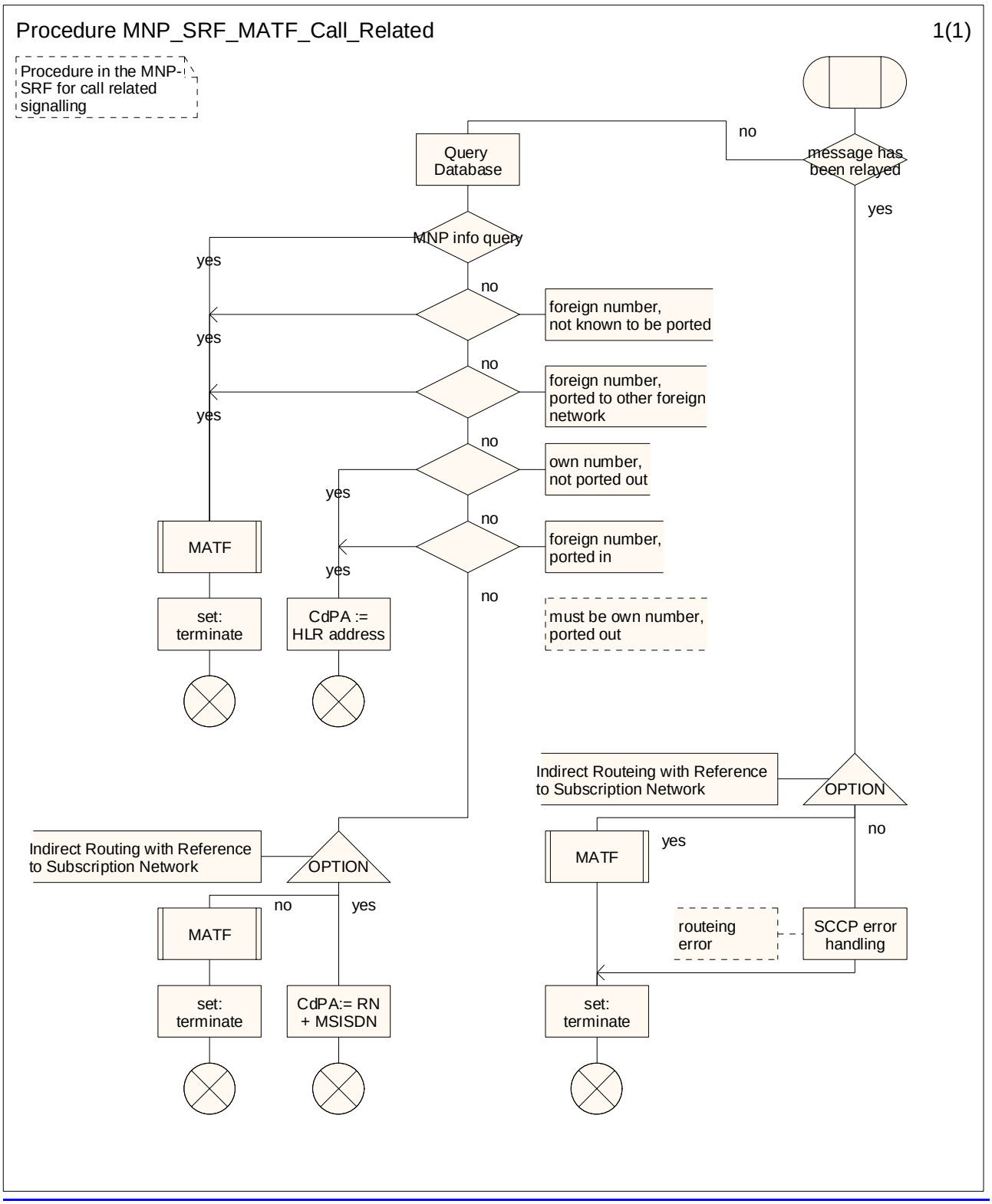


Figure C.2.2: Procedure MNP_SRF_MATF_Call_Related

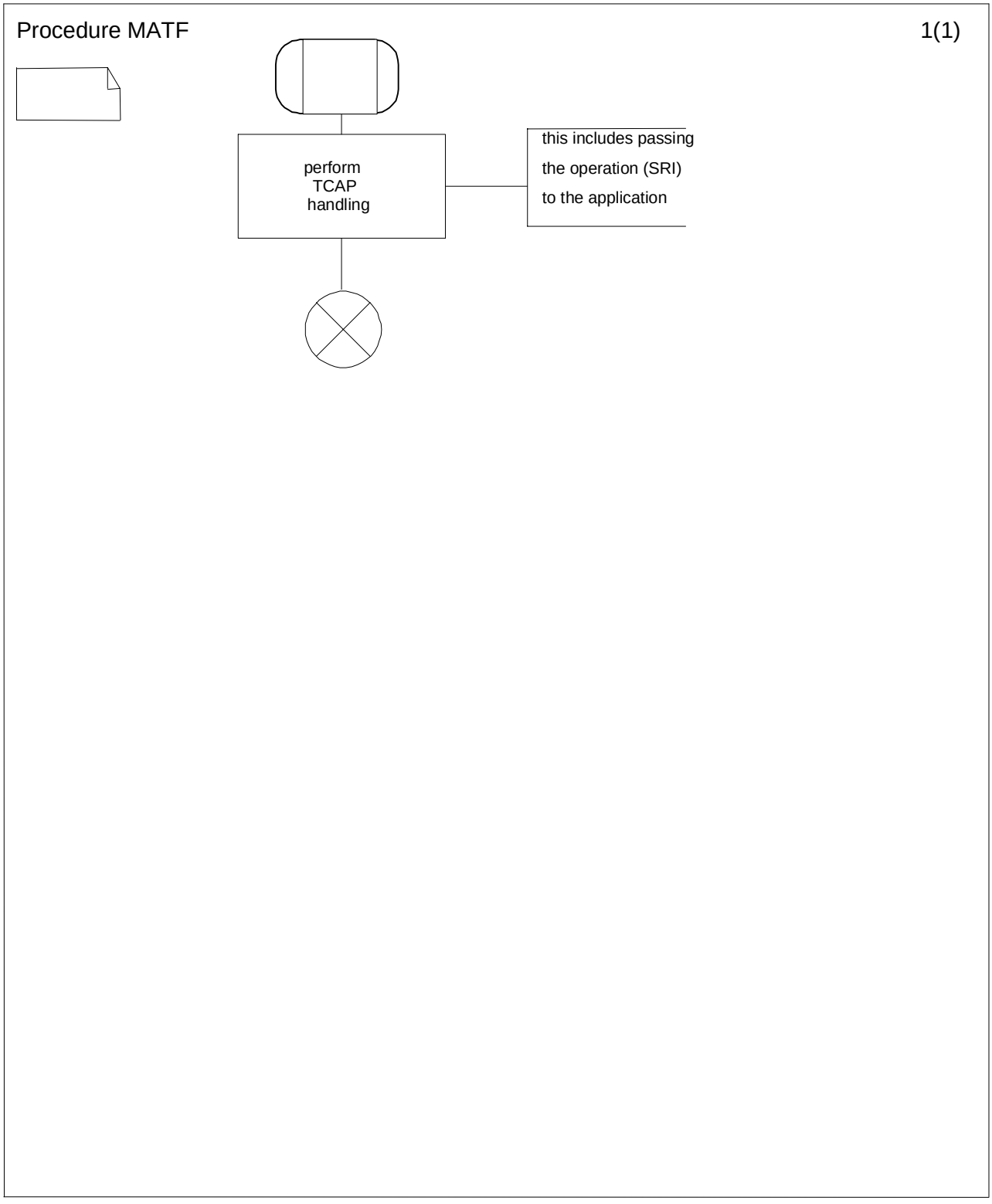
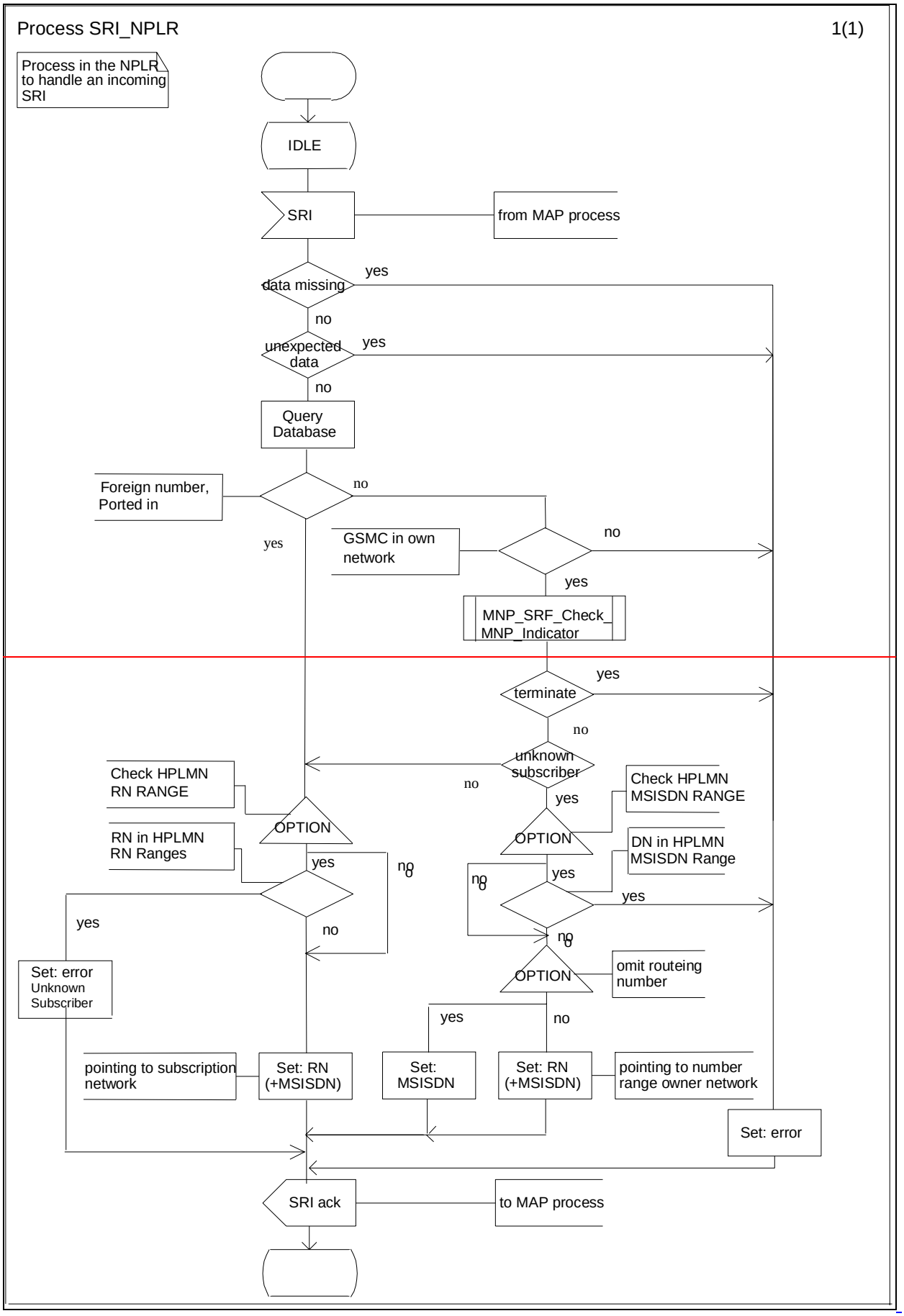


Figure C.2.2.1: Procedure MATF


Process SRI_NPLR
1(1)
Process in the NPLR to handle an incoming SRI
IDLE
SRI
from MAP process
data missing
yes
no
unexpected data
yes
no
Query Database
Foreign number, Ported in
no
yes
GSMC in own network
no
yes
MNP_SRF_Check_MNP_Indicator
terminate
yes
no
unknown subscriber
no
yes
Check HPLMN RN RANGE
OPTION
RN in HPLMN RN Ranges
yes
no
yes
Set: error Unknown Subscriber
Check HPLMN MSISDN RANGE
OPTION
DN in HPLMN MSISDN Range
no
yes
yes
no
OPTION
omit routeing number
yes
no
pointing to subscription network
Set: RN (+MSISDN)
Set: MSISDN
Set: RN (+MSISDN)
pointing to number range owner network
Set: error
SRI ack
to MAP process

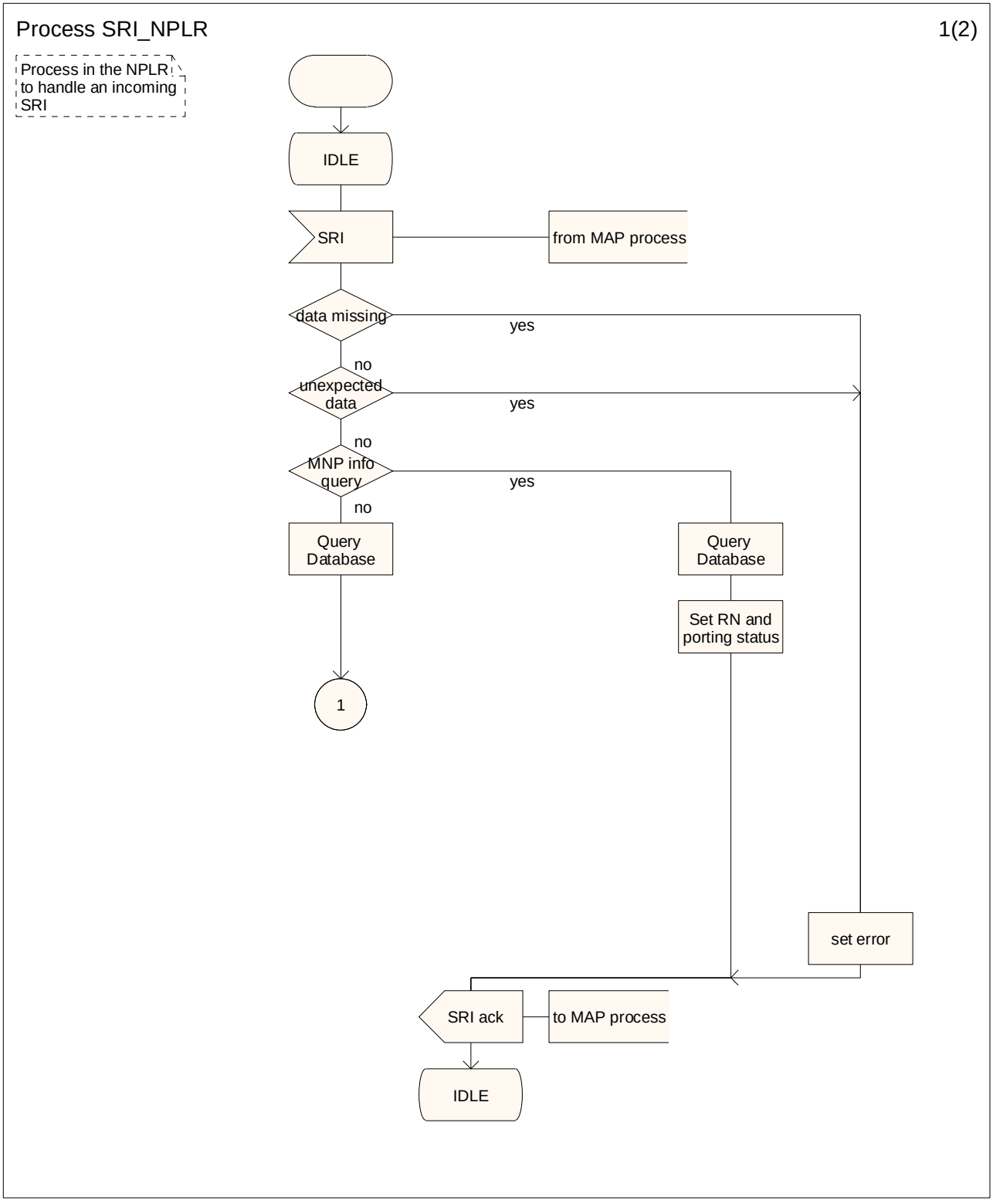


Figure C.2.2.2: Process SRI_NPLR sheet 1

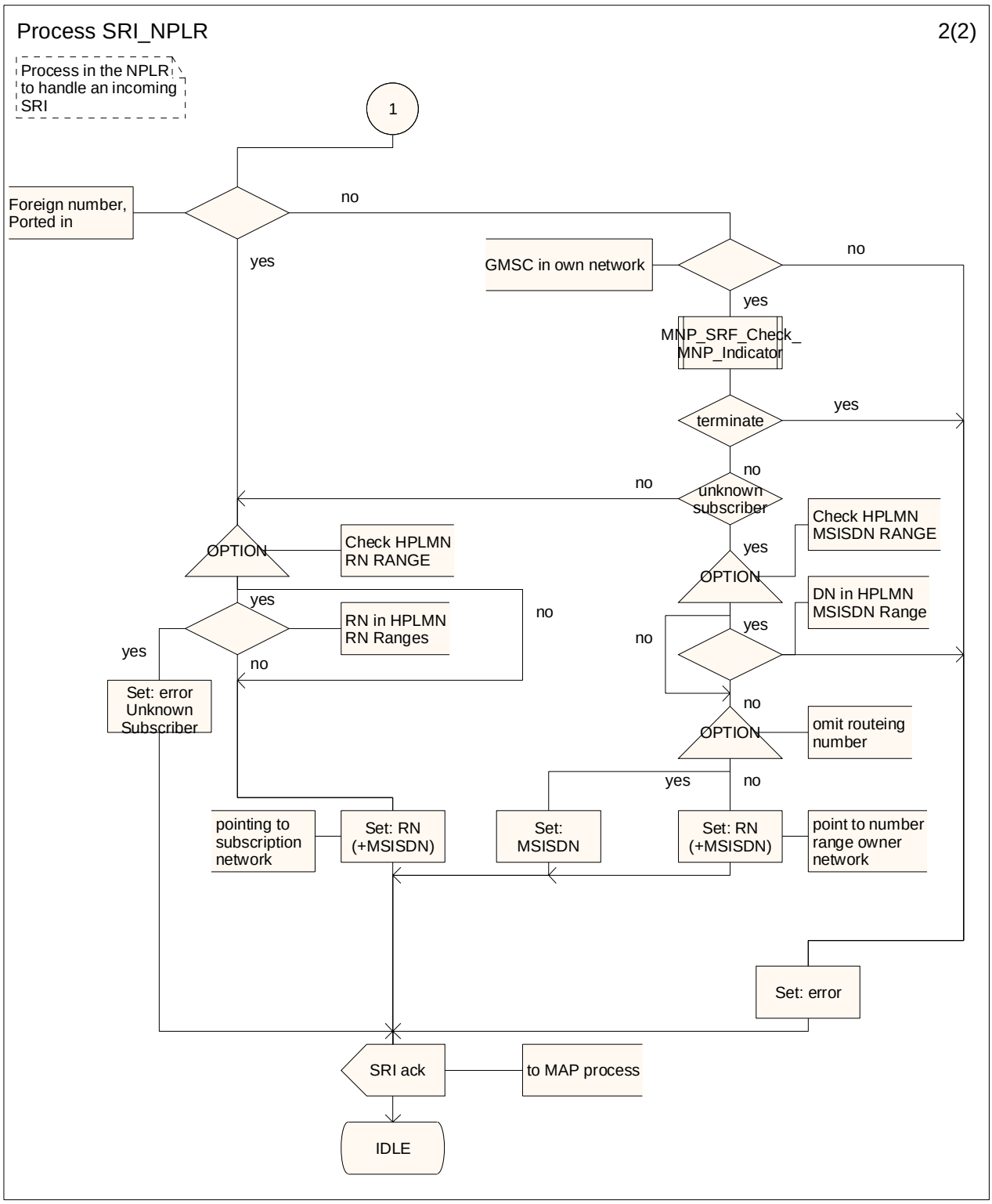


Figure C.2.2.2: Process SRI_NPLR sheet 2

C.3 Call Scenarios

The notation TT=SRI in diagrams in this section assumes that SRI=CRMNP for ETSI and SRI = Translation Type 14 for ANSI. For explicit MNP info query a dedicated Translation Type EXPMNP is used. The use of other translation types is for further study. The message flows for the following scenarios are based on the use of an SCCP relay function in MNP-SRF(s). The message flows for the higher level relay function (e.g. TC relay) in MNP-SRF are not covered

here, but the principle can be found in B.4.2. For further details of the signalling relay function, the reader is referred to [7].

C.3.1 Call to a Non-Ported Number or Number Ported into the Network

Figure C.3.1 shows the signalling involved for a call to a non-ported number or number ported into the network (see 3G TS 23.018 [3]).

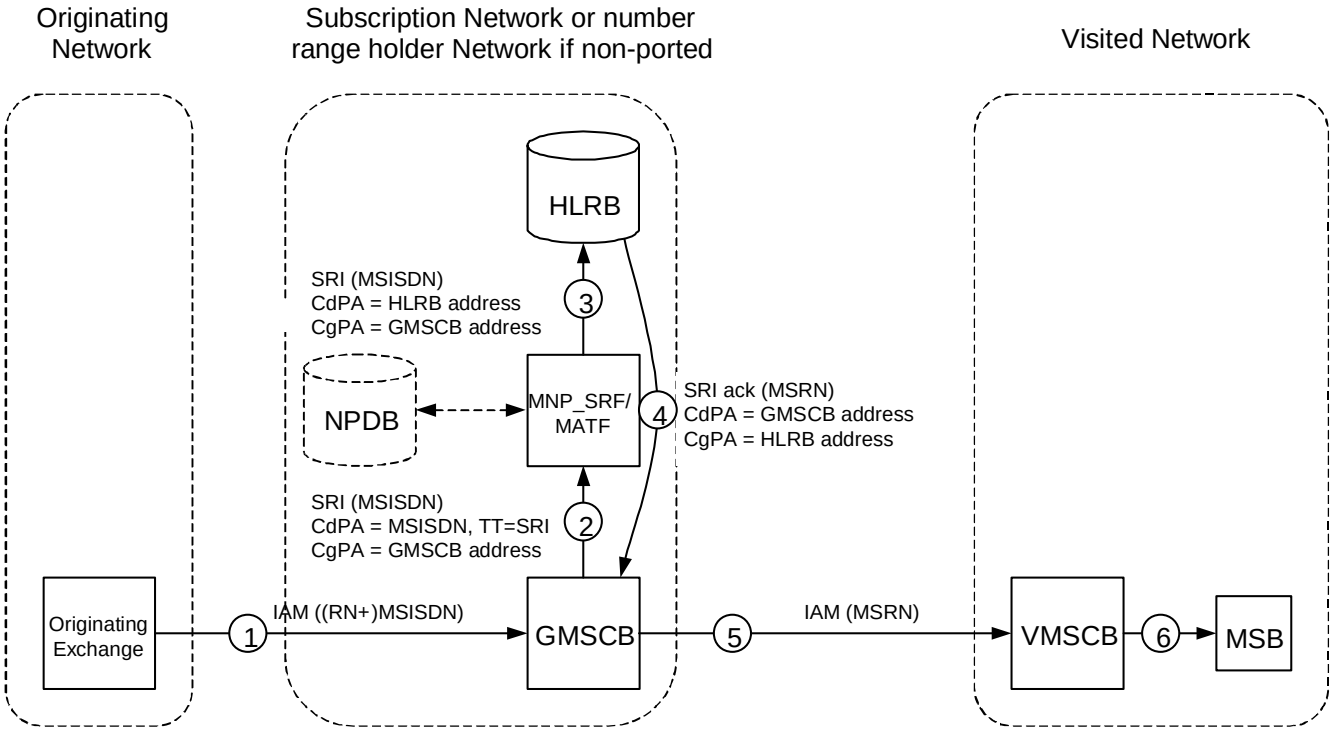


Figure C.3.1: Call to a non-ported number

1. From an Originating Exchange a call is set up to MSISDN. The call is routed to the subscription network being the number range holder network, if the number is non-ported.

2. When GMSCB receives the ISUP IAM, it requests routeing information by submitting a MAP SRI to the MNP_SRF/MATF. The TT on SCCP may be set to 'SRI'.

3. When the MNP_SRF/MATF receives the message, the MNP_SRF/MATF analyses the MSISDN in the CdPA and identifies the MSISDN as being non-ported. The MNP_SRF/MATF function then replaces the CdPA by an HLRB address. After modifying the CdPA, the message is routed to HLRB.

4. When HLRB receives the SRI, it responds to the GMSCB by sending an SRI ack with an MSRN that identifies the MSB in the VMSCB.

5. GMSCB uses the MSRN to route the call to VMSCB.

C.3.2 Call to a Ported Number – Originating Network = Subscription Network – Direct Routeing

Figure C.3.2 shows the signalling involved for a call to a ported number via direct routeing where the call is originated in the subscription network.

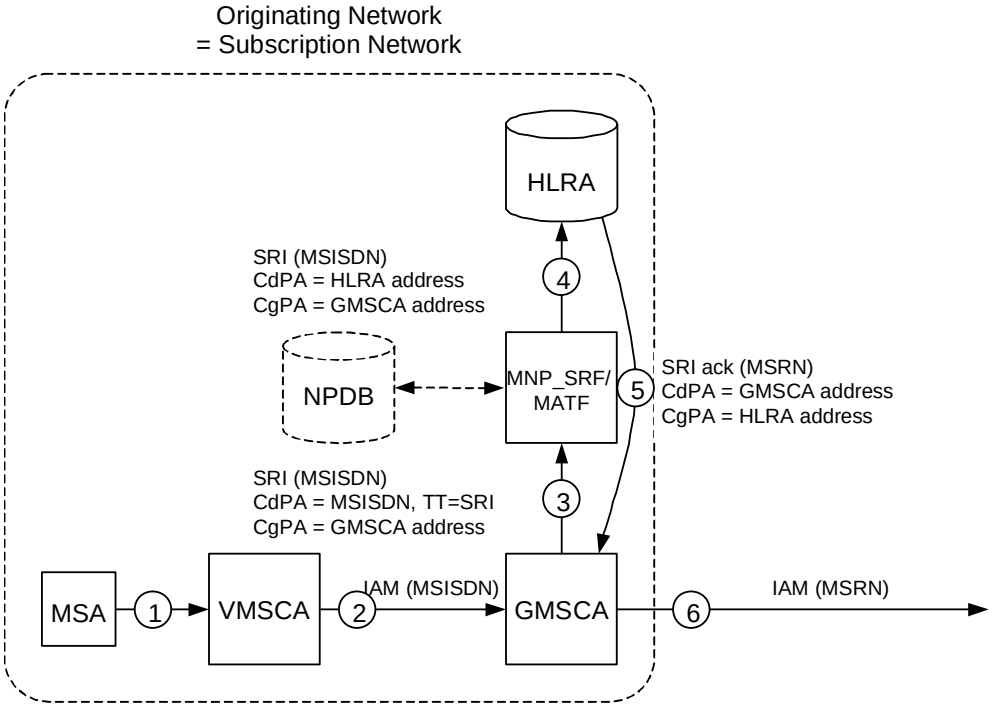


Figure C.3.2: Call to a ported number via direct routeing where the call is originated in the subscription network

1. MSA originates a call to MSISDN.
2. VMSCA routes the call to the network's GMSCA.
3. When GMSCA receives the ISUP IAM, it requests routeing information by submitting a MAP SRI to the MNP_SRF/MATF. The TT on SCCP may be set to 'SRI'.
4. When the MNP_SRF/MATF receives the message, it analyses the MSISDN in the CdPA and identifies the MSISDN as being ported into the network. The MNP_SRF/MATF function then replaces the CdPA by an HLRA address. After modifying the CdPA, the message is routed to HLRA.
5. When HLRA receives the SRI, it responds to the GMSCA by sending an SRI ack with an MSRN that identifies the MSB in the VMSCB.
6. GMSCA uses the MSRN to route the call to VMSCB.

C.3.3 Mobile Originated Call to a Ported or not known to be Ported Number – Originating Network ≠Subscription Network– Direct Routeing

Figure C.3.3 shows the signalling involved for a national mobile originated call to a number not Subscribed in the originating network via direct routeing. The scenario describes signalling in the originating network using direct routeing in the cases when an own number is ported out, a foreign number is not known to be ported or a foreign number is ported to other foreign network.

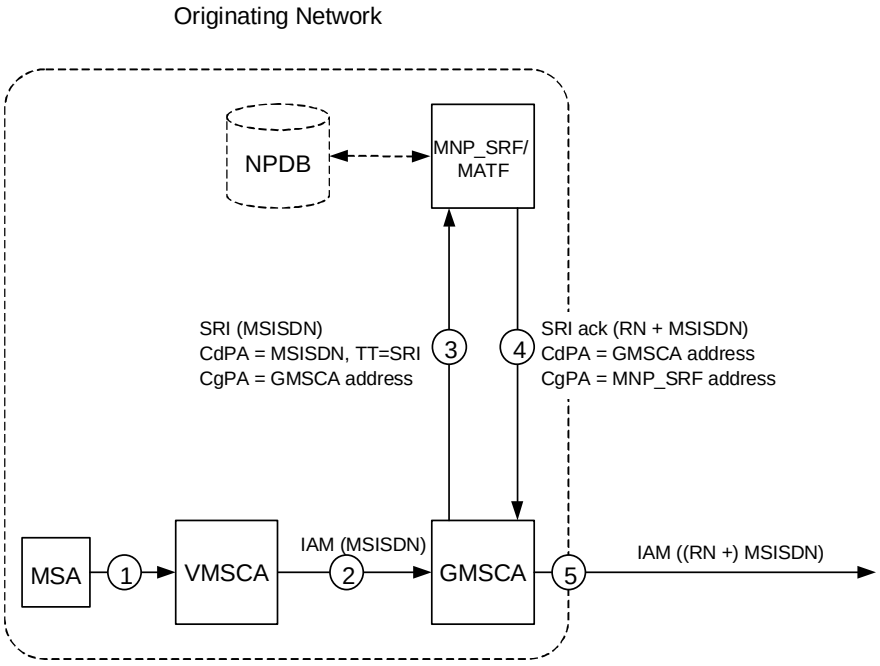


Figure C.3.3: National mobile originated call to a ported number via direct routeing

1. MSA originates a call to MSISDN.
2. VMSCA routes the call to the network's GMSCA.
3. When GMSCA receives the ISUP IAM, it requests routeing information by submitting a MAP SRI to the MNP_SRF/MATF. The TT on SCCP may be set to 'SRI'.
4. When the MNP_SRF/MATF receives the message, it analyses the MSISDN in the CdPA and identifies the MSISDN as not known to be ported or being ported to another network. As the message is a SRI message, the MNP_SRF/MATF responds to the GMSCA by sending an SRI ack with a RN + MSISDN; For the case the number is not known to be ported the routeing number may be omitted.
5. GMSCA uses the (RN +) MSISDN to route the call to GMSCB in the subscription network. Depending on the interconnect agreement, the RN will be added in the IAM or not.

C.3.4 Call to a Ported Number – Indirect Routeing

Figure C.3.4 shows the signalling involved for a call to a ported number via indirect routeing.

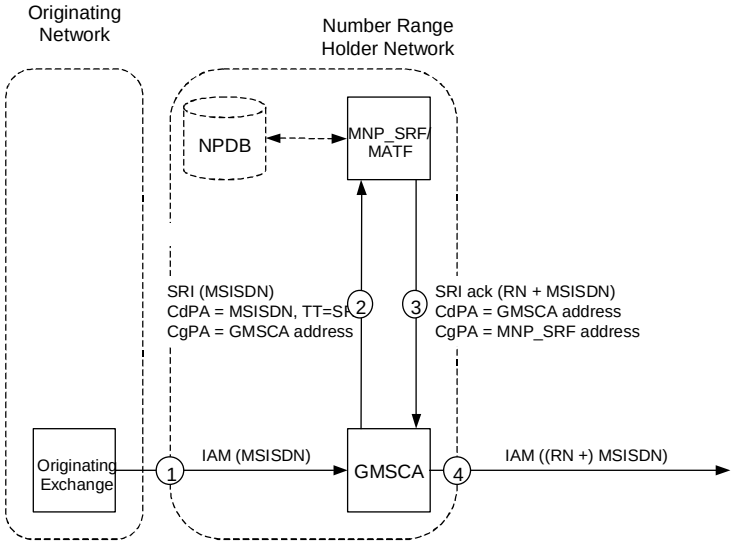


Figure C.3.4: Call to a ported number via indirect routeing

1. From an Originating Exchange a call is set up to MSISDN. The call is routed to the number range holder network.

2. When GMSCA in the number range holder network receives the ISUP IAM, it requests routeing information by submitting a MAP SRI to MNP_SRF/MATF. The TT on SCCP may be set to 'SRI'.

3. When the MNP_SRF/MATF receives the message, it analyses the MSISDN in the CdPA and identifies the MSISDN as being ported to another network. As the message is an SRI message, the MNP_SRF/MATF responds to the GMSCA by sending an SRI ack with a RN + MSISDN.

4. GMSCA uses the RN + MSISDN to route the call to GMSCB in the subscription network. Depending on the interconnect agreement, the RN will be added in the IAM or not.

C.3.5 Call to a Ported Number – Indirect Routeing with Reference to Subscription Network

Figure C.3.5 shows the signalling involved for a call to a ported number where indirect routeing with reference to the subscription network is used.

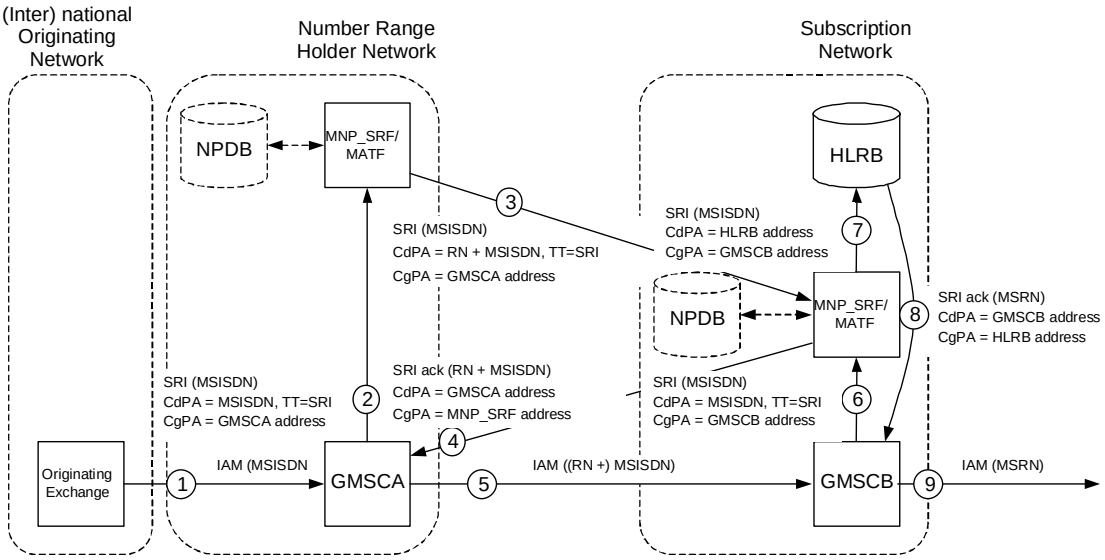


Figure C.3.5: National or international originated call to a ported number where indirect routeing with reference to the subscription network is used

1. From an Originating Exchange a call is set up to MSISDN. The call is routed to the number range holder network.

2. When GMSCA in the number range holder network receives the ISUP IAM, it requests routeing information by submitting a MAP SRI to the MNP_SRF/MATF. The TT on SCCP may be set to 'SRI'.

3. When MNP_SRF/MATF receives the message, MNP_SRF/MATF operation is triggered. The MNP_SRF/MATF functionality analyses the MSISDN in the CdPA and identifies the MSISDN as being ported to another network. As the message is a SRI message, the MNP_SRF/MATF function relays the message to the subscription network by adding a routeing number to the CdPA which information may be retrieved from a database. After modifying the CdPA, the message is routed to the subscription network.

4. When MNP_SRF/MATF in the subscription network receives the SRI, it responds to the GMSCA in the number range holder network by sending a SRI ack with a RN + MSISDN.

5. GMSCA uses the (RN +) MSISDN to route the call to GMSCB in the subscription network; Depending on the interconnect agreement, the RN will be added in the IAM or not.

6. When GMSCB in the subscription network receives the ISUP IAM, it requests routeing information by submitting a MAP SRI to MNP_SRF/MATF. The TT on SCCP may be set to 'SRI'.

7. When MNP_SRF/MATF receives the message, MNP_SRF/MATF operation is triggered. The MNP_SRF/MATF functionality analyses the MSISDN in the CdPA and identifies the MSISDN as being ported into the network. The MNP_SRF/MATF function then replaces the CdPA by an HLRB address which information may be retrieved from a database. After modifying the CdPA, the message is routed to HLRB.

8. When HLRB receives the SRI, it responds to the GMSCB by sending an SRI ack with an MSRN that identifies the MSB in the VMSCB.

9. GMSCB uses the MSRN to route the call to VMSCB.

NOTE: The MNP_SRF/MATF in this scenario has only information about all ported numbers to one subscription network, except those for which subscription information is held in the subscription networks HLR. In this scenario the routeing depends always on the number range holder and the subscription network.

C.3.6 MNP explicit query

Figure C.3.6 shows the scenario for providing MNP information for a ported or non-ported number where the interrogating network entity explicitly requests MNP information.

The Interrogating Network Entity (INE) submits an Send Routing Information (SRI) message. When MNP-SRFA receives the message, MNP-SRF operation is triggered. The MNP-SRF functionality analyses the MSISDN in the application level and queries an MNP database to get the MNP information. The INE requesting MNP information may be gsmSCF for CAMEL prepaid services.

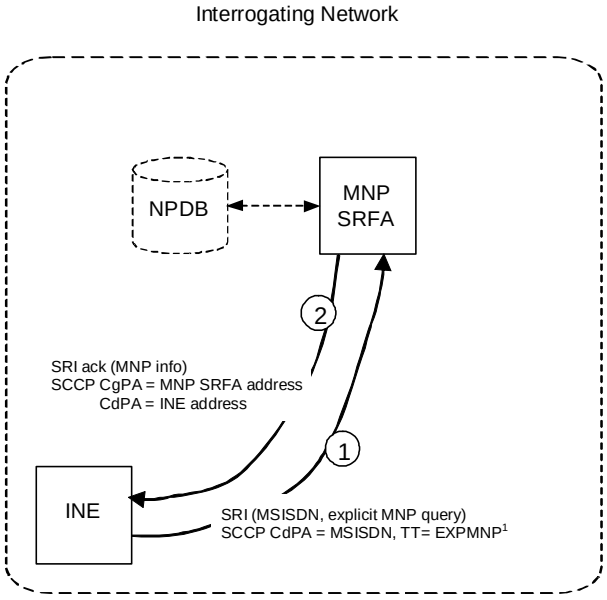


Figure C.3.6: Providing MNP information for a ported or non-ported number where the INE explicitly requests MNP information

NOTE 1: the TT has a special value for SRI message to query the MNP information in the interrogating network.

1. The INE sends an SRI message to the MNP-SRFA with the MSISDN for the called party, an indication for explicit MNP info query, and a special TT set to EXPMNP at SCCP level to query the MNP information.

2. The MNP-SRFA sends the SRI acknowledgement with the MNP information back to the INE.

C.4 Information Flows

Figure C.4.1 shows the information flow for a successful delivery of a call to a non-ported number or number ported into the network. The figure is related to figure C.3.1.

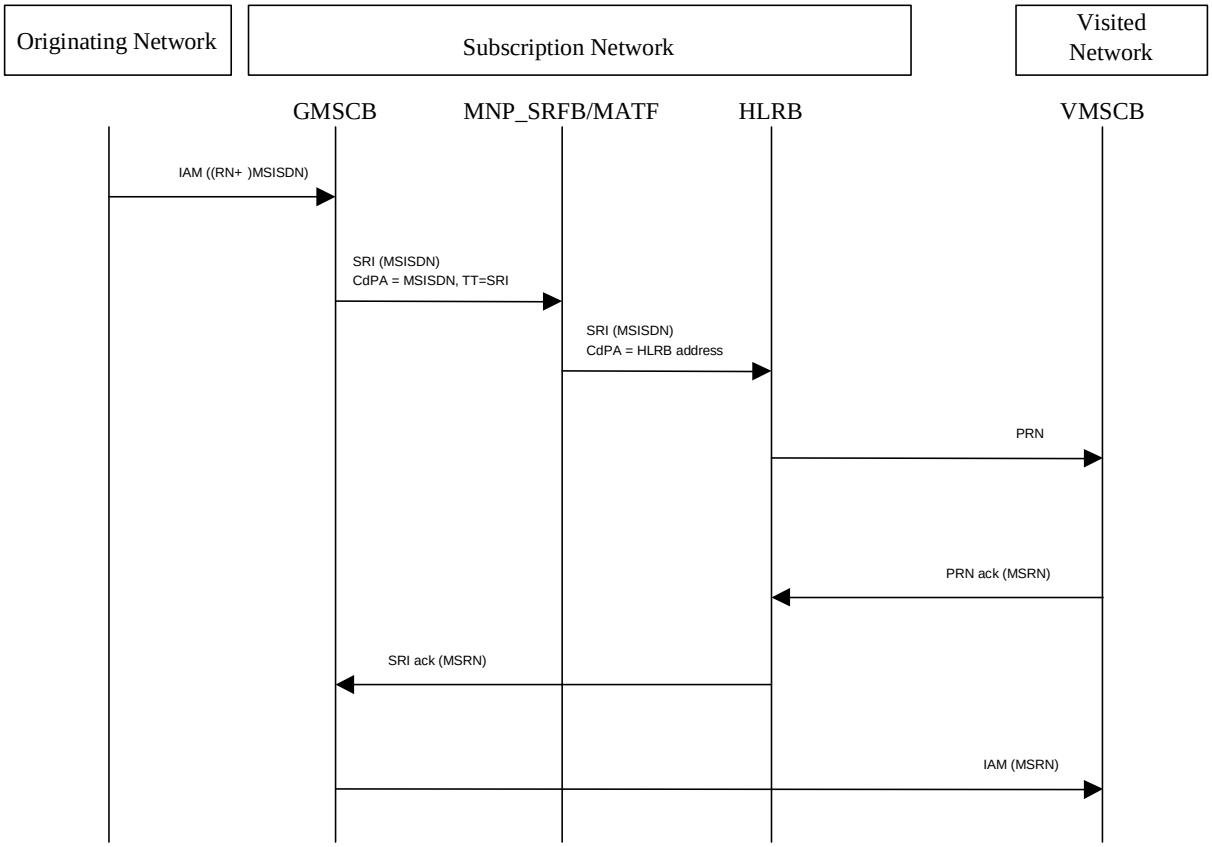


Figure C.4.1: Successful delivery of a call to a non-ported subscriber or number ported into the network

Figure C.4.2 shows the signalling involved for a call to a ported number via direct routeing where the call is originated in the subscription network. The figure is related to figure C.3.2.

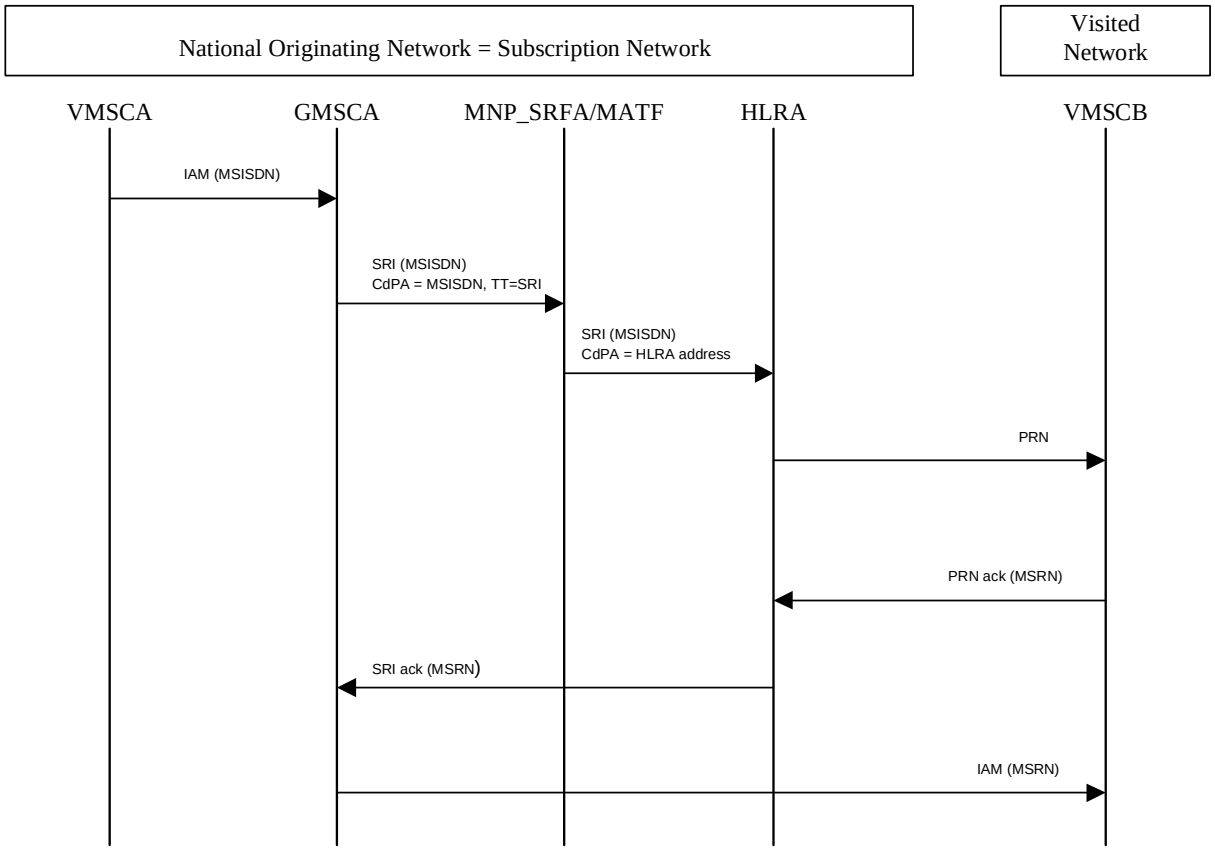


Figure C.4.2: Successful delivery of a call to a ported number via direct routeing where the call is originated in the subscription network

Figure C.4.3 shows the signalling involved for a national mobile originated call to a ported number via direct routeing. The figure is related to figure C.3.3.

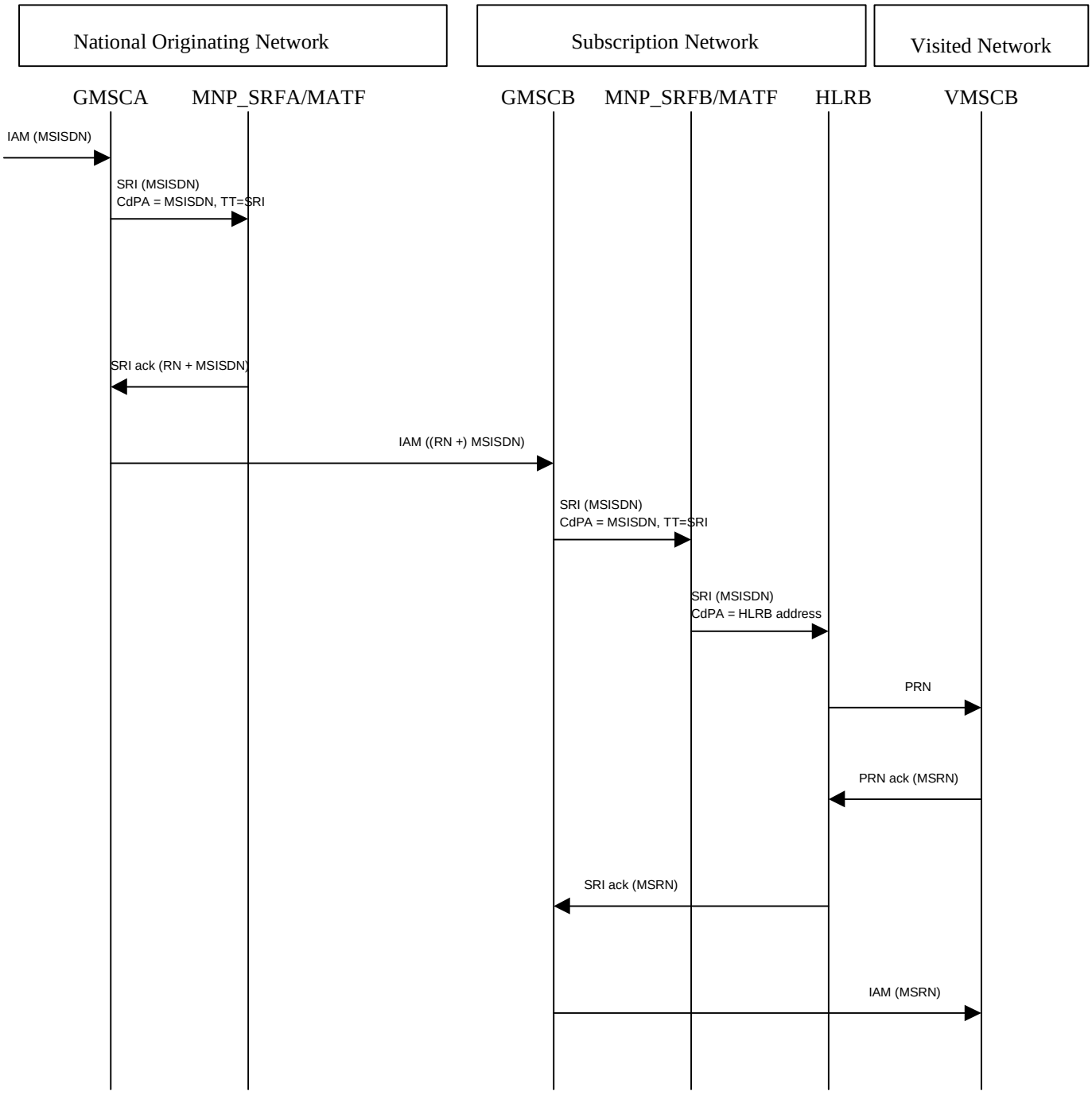


Figure C.4.3: Successful delivery of a national mobile originated call to a ported number via direct routeing

Figure C.4.4 shows the signalling involved for a national mobile originated call to a not known to be ported number via direct routeing. The figure is related to figure C.3.3.

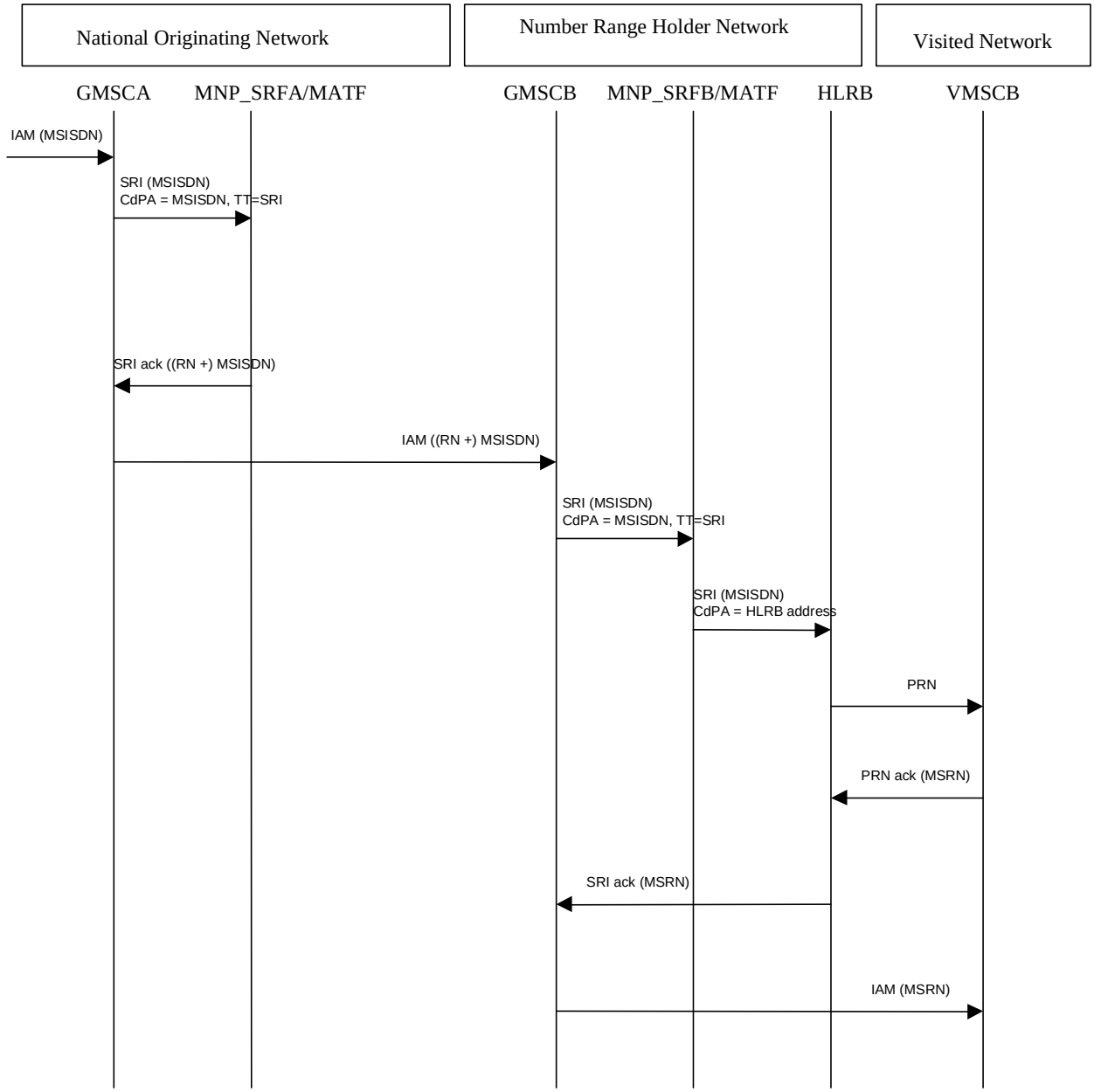


Figure C.4.4: Successful delivery of a national mobile originated call to a not known to be ported number via direct routeing

Figure C.4.5 shows the signalling involved for a call to a ported number via indirect routeing. The figure is related to figure C.3.4.

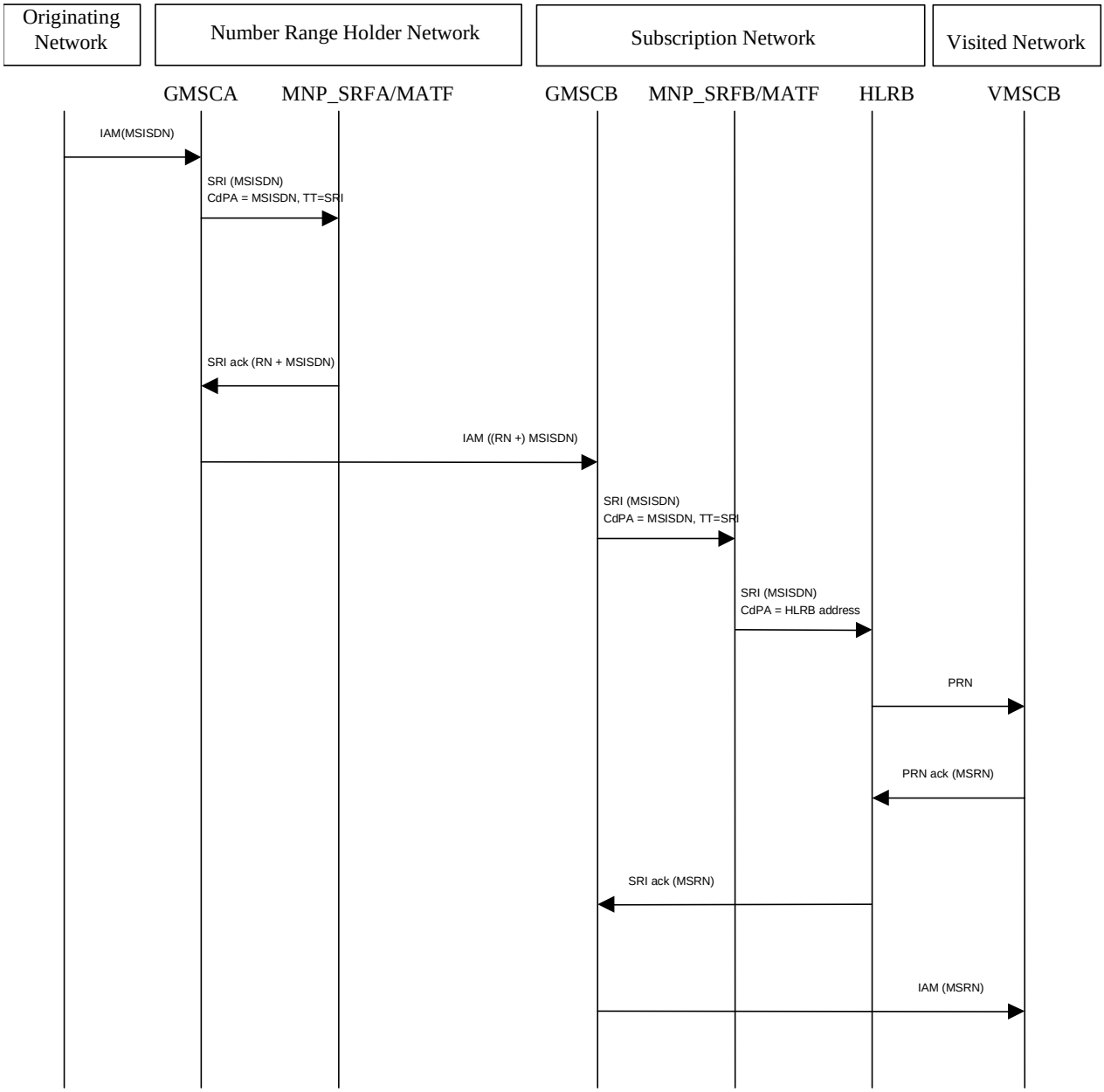


Figure C.4.5: Successful delivery of a call to a ported number via indirect routeing

Figure C.4.6 shows the signalling involved for a call to a ported number where indirect routeing with reference to the subscription network is used. The figure is related to figure C.3.5.

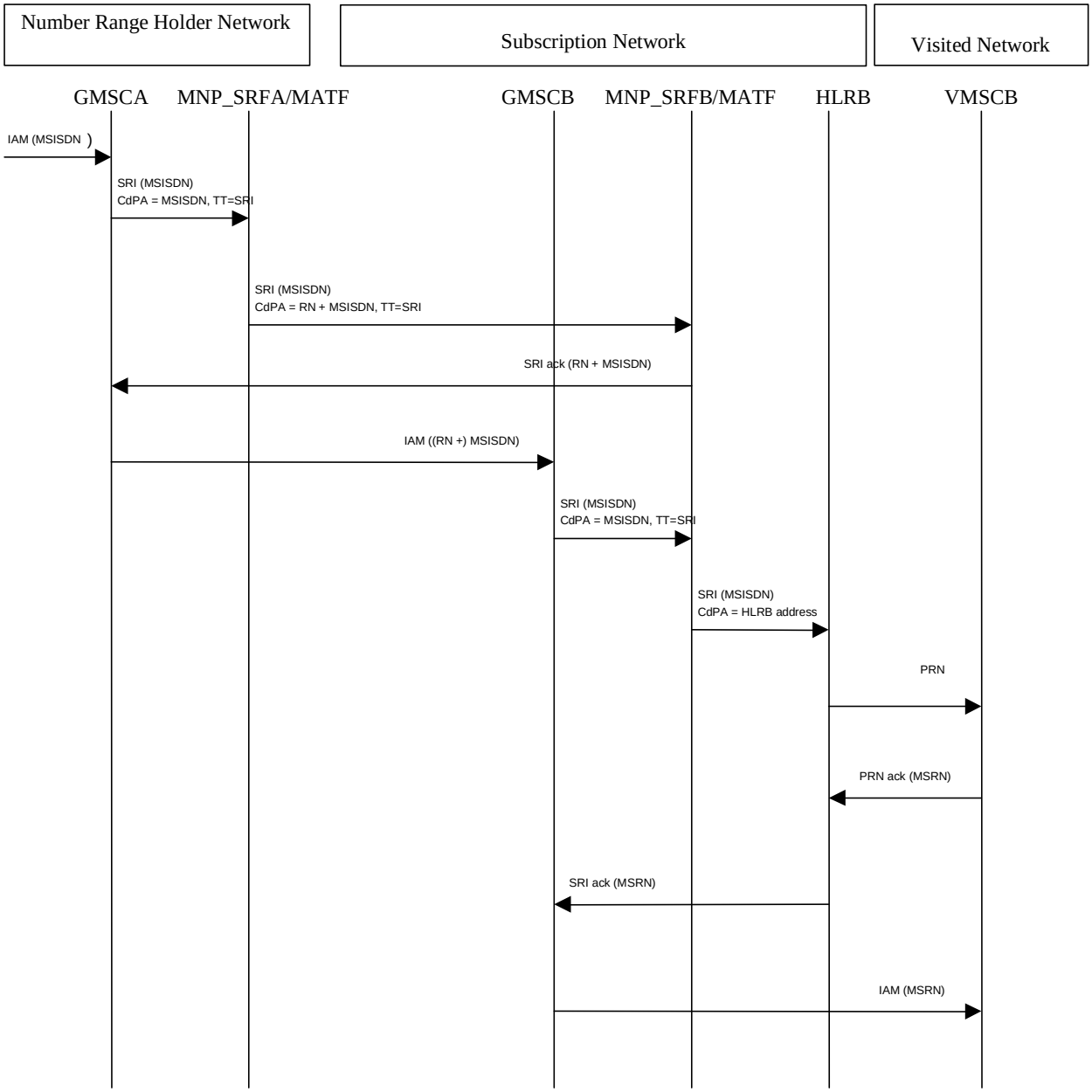


Figure C.4.6: Successful delivery for a call to a ported number where indirect routeing with reference to the subscription network is used

C.5 Contents of the messages

This clause contains detailed description of the messages shown in this part B of the specification.

C.5.1 Send Routeing Info

The contents of this message are specified in 3G TS 23.018 [3]. In the case that the message is sent from the NPLR to the gsmSCF the following MNP specific information is defined:

Information element name	Required	Description
Explicit MNP query	C	The gsmSCF explicitly requests MNP information from the NPLR.

C.5.2 Send Routeing Info ack

The contents of this message are specified in 3G TS 23.018 [3]. In the case that the message is sent from the NPLR to the GMSC, the following MNP specific information is defined:

Information element name	Required	Description
Imsi	M	The IMSI returned by an NPLR is a generic IMSI, i.e. it is not tied necessarily to the Subscriber. MCC and MNC values in this IMSI shall point to the Subscription Network of the B Subscriber
Msrn	C	When returned from the NPLR, this parameter contains a Routeing Number that points to Subscription Network. If concatenate addressing is used, it also contains the MSISDN in addition to the Routeing Number.In the case of a number which is not known to be ported, the Routeing Number may be omitted as an operator option. If the routeing number is omitted, this parameter contains only the MSISDN.
Msisdn	C	MSISDN of the B subscriber. This information element shall be present if MSRN contains the routeing number to reach the subscription network for B subscriber and the MSISDN is not contained in the MSRN information element.
MNP Indicator	U	Indicates the number portability status of the subscriber.

C.6 Handling of MAP to ISUP mapping (informative)

Different configurations can be possible within a portability domain depending on the versions of MAP and ISUP protocols being used. The following sections describe possible interworking scenarios.

C.6.1 ETSI Mapping direction: ISUP to MAP

The GMSC always constructs the Send Routeing Info message using the MSISDN. If the incoming IAM corresponds to a ported number the GMSC shall retrieve the MSISDN from the corresponding parameter in the IAM.

C.6.2 ETSI Mapping direction: MAP to ISUP

In MAP SRIack messages from NPLR, MAP versions 1 and 2 only support concatenate addressing for MNP. If MSISDN parameter is present in the SRIack, this means that separate addressing is used in MAP; this is only possible if MAP version 3 is used. MAP version 3 can also support concatenate addressing. In all cases, when a Routeing Number is returned, it is included in the MSRN parameter of the SRIack.

Regardless of how MAP is established, the possible mappings of the parameters in ISUP IAM message is one of these 4 options (see also [6]):

1. CdPN parameter includes only the MSISDN.
2. CdPN parameter includes both RN and MSISDN concatenated.
3. CdPN parameter includes the MSISDN and NRN parameter includes the Routeing Number.
4. CdPN parameter includes the Routeing Number and CDN parameter includes the MSISDN.

In all cases, the method to transport the routeing number in the IAM depends on the interfaces agreed by the operators in the portability domain.

C.6.3 ANSI Mapping direction: ISUP to MAP

The GMSC always constructs the Send Routeing Info message using the MSISDN. If the incoming IAM corresponds to a ported number the GMSC shall retrieve the MSISDN from the corresponding parameter in the IAM.

The IAM message is specified for ANSI ISUP implementation in [8] and [9].

C.6.4 ANSI Mapping direction: MAP to ISUP

In MAP SRIack messages from NPLR, MAP versions 1 and 2 only support concatenate addressing for MNP. If MSISDN parameter is present in the SRI Ack, this means that separate addressing is used in MAP; this is only possible if MAP version 3 is used. MAP version 3 can also support concatenate addressing. In all cases, when a Routeing Number is returned, it is included in the MSRN parameter of the SRI Ack.

Regardless of how MAP is established, the possible mappings of the parameters in ISUP IAM message is one of these 4 options (see also [8] and [9]):

MAP Parameters	SRI Ack		ISUP Parameters	IAM
IMSI	Subscriber IMSI		CdPN	MSRN
MSRN	MSRN	MAPS TO	GAP	N/A
MSISDN	Not Present		FCI Bit M Indicator	1
MNP Indicator	Not Present			

MAP Parameters	SRI Ack		ISUP Parameters	IAM
IMSI	Default IMSI		CdPN	Dialled DN
MSRN	Dialled DN	MAPS TO	GAP	N/A
MSISDN	Not Present		FCI Bit M Indicator	1
MNP Indicator	NotKnownToBePorted			

MAP Parameters	SRI Ack		ISUP Parameters	IAM
IMSI	Default IMSI		CdPN	RN
MSRN	RN	MAPS TO	GAP	Dialled DN
MSISDN	Dialled DN		FCI Bit M Indicator	1
MNP Indicator	OwnNumber PortedOut			

MAP Parameters	SRI Ack		ISUP Parameters	IAM
IMSI	Default IMSI		CdPN	RN
MSRN	RN	MAPS TO	GAP	Dialled DN
MSISDN	Dialled DN		FCI Bit M Indicator	1
MNP Indicator	Foreign Number PortedToForeign Network			

In all cases, the method to transport the routing number in the IAM depends on the interfaces agreed by the operators in the portability domain.

3GPP TSG CN WG4 Meeting #20
Sophia Antipolis, FRANCE, 25th – 29th August 2003

N4-030804

CR-Form-v7

CHANGE REQUEST

⌘ **29.002** **CR** **596** ⌘**rev** **1** ⌘ Current version: **5.6.2** ⌘

*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:	⌘	SRF-based solution for correct charging of calls to ported or non-ported subscribers originated by pre-paid subscribers
Source:	⌘	CN4
Work item code:	⌘	MNP
Date:	⌘	24/04/2003
Category:	⌘	**F**
Release:	⌘	Rel-5

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

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

Reason for change:	⌘	A pre-paid subscriber may be charged with different rates depending on the porting status of the called subscriber.
Summary of change:	⌘	The option to use an SRF-based query between gsmSCF and NPDB is added.
Consequences if not approved:	⌘	Pre-paid subscribers cannot be charged depending on the subscription network of the called party.

Clauses affected:	⌘	10.1, 17.7.3			
		Y	**N**		
Other specs	⌘	**X**		Other core specifications	⌘ 22.115 CR 012 22.066 CR 005 23.066 CR 024
affected:			**X**	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

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

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

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

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, and between the gsmSCF and the NPLR.

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(=)		
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(=)		
Explicit MNP query	C	C(=)		
IMSI			C	C(=)
MSRN			C	C(=)
Forwarding Data			C	C(=)
Forwarding Interrogation Required			C	C(=)
VMSC address			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(=)
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(=)

Parameter name	Request	Indication	Response	Confirm
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.

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.

Explicit MNP query

This parameter indicates by its presence that MNP information is requested from the NPLR.

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.

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.

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.

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

17.7.3 Call handling data types

…

```
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,
    explicit-MNP-query                  [25] NULL                           OPTIONAL
     }
```

...

```
NumberPortabilityStatus ::= ENUMERATED {
    notKnownToBePorted                  (0),
    ownNumberPortedOut                  (1),
    foreignNumberPortedToForeignNetwork (2),
    ...,
    foreignNumberPortedIn               (3)}
    --   exception handling:
    --  reception of other values than the ones listed the receiver shall ignore the
    --  whole NumberPortabilityStatus
```

3GPP TSG CN WG4 Meeting #20
Sophia Antipolis, FRANCE, 25th – 29th August 2003

N4-030805

CR-Form-v7

CHANGE REQUEST

⌘ **29.002** **CR** **597** ⌘ **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:	⌘	SRF-based solution for correct charging of calls to ported or non-ported subscribers originated by pre-paid subscribers
Source:	⌘	CN4
Work item code:	⌘	MNP
Date:	⌘	24/04/2003
Category:	⌘	**A**
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:	⌘	A pre-paid subscriber may be charged with different rates depending on the porting status of the called subscriber.
Summary of change:	⌘	The option to use an SRF-based query between gsmSCF and NPDB is added.
Consequences if not approved:	⌘	Pre-paid subscribers cannot be charged depending on the subscription network of the called party.

Clauses affected:	⌘	10.1, 17.7.3			
		Y	**N**		
Other specs	⌘	**X**		Other core specifications	⌘ 22.115 CR 013 22.066 CR 006 23.066 CR 024
affected:			**X**	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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

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

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

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

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, and between the gsmSCF and the NPLR.

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(=)		
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(=)		
Explicit MNP query	C	C(=)		
IMSI			C	C(=)
MSRN			C	C(=)
Forwarding Data			C	C(=)
Forwarding Interrogation Required			C	C(=)
VMSC address			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(=)
North American Equal Access preferred			U	C(=)

Parameter name	Request	Indication	Response	Confirm
Carrier Id				
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(=)
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.

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.

Explicit MNP query

This parameter indicates by its presence that MNP information is requested from the NPLR.

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.

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.

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.

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

17.7.3 Call handling data types

…

```
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,
    explicit-MNP-query                  [25] NULL                           OPTIONAL
     }
```

...

```
NumberPortabilityStatus ::= ENUMERATED {
    notKnownToBePorted                  (0),
    ownNumberPortedOut                  (1),
    foreignNumberPortedToForeignNetwork (2),
    ...,
    foreignNumberPortedIn               (3)}
    --   exception handling:
    --  reception of other values than the ones listed the receiver shall ignore the
    --  whole NumberPortabilityStatus
```