3GPP TSG_CN#6 **NP-99498**

Nice, France

13th – 15th December 1999

Agenda item:

Source: **TSG_N WG2**

Title: **CRs to 3G TS 23.007, 23.008, 29.002 (Work Item Security)**

Introduction:

This document contains **4** CRs on **Work Item Security** agreed by **TSG_N WG2** and forwarded to **TSG_N Plenary** meeting #6 for approval.

TDoc	Spec	CR	Rev	Ph.	Cat	Old v.	New v.	Subject
N2-99H72	23.007	002	2	R99	B	3.1.3	3.2.0	Authentication procedure
N2-99G46	23.008	009		R99	B	3.1.0	3.2.0	Authentication Enhancements
N2-99J72	23.008	004	3	R99	B	3.1.0	3.2.0	Authentication enhancements
N2-99K58	29.002	045	4	R99	B	3.2.0	3.3.0	Authentication enhancements

3GPP TSG-N2 meeting #12
Phoenix, USA, 15-19 Nov 1999

Document N2-99H72
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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23.007	CR	002r2	Current Version:	3.0.0

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

For submission to:	CN#06	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio		Core Network	X

Source: TSG N2 **Date:** 07/11/1999

Subject: Authentication Enhancements

Work item: Security

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

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

Reason for change: Clarifications of how handle the Quintuplets if VLR or SGSN has no Quintuplet.

Clauses affected: 8, 9

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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8 Stand-alone operation of the VLR

~~If no unused authentication triplets are available in the VLR for an IMSI record when authentication is required, the VLR may reuse already used authentication triplets. It is an operator option to define how many times an authentication triplets may be reused in the VLR.~~

In a 2G authentication regime, triplets, regardless of its nature (generated in a 2G AuC or derived from quintuplets in a 3G VLR or a 3G HLR), may be reused when no unused authentication triplets are available in the VLR for an IMSI record. It is an operator option to define how many times an authentication triplet may be reused in the VLR.

In a 3G authentication regime, quintuplets, regardless of its nature (generated in a 3G AuC or derived from triplets in a 3G VLR), shall not be reused when no unused authentication quintuplets are available in the VLR for an IMSI record.

If the Update Location response contains an error different from "Unknown Subscriber" or "Roaming Not Allowed" or if there is a parameter problem (e.g. no HLR number included), no error shall be indicated to the MSC and the IMSI record in the VLR shall not be affected, provided that the associated "Subscriber Data Confirmed by HLR" indicator is in the "Confirmed" status.

9 Stand-alone operation of the SGSN

~~If no unused authentication triplets are available in the SGSN for an IMSI record when authentication is required, the SGSN may reuse already used authentication triplets. It is an operator option to define how many times an authentication triplets may be reused in the SGSN.~~

In a 2G authentication regime, triplets, regardless of its nature (generated in a 2G AuC or derived from quintuplets in a 3G SGSN or a 3G HLR), may be reused when no unused authentication triplets are available in the SGSN for an IMSI record. It is an operator option to define how many times an authentication triplet may be reused in the SGSN.

In a 3G authentication regime, quintuplets, regardless of its nature (generated in a 3G AuC or derived from triplets in a 3G SGSN), shall not be reused when no unused authentication quintuplets are available in the SGSN for an IMSI record.

3GPP TSG CN2 Meeting #12
Phoenix, USA, 15-19 Nov 1999

Document* *N2-99G46
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CHANGE REQUEST

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23.008	**CR**	**009**	Current Version:	3.1.0

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

For submission to: CN#06	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑	for information		non-strategic	X	

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME		UTRAN / Radio		Core Network	X

Source: TSG N2 **Date:** 27/10/1999

Subject: Authentication Enhancements

Work item: Security

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

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

Reason for change: Introduction of UMTS Authentication parameters

Clauses affected: 2.3

Other specs affected:

Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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2.3.2 The Ciphering Key Sequence Number (CKSN)

The Ciphering Key Sequence Number (CKSN) is used to ensure GSM authentication information (Kc) consistency between the MS and the VLR and between the MS and the SGSN.

CKSN and its handling are defined in GSM 04.08 and GSM 03.20. It is a temporary subscriber data and is stored in the VLR and in the SGSN.

2.3.X The Key Set Identifier (KSI)

The Key Set Identifier (KSI) is used to ensure UMTS authentication information (CK and IK) consistency between the MS and the VLR and between the MS and the SGSN.

KSI and its handling are defined in UMTS TS 24.008 and UMTS TS 33.102. It is temporary subscriber data and is stored in the VLR and the SGSN.

3GPP TSG-N2 meeting #12
Phoenix, USA, 15-19 Nov 1999

***Document* N2-99J72**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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23.008	CR	004r3	Current Version:	3.0.0

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

For submission to:	CN #06	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]
(at least one should be marked with an X)

Source: TSG N2 **Date:** 16/11/1999

Subject: Authentication Enhancements

Work item: Security

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

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

Reason for change: Introduction of authentication parameters of Quintuplets

Clauses affected: 2.3, 4

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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2.3 Data related to authentication and ciphering

2.3.1 Random Number (RAND), Signed Response (SRES) and Ciphering Key (Kc)

Random Number (RAND), Signed Response (SRES) and Ciphering Key (Kc) form a triplet ~~of~~ vector~~s~~ used for authentication and encryption as defined in GSM 03.20.

~~A set of up to 5 triplet values is~~ For GSM users, triplet vectors are calculated in the 2G AuC and provided to the 2G HLR (see GSM 12.03), ~~provided to and stored in~~ and for UMTS users triplet vectors are derived from quintuplet vectors in the 3G HLR or 3G VLR, if needed (see UMTS TS 33.102). ~~and sent to the VLR and to the SGSN on request.~~

A set of up to 5 triplet values are sent from the 2G HLR to the VLR and the SGSN on request. These data are temporary subscriber data conditionally stored in ~~the HLR,~~ the VLR and the SGSN.

2.3.X Random Challenge (RAND), Expected Response (XRES), Cipher Key (CK), Integrity Key(IK) and Authentication Token(AUTN)

Random Challenge (RAND), Expected Response (XRES), Cipher Key (CK), Integrity Key(IK) and Authentication Token(AUTN) form a quintuplet vector used for user authentication, data confidentiality and data integrity as defined in UMTS TS 33.102.

When both HLR and VLR or SGSN are 3G, a set of quintuplet vectors are calculated in the AuC, and up to 5 quintuplets are sent from the HLR to the VLR and to the SGSN on request (see UMTS TS 29.002). These data are temporary subscriber data conditionally stored in the HLR, the VLR and the SGSN.

When the HLR is 2G and the VLR or SGSN are 3G, quintuplet vectors are derived by the 3G VLR or SGSN from the received triplet vectors from the HLR, if needed (see UMTS TS 33.102)

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

4 Accessing subscriber data

It shall be possible to retrieve or store subscriber data concerning a specific MS from the HLR by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Mobile Station ISDN Number (MSISDN)

It shall be possible to retrieve or store subscriber data concerning a specific MS from the VLR by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);
- Temporary Mobile Subscriber Identity (TMSI).

It shall be possible to retrieve or store subscriber data concerning a specific MS from the SGSN by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);

  Packet Temporary Mobile Subscriber identity (P-TMSI).

It shall be possible to retrieve or store subscriber data concerning a specific MS from the GGSN by use of each of the following references:

- International Mobile Subscriber Identity (IMSI);

See clause 3 for explanation of M, C, T and P in table 1 and table 2.

Table 1: Overview of data stored for non-GPRS Network Access Mode

PARAMETER	SUBCLAUSE	HLR	VLR	TYPE	
IMSI	2.1.1.1	M	M	P	Note
Network Access Mode	2.1.1.2	M	-	P	Note
International MS ISDN number	2.1.2	M	M	P	
multinumbering MSISDNs	2.1.3	C	-	P	Note
Basic MSISDN indicator	2.1.3.1	C	-	P	
MSISDN-Alert indicator	2.1.3.2	C	-	P	
TMSI	2.1.4	-	C	T	
LMSI	2.1.8	C	C	T	Note
Mobile Station Category	2.2.1	M	M	P	
RAND, SRES and Kc	2.3.1	~~M~~	C~~M~~	T	
RAND, XRES, CK, IK and AUTN	2.3.X	M	C	T	
Ciphering Key Sequence Number	2.3.2	-	M	T	
MSRN	2.4.1	-	C	T	Note
Location Area Identity	2.4.2	-	M	T	
VLR number	2.4.5	M	-	T	Note
MSC number	2.4.6	M	C	T	
HLR number	2.4.7	-	C	T	
Subscription restriction	2.4.9	C	-	P	
RSZI lists	2.4.10.1	C	-	P	
Zone Code List	2.4.10.2	-	C	P	
MSC area restricted flag	2.4.11	M	-	T	
LA not allowed flag	2.4.12	-	M	T	
ODB-induced barring data	2.4.15.1	C	-	T	
Roaming restriction due to unsupported feature	2.4.15.2	M	M	T	
Cell ID	2.4.16	-	C	T	
LSA Identity	2.4.X.1	C	C	P	
LSA Priority	2.4.X.2	C	C	P	
LSA Only Access Indicator	2.4.X.3	C	C	P	
LSA Active Mode Indicator	2.4.X.4	C	C	P	
VPLMN Identifier	2.4.X.5	C	-	P	
Provision of bearer service	2.5.1	M	M	P	
Provision of teleservice	2.5.2	M	M	P	
BC allocation	2.5.3	C	C	P	
IMSI detached flag	2.7.1	-	C	T	
Confirmed by Radio Contact indicator	2.7.4.1	-	M	T	
Subscriber Data Confirmed by HLR indicator	2.7.4.2	-	M	T	
Location Information Confirmed in HLR indicator	2.7.4.3	-	M	T	
Check SS indicator	2.7.4.4	M	-	T	
MS purged for non-GPRS flag	2.7.5	M	-	T	
MNRR	2.7.7	C	-	T	
Subscriber status	2.8.1	C	C	P	
Barring of outgoing calls	2.8.2.1	C	C	P	
Barring of incoming calls	2.8.2.2	C	-	P	
Barring of roaming	2.8.2.3	C	-	P	
Barring of premium rate calls	2.8.2.4	C	C	P	
Barring of supplementary service management	2.8.2.5	C	C	P	
Barring of registration of call forwarding	2.8.2.6	C	-	P	
Barring of invocation of call transfer	2.8.2.7	C	C	P	
Operator determined barring PLMN-specific data	2.8.3	C	C	P	
Handover Number	2.9.1	-	C	T	
Messages Waiting Data	2.10.1	C	-	T	
Mobile Station Not Reachable Flag	2.10.2	C	M	T	
Memory Capacity Exceeded Flag	2.10.3	C	-	T	

(continued)

Table 1 (concluded): Overview of data stored for non-GPRS Network Access Mode

PARAMETER	SUBCLAUSE	HLR	VLR	TYPE	
Trace Reference	2.11.1	C	C	P	
Trace Type	2.11.2	C	C	P	
Operations Systems Identity	2.11.3	C	C	P	
HLR Trace Type	2.11.4	C	-	P	
MAP Error On Trace	2.11.5	C	-	T	
Trace Activated in VLR	2.11.6	C	C	T	
Foreign Subscriber Registered in VLR	2.11.7	-	C	P	Note
VGCS Group Membership List	2.12.1	C	C	P	
VBS Group Membership List	2.12.2	C	C	P	
Broadcast Call Initiation Allowed List	2.12.2.1	C	C	P	
Originating CAMEL Subscription Information	2.14.1.1	C	C	P	
Terminating CAMEL Subscription Information	2.14.1.2	C	-	P	
Location Information/Subscriber state Information	2.14.1.3	C	-	P	
USSD CAMEL subscription information(U-CSI)	2.14.1.4	C	-	P	
SS invocation notification (SS-CSI)	2.14.1.5/3.2	C	C	P	
FTN translation information flag(TIF-CSI)	2.14.1.6	C	-	P	
USSD General CAMEL service information (UG-CSI)	2.14.2	C	-	P	
Negotiated CAMEL Capability Handling	2.14.2	C	-	T	

Table 2: Overview of data used for GPRS Network Access Mode

PARAMETER	Subclause	HLR	VLR	SGSN	GGSN	TYPE	
IMSI	2.1.1.1	M	M	M	M	P	Note
Network Access Mode	2.1.1.2	M	-	C (a)	-	P	Note
International MS ISDN number	2.1.2	M	M	M	-	T	
multinumbering MSISDNs	2.1.3	C	-	-	-	T	Note
Basic MSISDN indicator	2.1.3.1	C	-	-	-	T	.
MSISDN-Alert indicator	2.1.3.2	C	-	-	-	T	
P-TMSI	2.1.5	-	-	C	-	T	Note
TLLI	2.1.6	-	-	C	-	T	
Random TLLI	2.1.7	-	-	C	-	T	Note
IMEI	2.1.9	-	-	C	-	T	
RAND/SRES and Kc	2.3.1	~~M~~ -	-	~~M~~C	-	T	
RAND, XRES, CK, IK, AUTN	2.3.X	M	-	C	-	T	
Ciphering Key Sequence Number	2.3.2	-	-	M	-	T	
Selected Ciphering Algorithm	2.3.3	-	-	M	-	T	
Current Kc	2.3.4	-	-	M	-	T	
P-TMSI Signature	2.3.5	-	-	C	-	T	
Routing Area Identity	2.4.3	-	-	M	-	T	
Cell Global Identification	2.4.4	-	-	C	-	T	
SGSN Number	2.4.8.1	M	C (Gs)	-	-	T	Note
GGSN Number	2.4.8.2	©	-	-	-	P	Note
VLR Number	2.4.5	M	-	C (Gs)	-	T	
RSZI Lists	2.4.10.1	C	-	-	-	P	
Zone Code List	2.4.10.2	-	-	C	-	P	
LA not allowed flag	2.4.12	-	-	M	-	T	
SGSN area restricted flag	2.4.13	M	-	-	-	T	
Roaming Restriction in the SGSN ..	2.4.15.2	M	-	M	-	T	
Cell ID	2.4.16	-	-	C	-	T	
LSA Identity	2.4.X.1	C	C	C	-	P	
LSA Priority	2.4.X.2	C	C	C	-	P	
LSA Only Access Indicator	2.4.X.3	C	C	C	-	P	
LSA Active Mode Indicator	2.4.X.4	C	C	C	-	P	
VPLMN Identifier	2.4.X.5	C	-	-	-	P	
Provision of teleservice	2.5.2	C	-	C	-	P	
Transfer of SM option	2.5.4	M	-	-	-	P	
Subscriber Status	2.8.1	C	-	C	-	P	
Barring of outgoing calls	2.8.2.1	C	-	C	-	P	
Barring of roaming	2.8.2.3	C	-	C	-	P	
ODB PLMN-specific data	2.8.3	C	-	C	-	P	
MM State	2.7.3	-	-	M	-	T	
Subscriber Data Confirmed by HLR Indicator	2.7.4.2	-	-	M	-	T	
Location Info Confirmed by HLR Indicator	2.7.4.3	-	-	M	-	T	
MS purged for GPRS flag	2.7.6	M	-	-	-	T	
MNRG	2.7.2	M	-	M	M	T	
MNRR	2.7.7	C	-	-	-	T	
Trace Activated in SGSN	2.11.7	C	-	C	-	P	
PDP Type	2.13.1	C	-	C	M	P	
PDP Address	2.13.2	C	-	C	M	P	
NSAPI	2.13.3	-	-	C	C	T	
PDP State	2.13.4	-	-	C	-	T	
New SGSN Address	2.13.5	-	-	C	-	T	
Access Point Name	2.13.6	C	-	C	C	P/T	Note
GGSN Address in Use	2.13.7	-	-	C	-	T	
VPLMN Address Allowed	2.13.8	C	-	C	-	P	
Dynamic Address	2.13.9	-	-	-	C	T	
SGSN Address	2.13.10	-	-	-	M	T	
GGSN-list	2.13.11	M	-	-	-	T	

(continued)

Table 2 (concluded): Overview of data used for GPRS Network Access Mode

PARAMETER	Subclause	HLR	VLR	SGSN	GGSN	TYPE
Quality of Service Subscribed	2.13.12	C	-	C	-	P
Quality of Service Requested	2.13.13	-	-	C	-	T
Quality of Service Negotiated	2.13.14	-	-	C	M	T
SND	2.13.15	-	-	C	C	T
SNU	2.13.16	-	-	C	C	T
DRX Parameters	2.13.17	-	-	M	-	T
Compression	2.13.18	-	-	C	-	T
NGAF	2.13.19	-	-	C (Gs)	-	T
Classmark	2.13.20	-	-	M	-	T
TID	2.13.21	-	-	C	C	T
Radio Priority	2.13.22	-	-	C	-	T
Radio Priority SMS	2.13.23	-	-	C	-	T

NOTE: The HLR column indicates only GPRS related use, i.e. if the HLR uses a parameter in non-GPRS Network Access Mode but not in GPRS Network Access Mode, it is not mentioned in this table 2.
(Gs): The VLR column is applicable if Gs interface is installed. It only indicates GPRS related data to be stored and is only relevant to GPRS subscribers registered in VLR.

a): This parameter is relevant in the SGSN only when the Gs interface is installed.

NOTE: For special condition of storage see in the clauses 2.x.y referred-to.
See clause 3 for explanation of M,C,T and P in table 2.

3GPP TSG-CN WG2 **Document** ***N2-99K58***

Phoenix, USA, 15-19 Nov 1999

3G CHANGE REQUEST

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29.002 **CR** **045r4** Current Version: 3.2.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG CN#06 *list TSG meeting no. here ↑*

for approval [X]
for information [ ]

(only one box should be marked with an X)

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

Proposed change affects: *(at least one should be marked with an X)* USIM [ ] ME [ ] UTRAN [ ] Core Network [X]

Source: TSG N2 **Date:** 05/11/1999

Subject: Authentication Enhancements

3G Work item: Security

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

F	Correction	[ ]
A	Corresponds to a correction in a 2G specification	[ ]
B	Addition of feature	[X]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Reason for change: Introduction of Authentication Quintuplets,
Segmentation of SendAuthenticationInfo and SendIdentification

Clauses affected: 5, 7, 8, 17, 19, 25

Other specs Affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other 2G core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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5.1.2 Overload control for MAP entities

For all MAP entities, especially the HLR, the following overload control method is applied:

If overload of a MAP entity is detected requests for certain MAP operations (see tables 5.1/1, 5.1/2, 5.1/3 and 5.1/4) may be ignored by the responder. The decision as to which MAP Operations may be ignored is made by the MAP service provider and is based upon the priority of the application context.

Since most of the affected MAP operations are supervised in the originating entity by TC timers (medium) an additional delay effect is achieved for the incoming traffic.

If overload levels are applicable in the Location Registers the MAP operations should be discarded taking into account the priority of their application context (see table 5.1/1 for HLR, table 5.1/2 for MSC/VLR, table 5.1/3 for the SGSN and table 5.1/4 for the SMLC; the lowest priority is discarded first).

The ranking of priorities given in the tables 5.1/1, 5.1/2, 5.1/3 and 5.1/4 is not normative. The tables can only be seen as a proposal which might be changed due to network operator/implementation matters.

Table 5.1/1: Priorities of Application Contexts for HLR as Responder

	Responder = HLR	**Initiating Entity**
Priority high		
	Mobility Management	
	networkLocUp (updateLocation), (restoreData/v2), (sendParameters/v1)	VLR
	gprsLocationUpdate (updateGPRSLocation/v3),	SGSN
	infoRetrieval (sendAuthenticationInfo/v2/v3), (sendParameters/v1)	VLR/SGSN
	msPurging VLR (purgeMS/v2/v3)	
	msPurging SGSN (purgeMS/v3)	
	Short Message Service	
	shortMsgGateway (sendRoutingInfoforSM), (reportSM-DeliveryStatus)	GMSC
	mwdMngt VLR/SGSN (readyForSM/v2/v3), (noteSubscriberPresent/v1)	
	Mobile Terminating Traffic	
	locInfoRetrieval (sendRoutingInfo)	GMSC
	anyTimeEnquiry (anyTimeInterrogation)	gsmSCF
	reporting (statusReport)	VLR
	Location Services	
	locationSvcGateway (sendRoutingInfoforLCS/v3)	GMLC
	Subscriber Controlled Inputs (Supplementary Services)	
	networkFunctionalSs (registerSS), (eraseSS), (activateSS), (deactivateSS), (interrogateSS), (registerPassword), (processUnstructuredSS-Data/v1), (beginSubscriberActivity/v1)	VLR
	callCompletion (registerCCEntry), (eraseCCEntry)	VLR
	networkUnstructuredSs (processUnstructuredSS-Request/v2)	VLR
	imsiRetrieval (sendIMSI/v2)	VLR
	gprsLocationInfoRetrieval (sendRoutingInfoForGprs/v3)	GGSN/SGSN
	failureReport (failureReport/v3)	GGSN/SGSN
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.

Table 5.1/3: Priorities of Application Contexts for SGSN as Responder

Responder = SGSN	Initiating Entity
Priority high	
Mobility and Location Register Management	
locationCancel (cancelLocation v3)	HLR
reset (reset)	HLR
subscriberDataMngt (insertSubscriberData v3), (deleteSubscriberData v3)	HLR
tracing (activateTraceMode), (deactivateTraceMode)	HLR
Short Message Service	
shortMsgMT-Relay (MT-ForwardSM v3) (forwardSM v1/v2)	MSC
Network-Requested PDP context activation	
gprsNotify HLR (noteMsPresentForGprs v3),	
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.

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

Responder = MSC/VLR	Initiating Entity
Priority high	
Handover	
handoverControl (prepareHandover/v2), (performHandover/v1)	MSC
Mobility and Location Register Management	
locationCancel (cancelLocation)	HLR
reset (reset)	HLR
interVlrInfoRetrieval (sendIdentification/v2/v3), (sendParameters/v1)	VLR
subscriberDataMngt (insertSubscriberData), (deleteSubscriberData)	HLR
tracing (activateTraceMode), (deactivateTraceMode)	HLR
Short Message Service	
shortMsgMO-Relay (MO-ForwardSM v3) (forwardSM v1/v2)	MSC/SGSN
shortMsgMT-Relay (MT-ForwardSM v3) (forwardSM v1/v2)	MSC
shortMsgAlert (alertServiceCentre/v2), (alertServiceCentreWithoutResult/v1)	HLR
Mobile Terminating Traffic	
roamingNbEnquiry (provideRoamingNumber)	HLR
callControlTransfer (resumeCallHandling)	MSC
subscriberInfoEnquiry (provideSubscriberInformation)	HLR
reporting (remoteUserFree) (SetReportingState)	HLR
Location Services	
locationSvcLMUControl (lcsReset v3)	SMLC
locationSvcDataTransfer (lcsInformationRequest v3)	SMLC
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.

Table 5.1/4: Priorities of Application Contexts for SMLC as Responder

Responder = SMLC	Initiating Entity
Priority high	
Location Services	
locationSvcLMUControl (lcsRegistration v3)	VLR
locationSvcDataTransfer (lcsInformationReport v3)	MSC
locationSvcPositioning (performLocation v3)	MSC
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.

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

7.6.7 Authentication parameters

7.6.7.1 Authentication set list

This parameter represents a list of sets of authentication parameters for a given subscriber.~~:~~
The list either contains Authentication Triplets (Rand, Sres, Kc) or Authentication Quintuplets (Rand, Xres, Ck, Ik, Autn). If the list contains Authentication Quintuplets, the order of sequence in this list is chronological, the first quintuplet in the list is the oldest one.

~~— Rand;~~

~~— Sres;~~

~~— Kc.~~

7.6.7.2 Rand

This parameter represents a random number used for authentication.

7.6.7.3 Sres

This parameter represents the response to an authentication request.

7.6.7.4 Kc

This parameter refers to a key used for ciphering purposes.

7.6.7.5 Xres~~[spare]~~

This parameter represents the response to an UMTS authentication request.

7.6.7.5A Ck

This parameter refers to a key used for UMTS ciphering purposes.

7.6.7.5B Ik

This parameter refers to the Integrity Key.

7.6.7.5C Autn

This parameter refers to the Authentication Token.

7.6.7.6 Cksn

This parameter refers to a ciphering key sequence number.

7.6.7.6A Ksi

This parameter refers to a key set identifier.

7.6.7.6B Auts

This parameter refers to the resynchronisation token.

7.6.7.7 Ciphering mode

This parameter refers to the ciphering mode which is associated with a radio channel. It may take values as follows:

- no encryption;
- identification of specific ciphering algorithm.

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

8.1.4 MAP_SEND_IDENTIFICATION service

8.1.4.1 Definition

The MAP_SEND_IDENTIFICATION service is used between a VLR and a previous VLR to retrieve IMSI and authentication sets for a subscriber registering afresh in that VLR.

The MAP_SEND_IDENTIFICATION service is a confirmed service using the service primitives defined in table 8.1/4.

8.1.4.2 Service primitives

Table 8.1/4: MAP_SEND_IDENTIFICATION

Parameter name	Request	Indication	Response	Confirm
Invoke Id	M	M(=)	M(=)	M(=)
TMSI	M	M(=)		
Number of requested vectors	M	M(=)		
Segmentation prohibited indicator	C	C (=)		
IMSI			C	C(=)
Authentication set			U	C(=)
User error			C	C(=)
Provider error				O

8.1.4.3 Parameter definitions and use

Invoke Id

See definition in subclause 7.6.1.

TMSI

See definition in subclause 7.6.2.

Number of requested vectors

A number indicating how many authentication vectors the new VLR is prepared to receive.

Segmentation prohibited indicator

This parameter indicates if the new VLR or SGSN allows message segmentation.

IMSI

See definition in subclause 7.6.2. The IMSI is to be returned if the service succeeds.

Authentication set

See definition in subclause 7.6.7. If the service succeeds a list of up to five authentication sets is returned, if there are any available.

User error

This parameter is mandatory if the service fails. The following error cause defined in subclause 7.6.1 may be used, depending on the nature of the fault:

- unidentified subscriber.

Provider error

For definition of provider errors see subclause 7.6.1.

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

8.5.2 MAP_SEND_AUTHENTICATION_INFO service

8.5.2.1 Definition

This service is used between the VLR and the HLR for the VLR to retrieve authentication information from the HLR. The VLR requests up to five authentication~~some sets of RAND/SRES/Kc~~ vectors.

Also this service is used between the SGSN and the HLR for the SGSN to retrieve authentication information from the HLR. The SGSN requests up to five authentication~~some sets of RAND/SRES/Kc~~ vectors.

If the HLR cannot provide the VLR or the SGSN with triplets, an empty response is returned. The VLR or the SGSN may then re-use old authentication triplets, except where this is forbidden under the conditions specified in GSM 03.20 [24].

If the HLR cannot provide the VLR or the SGSN with quintuplets, an empty response is returned. The VLR or the SGSN shall not re-use old authentication quintuplets.

If the VLR or SGSN receives a MAP-Send_AUTHENTICATION_INFO response containing a User Error parameter as part of the handling of an authentication procedure, the authentication procedure in the VLR or SGSN shall fail.

Security related network functions are further described in GSM 03.20 and 3GPP TS 33.102.

The service is a confirmed service and consists of four service primitives.

8.5.2.2 Service primitives

The service primitives are shown in table 8.5/2.

Table 8.5/2: MAP_SEND_AUTHENTICATION_PARAMETERS parameters

Parameter name	Request	Indication	Response	Confirm
Invoke id	M	M(=)	M(=)	M(=)
IMSI	M	M(=)		
Number of requested vectors	M	M(=)		
Re-synchronisation Info	C	C(=)		
Segmentation prohibited indicator	C	C (=)		
Immediate response preferred indicator	C	C (=)		
AuthenticationSetList			C	C(=)
User error			C	C(=)
Provider error				O

8.5.2.3 Parameter use

Invoke id

See subclause 7.6.1 for the use of this parameter.

IMSI

See subclause 7.6.2 for the use of this parameter.

Number of requested vectors

A number indicating how many authentication vectors the VLR or SGSN is prepared to receive.

Re-synchronisation Info

For definition and use of this parameter see 3G TS 33.102.

Segmentation prohibited indicator

This parameter indicates if the VLR or SGSN allows message segmentation.

Immediate response preferred indicator

This parameter indicates that the VLR or SGSN requests that the HLR immediately sends back the available authentication vectors. It shall be ignored if the number of available vectors is less than the number of requested vectors and if the VLR or SGSN or the HLR does not support message segmentation.

AuthenticationSetList

A set of one to five authentication vectors are transferred from the HLR to the VLR or from the HLR to the SGSN, if the outcome of the service was successful.

User error

One of the following error causes defined in subclause 7.6.1 shall be sent by the user in case of unsuccessful outcome of the service, depending on the respective failure reason:

- unknown subscriber;
- unexpected data value;
- system failure;
- data missing.

Provider error

See subclause 7.6.1 for the use of this parameter.

**********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 sections 17.6 & 17.7 relates only to the ACs in this table.

AC Name	AC Version	Operations Used	Comments *
LocationCancellationContext	v3	cancelLocation	
EquipmentMngtContext	v2	checkIMEI	
ImsiRetrievalContext	v2	sendIMSI	
InfoRetrievalContext	v3~~2~~	sendAuthenticationInfo	
InterVlrInfoRetrievalContext	v3~~2~~	sendIdentification	
HandoverControlContext	v2	prepareHandover forwardAccessSignalling sendEndSignal processAccessSignalling prepareSubsequentHandover	
MwdMngtContext	v3	readyForSM	
MsPurgingContext	v3	purgeMS	
ShortMsgAlertContext	v2	alertServiceCentre	
resetContext	v2	reset	
networkUnstructuredSsContext	v2	processUnstructuredSS-Request unstructuredSS-Request unstructuredSS-Notify	
tracingContext	v3	activateTraceMode deactivateTraceMode	
networkFunctionalSsContext	v2	registerSS eraseSS activateSS deactivateSS registerPassword interrogateSS getPassword	
shortMsgMO-RelayContext	v3	mo-forwardSM	
shortMsgMT-RelayContext	v3	mt-forwardSM	
shortMsgGatewayContext	v3	sendRoutingInfoForSM reportSM-DeliveryStatus InformServiceCentre	the syntax of this operation has been extended in comparison with release 96 version
networkLocUpContext	v3	updateLocation forwardCheckSs-Indication restoreData insertSubscriberData activateTraceMode	the syntax is the same in v1 & v2
gprsLocationUpdateContext	v3	updateGprsLocation insertSubscriberData activateTraceMode	
subscriberDataMngtContext	v3	insertSubscriberData deleteSubscriberData	
roamingNumberEnquiryContext	v3	provideRoamingNumber	
locationInfoRetrievalContext	v3	sendRoutingInfo	
gprsNotifyContext	v3	noteMsPresentForGprs	
gprsLocationInfoRetrievalContext	v3	sendRoutingInfoForGprs	
failureReportContext	v3	failureReport	
callControlTransferContext	v4	resumeCallHandling	
subscriberInfoEnquiryContext	v3	provideSubscriberInfo	
anyTimeEnquiryContext	v3	anyTimeInterrogation	

ss-InvocationNotificationContext	v3	ss-InvocationNotification	
sIWFSAllocationContext	v3	provideSIWFSNumber sIWFSSignallingModify	
groupCallControlContext	v3	prepareGroupCall processGroupCallSignalling forwardGroupCallSignalling sendGroupCallEndSignal	
reportingContext	v3	setReportingState statusReport remoteUserFree	
callCompletionContext	v3	registerCC-Entry eraseCC-Entry	
locationSvcLMUControlContext	v3	lcsRegistrationlcsReset	
locationSvcDataTransferContext	v3	lcsInformationRequest lcsInformationReport	
locationSvcEnquiryContext	v3	provideSubscriberLocation subscriberLocationReport	
locationSvcGatewayContext	v3	sendRoutingInfoForLCS	
locationSvcPositioningContext	v3	lcsAssignTrafficChannel lcsInformationRequest lcsInformationReport performLocation	

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

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

17.2.2.4 Information retrieval

This operation package includes the operation required for the authentication information retrieval procedure between HLR and VLR and between HLR and SGSN.

```
InfoRetrievalPackage-v3 ::= OPERATION-PACKAGE
     -- Supplier is HLR if Consumer is VLR
     -- Supplier is HLR if Consumer is SGSN
     CONSUMER INVOKES {
          sendAuthenticationInfo}
```

The v2-equivalent package is defined as follows:

```
InfoRetrievalPackage-v2 ::= OPERATION-PACKAGE
     -- Supplier is HLR if Consumer is VLR
     -- Supplier is HLR if Consumer is SGSN
     CONSUMER INVOKES {
          sendAuthenticationInfo}
```

The v1-equivalent package is defined as follows:

```
InfoRetrievalPackage-v1 ::= OPERATION-PACKAGE
     -- Supplier is HLR or VLR if Consumer is VLR
     -- Supplier is HLR if Consumer is SGSN
     CONSUMER INVOKES {
          sendParameters}
```

17.2.2.5 Inter-VLR information retrieval

This operation package includes the operations required for inter VLR information retrieval procedures.

```
InterVlrInfoRetrievalPackage-v3 ::= OPERATION-PACKAGE
     -- Supplier is VLR if Consumer is VLR
     CONSUMER INVOKES {
          sendIdentification}
```

The v2-equivalent package is defined as follows:

```
InterVlrInfoRetrievalPackage-v2 ::= OPERATION-PACKAGE
     -- Supplier is VLR if Consumer is VLR
     CONSUMER INVOKES {
          sendIdentification}
```

The v1-equivalent package is : InfoRetrievalPackage-v1

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

17.3 Application contexts

17.3.1 General aspects

An application-context is assigned for each dialogue established by a MAP-user. In the present document each application-context is assigned a name which is supplied in the MAP-OPEN Req primitive by the MAP-User and transmitted to the peer under certain circumstances.

The following ASN.1 MACRO is used to describe the main aspects of application-contexts in the following subclauses:

```
APPLICATION-CONTEXT MACRO ::=

BEGIN

TYPE NOTATION ::= Symmetric | InitiatorConsumerOf
ResponderConsumerOf | empty

VALUE NOTATION ::= value(VALUE OBJECT IDENTIFIER)

Symmetric ::= "OPERATIONS OF" "{" PackageList "}"

InitiatorConsumerOf ::= "INITIATOR CONSUMER OF" "{" PackageList "}"

ResponderConsumerOf ::= "RESPONDER CONSUMER OF" "{" PackageList "}"
          | empty

PackageList ::= Package | PackageList "," Package

Package ::= value(OPERATION-PACKAGE)
          | type -- shall reference a package type

END
```

The following definitions are used throughout this subclause:

- v1-application-context: An application-context which contains only v1-packages and uses only TC v1 facilities;
- v1 context set: the set of v1-application-contexts defined in the present document.
- vn-application-context (n>=2): An application-context which contains only vn-packages;

The names of v1-application-contexts are suffixed by "-v1" while other names are suffixed by "-vn" where n>=2.

Application-contexts which do not belong to the v1 context set use v2 TC facilities.

The last component of each application-context-name (i.e. the last component of the object identifier value) assigned to an application-context which belongs to the v1 context set indicates explicitly "version1".

For each application-context which does not belong to the "v1 context set" there is a v1-equivalent application context. This is a v1-application-context which includes the v1-equivalents of the packages included in the original context.

Each application-context uses the abstract-syntax associated with the operation-packages it includes and uses the transfer-syntax derived from it by applying the encoding rules defined in subclause 17.1.1.

ACs which do not belong to the v1 context set require the support of the abstract-syntax identified by the object identifier value: MAP-DialogueInformation.map-Dialogue-AS defined in subclause 17.4.

17.3.2 Application context definitions

17.3.2.1 [spare]

17.3.2.2 Location Updating

This application context is used between HLR and VLR for location updating procedures.

```
networkLocUpContext-v3 APPLICATION-CONTEXT
     -- Responder is HLR if Initiator is VLR
     INITIATOR CONSUMER OF {
          LocationUpdatingPackage-v3,
          DataRestorationPackage-v3}
     RESPONDER CONSUMER OF {
          SubscriberDataMngtPackage-v3
          TracingPackage-v3}
::= {map-ac networkLocUp(1) version3(3)}
```

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

```
{map-ac networkLocUp(1) version2(2)}
```

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

```
{map-ac networkLocUp(1) version1(1)}
```

17.3.2.3 Location Cancellation

This application context is used between HLR and VLR or between HLR and SGSN for location cancellation procedures. For the HLR - SGSN interface only version 3 of this application context is applicable.

```
locationCancellationContext-v3 APPLICATION-CONTEXT
     -- Responder is VLR or SGSN if Initiator is HLR
     INITIATOR CONSUMER OF {
          LocationCancellationPackage-v3}
::= {map-ac locationCancel(2) version3(3)}
```

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

```
map-ac locationCancel(2) version2(2)
```

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

```
map-ac locationCancel(2) version1(1)
```

17.3.2.4 Roaming number enquiry

This application context is used between HLR and VLR for roaming number enquiry procedures.

```
roamingNumberEnquiryContext-v3 APPLICATION-CONTEXT
     -- Responder is VLR if Initiator is HLR
     INITIATOR CONSUMER OF {
          RoamingNumberEnquiryPackage-v3}
::= {map-ac roamingNbEnquiry(3) version3(3)}
```

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

```
{map-ac roamingNbEnquiry(3) version2(2)}
```

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

```
{map-ac roamingNbEnquiry(3) version1(1)}
```

17.3.2.5 [spare]

17.3.2.6 Location Information Retrieval

This application-context is used between GMSC and HLR or between GMSC and NPLR when retrieving location information. For the GMSC - NPLR interface version 1, version 2 and version 3 of this application context are applicable.

```
locationInfoRetrievalContext-v3 APPLICATION-CONTEXT
     -- Responder is HLR or NPLR if Initiator is GMSC
     INITIATOR CONSUMER OF {
          InterrogationPackage-v3}
::= {map-ac locInfoRetrieval(5) version3(3)}
```

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

```
{map-ac locInfoRetrieval(5) version2(2)}
```

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

```
{map-ac locInfoRetrieval(5) version1(1)}
```

17.3.2.7 Call control transfer

This application context is used for the call control transfer procedure between the VMSC and the GMSC.

```
callControlTransferContext-v4 APPLICATION-CONTEXT
     -- Responder is GMSC if Initiator is VMSC
     INITIATOR CONSUMER OF {
          CallControlTransferPackage-v4}
::= {map-ac callControlTransfer(6) version4(4)}
```

The following application-context-name is assigned to the v3-equivalent application-context:

```
{map-ac callControlTransfer(6) version3(3)}
```

17.3.2.8 - 17.3.2.10 [spare]

17.3.2.11 Location registers restart

This application context is used between HLR and VLR or between HLR and SGSN for location register restart procedures. For the HLR - SGSN interface version 1 and version 2 of this application context are applicable.

```
resetContext-v2 APPLICATION-CONTEXT
     -- Responder is VLR or SGSN if Initiator is HLR
     INITIATOR CONSUMER OF {
          ResetPackage-v2}
::= {map-ac reset(10) version2(2)}
```

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

```
{map-ac reset(10) version1(1)}
```

17.3.2.12 Handover control

This application context is used for handover procedures between MSCs.

```
handoverControlContext-v2 APPLICATION-CONTEXT
     -- Responder is MSCB if Initiator is MSCA
     INITIATOR CONSUMER OF {
          HandoverControlPackage-v2}
::= {map-ac handoverControl(11) version2(2)}
```

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

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

17.3.2.13 IMSI Retrieval

This application context is used for IMSI retrieval between HLR and VLR.

```
imsiRetrievalContext-v2 APPLICATION-CONTEXT
     -- Responder is HLR if Initiator is VLR
     INITIATOR CONSUMER OF {
          IMSIRetrievalPackage-v2}
::= {map-ac imsiRetrieval(26) version2(2)}
```

This application-context is v2 only.

17.3.2.14 Equipment Management

This application context is used for equipment checking between MSC and EIR or between SGSN and EIR. For the SGSN - EIR interface version 1 and version 2 of this application context are applicable:

```
equipmentMngtContext-v2 APPLICATION-CONTEXT
     -- Responder is EIR if Initiator is MSC
     -- Responder is EIR if Initiator is SGSN
     INITIATOR CONSUMER OF {
          EquipmentMngtPackage-v2}
::= {map-ac equipmentMngt(13) version2(2)}
```

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

```
{map-ac equipmentMngt(13) version1(1)}
```

17.3.2.15 Information retrieval

This application context is used for authentication information retrieval between HLR and VLR or between HLR and SGSN. For the HLR - SGSN interface version 1 and version 2 and version 3 of this application context are applicable.

```
infoRetrievalContext-v3 APPLICATION-CONTEXT
     -- Responder is HLR if Initiator is VLR
     -- Responder is HLR if Initiator is SGSN
     INITIATOR CONSUMER OF {
          InfoRetrievalPackage-v3}
::= {map-ac infoRetrieval(14) version3(3)}
```

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

```
infoRetrievalContext-v2 APPLICATION-CONTEXT
     -- Responder is HLR if Initiator is VLR
     -- Responder is HLR if Initiator is SGSN
     INITIATOR CONSUMER OF {
          InfoRetrievalPackage-v2}
::= {map-ac infoRetrieval(14) version2(2)}
```

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

```
     -- Responder is HLR if Initiator is VLR
{map-ac infoRetrieval(14) version1(1)}
```

17.3.2.16 Inter-VLR information retrieval

This application context is used for information retrieval between VLRs.

```
interVlrInfoRetrievalContext-v3 APPLICATION-CONTEXT
     -- Responder is VLR if Initiator is VLR
     INITIATOR CONSUMER OF {
          InterVlrInfoRetrievalPackage-v3}
::= {map-ac interVlrInfoRetrieval(15) version3(3)}
```

The v2-equivalent application-context is:

```
interVlrInfoRetrievalContext-v2 APPLICATION-CONTEXT
     -- Responder is VLR if Initiator is VLR
     INITIATOR CONSUMER OF {
          InterVlrInfoRetrievalPackage-v2}
::= {map-ac interVlrInfoRetrieval(15) version2(2)}
```

The v1-equivalent application-context is:

```
     -- Responder is VLR if Initiator is VLR
{map-ac infoRetrieval(14) version1(1)}
```

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

17.3.3 ASN.1 Module for application-context-names

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

```
MAP-ApplicationContexts {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ApplicationContexts (2) version5 (5)}

DEFINITIONS

::=

BEGIN


-- EXPORTS everything


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

-- application-context-names

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

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

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

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

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

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

handoverControlContext-v2  OBJECT IDENTIFIER ::=
     {map-ac handoverControl(11) version2(2)}

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

infoRetrievalContext-v32  OBJECT IDENTIFIER ::=
     {map-ac infoRetrieval(14) version32(32)}

interVlrInfoRetrievalContext-v32  OBJECT IDENTIFIER ::=
     {map-ac interVlrInfoRetrieval(15) version32(32)}
```

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

locationSvcPositioningContext-v3  OBJECT IDENTIFIER ::=
    {map-ac locationSvcPositioning(39) version3(3)}

locationSvcLMUControlContext-v3  OBJECT IDENTIFIER ::=
    {map-ac locationSvcLMUControl(40) version3(3)}

locationSvcDataTransferContext-v3  OBJECT IDENTIFIER ::=
    {map-ac locationSvcDataTransfer(41) 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)
-- equipmentMngtContext-v1	map-ac equipmentMngt (13)	version1 (1)
-- infoRetrievalContext-v1	map-ac infoRetrieval (14)	version1 (1)
-- infoRetrievalContext-v2	map-ac infoRetrieval (14)	version2 (2)
-- interVlrInfoRetrievalContext-v2	map-ac interVlrInfoRetrieval (15)	version2 (2)
-- subscriberDataMngtContext-v1	map-ac subscriberDataMngt (16)	version1 (1)
-- subscriberDataMngtContext-v2	map-ac subscriberDataMngt (16)	version2 (2)
-- tracingContext-v1	map-ac tracing (17)	version1 (1)
-- tracingContext-v2	map-ac tracing (17)	version2 (2)
-- networkFunctionalSsContext-v1	*map-ac networkFunctionalSs (18)*	*version1 (1)*
-- shortMsgGatewayContext-v1	map-ac shortMsgGateway (20)	version1 (1)
-- shortMsgGatewayContext-v2	map-ac shortMsgGateway (20)	version2 (2)
-- shortMsgRelayContext-v1	map-ac shortMsgRelay (21)	version1 (1)
-- shortMsgAlertContext-v1	map-ac shortMsgAlert (23)	version1 (1)
-- mwdMngtContext-v1	*map-ac mwdMngt (24)*	*version1 (1)*
-- mwdMngtContext-v2	map-ac mwdMngt (24)	version2 (2)
-- shortMsgMT-RelayContext-v2	map-ac shortMsgMT-Relay (25)	version2 (2)
-- msPurgingContext-v2	map-ac msPurging (27)	version2 (2)
-- callControlTransferContext-v3	map-ac callControlTransferContext (6)	version3 (3)

```
END
**********************************************NEXT MODIFICATION**********************************************
```

17.6 MAP operation and error types

17.6.1 Mobile Service Operations

```
MAP-MobileServiceOperations {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MobileServiceOperations (5)
   version5 (5)}

DEFINITIONS

::=

BEGIN

EXPORTS

   -- location registration operations
   UpdateLocation,
   CancelLocation,
```

```
   PurgeMS,
   SendIdentification,

   -- gprs location registration operations
   UpdateGprsLocation,

   -- subscriber information enquiry operations
   ProvideSubscriberInfo,

   -- any time information enquiry operations
   AnyTimeInterrogation,

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

   -- authentication management operations
   SendAuthenticationInfo,

   -- IMEI management operations
   CheckIMEI,

   -- subscriber management operations
   InsertSubscriberData,
   DeleteSubscriberData,

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

-- gprs location information retrieval operations
   SendRoutingInfoForGprs,

   -- failure reporting operations
   FailureReport,

   -- gprs notification operations
   NoteMsPresentForGprs



;

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

   SystemFailure,
   DataMissing,
   UnexpectedDataValue,
   UnknownSubscriber,
   UnknownMSC,
   UnidentifiedSubscriber,
   UnknownEquipment,
   RoamingNotAllowed,
   ATI-NotAllowed,
   NoHandoverNumberAvailable,
   SubsequentHandoverFailure,
   AbsentSubscriber

FROM MAP-Errors {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-Errors (10) version5 (5)}

   UpdateLocationArg,
   UpdateLocationRes,
   CancelLocationArg,
   CancelLocationRes,
   PurgeMS-Arg,
   PurgeMS-Res,
   SendIdentificationArg,
   SendIdentificationRes,
   UpdateGprsLocationArg,
   UpdateGprsLocationRes,
```

```
   PrepareHO-Arg,
   PrepareHO-Res,
   PrepareSubsequentHO-Arg,
   SendAuthenticationInfoArg,
   SendAuthenticationInfoRes,
   EquipmentStatus,
   InsertSubscriberDataArg,
   InsertSubscriberDataRes,
   DeleteSubscriberDataArg,
   DeleteSubscriberDataRes,
   ResetArg,
   RestoreDataArg,
   RestoreDataRes,
   ProvideSubscriberInfoArg,
   ProvideSubscriberInfoRes,
   AnyTimeInterrogationArg,
   AnyTimeInterrogationRes,
   SendRoutingInfoForGprsArg,
   SendRoutingInfoForGprsRes,
   FailureReportArg,
   FailureReportRes,
   NoteMsPresentForGprsArg,
   NoteMsPresentForGprsRes

FROM MAP-MS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MS-DataTypes (11) version5 (5)}

   ExternalSignalInfo,
   TMSI,
   IMEI
FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version5 (5)}
;


-- location registration operations

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

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

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

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

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

17.7 MAP constants and data types

17.7.1 Mobile Service data types

```
MAP-MS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-MS-DataTypes (11) version5 (5)}

DEFINITIONS

IMPLICIT TAGS

::=

BEGIN

EXPORTS

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



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

   -- authentication management types
   SendAuthenticationInfoArg,
   SendAuthenticationInfoRes,

   -- security management types
   EquipmentStatus,
   Kc,

   -- subscriber management types
   InsertSubscriberDataArg,
   InsertSubscriberDataRes,
   DeleteSubscriberDataArg,
   DeleteSubscriberDataRes,
   SubscriberData,
   ODB-Data,
   SubscriberStatus,
   ZoneCodeList,
   maxNumOfZoneCodes,
   O-CSI,
   O-BcsmCamelTDPCriteriaList,
   SS-CSI,
   ServiceKey,
   DefaultCallHandling,
   CamelCapabilityHandling,
   BasicServiceCriteria,
   SupportedCamelPhases,
   maxNumOfCamelTDPData,
   CUG-Index,
   CUG-Interlock,
   InterCUG-Restrictions,
   IntraCUG-Options,

   -- fault recovery types
   ResetArg,
   RestoreDataArg,
   RestoreDataRes,

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

   -- any time information enquiry types
   AnyTimeInterrogationArg,
```

```
   AnyTimeInterrogationRes,

   -- gprs location information retrieval types
   SendRoutingInfoForGprsArg,
   SendRoutingInfoForGprsRes,

   -- failure reporting types
   FailureReportArg,
   FailureReportRes,

   -- gprs notification types
   NoteMsPresentForGprsArg,
   NoteMsPresentForGprsRes


;

IMPORTS
   maxNumOfSS,
   SS-SubscriptionOption,
   SS-List
FROM MAP-SS-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SS-DataTypes (14) version5 (5)}

   SS-Code
FROM MAP-SS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-SS-Code (15) version5 (5)}

   Ext-BearerServiceCode
FROM MAP-BS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-BS-Code (20) version5 (5)}

   Ext-TeleserviceCode
FROM MAP-TS-Code {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-TS-Code (19) version5 (5)}


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



FROM MAP-CommonDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-CommonDataTypes (18) version5 (5)}

   ExtensionContainer
FROM MAP-ExtensionDataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ExtensionDataTypes (21) version5 (5)}

   AbsentSubscriberDiagnosticSM
FROM MAP-ER-DataTypes {
   ccitt identified-organization (4) etsi (0) mobileDomain (0)
   gsm-Network (1) modules (3) map-ER-DataTypes (17) version5 (5)}


;
```

-- location registration types

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

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

```
VLR-Capability ::= SEQUENCE{
    supportedCamelPhases            [0] SupportedCamelPhases        OPTIONAL,
    extensionContainer              ExtensionContainer              OPTIONAL,
    … }
```

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

    extensionContainer              ExtensionContainer              OPTIONAL,
    ... ,
    solsaSupportIndicator           [2]  NULL                       OPTIONAL }
```

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

```
CancellationType ::= ENUMERATED {
    updateProcedure                 (0),
    subscriptionWithdraw            (1),
    ...}
```

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

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

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

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

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

```
AuthenticationSetList ::= CHOICE {SEQUENCE SIZE (1..5) OF
    tripletList                     [0] TripletList,
    quintupletList                  [1] QuintupletListAuthenticationSet}
```

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

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

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

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

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

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

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

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

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

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

AUTN ::= OCTET STRING (SIZE (142..186))

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

-- gprs location registration types

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

SGSN-Capability ::= SEQUENCE{
    solsaSupportIndicator               NULL                            OPTIONAL,
    extensionContainer                  [1] ExtensionContainer          OPTIONAL,
    ... }

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

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

-- handover types

```
PrepareHO-Arg ::= SEQUENCE {
    targetCellId                        GlobalCellId                    OPTIONAL,
    ho-NumberNotRequired                NULL                            OPTIONAL,
    bss-APDU                            ExternalSignalInfo              OPTIONAL,
    ...}

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

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

-- authentication management types

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

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

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

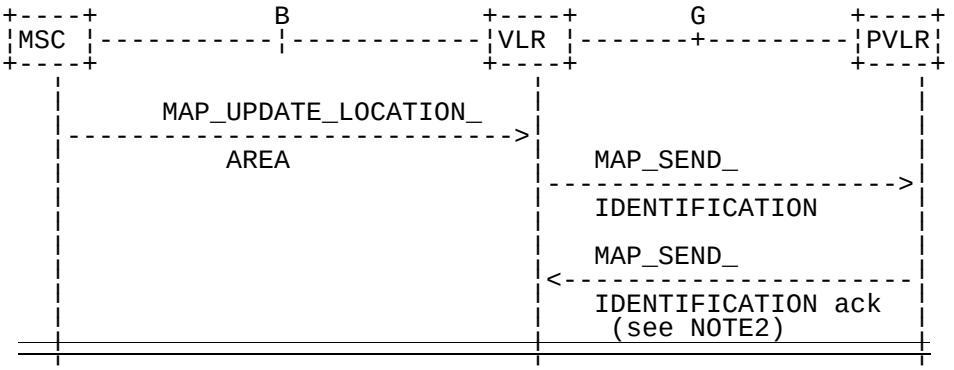
```
SendAuthenticationInfoRes ::= [3] SEQUENCE {
    authenticationSetList               AuthenticationSetList           OPTIONAL,
    extensionContainer                  ExtensionContainer              OPTIONAL,
    ...}
```

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

19.1.1.5 Send Identification

19.1.1.5.1 General

This service is invoked by a VLR when it receives a MAP_UPDATE_LOCATION_AREA indication containing a LAI indicating that the subscriber was registered in a different VLR (henceforth called the Previous VLR, PVLR). If the identity of the PVLR is derivable for the VLR (usually if both are within the same network), the IMSI and authentication sets are requested from the PVLR (see subclause 19.1.1.3), using the service described in subclause 8.1.4.



NOTE1: The service shown in dotted lines indicates the trigger provided by other MAP signalling.

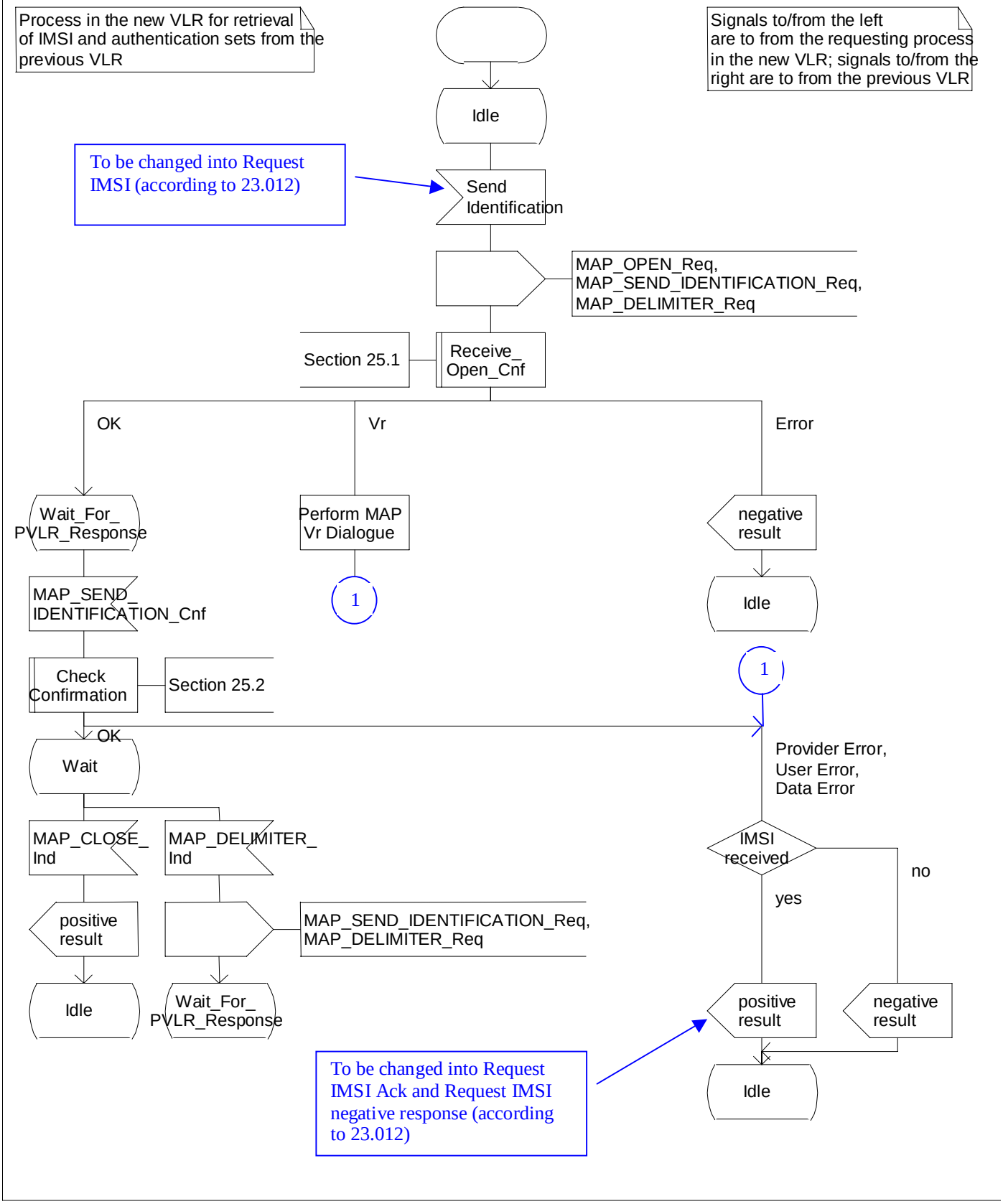
NOTE2: Several MAP_SEND_IDENTIFICATION request/response may be used if message segmentation is required.

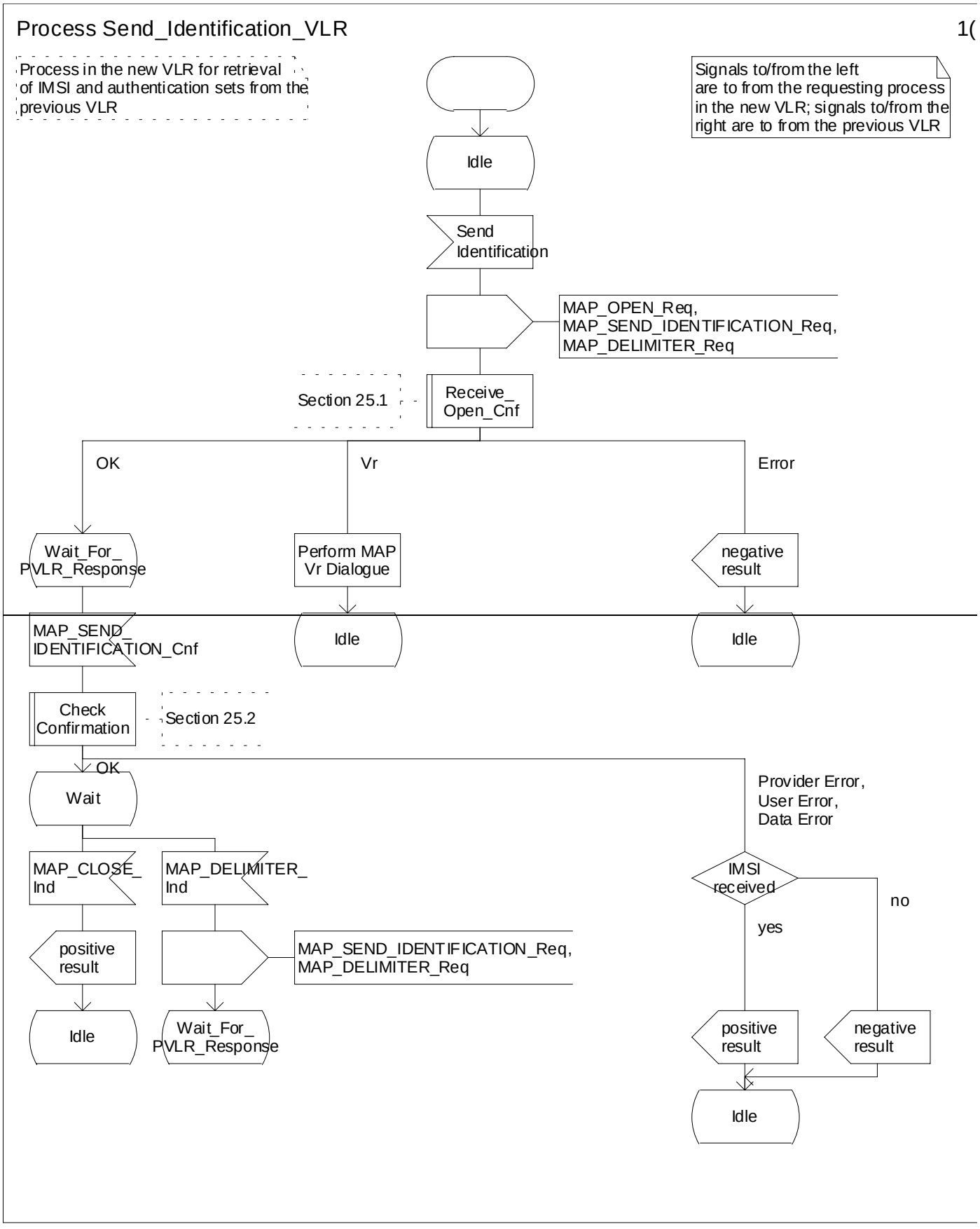
Figure 19.1.1/10: Interface and services for Send Identification

19.1.1.5.2 Detailed procedure in the VLR

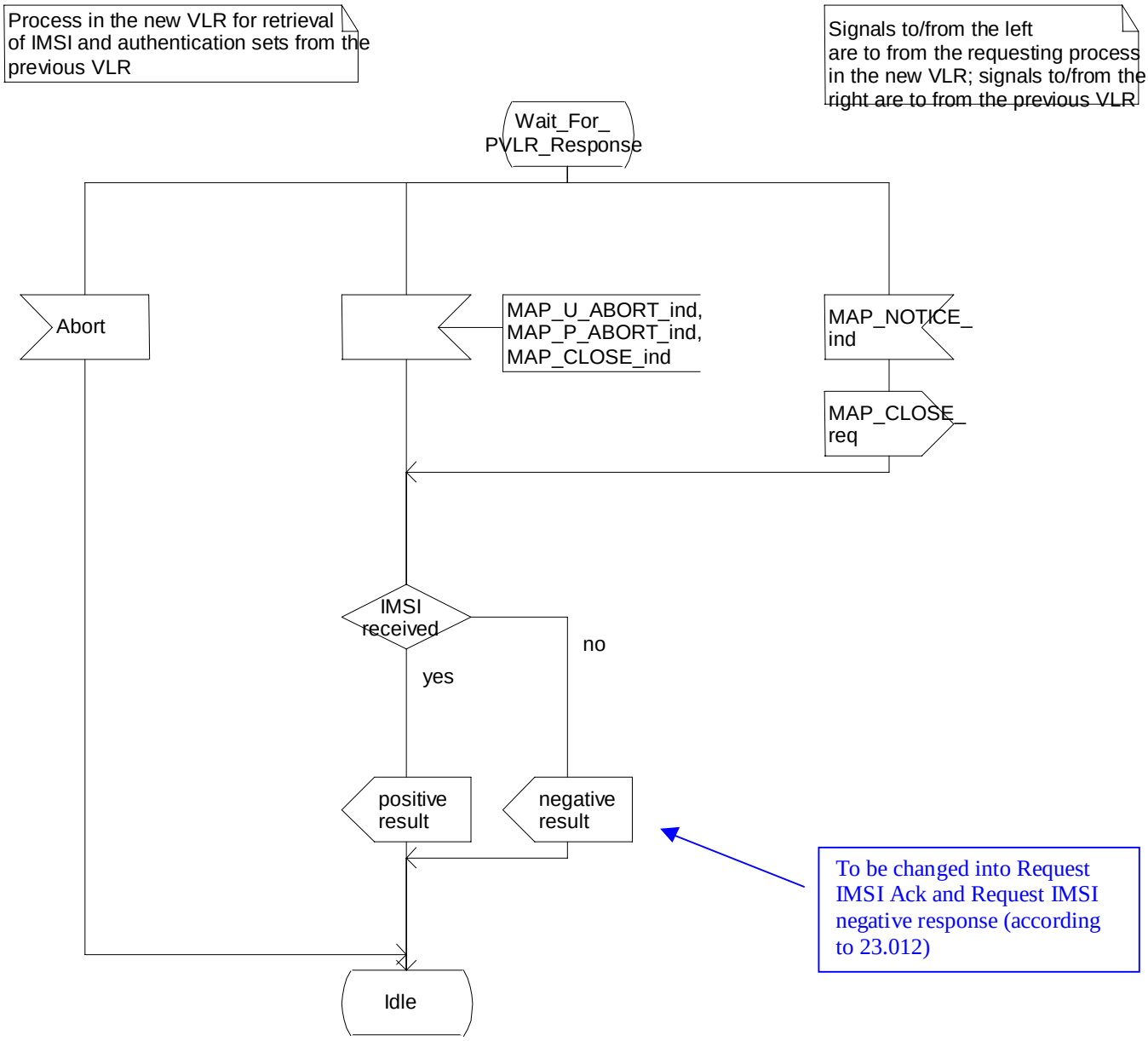
The VLR procedure is part of the location area updating process described in subclause 19.1.1.3, see also figure 19.1.1/6 sheet 3.

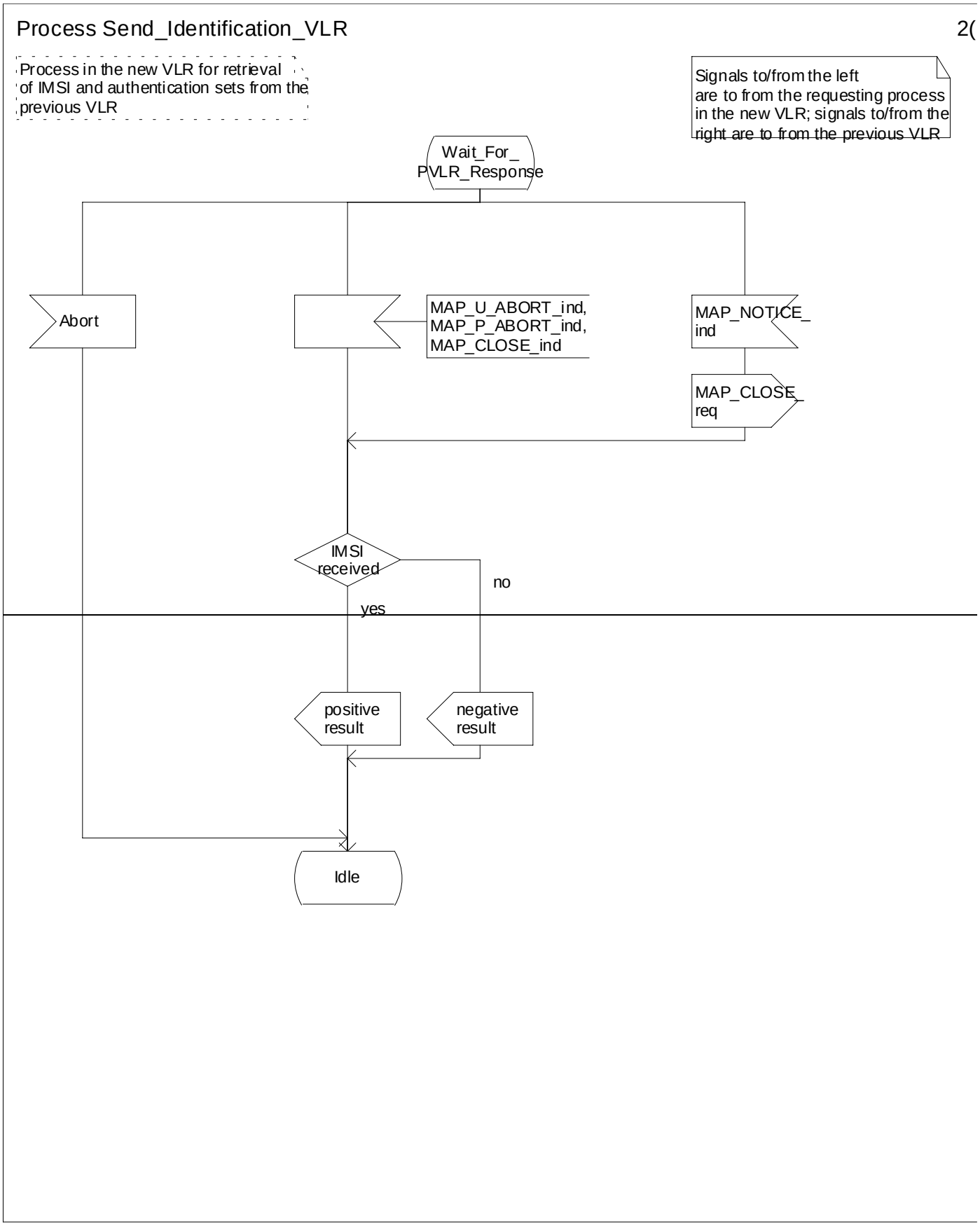
Editor's note: modifications depend on outcome of restructuring 29.002 and 23.012. Some procedures should be updated as specified and integrated in the CRs to 29.002 and to 23.012 due to location management restructuring.


Process Send_Identification_VLR
1(2)
Process in the new VLR for retrieval of IMSI and authentication sets from the previous VLR
Signals to/from the left are to from the requesting process in the new VLR; signals to/from the right are to from the previous VLR
Idle
To be changed into Request IMSI (according to 23.012)
Send Identification
MAP_OPEN_Req, MAP_SEND_IDENTIFICATION_Req, MAP_DELIMITER_Req
Section 25.1
Receive_ Open_Cnf
OK
Vr
Error
Wait_For_ PVLR_Response
Perform MAP Vr Dialogue
negative result
MAP_SEND_ IDENTIFICATION_Cnf
1
Idle
Check Confirmation
Section 25.2
1
OK
Wait
Provider Error, User Error, Data Error
MAP_CLOSE_ Ind
MAP_DELIMITER_ Ind
IMSI received
no
yes
positive result
MAP_SEND_IDENTIFICATION_Req, MAP_DELIMITER_Req
Idle
Wait_For_ PVLR_Response
positive result
negative result
To be changed into Request IMSI Ack and Request IMSI negative response (according to 23.012)
Idle


Process Send_Identification_VLR
1(
Process in the new VLR for retrieval of IMSI and authentication sets from the previous VLR
Signals to/from the left are to from the requesting process in the new VLR; signals to/from the right are to from the previous VLR
Idle
Send Identification
MAP_OPEN_Req, MAP_SEND_IDENTIFICATION_Req, MAP_DELIMITER_Req
Section 25.1
Receive_ Open_Cnf
OK
Vr
Error
Wait_For_ PVLR_Response
Perform MAP Vr Dialogue
negative result
MAP_SEND_ IDENTIFICATION_Cnf
Idle
Idle
Check Confirmation
Section 25.2
OK
Wait
Provider Error, User Error, Data Error
MAP_CLOSE_ Ind
MAP_DELIMITER_ Ind
IMSI received
no
yes
positive result
MAP_SEND_IDENTIFICATION_Req, MAP_DELIMITER_Req
Idle
Wait_For_ PVLR_Response
positive result
negative result
Idle

Process Send_Identification_VLR 2(2)




Process Send_Identification_VLR
2(
Process in the new VLR for retrieval of IMSI and authentication sets from the previous VLR
Signals to/from the left are to from the requesting process in the new VLR; signals to/from the right are to from the previous VLR
Wait_For_ PVLR_Response
Abort
MAP_U_ABORT_ind, MAP_P_ABORT_ind, MAP_CLOSE_ind
MAP_NOTICE_ ind
MAP_CLOSE_ req
IMSI received
no
yes
positive result
negative result
Idle

19.1.1.5.3 Detailed procedure in the PVLR

On receipt of a dialogue request for the Send Identification procedure, (see Receive_Open_Ind macro in subclause 25.1), the PVLR will:

- terminate the procedure in case of parameter problems;
- revert to the MAP version Vr procedure in case the VLR indicated version Vr protocol; or
- continue as below, if the dialogue is accepted.

If the PVLR process receives a MAP_NOTICE indication, it terminates the dialogue by sending a MAP_CLOSE request.

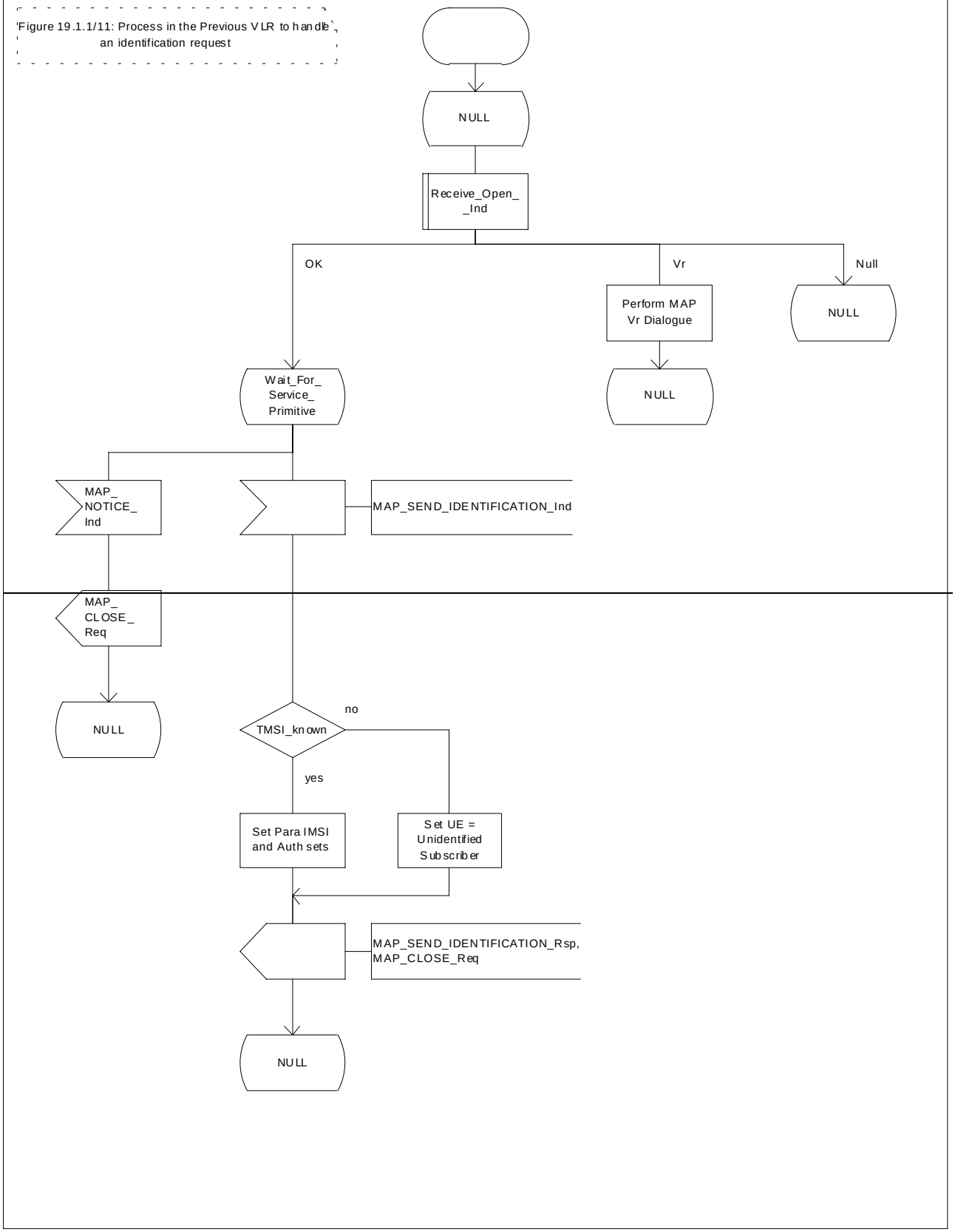
If the PVLR process receives a MAP_SEND_IDENTIFICATION indication from the VLR (see figure 19.1.1/11), it checks whether the subscriber identity provided is known:

- if so, the IMSI and - if available - authentication parameters for the subscriber are returned in the MAP_SEND_IDENTIFICATION response;
- if not, the error Unidentified Subscriber is returned in the MAP_SEND_IDENTIFICATION response.

In all cases where the PVLR sends a MAP_SEND_IDENTIFICATION response to the VLR, the dialogue towards the VLR is terminated by a MAP_CLOSE request with parameter Release Method indicating Normal Release.

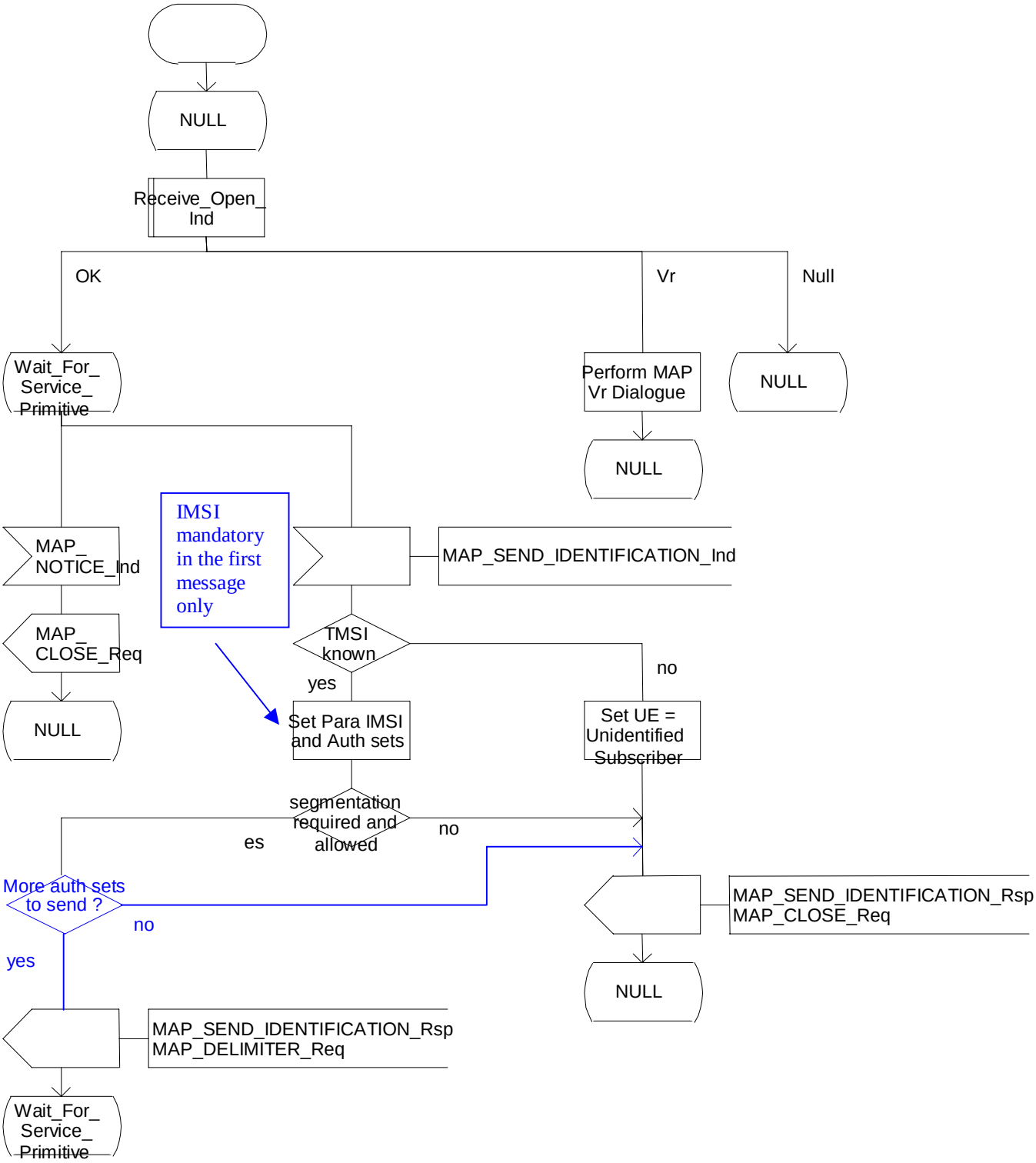
Process Send_Identification_PVLR 19.1.1_11(1)

'Figure 19.1.1/11: Process in the Previous VLR to handle an identification request



Process Send_Identification_PVLR 1(1)

Figure 19.1/11: Process in the Previous VLR to handle an identification request



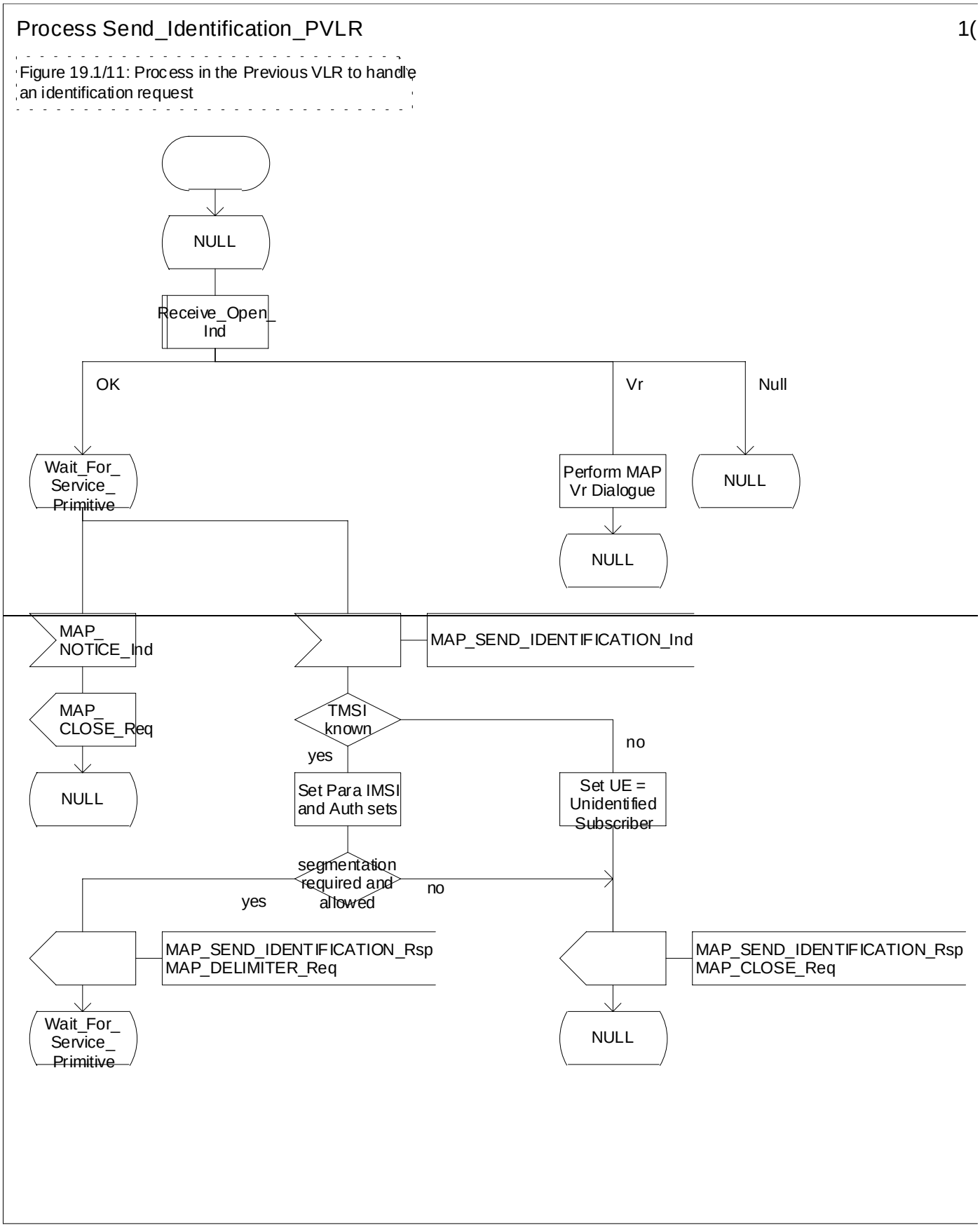


Figure 19.1.1/11: Process Send_Identification_PVLR

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

**********NEXT MODIFICATION**********+

25.5.5 Process Obtain_Auth_Sets_HLR

Opening of the dialogue is described in the macro Receive_Open_Ind in subclause 25.1, with outcomes:

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

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

- a MAP_SEND_AUTHENTICATION_INFO indication is received by the HLR;
- the HLR checks the service indication for errors. If any, they are reported to the VLR or to the SGSN in the MAP_SEND_AUTHENTICATION_INFO response. If no errors are detected, authentication vectors~~triplets~~ are fetched from the AuC. Further details are found in GSM 03.20;
- ~~—~~if errors are detected they are reported to the VLR or to the SGSN in the MAP_SEND_AUTHENTICATION_INFO response. Otherwise the authentication vectors~~triplets~~ are returned.
- if segmentation of the response message is required and allowed, a MAP_SEND_AUTHENTICATION_INFO response, containing at least one authentication vector, followed by a MAP_DELIMITER request is returned to the VLR or SGSN, the remaining authentication vectors are stored and the HLR waits for a new service indication from the VLR or SGSN.

The process is described in figure 25.5/5.

Macrodefinition Authenticate_MSC 25.5_1(1)

'Figure 25.5/1: Authentication macro in the MSC, relaying authentication indication from the VLR to the MS, and relaying the confirmation from the MSC to the VLR

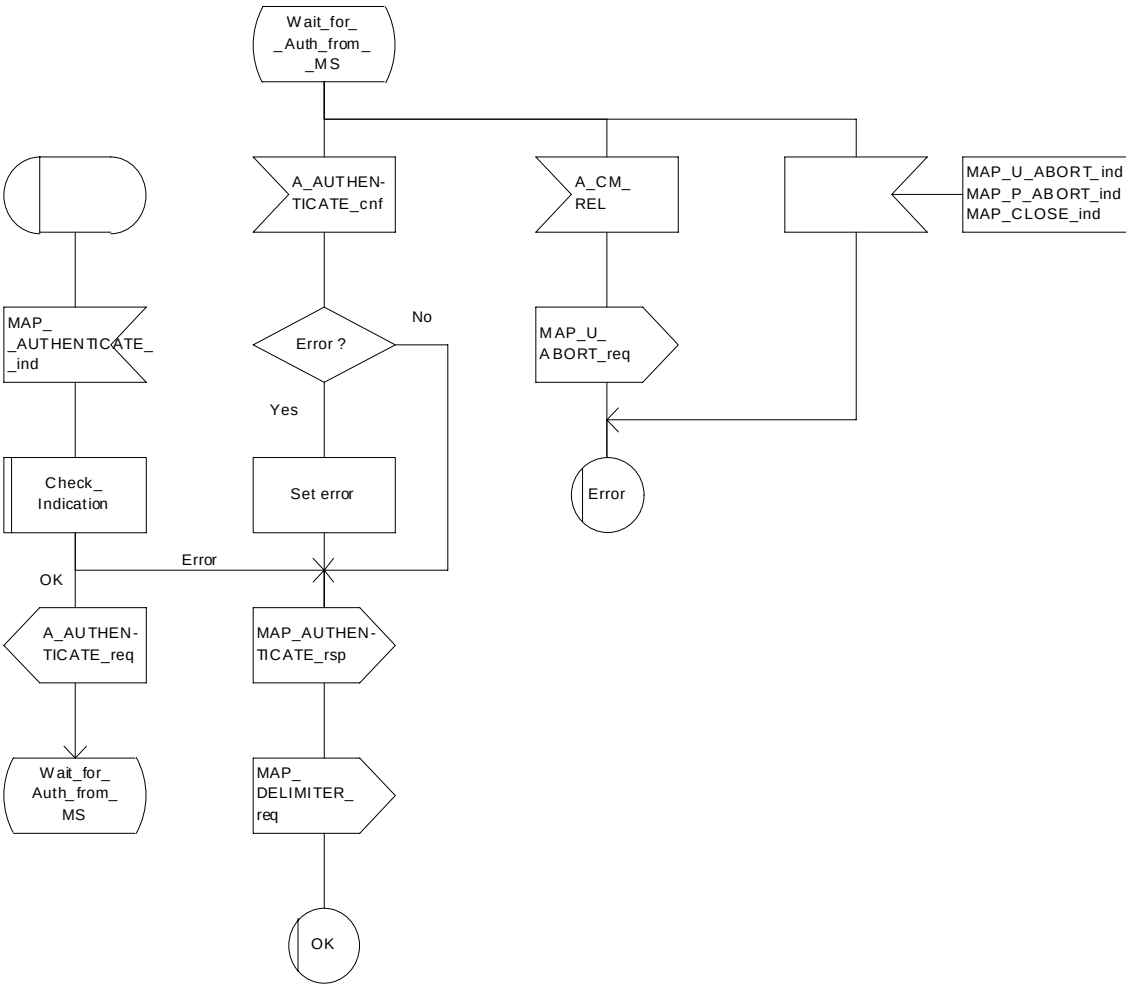
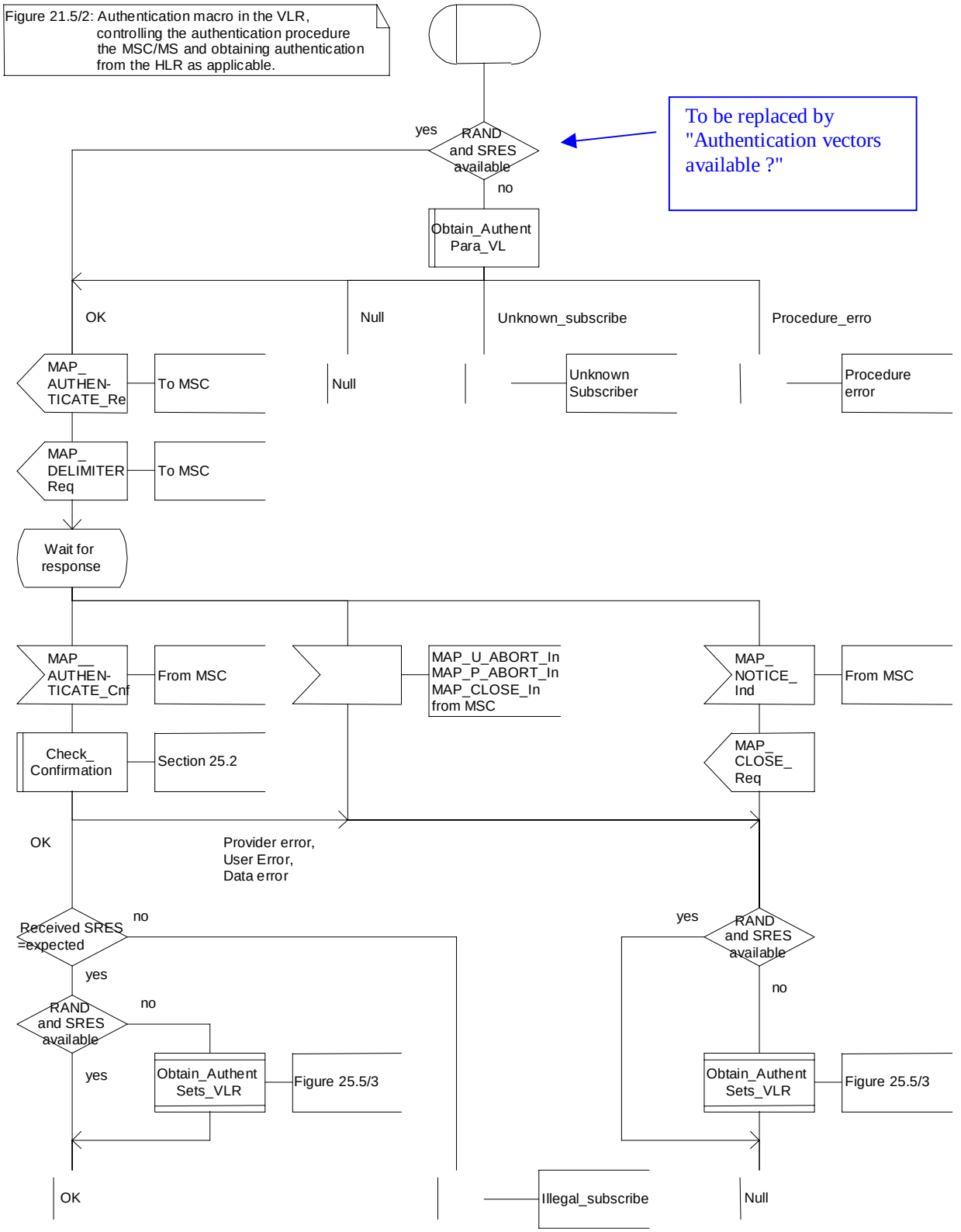


Figure 25.5/1: Macro Authenticate_MSC

Figure 21.5/2: Authentication macro in the VLR, controlling the authentication procedure the MSC/MS and obtaining authentication from the HLR as applicable.



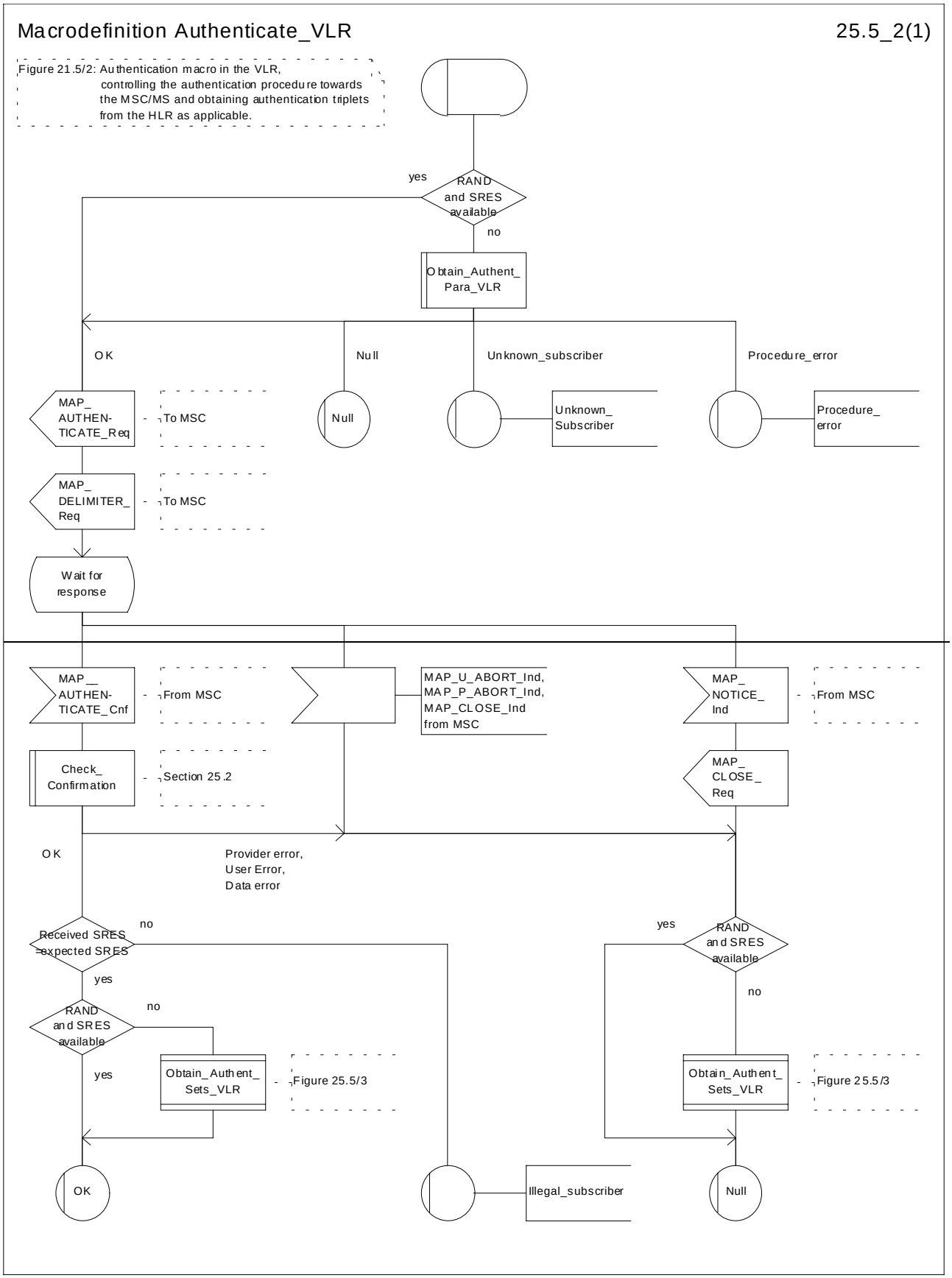


Figure 25.5/2: Macro Authenticate_VLR

Process Obtain_Authent_Sets_VLR 25.5_3(1)

Figure 25.5/3: Process to obtain authentication sets from the HLR to the VLR

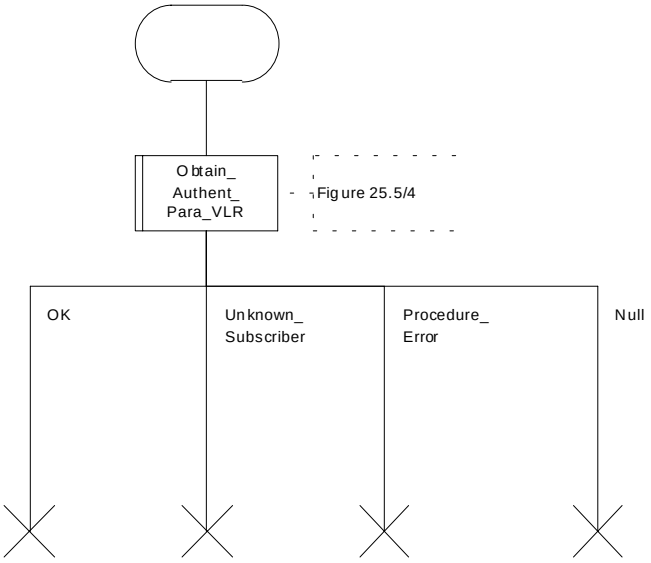
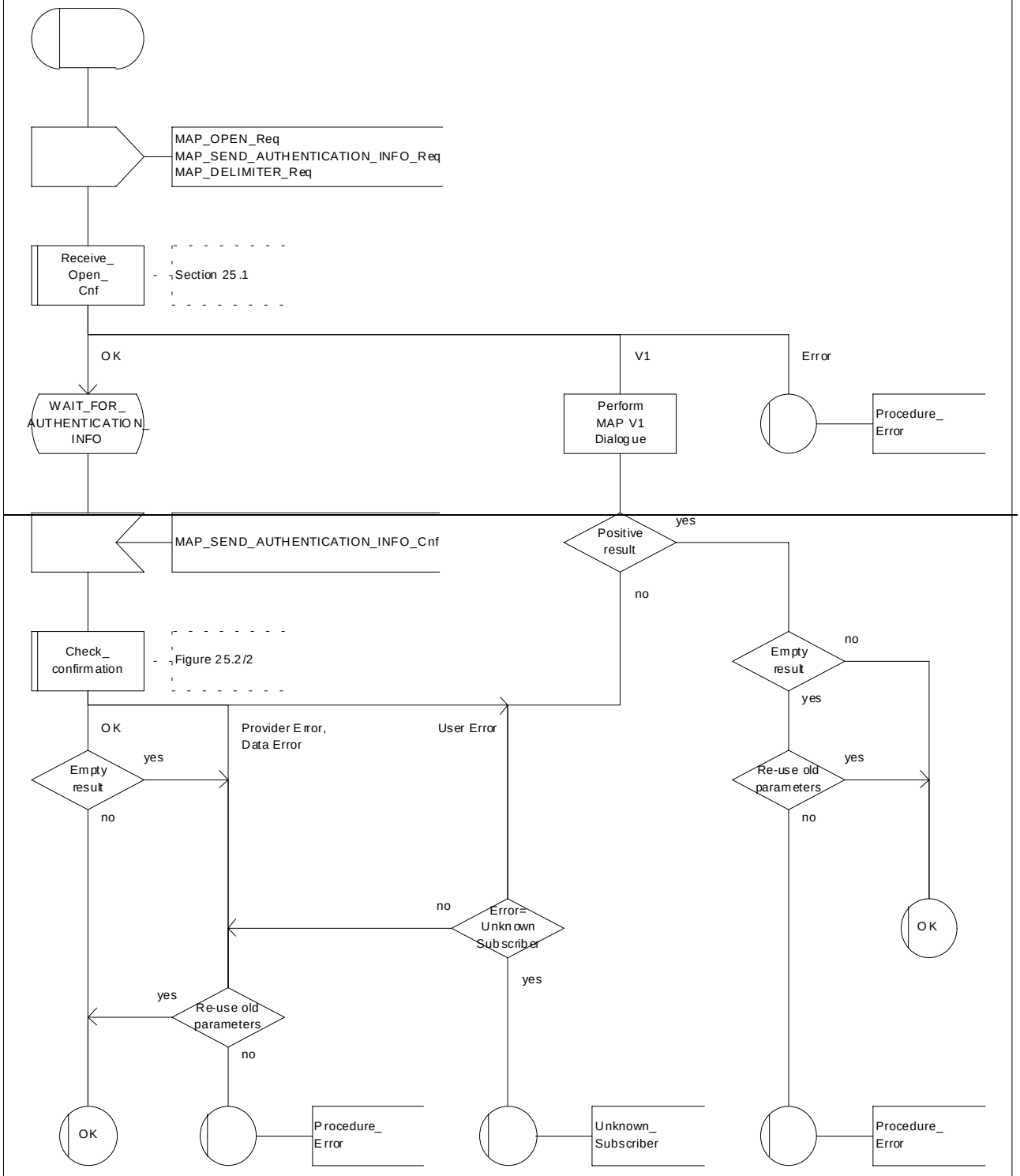


Figure 25.5/3: Process Obtain_Authentication_Sets_VLR

Macrodefinition Obtain_Authent_Para_VLR 25.5_4.1(2)

Figure 25.5/4: Macro to obtain authentication parameters from the HLR to the VLR



Macrodefinition OBTAIN_AUTHENT_PARA_VLR 1(3)

Figure 25.5/4: Macro to obtain authentication parameters from the HLR to the VLR

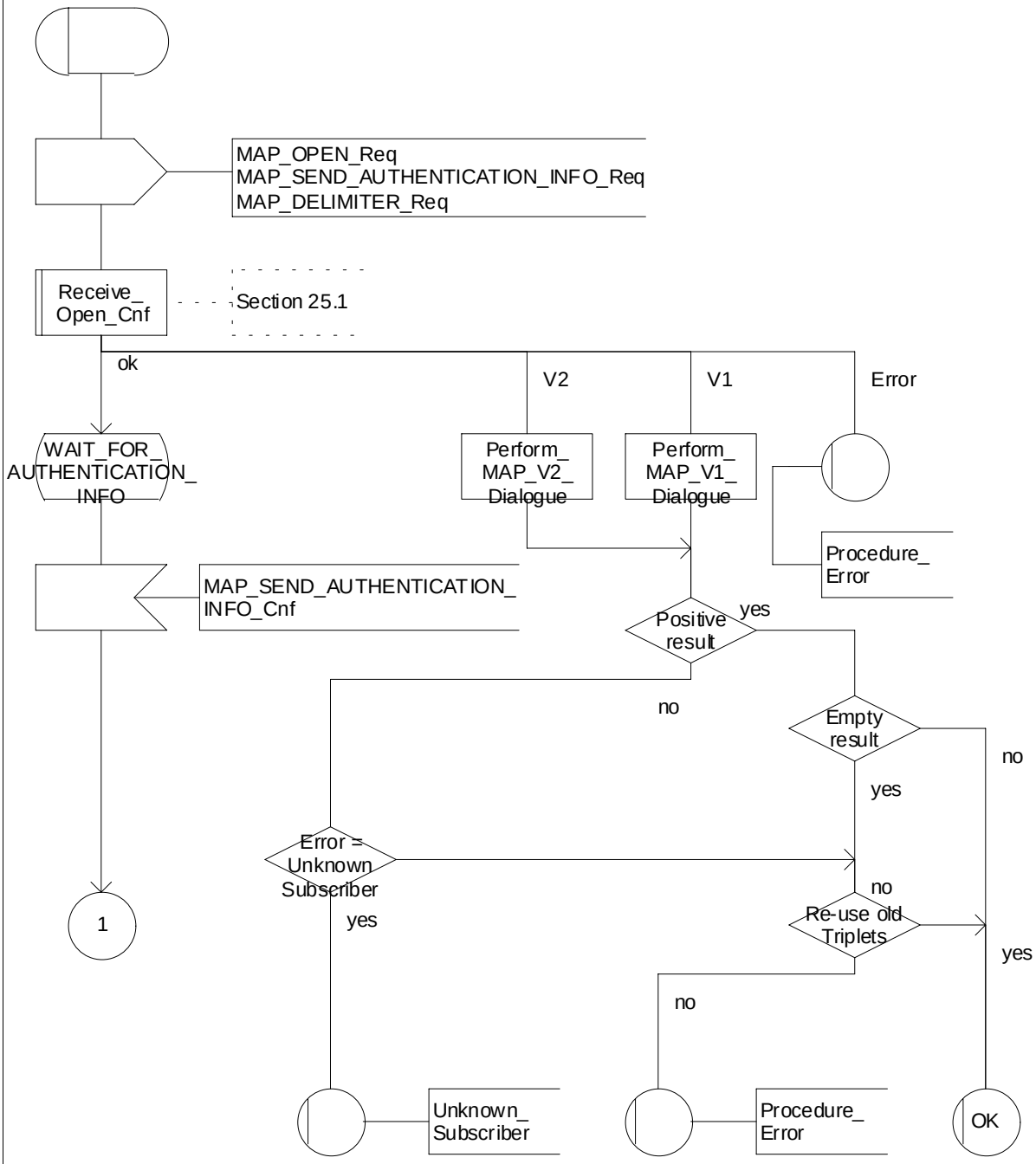
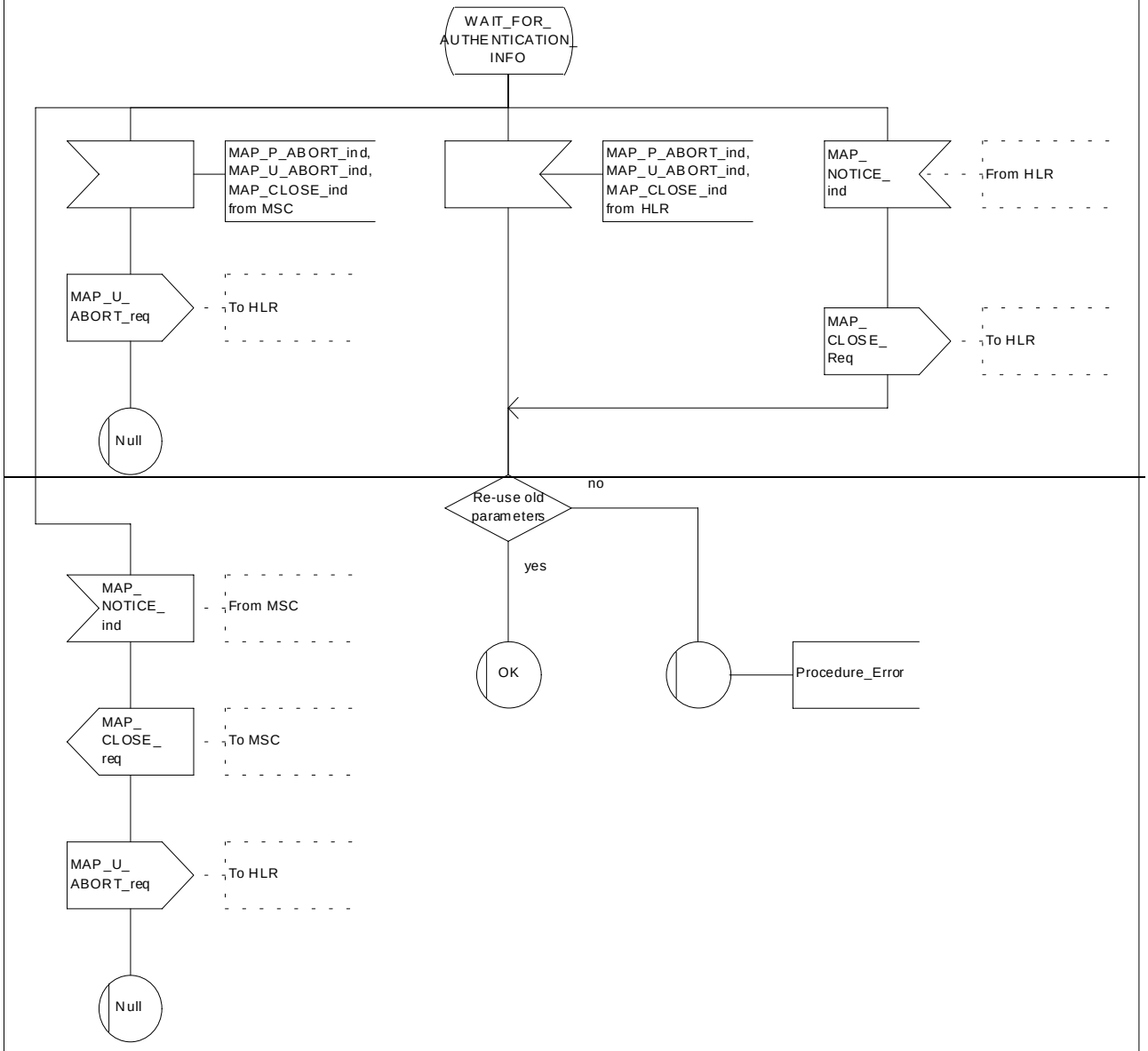


Figure 25.5/4 (sheet 1 of 3~~2~~): Macro Obtain_Authent_Para_VLR

Macrodefinition Obtain_Authent_Para_VLR 25.5_4.2(2)

Figure 25.5/4: Macro to obtain authentication parameters from the HLR to the VLR



Macrodefinition OBTAIN_AUTHENT_PARA_VLR 2(3)

Figure 25.5/4: Macro to obtain authentication parameters from the HLR to the VLR

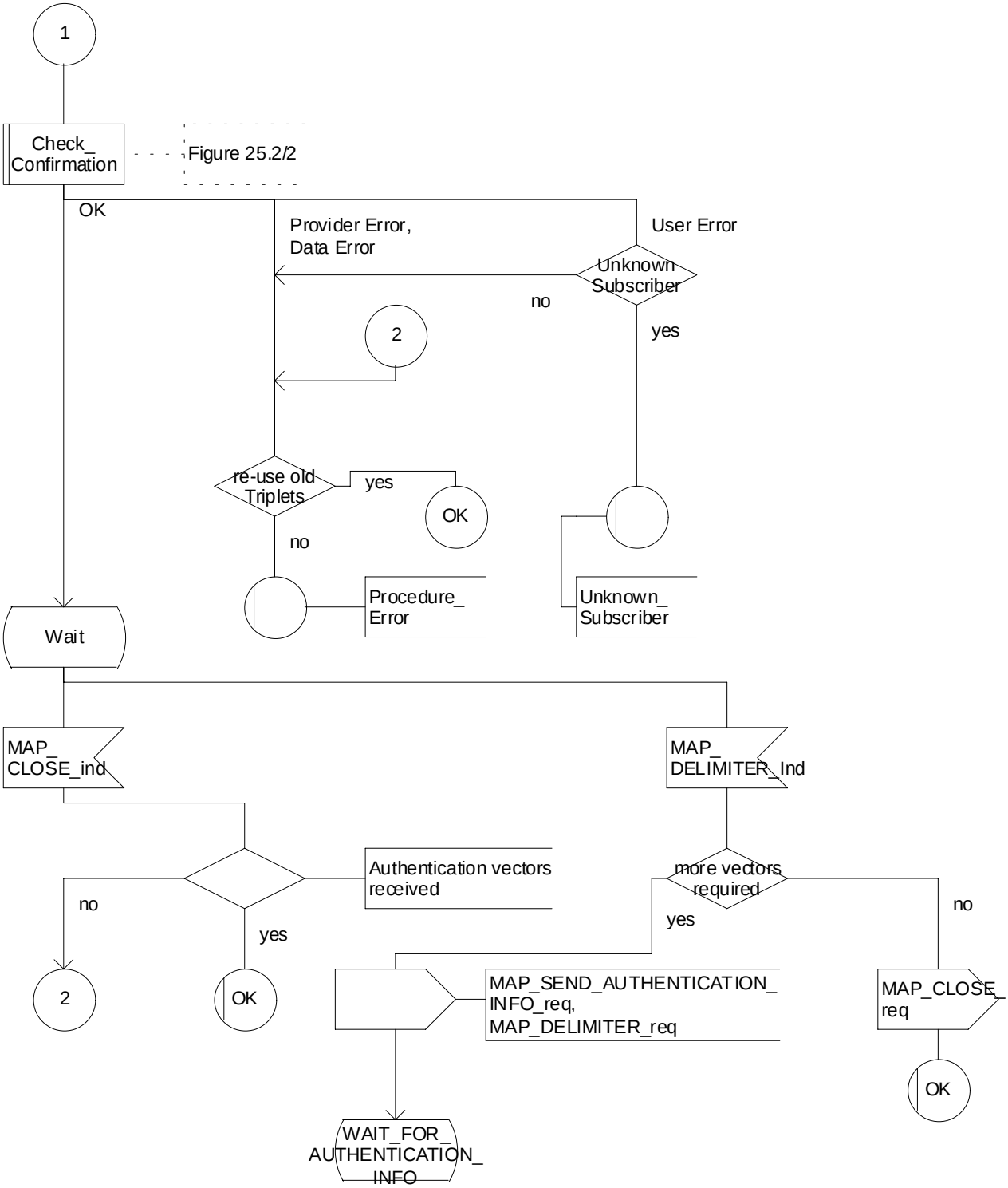


Figure 25.5/4 (sheet 2 of 3~~2~~): Macro Obtain_Authent_Para_VLR

Figure 25.5/4: Macro to obtain authentication parameters from the HLR to the VLR

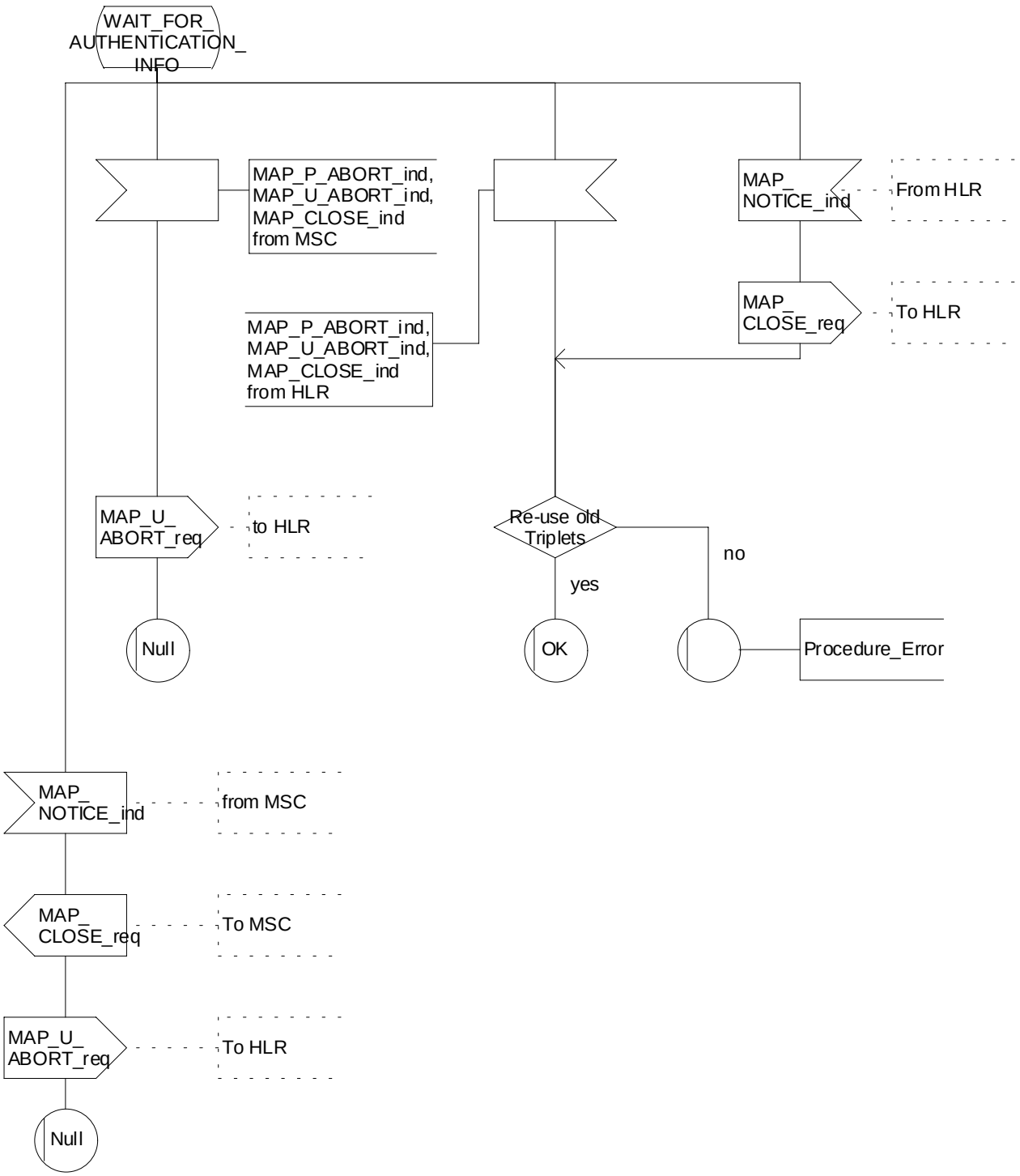
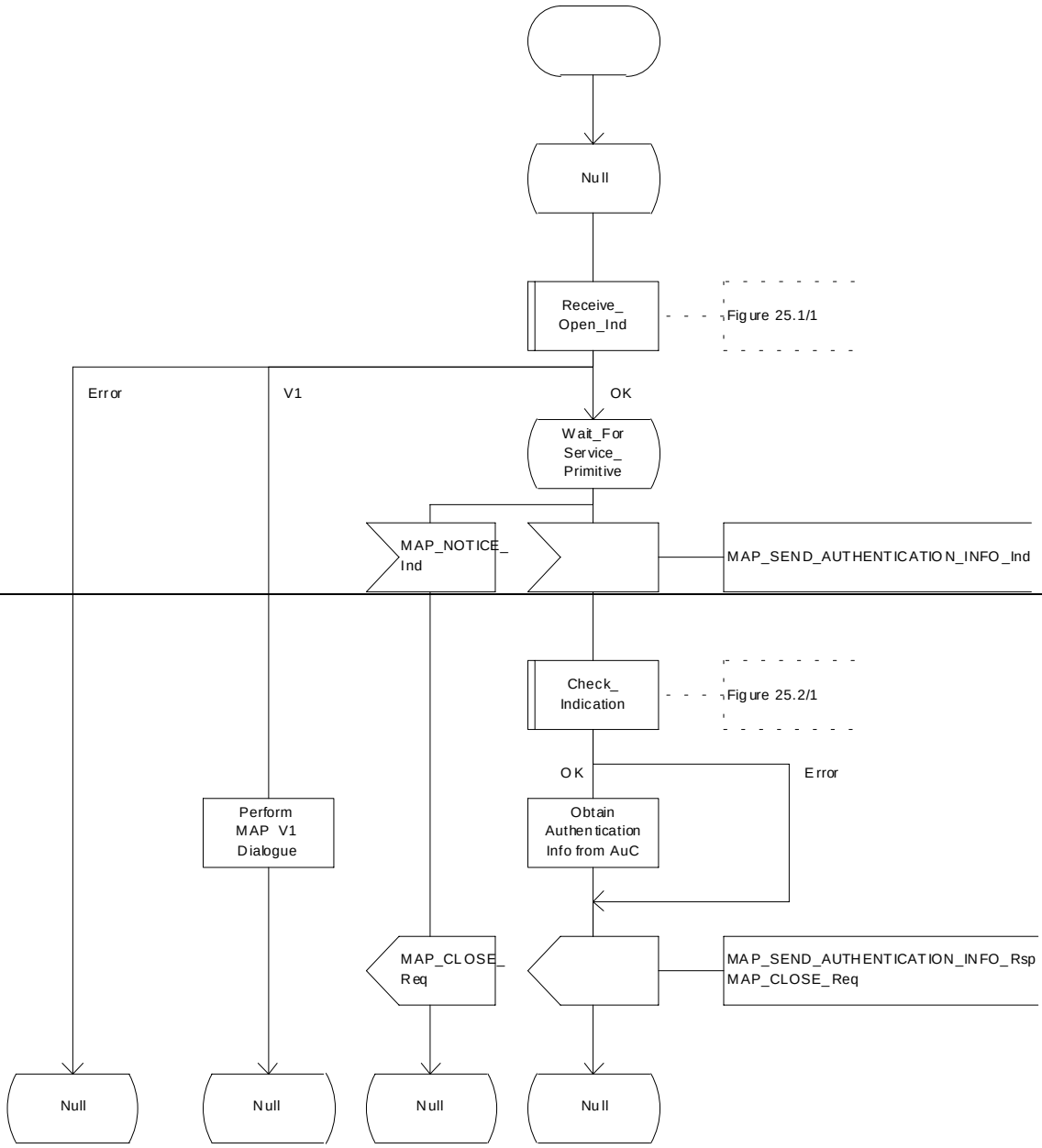


Figure 25.5/4 (sheet 3 of 3): Macro Obtain_Authent_Para_VLR

Process Obtain_Auth_Sets_HLR 25.5_5(1)

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



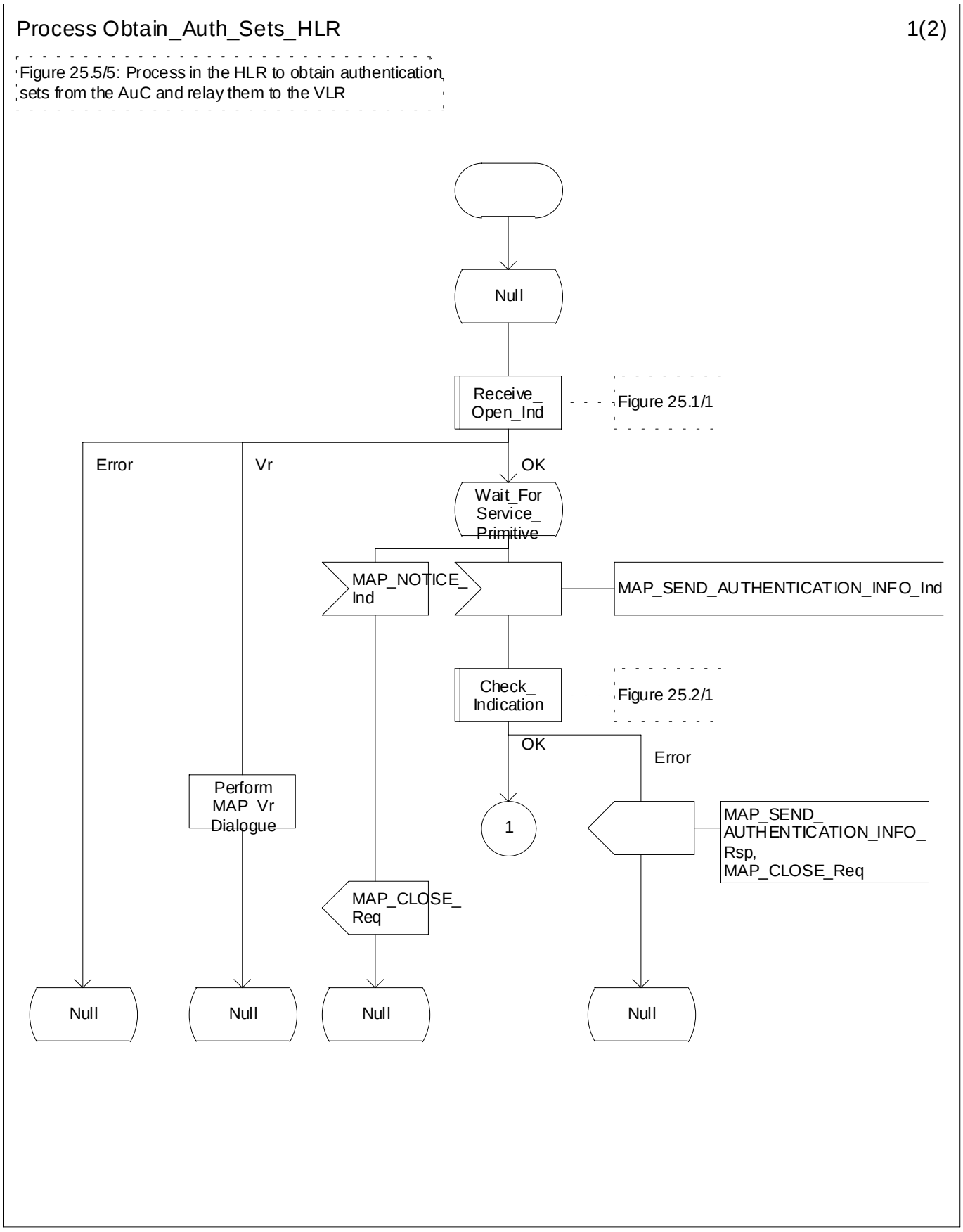


Figure 25.5/5 (sheet 1 of 2): Process Obtain_Auth_Sets_HLR

Process Obtain_Auth_Sets_HLR 2(2)

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

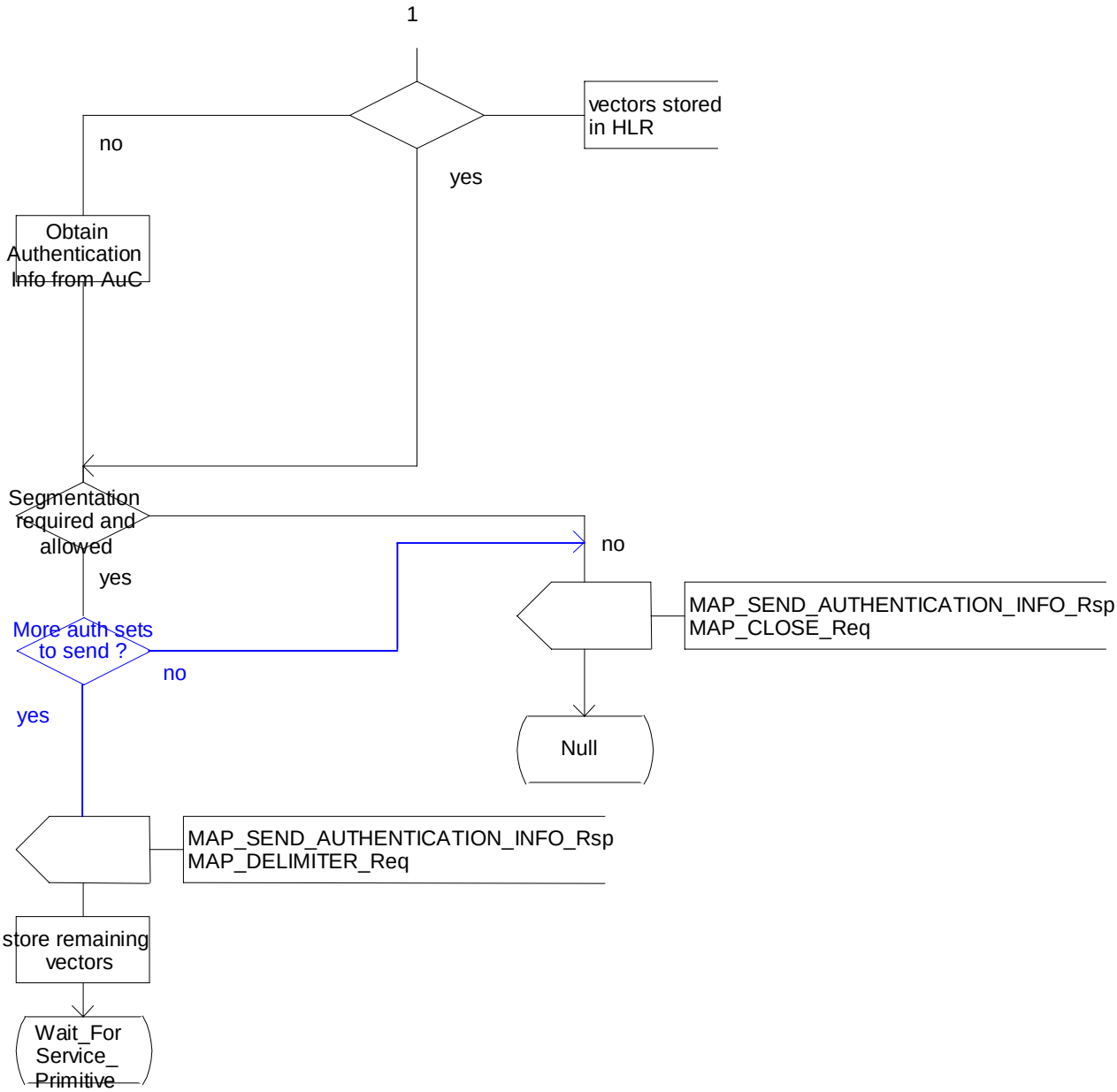


Figure 25.5/5: Process in the HLR to obtain authentication sets from the AuC and relay them to the VLR

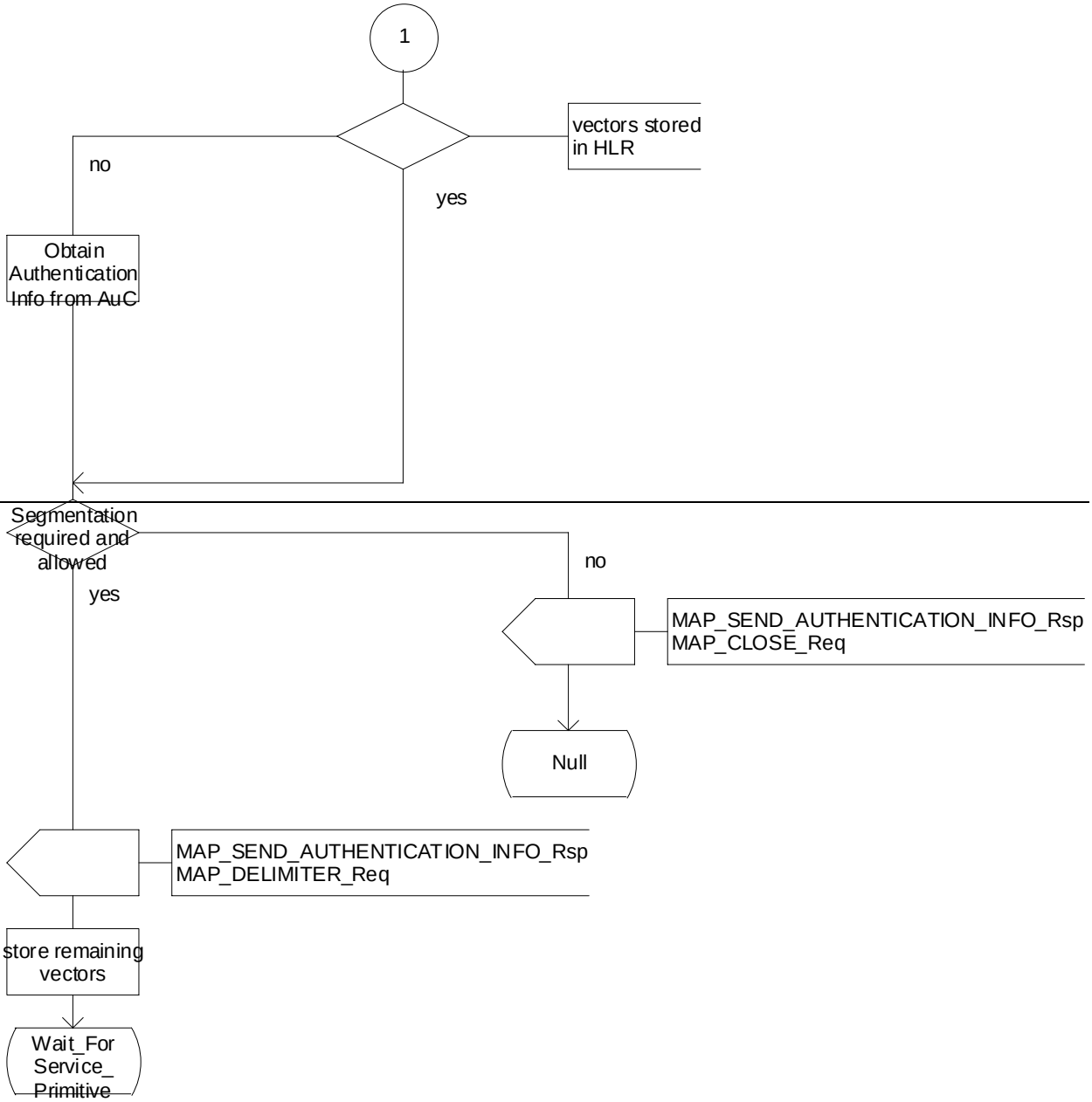


Figure 25.5/5 (sheet 2 of 2): Process Obtain_Auth_Sets_HLR

25.5.6 Process Obtain_Authent_Para_SGSN

For authentication procedure description see GSM 03.60 and GSM 04.08.

This Process is used by the SGSN to request authentication vectors~~triplets~~ from the HLR. The Process proceeds as follows:

- a connection is opened, and a MAP_SEND_AUTHENTICATION_INFO request sent to the HLR;
- if the HLR indicates that a MAP version 1or 2 dialogue is to be used, the SGSN performs the equivalent MAP version 1 or 2dialogue. which can return a positive result containing authentication sets, an empty positive result, or an error;
- if the dialogue opening fails, the Authentication Parameters negative response with appropriate error is sent to the requesting process. Otherwise, the SGSN waits for the response from the HLR;
- if a MAP_SEND_AUTHENTICATION_INFO confirmation is received from the HLR, the SGSN checks the received data.

One of the following positive responses may be received from a MAP version 1 or MAP version 2 dialogue with the HLR:

- Authentication triplets, in which case the outcome is successful;
- Empty response, in which case the SGSN may re-use old triplets, if allowed by the PLMN operator.

If the SGSN cannot re-use old triplets (or no such triplets are available) then the the Authentication Parameters negative response with appropriate error is sent to the requesting process.

If the outcome was successful or re-use of old parameters in the SGSN is allowed, then the Authentication Parameters response is sent to the requesting process

If an "Unknown Subscriber" error is included in the MAP_SEND_AUTHENTICATION_INFO confirm or is returned by the MAP version 1 dialogue, then the appropriate error is sent to the requesting process in the Authentication Parameters negative response

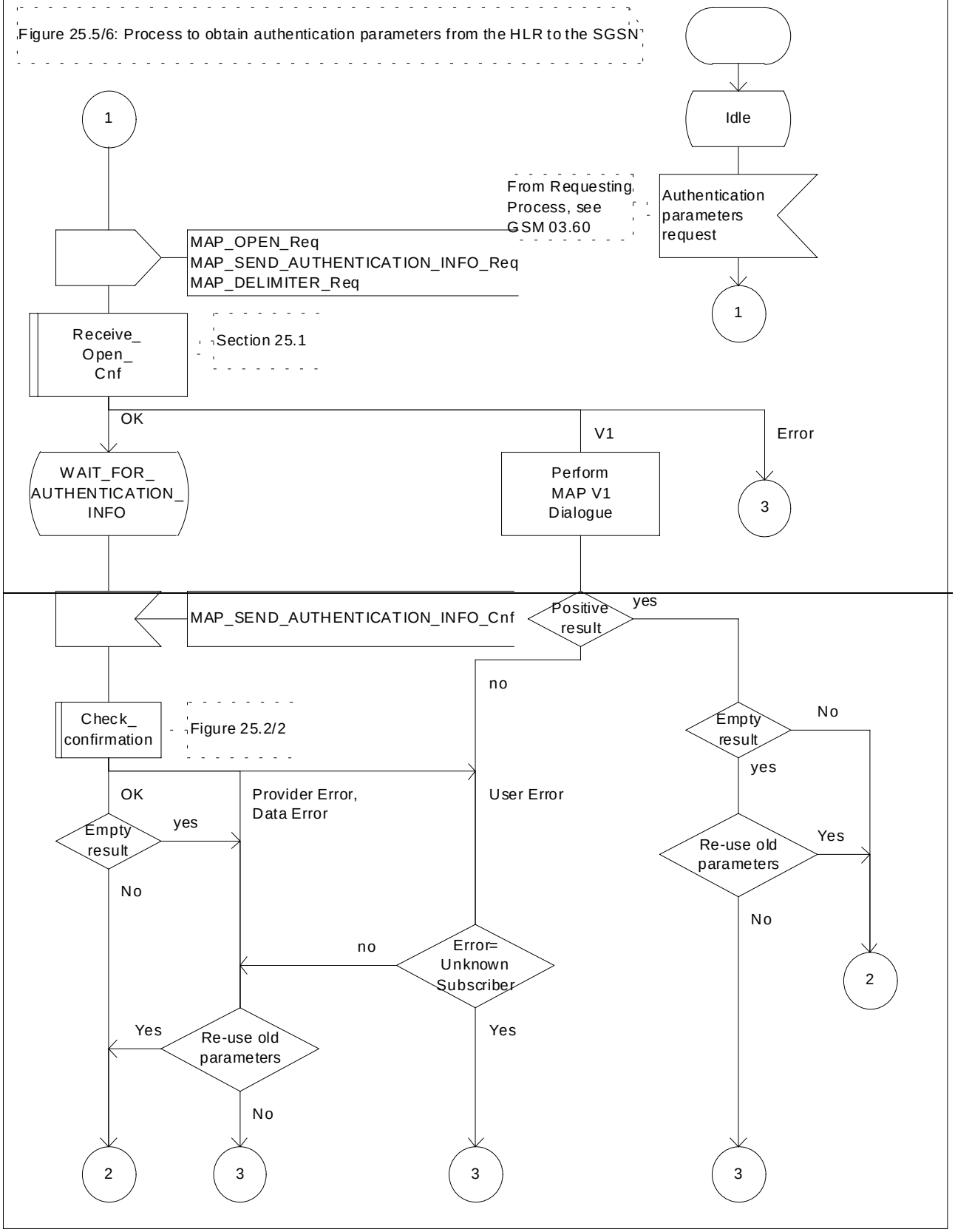
In a MAP version 3 dialogue a (possibly empty) set of authentication vectors may be received from the HLR followed by a MAP_CLOSE Indication or by a MAP_DELIMITER Indication. If a MAP_DELIMITER Indication is received, the SGSN may request additional authentication vectors from the HLR by sending a new MAP_SEND_AUTHENTIFICATION_INFO Request. If a MAP_CLOSE Indication is received, and authentication vectors have been received during the dialogue, then the "OK" exit is used. If no authentication vectors have been received during the dialogue, the SGSN checks whether old GSM Triplets are available and can be re-used. If so, the "OK" exit is used, otherwise the "Procedure Error" exit is used. Note that re-use of old UMTS Quintuplets is not allowed.

If in a MAP version 3 dialogue an "Unknown Subscriber" error is received, then the "Unknown Subscriber" exit is used. If other errors are received, the SGSN checks whether old GSM Triplets are available and can be re-used. If so, the "OK" exit is used, otherwise the "Procedure Error" exit is used. Note that re-use of old UMTS Quintuplets is not allowed.

- if a MAP-U-ABORT, MAP_P_ABORT or unexpected MAP_CLOSE service indication is received from the HLR, then the SGSN checks whether old authentication parameters can be re-used. If old parameters cannot be re-used the Authentication Parameters negative response with appropriate error is sent to the requesting process.
- if a MAP_NOTICE service indication is received from the HLR, then the dialogue with the HLR is closed. The SGSN then checks whether old authentication parameters can be re-used. If old parameters cannot be re-used the process terminates and the Authentication Parameters negative response with appropriate error is sent to the requesting process; Otherwise the Authentication Parameters response is sent to requesting process.

The process is described in figure 25.5/6.

Figure 25.5/6: Process to obtain authentication parameters from the HLR to the SGSN



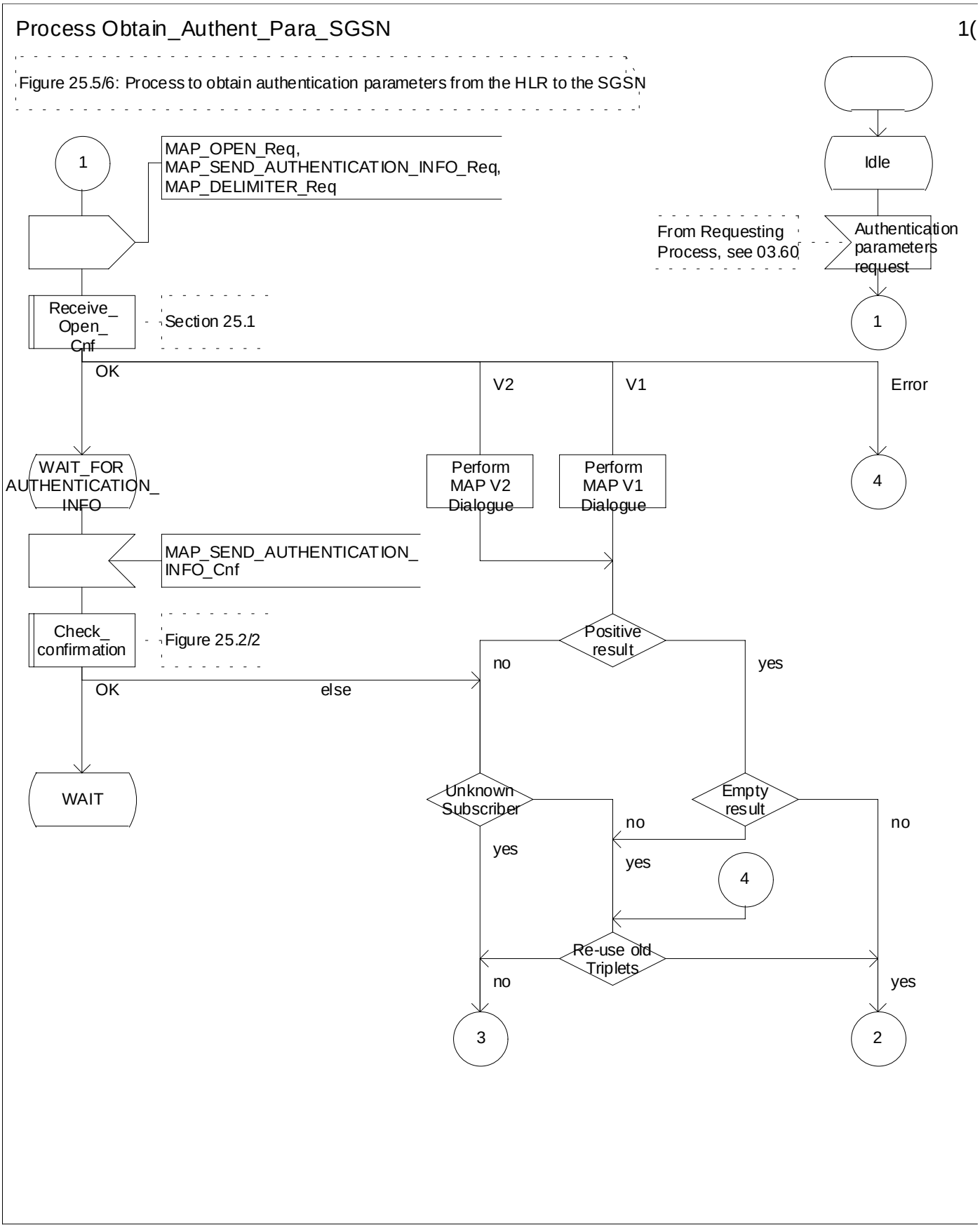
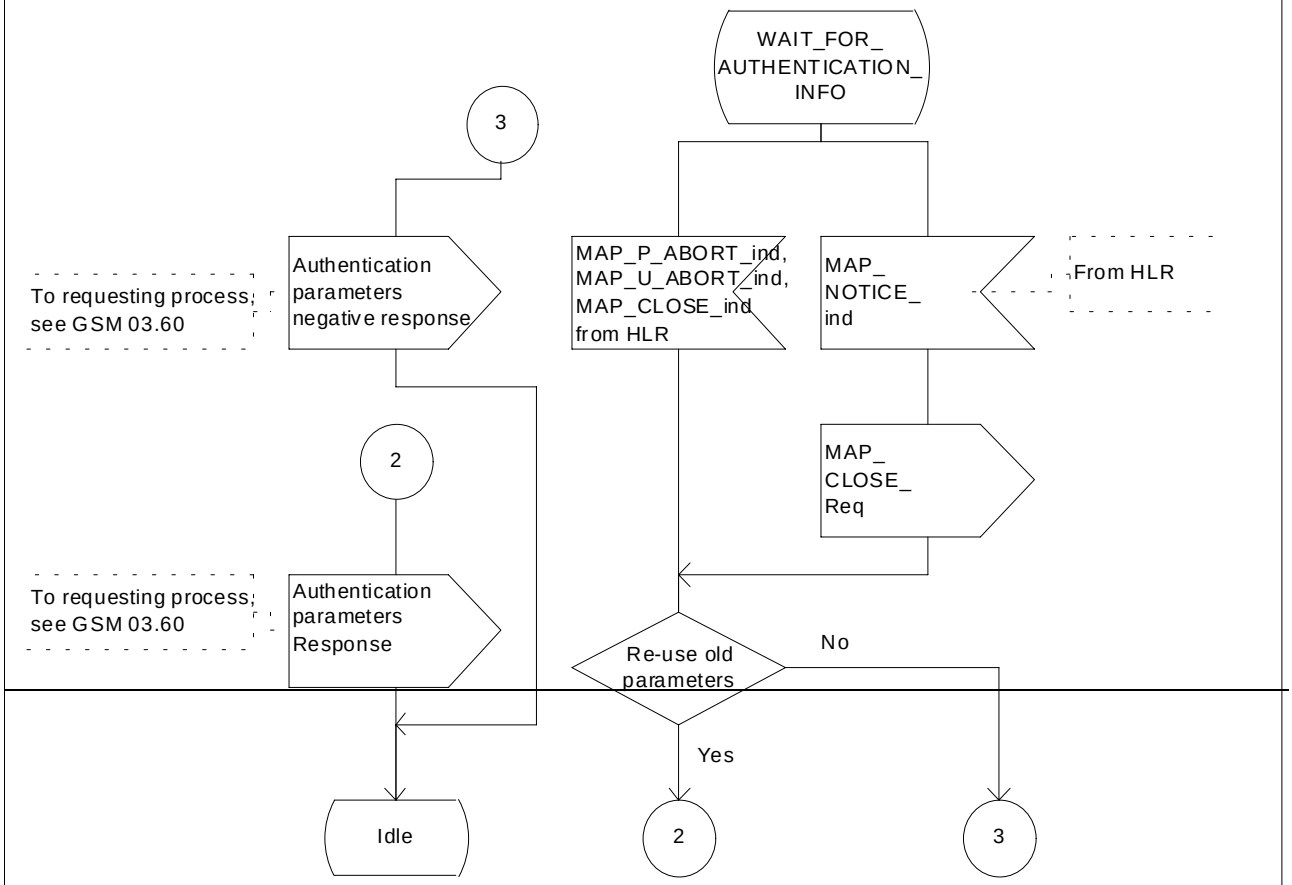


Figure 25.5/6 (sheet 1 of 2): Process~~Macro~~ Obtain_Authen_Para_SGSN

Process Obtain_Authent_Para_SGSN 25.5_6.2(2)

Figure 25.5/6: Process to obtain authentication parameters from the HLR to the SGSN



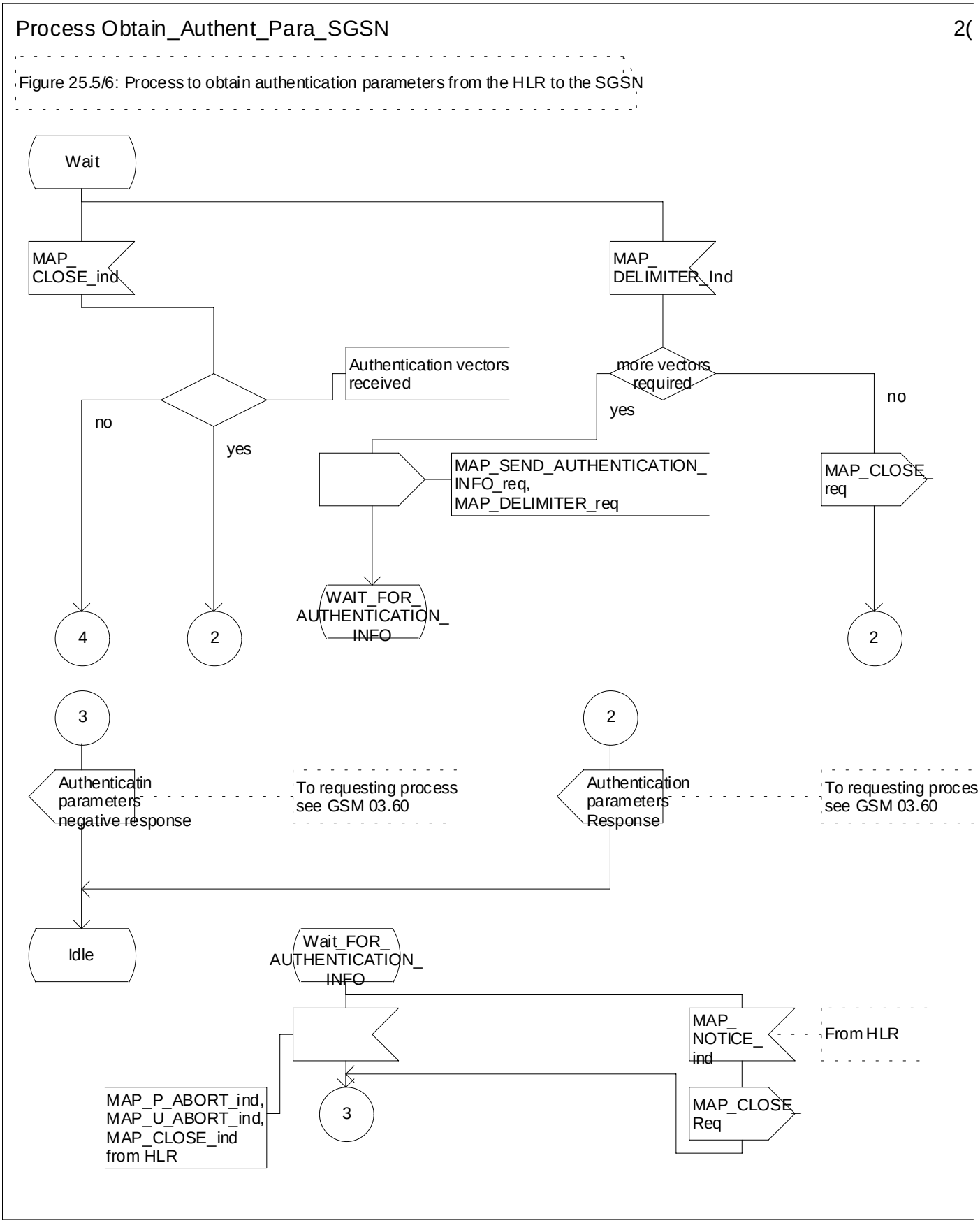


Figure 25.5/6 (sheet 2 of 2): Process~~Macro~~ Obtain_Authen_Para_SGSN