3GPP TSG_CN **Tdoc NP-000500**
Plenary Meeting #9, Oahu, Hawaii
20th – 22nd September 2000.

Source: **TSG_N WG 4**

Title: **Editorial CRs to R99 Work Item Technical Enhancements and Improvements (TEI)**

Agenda item:

Document for: **APPROVAL**

Introduction:

This document contains 13 Editorial CRs on R99 Work Item TEI, that have been agreed by TSG_N WG4, and is forwarded to TSG_N Plenary meeting #9 for approval.

SM	TDoc	SPEC	CR	REV	PHAS	VERS	SUBJECT	CAT
CN9	N4-000429	23.011	002		R99	3.0.1	SDL refresh	D
CN9	N4-000430	23.082	008		R99	3.2.0	SDL refresh	D
CN9	N4-000431	23.083	004		R99	3.1.0	SDL refresh	D
CN9	N4-000572	23.083	005	1	R99	3.1.0	Inclusion of call hold in basic call handling	D
CN9	N4-000432	23.084	002		R99	3.1.0	SDL refresh	D
CN9	N4-000433	23.085	001		R99	3.0.1	SDL refresh	D
CN9	N4-000434	23.086	001		R99	3.0.1	SDL refresh	D
CN9	N4-000435	23.087	001		R99	3.0.1	SDL refresh	D
CN9	N4-000436	23.088	002		R99	3.1.0	SDL refresh	D
CN9	N4-000437	23.090	002		R99	3.1.0	SDL refresh	D
CN9	N4-000438	23.091	002		R99	3.1.0	SDL refresh	D
CN9	N4-000748	29.002	179	1	R99	3.5.1	Correction to MSC-A handover SDLs	D
CN9	N4-000749	29.002	185		R99	3.5.1	Correction to MSC-A handover SDLs	D

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000429
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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23.011	CR	002	Current Version:	3.0.1

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

For submission to:	CN#09	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: N4 **Date:** 2000-06-26

Subject: SDL refresh

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

The SDL diagrams in this document have been replaced, without any semantic changes due to the following reasons:

- In the previous version, the diagrams contained nothing but garbage when viewed on-screen.
- Some of the diagrams were, if not impossible, very hard to print.
- A binary version of the SDL diagrams, suitable for standard tools, is needed to assure a qualitative handling of the diagrams in the future. Telelogic Tau SDL Suite (formerly known as SDT) versions of the diagrams have been created and made available, providing a new fresh base for future changes. For obvious reasons, the binary version, to be regarded as the source, should be mirrored in the document. Therefore, the diagrams replacing the previous versions are printouts of the binary versions.

Clauses affected: All figures in the document, containing an SDL diagram.

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:

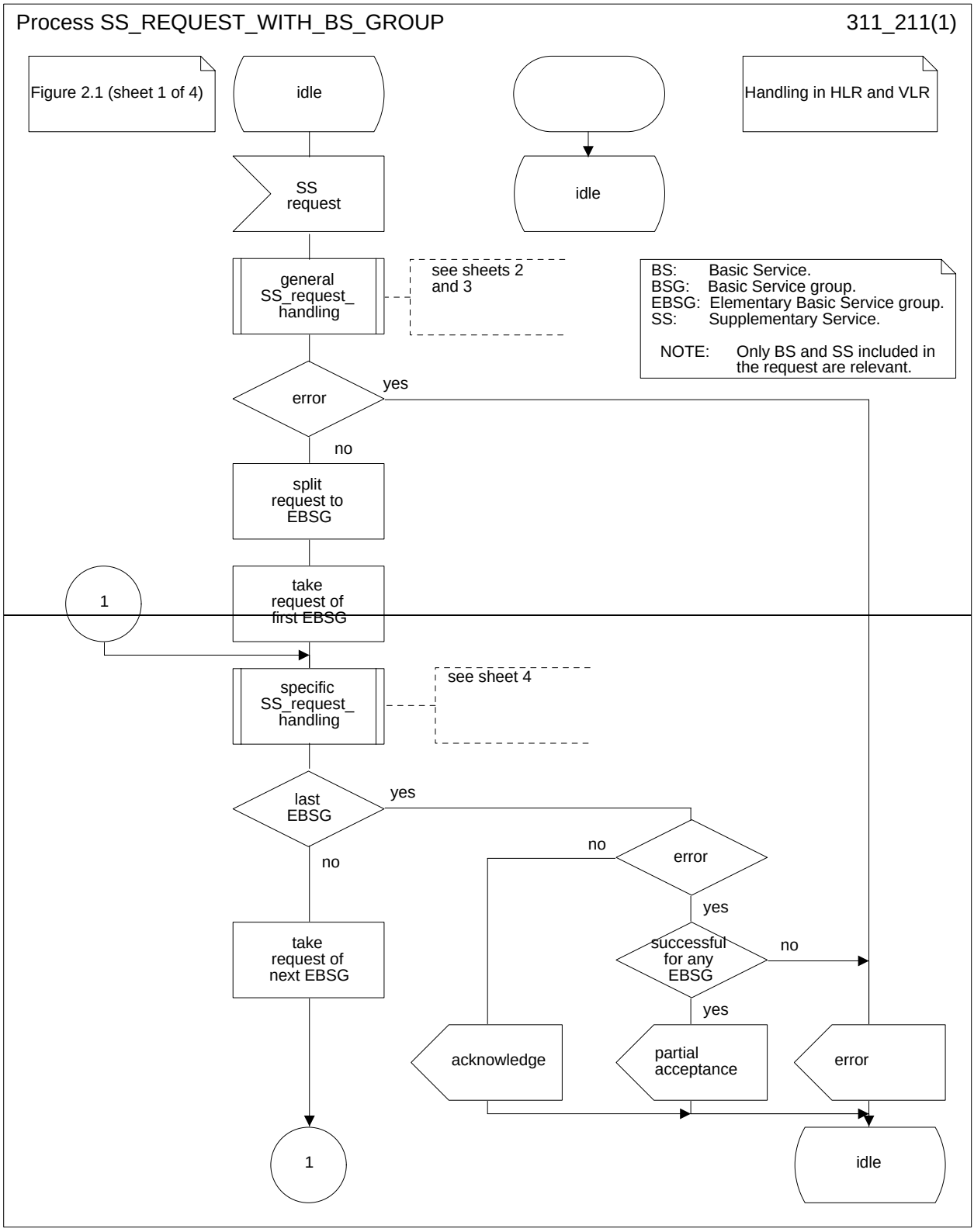
Other comments:

ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

2.3 Exceptional handling of basic service codes

When an individual teleservice code or bearer service code is sent by an MS instead of an elementary basic service group the network shall treat such a request as a request for the corresponding elementary basic service group.

The response to such a request shall include the elementary basic service group code of this basic service code if this is required by the protocol or application.


Process SS_REQUEST_WITH_BS_GROUP
311_211(1)
Figure 2.1 (sheet 1 of 4)
idle
idle
Handling in HLR and VLR
SS request
general SS_request_ handling
see sheets 2 and 3
BS: Basic Service.
BSG: Basic Service group.
EBSG: Elementary Basic Service group.
SS: Supplementary Service.
NOTE: Only BS and SS included in the request are relevant.
error
yes
no
split request to EBSG
1
take request of first EBSG
specific SS_request_ handling
see sheet 4
last EBSG
yes
no
error
no
yes
take request of next EBSG
successful for any EBSG
no
yes
acknowledge
partial acceptance
error
1
idle

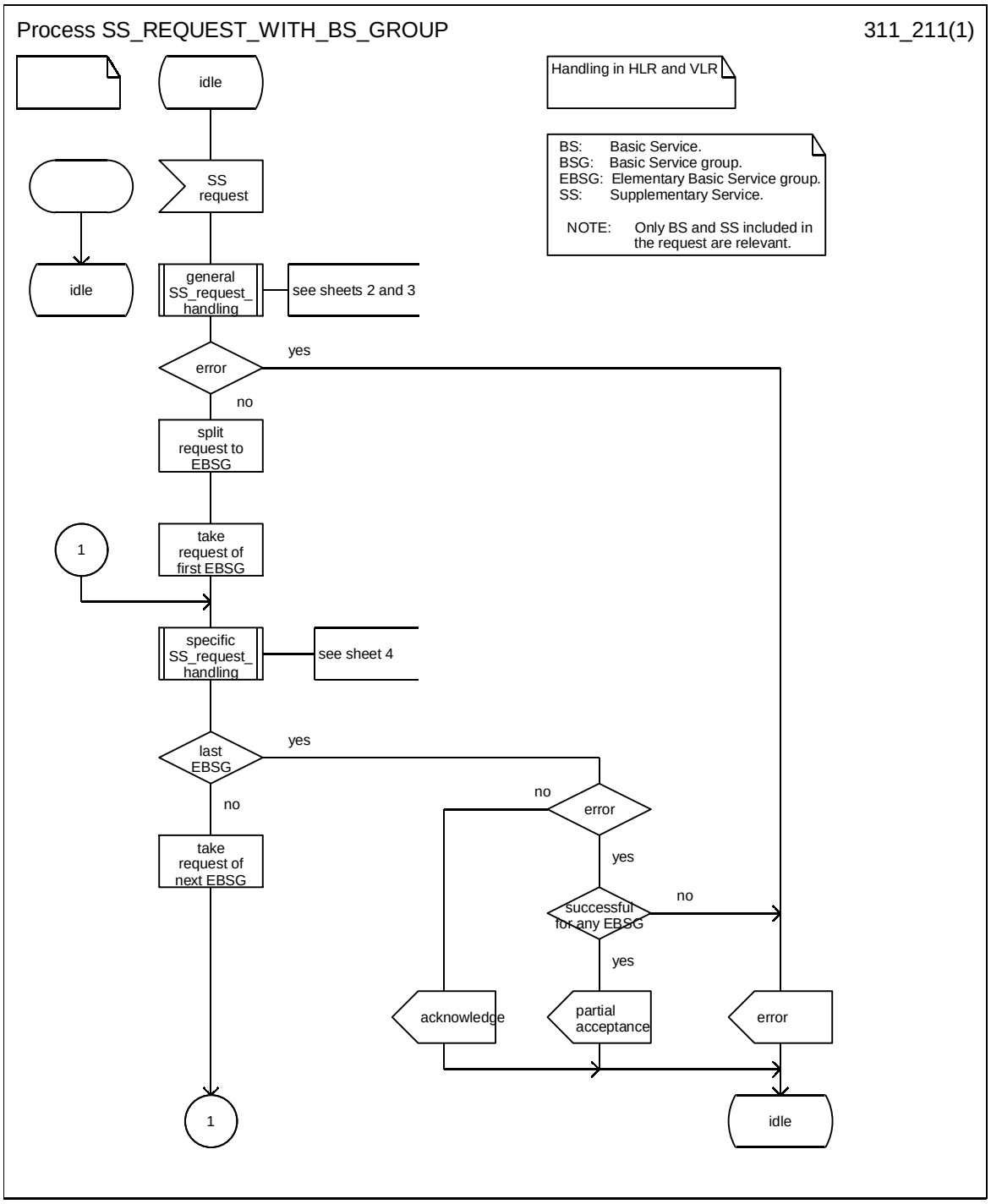
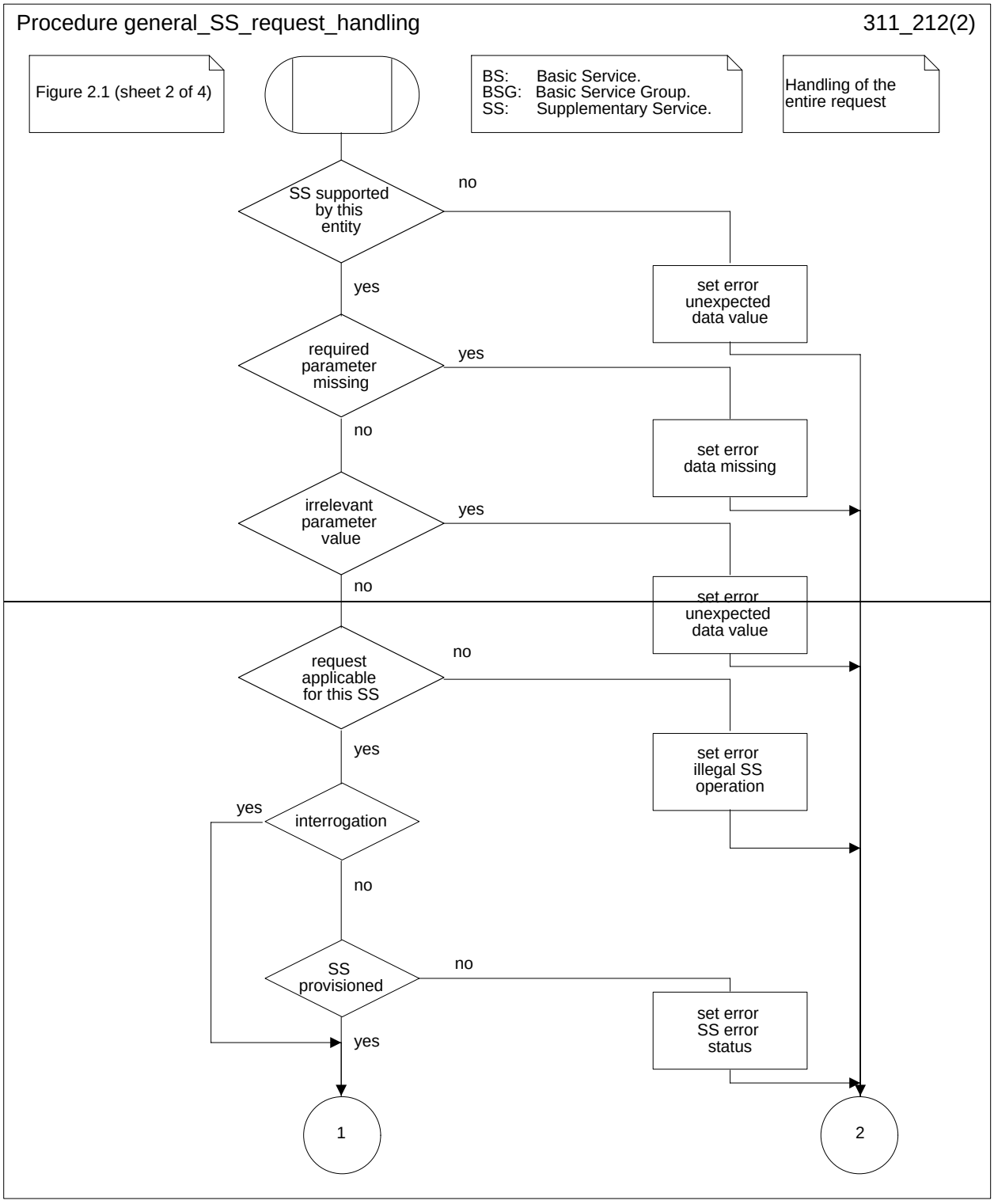


Figure 2.1 (sheet 1 of 4): Handling of call independent SS procedures with respect to basic service groups


Procedure general_SS_request_handling
311_212(2)
Figure 2.1 (sheet 2 of 4)
BS: Basic Service.
BSG: Basic Service Group.
SS: Supplementary Service.
Handling of the entire request
SS supported by this entity
no
yes
set error unexpected data value
required parameter missing
yes
no
set error data missing
irrelevant parameter value
yes
no
set error unexpected data value
request applicable for this SS
no
yes
set error illegal SS operation
yes
interrogation
no
SS provisioned
no
set error SS error status
yes
1
2

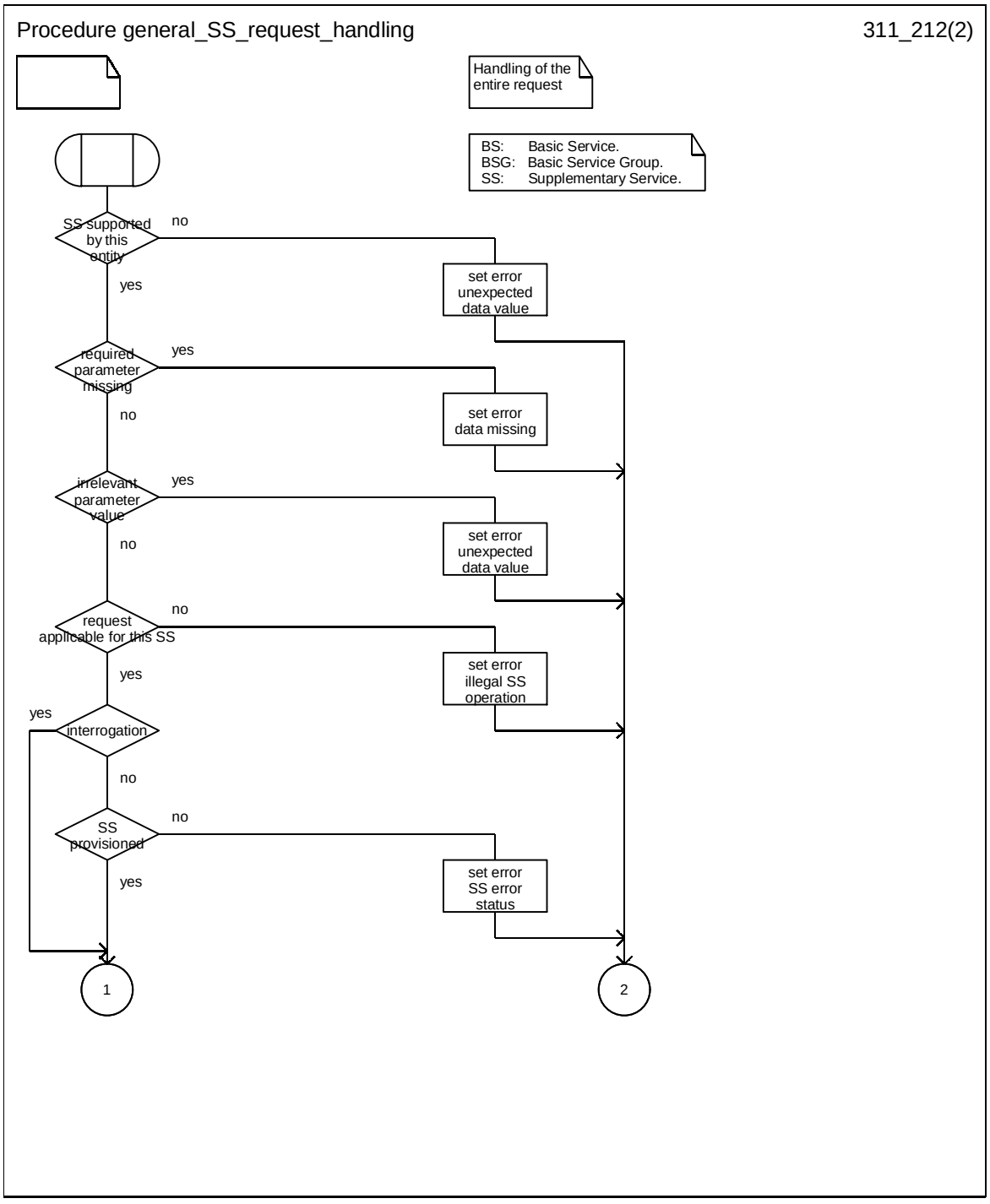
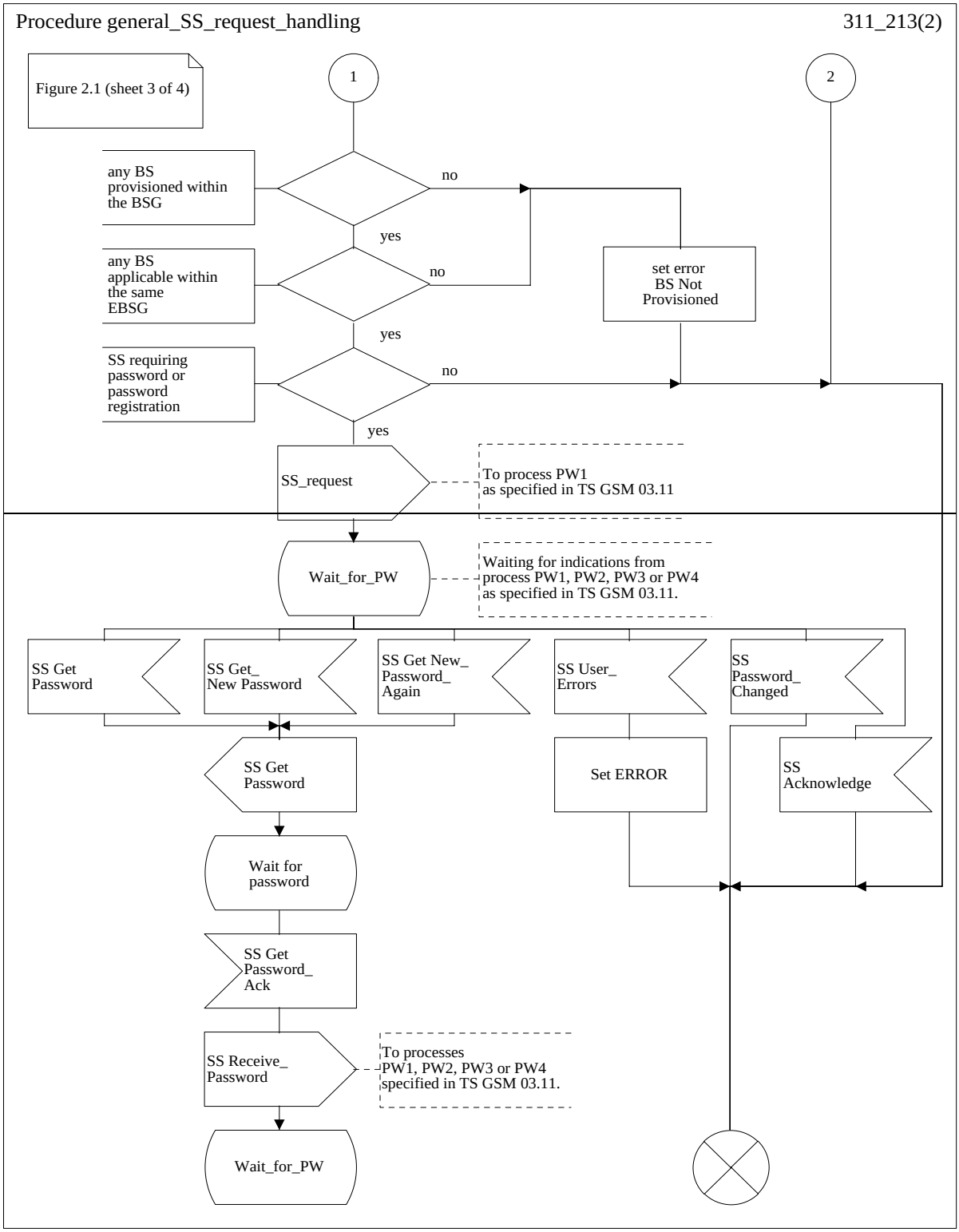


Figure 2.1 (sheet 2 of 4): Handling of call independent SS procedures with respect to basic service groups


Procedure general_SS_request_handling
311_213(2)
Figure 2.1 (sheet 3 of 4)
1
2
any BS provisioned within the BSG
no
yes
any BS applicable within the same EBSG
no
set error BS Not Provisioned
yes
SS requiring password or password registration
no
yes
SS_request
To process PW1 as specified in TS GSM 03.11
Wait_for_PW
Waiting for indications from process PW1, PW2, PW3 or PW4 as specified in TS GSM 03.11.
SS Get Password
SS Get_ New Password
SS Get New_ Password_ Again
SS User_ Errors
SS Password_ Changed
SS Get Password
Set ERROR
SS Acknowledge
Wait for password
SS Get Password_ Ack
SS Receive_ Password
To processes PW1, PW2, PW3 or PW4 specified in TS GSM 03.11.
Wait_for_PW

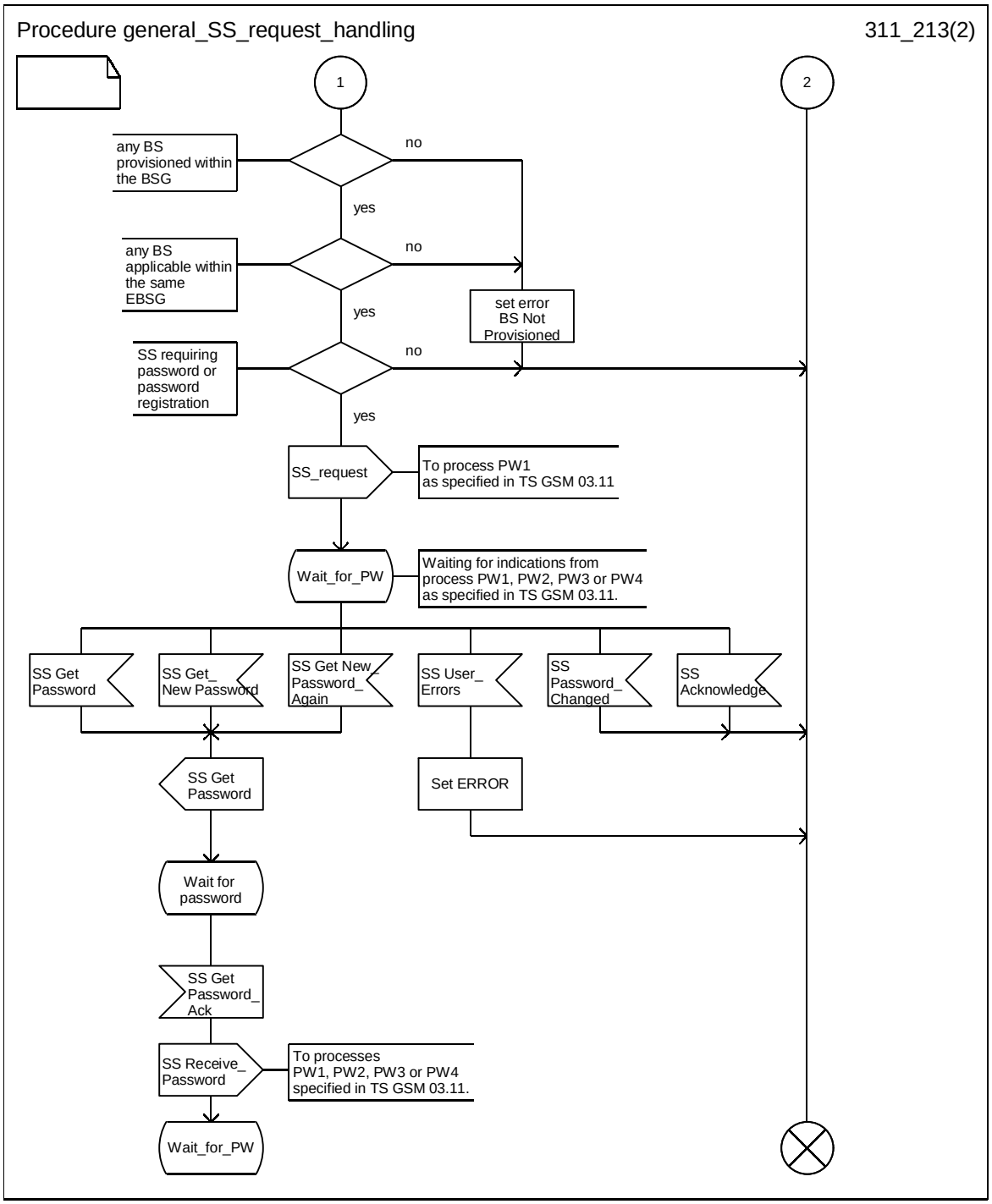
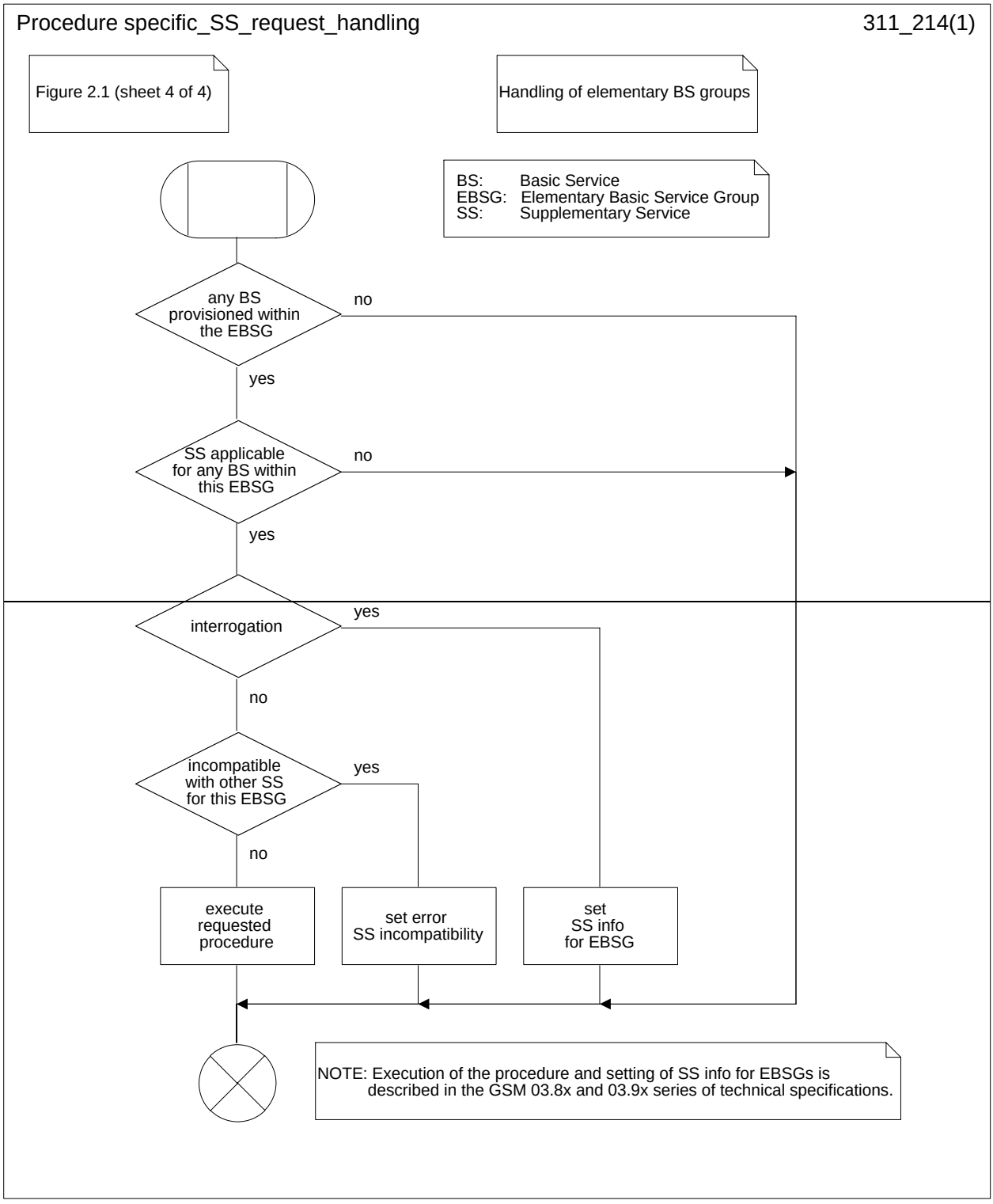


Figure 2.1 (sheet 3 of 4): Handling of call independent SS procedures with respect to basic service groups


Procedure specific_SS_request_handling
311_214(1)
Figure 2.1 (sheet 4 of 4)
Handling of elementary BS groups
BS: Basic Service
EBSG: Elementary Basic Service Group
SS: Supplementary Service
any BS provisioned within the EBSG
no
yes
SS applicable for any BS within this EBSG
no
yes
interrogation
yes
no
incompatible with other SS for this EBSG
yes
no
execute requested procedure
set error SS incompatibility
set SS info for EBSG
NOTE: Execution of the procedure and setting of SS info for EBSGs is described in the GSM 03.8x and 03.9x series of technical specifications.

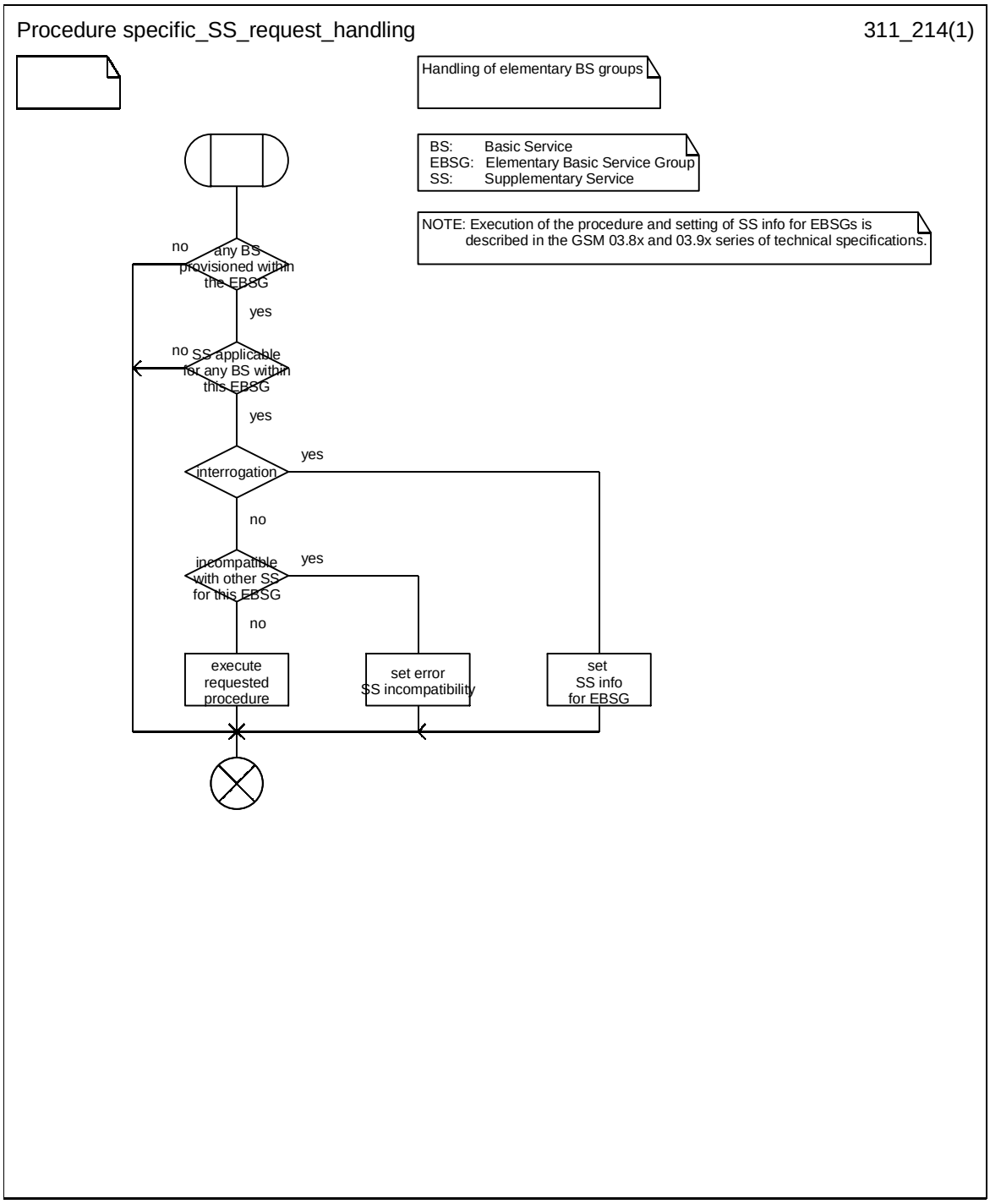


Figure 2.1 (sheet 4 of 4): Handling of call independent SS procedures with respect to basic service groups

3 Password handling

3.1 General

Some supplementary services can be subscribed with the option "control of supplementary service by subscriber using password" as described in the corresponding GSM 03.8x and 03.9x-series of technical specifications. These services are referenced in the following as protected supplementary services.

The password is stored in the HLR only.

It has to be memorised by the network, if a wrong password has been used. Therefore, the HLR stores the value of the Wrong Password Attempts counter (WPA).

If a password check is done with an incorrect password, the WPA is incremented by one. If a password check is passed, WPA is set to zero. If WPA exceeds the value three, the subscription option "control of supplementary service" is set to "by the service provider". This makes registration of password and activation or deactivation of protected supplementary services impossible (see GSM 02.04).

When the service provider registers a password, the WPA is set to zero.

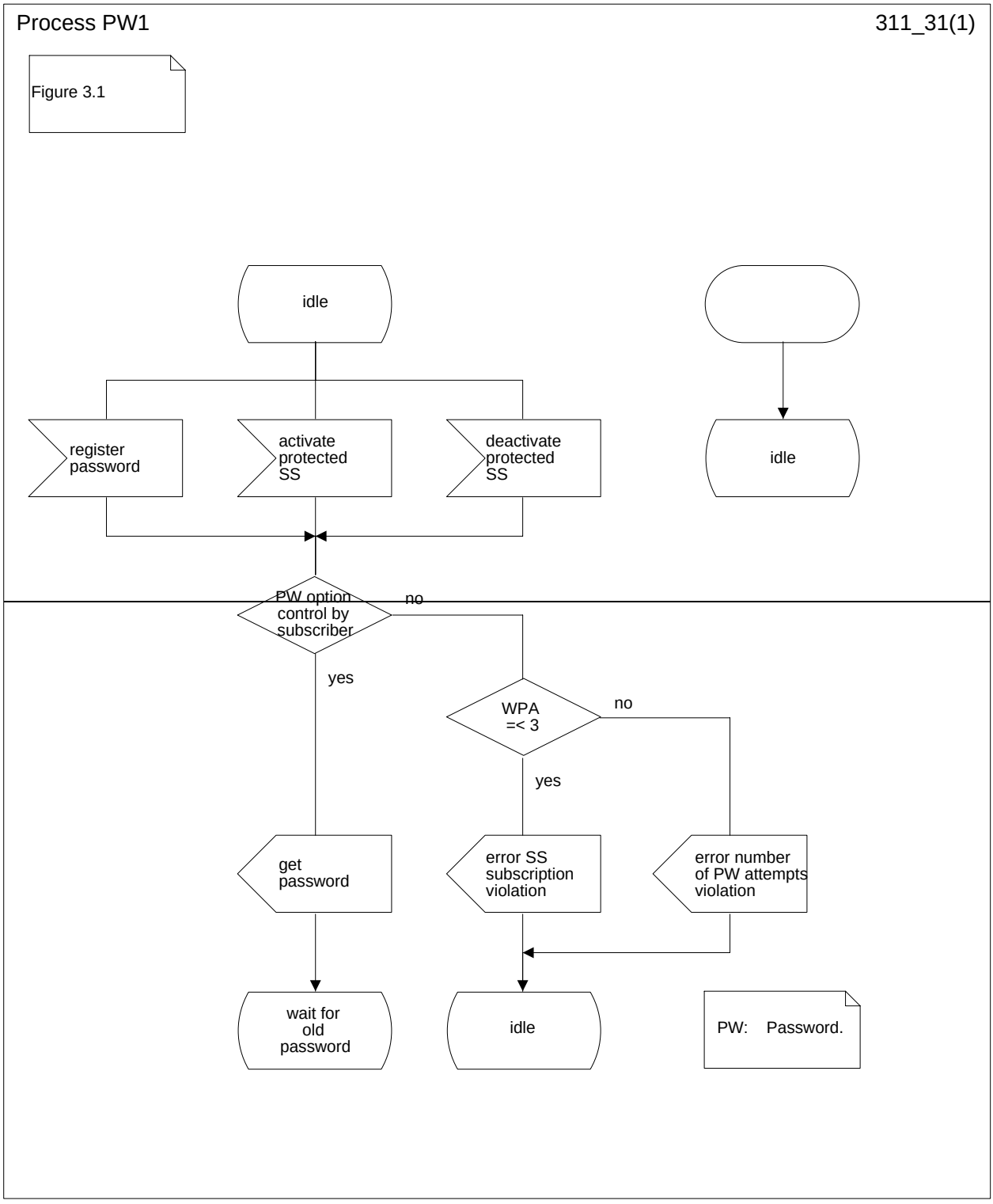
When an attempt to perform an operation requiring a password is received by the network, the network has to check whether the requesting subscriber has subscribed to the option "control of supplementary service by subscriber using password". This is shown in figure 3.1 (function PW1).

If this option has the value "by the service provider" the WPA has to be checked. When WPA exceeds three, then more than three attempts with a wrong password have been made and the appropriate message will be sent to the user. If the value of WPA is less than or equal to three, then the subscriber has not subscribed to "control of supplementary service by subscriber using password".

When a password is supplied, it has to be checked, whether it is identical to the one stored. If this applies, then WPA is reset to zero. Otherwise WPA is incremented by one and dependent of the value of the counter, the network shall request the password again, or shall send and error message and update the subscription option as shown in figure 3.2 (function PW2).

After the input of a wrong password more than three consecutive times, the only possibility to reset the Wrong Password Attempts counter (WPA) is, to register a new password by the service provider.

Figures 3.3 and 3.4 show the procedures executed by the network in order to check the format (function PW3) and to check the new password (function PW4).


Process PW1
311_31(1)
Figure 3.1
idle
register password
activate protected SS
deactivate protected SS
idle
PW option control by subscriber
no
yes
WPA =< 3
no
yes
get password
error SS subscription violation
error number of PW attempts violation
wait for old password
idle
PW: Password.

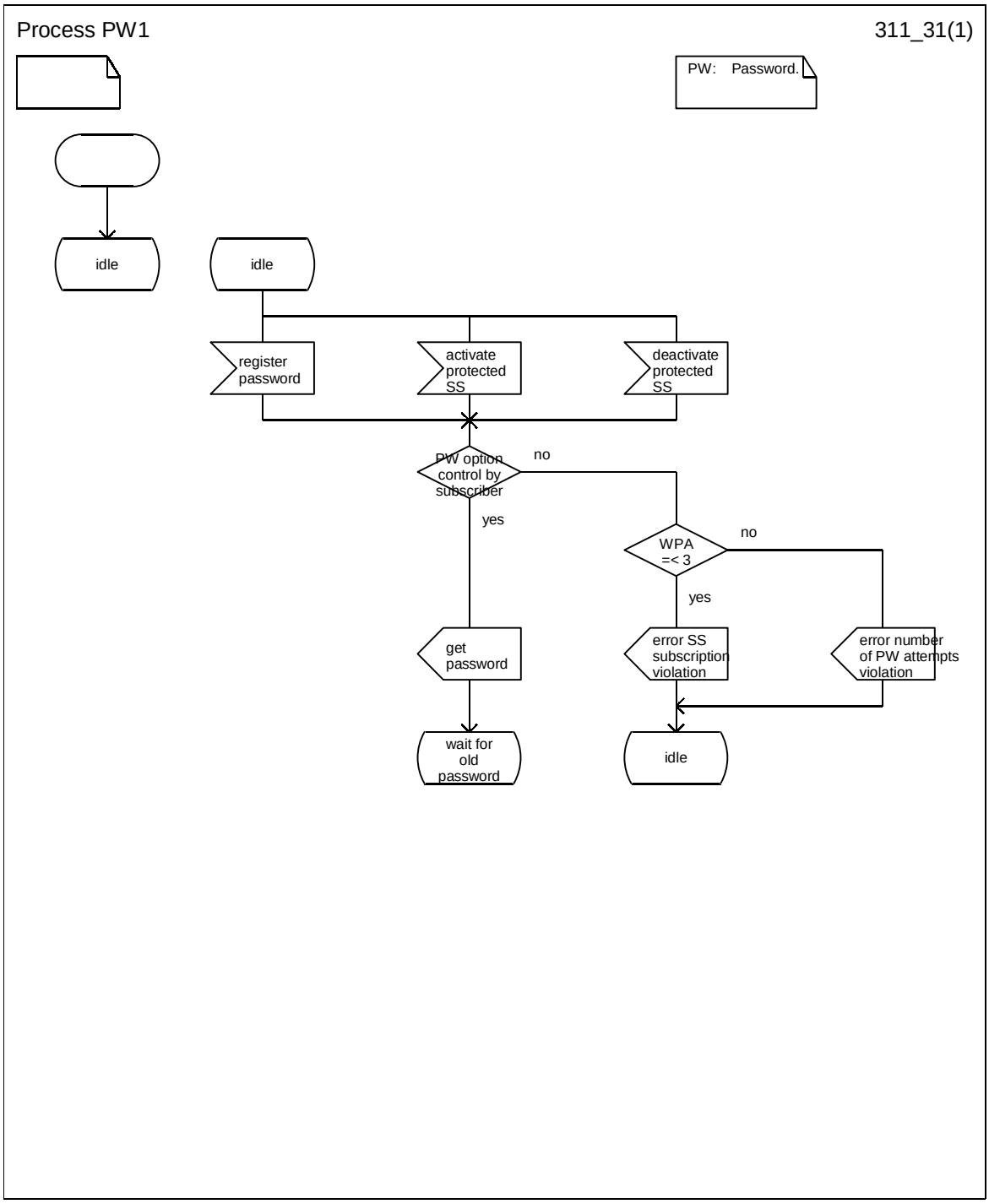
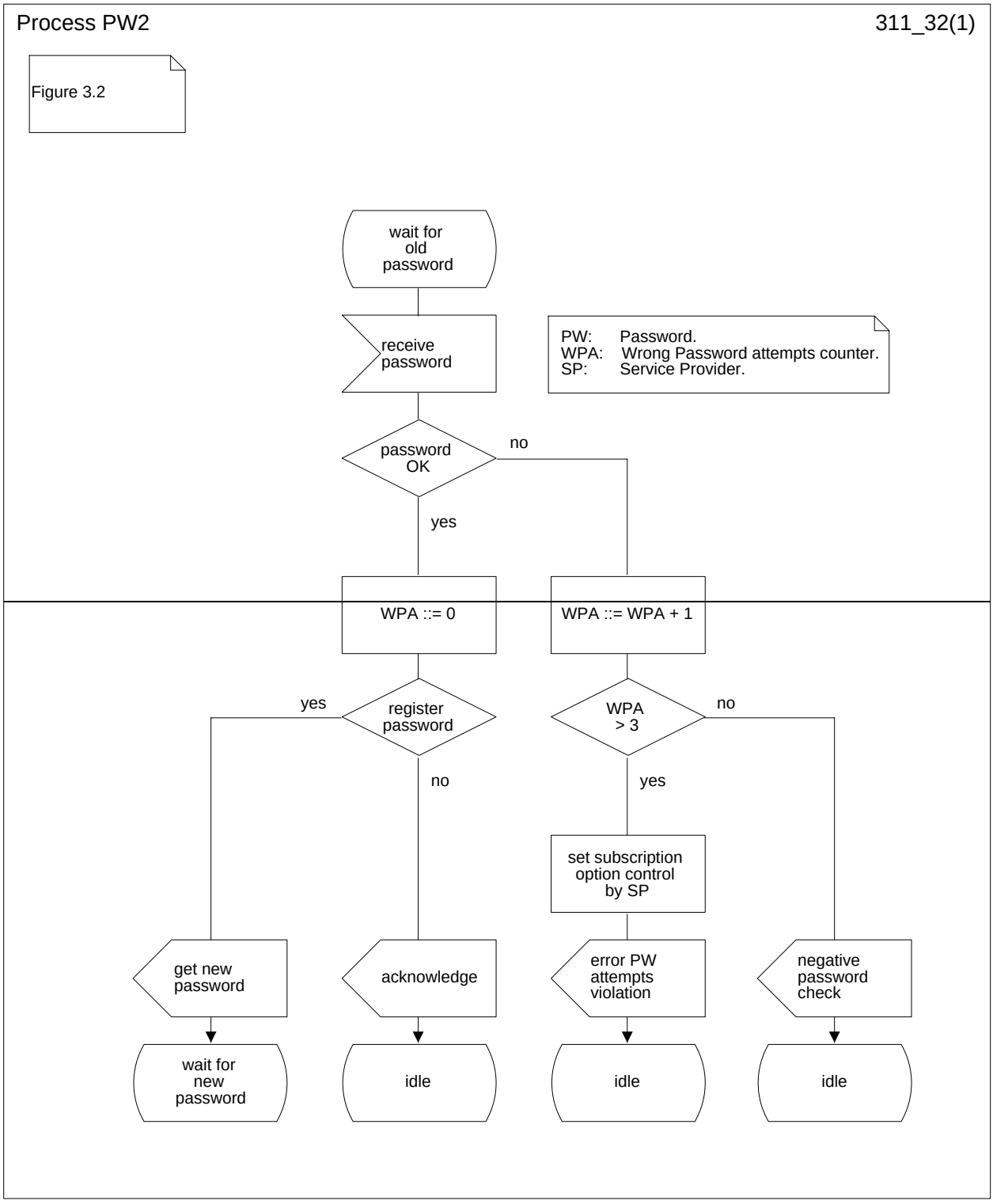


Figure 3.1: PW1; Check of subscription option (HLR)


Process PW2
311_32(1)
Figure 3.2
wait for old password
receive password
PW: Password.
WPA: Wrong Password attempts counter.
SP: Service Provider.
password OK
no
yes
WPA ::= 0
WPA ::= WPA + 1
yes
register password
WPA > 3
no
no
yes
set subscription option control by SP
get new password
acknowledge
error PW attempts violation
negative password check
wait for new password
idle
idle
idle

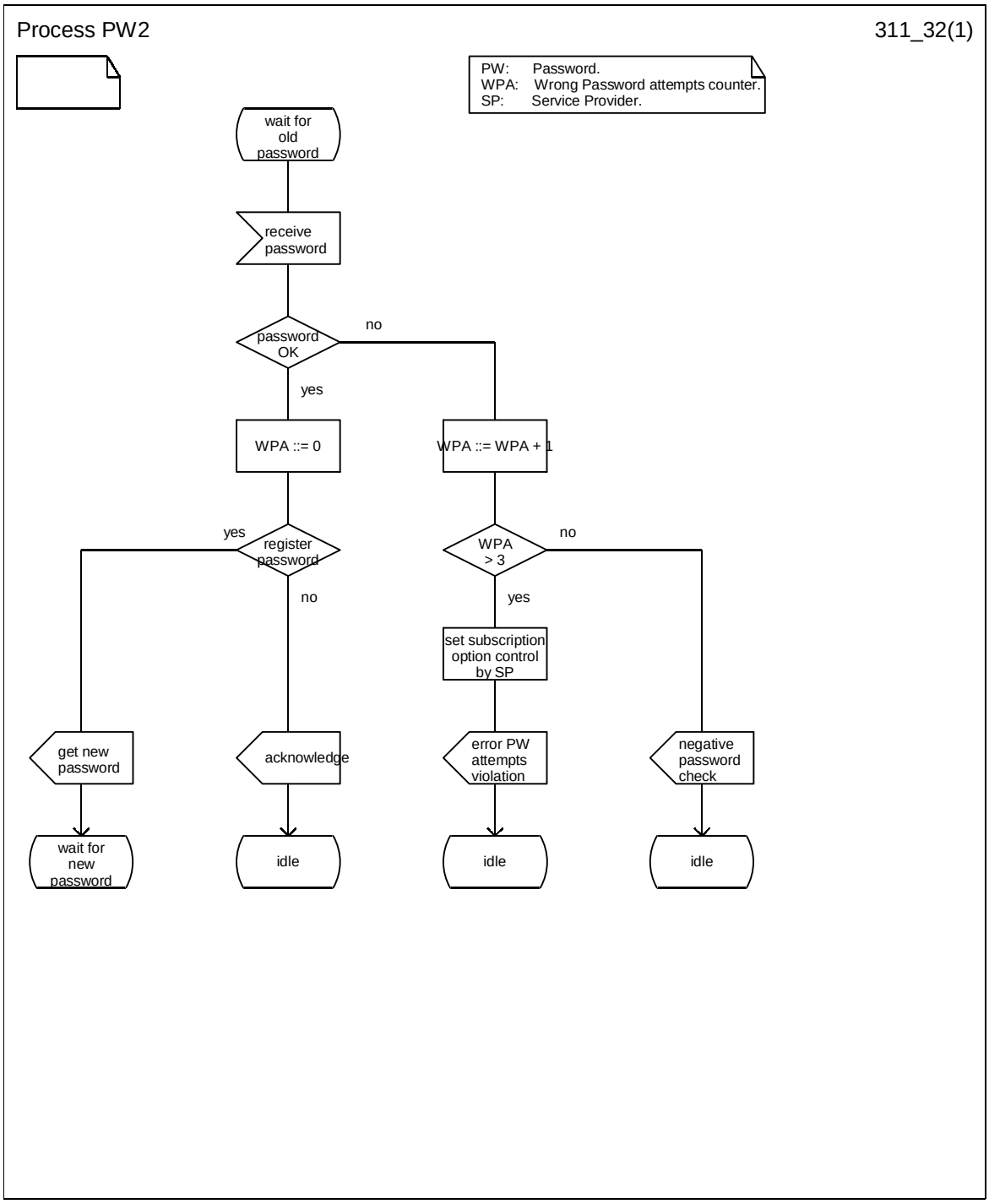
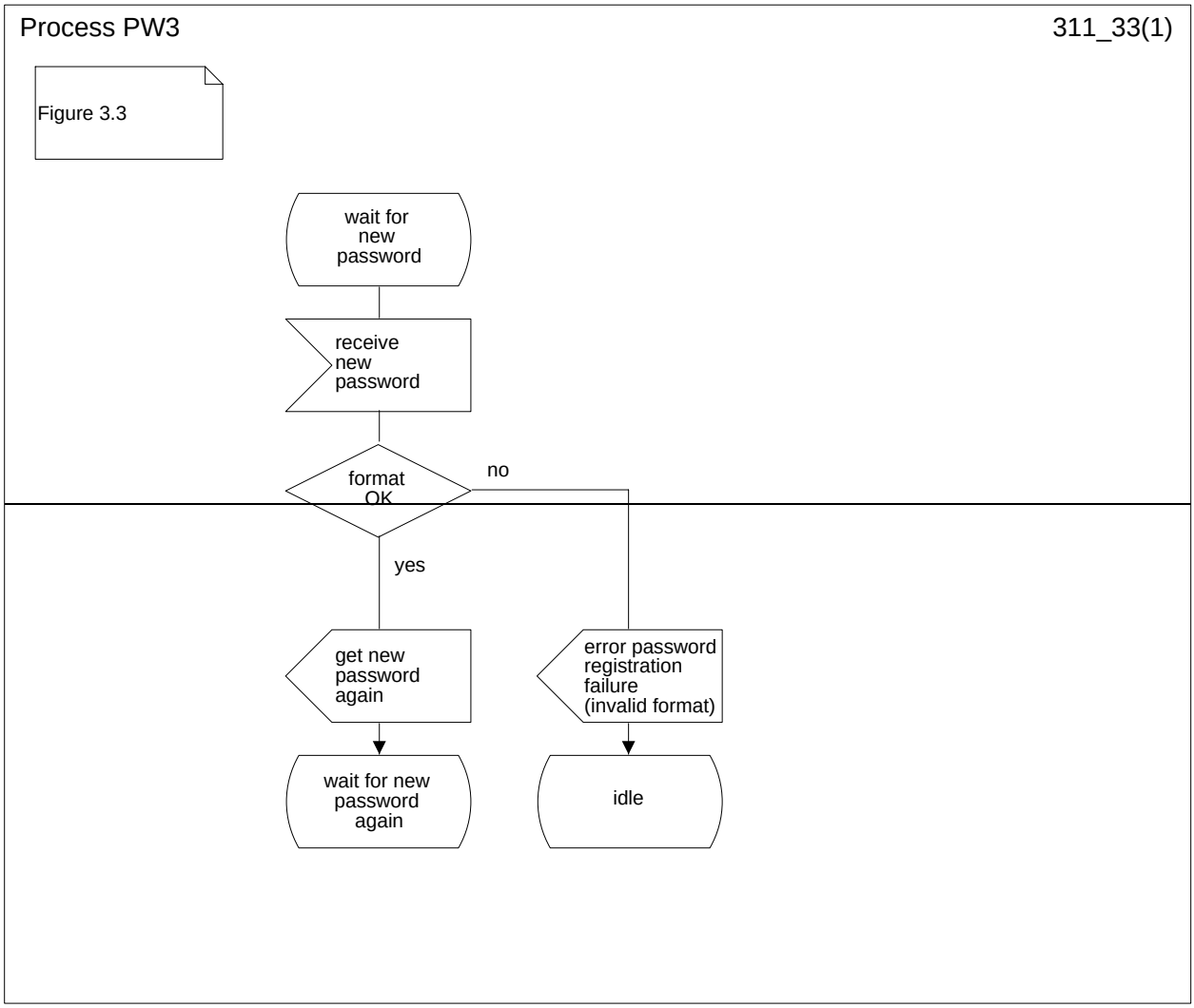


Figure 3.2: PW2; Check of password input (HLR)


Process PW3
311_33(1)
Figure 3.3
wait for new password
receive new password
format OK
no
yes
get new password again
error password registration failure (invalid format)
wait for new password again
idle

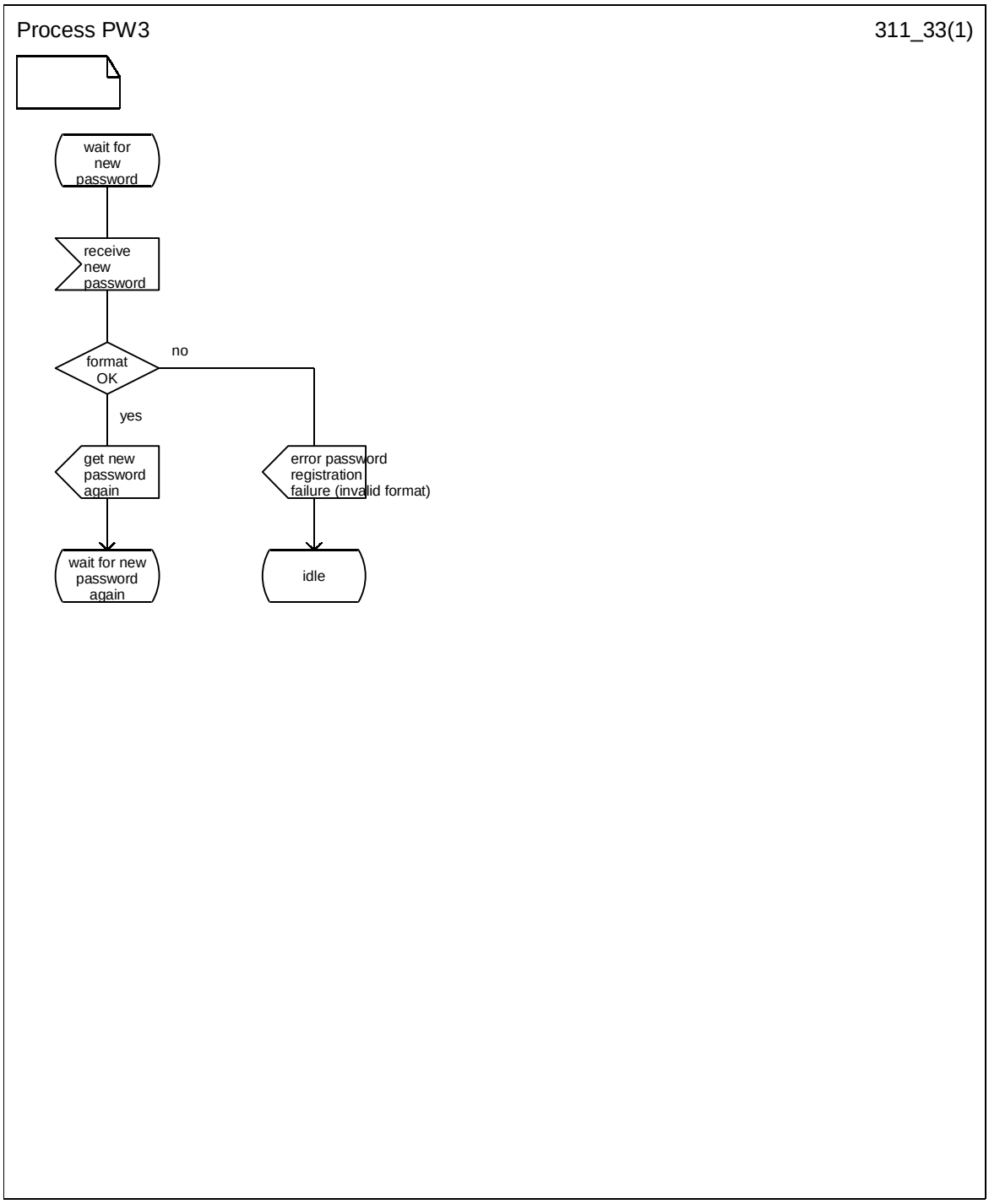
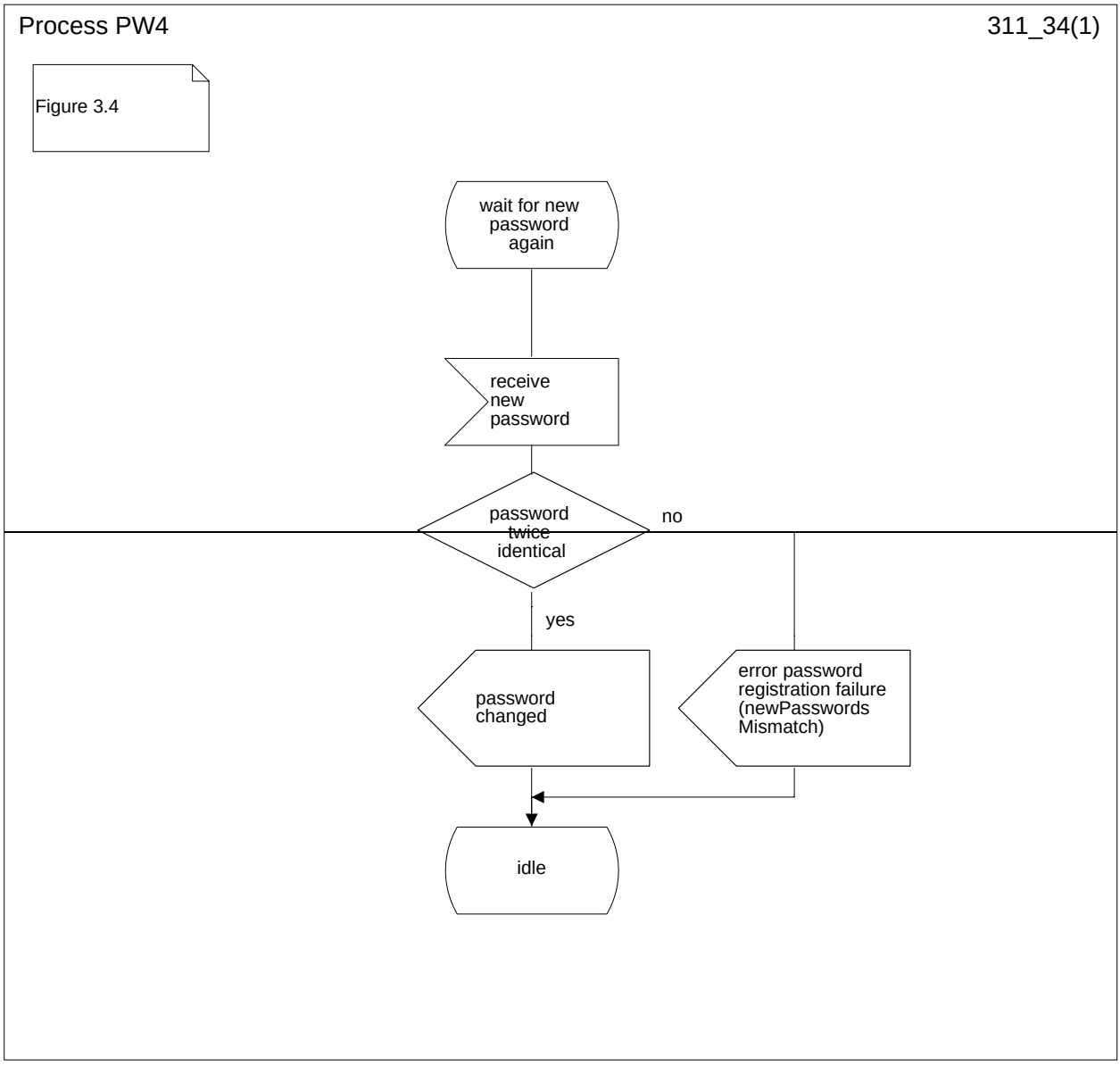


Figure 3.3: PW3; Format check (HLR)


Process PW4
311_34(1)
Figure 3.4
wait for new password again
receive new password
password twice identical
no
yes
password changed
error password registration failure (newPasswords Mismatch)
idle

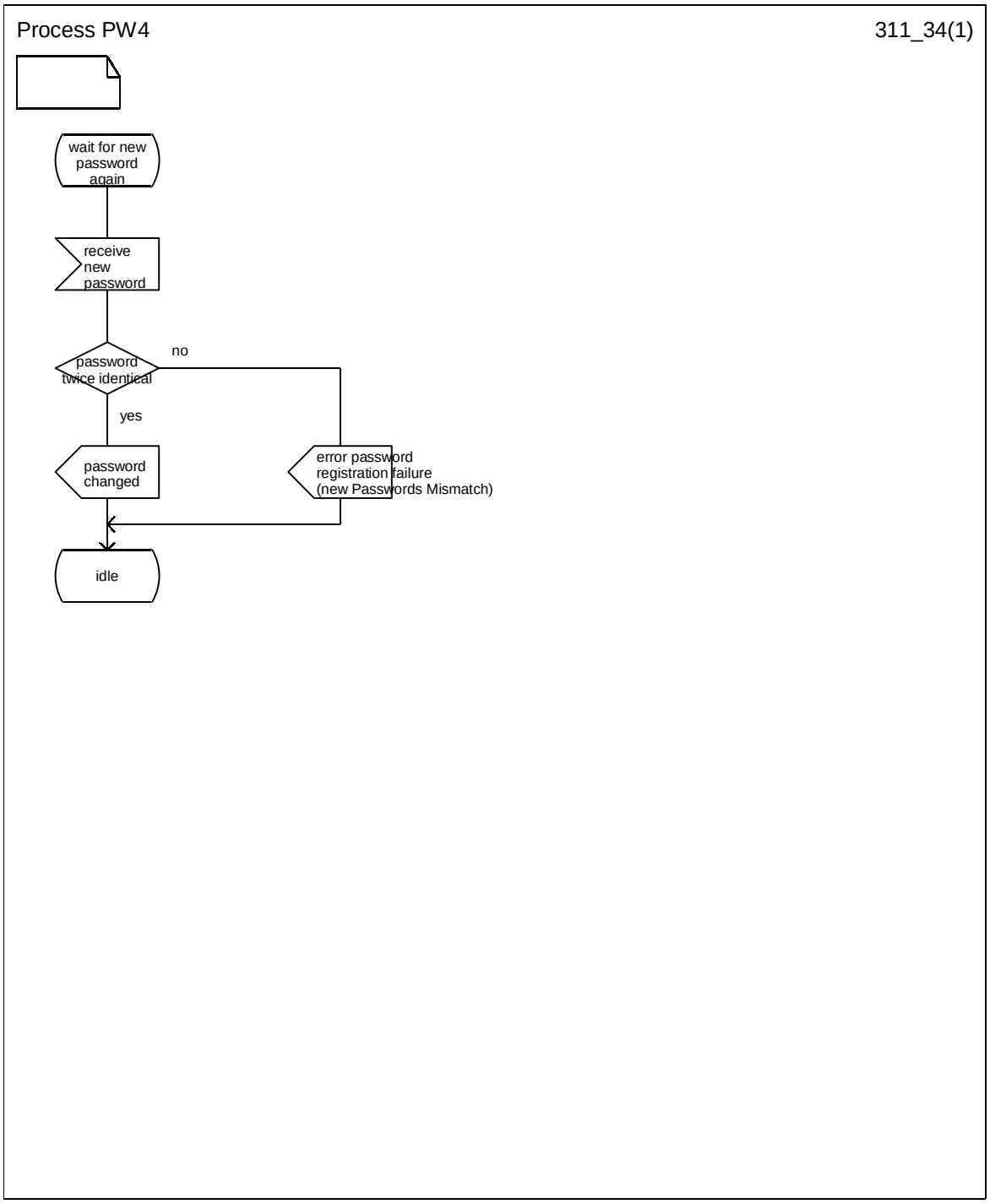


Figure 3.4: PW4; Check of new password (HLR)

3GPP/TSG-CN WG4 Meeting 4
Seattle, USA, 28 August - 1 September 2000

***Document* N4-000564**
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or for SMG, use the format P-99-xxx

CHANGE REQUEST

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23.018	CR	059	Current Version:	3.5.0

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

For submission to:	TSG-CN#09	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: N4 **Date:** 01/08/00

Subject: Modifications to procedure obtain routeing address.

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change: To define the handleing of the 'send routeing info ack' signal when CAMEL is not supported in the MSC.

Clauses affected: 7.2.1.2, 8.2.2

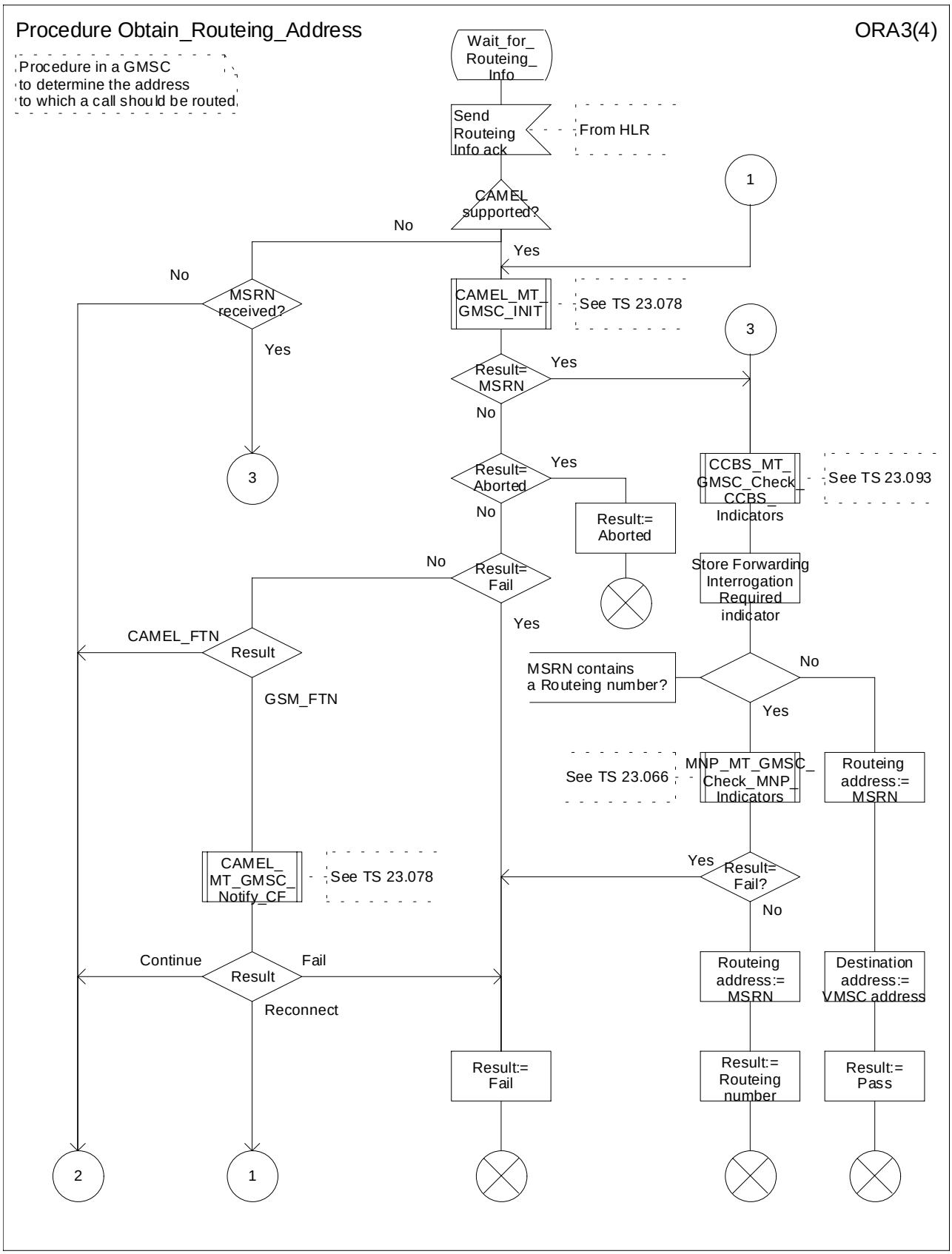
Other specs affected:

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:

help.doc

<--------- double-click here for help and instructions on how to create a CR.


Procedure Obtain_Routeing_Address
ORA3(4)
Procedure in a GMSC to determine the address to which a call should be routed
Wait_for_ Routeing_ Info
Send Routeing Info ack
From HLR
CAMEL supported?
No
Yes
1
MSRN received?
No
Yes
CAMEL_MT_ GMSC_INIT
See TS 23.078
3
Result= MSRN
Yes
No
3
Result= Aborted
Yes
No
CCBS_MT_ GMSC_Check_ CCBS_ Indicators
See TS 23.093
Result:= Aborted
Store Forwarding Interrogation Required indicator
Result= Fail
No
Yes
CAMEL_FTN
Result
GSM_FTN
MSRN contains a Routeing number?
No
Yes
See TS 23.066
MNP_MT_GMSC_ Check_MNP_ Indicators
Routeing address:= MSRN
CAMEL_ MT_GMSC_ Notify_CF
See TS 23.078
Yes
Result= Fail?
No
Continue
Result
Fail
Reconnect
Routeing address:= MSRN
Destination address:= VMSC address
Result:= Fail
Result:= Routeing number
Result:= Pass
2
1

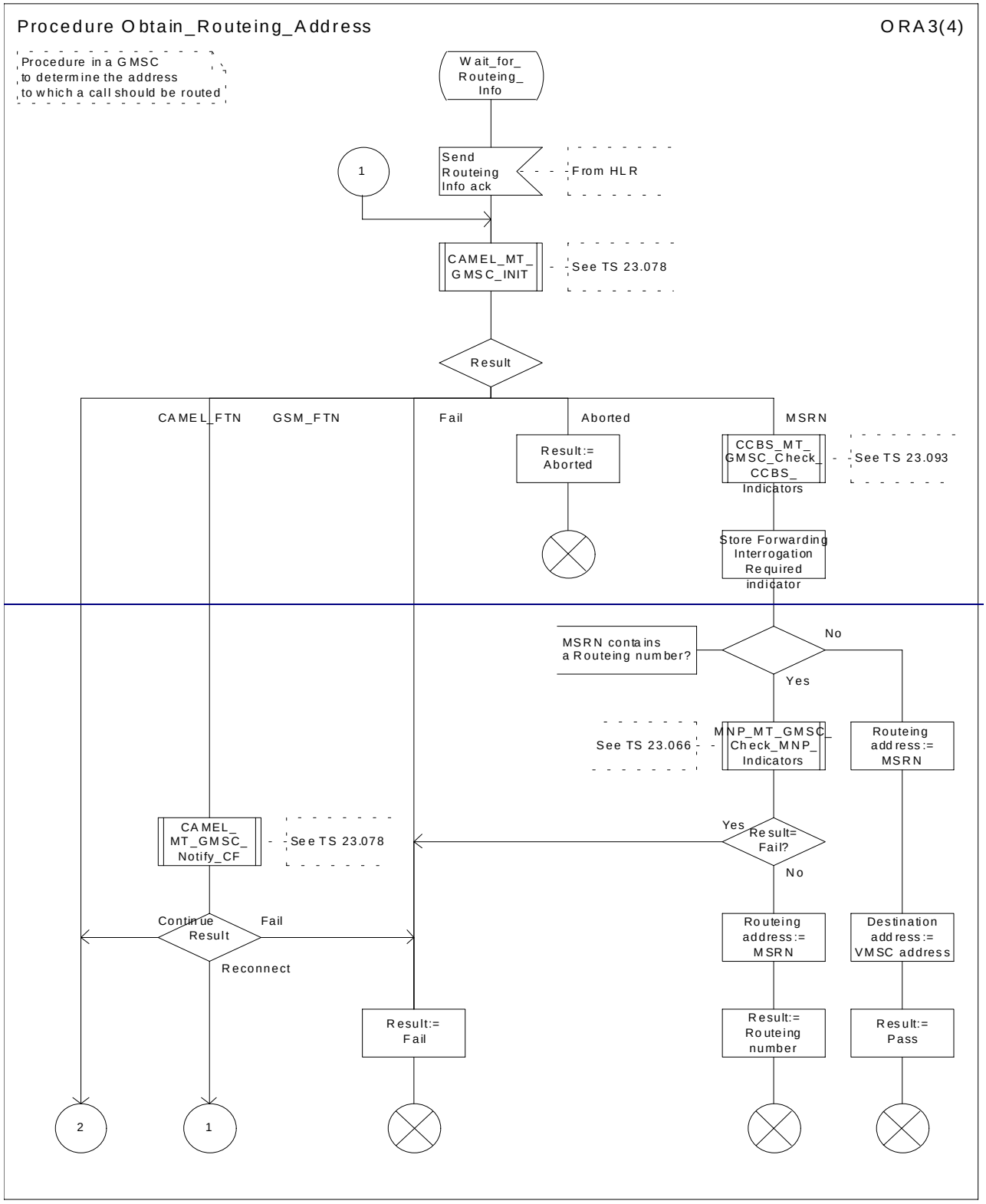


Figure 36c: Procedure Obtain_Routeing_Address (sheet 3)

******Next Modified Section ******

8.2.2 Send Routeing Info ack

The following information elements are required:

Information element name	Required	Description
IMSI	M	IMSI of the B subscriber (see 3G TS 23.003 [5]).
Roaming number	C	E.164 number required to route the call to VMSCB (see 3G TS 23.003 [5]). Shall be present if the HLR received it in the Provide Roaming Number ack and the call is not subject to early CF, otherwise shall be absent.
Forwarded-to number	C	E.164 number of the C subscriber. Shall be present if the HLR has determined that the call is to be forwarded, otherwise shall be absent.
Forwarded-to subaddress	C	Subaddress of the C subscriber (see 3G TS 23.003 [5]). Shall be present if the HLR has determined that the call is to be forwarded and a forwarded-to subaddress is stored in the HLR in association with the forwarded-to number, otherwise shall be absent.
Notification to calling party	C	Indication of whether the calling party is to be notified that the call has been forwarded. Shall be present if the HLR has determined that the call is to be forwarded, otherwise shall be absent.
Forwarding reason	C	Indication of why the call has been forwarded (unconditionally or on mobile subscriber not reachable). Shall be present if the HLR has determined that the call is to be forwarded, otherwise shall be absent.
Redirecting presentation	C	Indication of whether the MSISDN of B subscriber shall be presented to the C subscriber. Shall be present if the HLR has determined that the call is to be forwarded, otherwise shall be absent.
MSISDN	C	E.164 number which identifies the B subscriber (basic MSISDN). It will be used to create the redirecting number presented to the C subscriber. Shall be present if the HLR has determined that the call is to be forwarded, otherwise shall be absent.
CUG interlock	C	For the definition of this IE, see 3G TS 23.085 [18]. Shall be present if the HLR has determined that the call is to be treated as a CUG call in accordance with the rules in 3G TS 23.085 [18], otherwise shall be absent.
CUG outgoing access	C	For the definition of this IE, see 3G TS 23.085 [18]. Shall be present if the HLR has determined that the call is to be treated as a CUG call with outgoing access in accordance with the rules in 3G TS 23.085 [18], otherwise shall be absent.
NAEA preferred Carrier Id	O	The preferred carrier identity identifying the carrier to be used to route the interexchange call if the call requires routing via an interexchange carrier. This parameter may be included at the discretion of the HLR operator.

******End of document ******

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000430
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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23.082	CR	008	Current Version:	3.2.0

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

For submission to:	CN#09	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic	X	

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

Source: N4 **Date:** 2000-06-26

Subject: SDL refresh

Work item: TEI

Category: *(only one category Shall be marked With an X)*

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				Release 00	

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- In the previous version, the diagrams contained nothing but garbage when viewed on-screen.
- Some of the diagrams were, if not impossible, very hard to print.
- A binary version of the SDL diagrams, suitable for standard tools, is needed to assure a qualitative handling of the diagrams in the future. Telelogic Tau SDL Suite (formerly known as SDT) versions of the diagrams have been created and made available, providing a new fresh base for future changes. For obvious reasons, the binary version, to be regarded as the source, should be mirrored in the document. Therefore, the diagrams replacing the previous versions are printouts of the binary versions.

Clauses affected: All figures in the document, containing an SDL diagram.

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:

ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

1 Call forwarding unconditional (CFU)

1.1 Handling of call forwarding unconditional

1.1.1 Registration

At the beginning of registration subscription to the basic service, provision of the supplementary service and sufficiency of registration information has to be checked (see figure 1.2).

The following information has to be registered in the network:

1) the forwarded-to number (possibly including a sub-address);

2) information as to whether all calls or all calls of a specific basic service group should be forwarded.

The basic service group code

If the registration request received by the HLR does not contain any basic service group code, the registration shall be performed for all subscribed basic service groups for which CFU is provided, see figure 1.2.

The forwarded-to number

If the forwarded-to number is a number in the HPLMN country, it may be entered by the served mobile subscriber in three different formats, independent of his actual location, according to the schemes:

1) national (significant) number;

2) (trunk) prefix plus national (significant) number;

3) international prefix, country code, national (significant) number.

The received number may have to be converted to an international number before further processing.

The network may also validate the forwarded-to number before accepting the call forwarding registration request.

If a served mobile subscriber is provided with the Translation Information Flag (TIF-CSI) as part of the CAMEL subscriber data (refer to TS 23.078), the network shall accept and store the forwarded-to number transparently at the time of registration. In this case the network shall neither convert nor validate the received number. Therefore the forwarded-to number may not comply with the schemes indicated above.

For further details related to the handling of the forwarded-to number refer to figure 1.2.

Supplementary Service interaction

Possible interaction situations between CFU and other call forwarding and barring supplementary services must then be checked. This is described in figure 1.2. Also see technical specifications 3G TS 22.004 and 3G TS 22.082. For interaction between CFU and other supplementary services (ie not call barring or call forwarding services), the reader is referred to the respective technical specification for those supplementary services.

Interaction with CAMEL Phase 2 or higher

Possible interaction between CFU and CAMEL Phase 2 or higher is described in figure 1.2. If CAMEL Phase 2 or higher is not supported in the HLR, processing continues from the "No" exit of the test "Result=Pass".

Notifications to the subscriber

When the mobile subscriber registers CFU, the network shall attempt to register and activate the service. The network will return notification of acceptance of the request. This notification will include the forwarded-to number and possibly the basic service group code to which CFU is registered.

If the system cannot accept a registration request, the network sends a notification that CFU registration was not successful to the served mobile subscriber.

The information flow for registration of CFU is shown in figure 1.1.

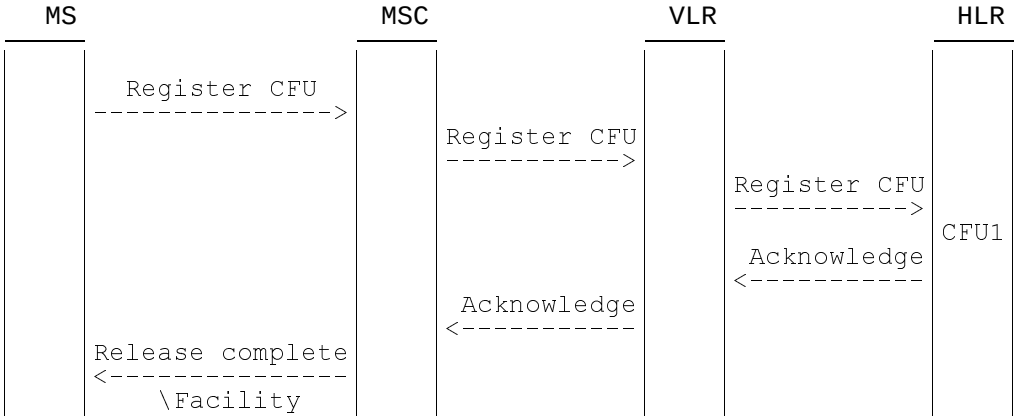
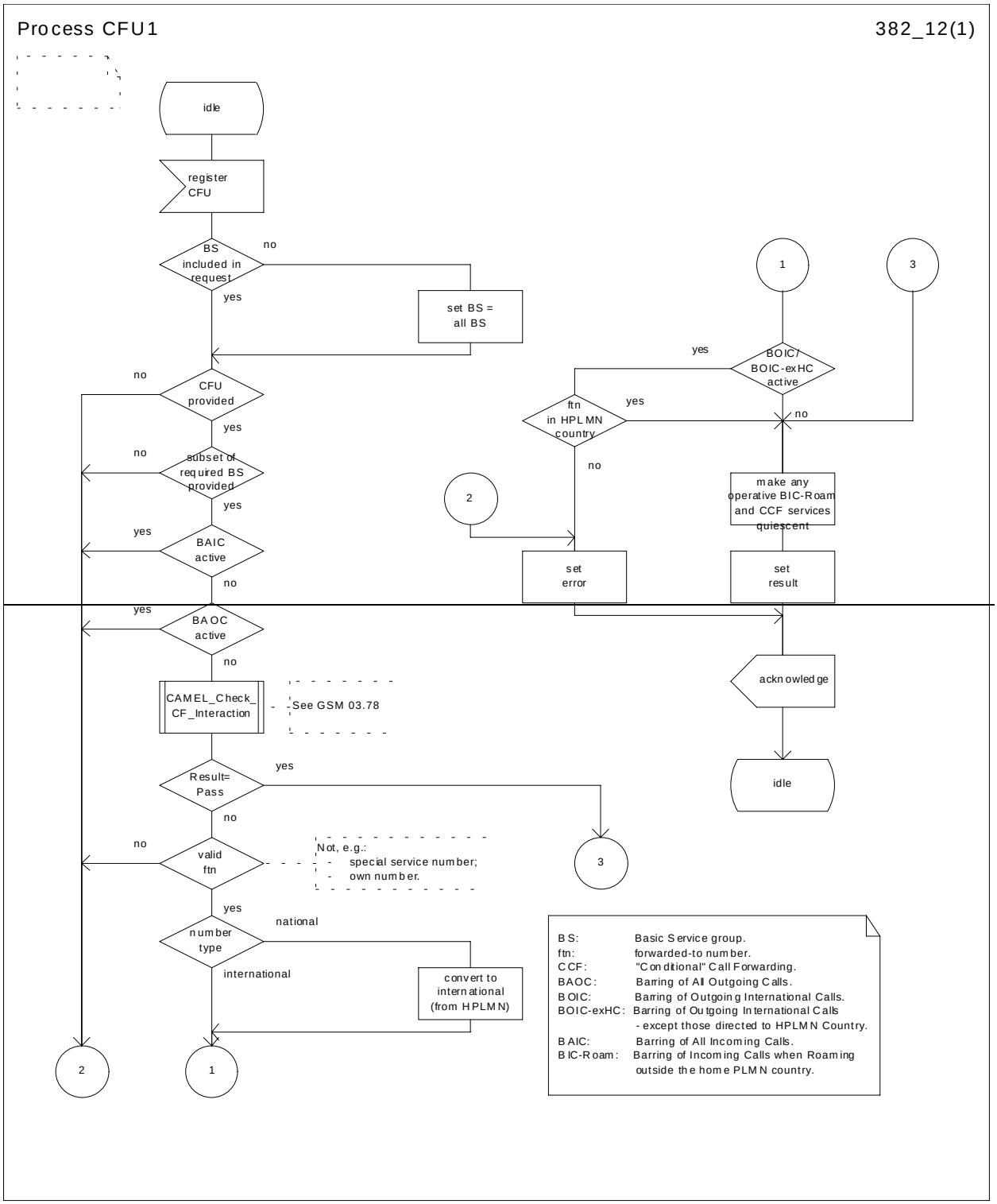


Figure 1.1: Registration of call forwarding unconditional


Process CFU1
382_12(1)
idle
register CFU
BS included in request
no
yes
set BS = all BS
CFU provided
subset of required BS provided
BAIC active
BAOC active
CAMEL_Check_ CF_Interaction
See GSM 03.78
Result= Pass
valid ftn
Not, e.g.:
special service number;
own number.
number type
national
international
convert to international (from HPLMN)
1
2
3
BOIC/ BOIC-exHC active
ftn in HPLMN country
make any operative BIC-Roam and CCF services quiescent
set error
set result
acknowledge
idle
BS: Basic Service group.
ftn: forwarded-to number.
CCF: "Conditional" Call Forwarding.
BAOC: Barring of All Outgoing Calls.
BOIC: Barring of Outgoing International Calls.
BOIC-exHC: Barring of Outgoing International Calls - except those directed to HPLMN Country.
BAIC: Barring of All Incoming Calls.
BIC-Roam: Barring of Incoming Calls when Roaming outside the home PLMN country.

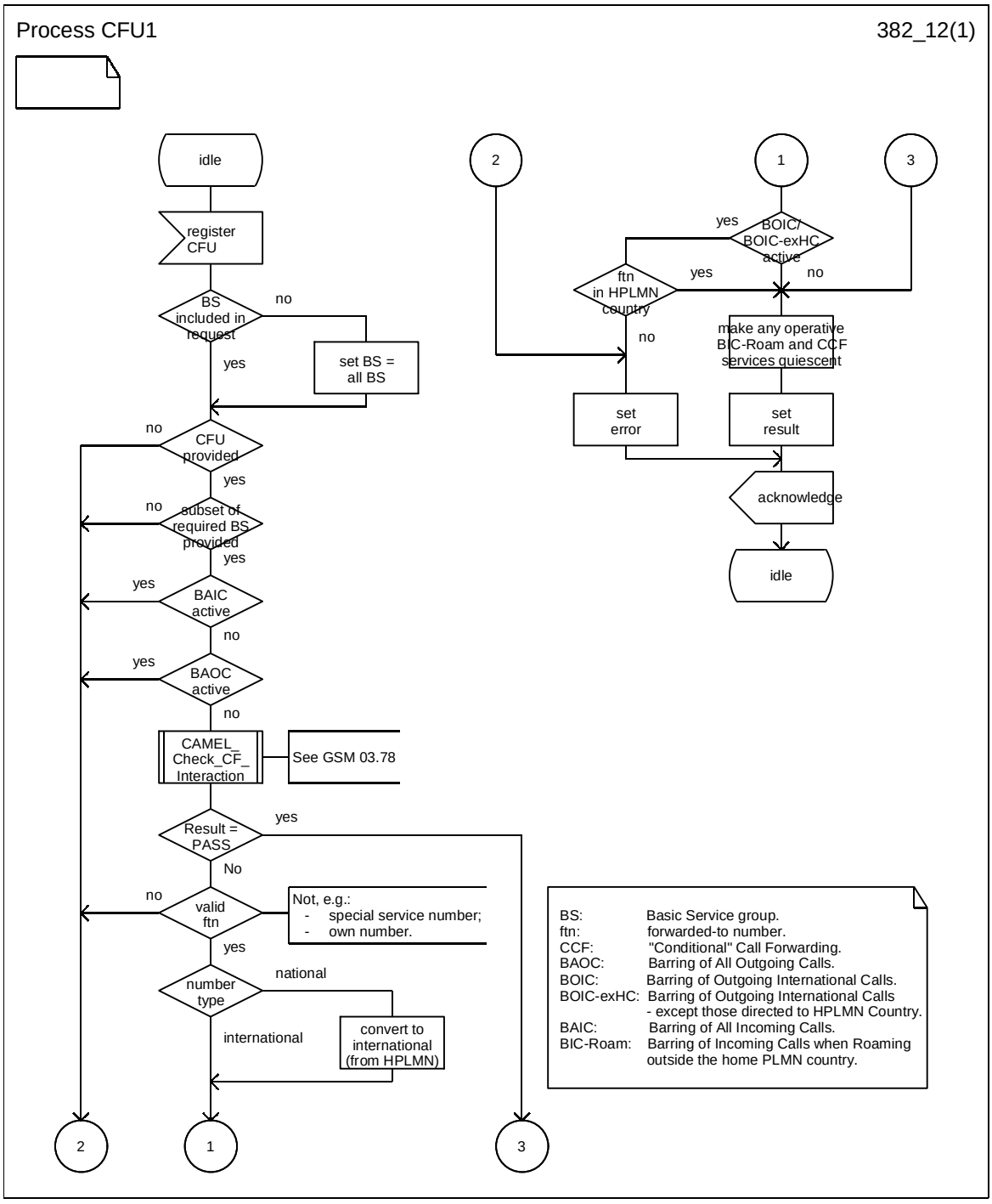


Figure 1.2: CFU1 Call forwarding unconditional registration process

1.1.2 Erasure

A previous registration can be erased in either of the following three ways:

- the subscriber can specifically erase a previous registration (to a basic service group) with an appropriate control procedure;
- the subscriber can register information for CFU (to a basic service group), thus causing previous registrations of CFU to be overridden (in the network this shall be handled as an erasure immediately followed by a registration);
- all information is erased as a result of withdrawal of the supplementary service (administrative handling).

The basic service group code

If the erasure request received by the HLR does not contain any basic service group code, the erasure request applies for all basic service groups for which CFU is registered. See figure 1.4.

Supplementary Service interaction

Possible interaction situations between CFU and other supplementary services must then be checked. This is shown in figure 1.4. Also see technical specifications 3G TS 22.004 and 3G TS 22.082. For interaction between CFU and other supplementary services (ie not call barring or call forwarding services), the reader is referred to the respective technical specification for those supplementary services.

Notifications to the subscriber

When the mobile subscriber erases CFU, the network shall attempt to erase (and thus deactivate) the service. The network shall send an indication of acceptance or rejection of the erasure request to the served mobile station.

The information flow for erasure of CFU is shown in figure 1.3.

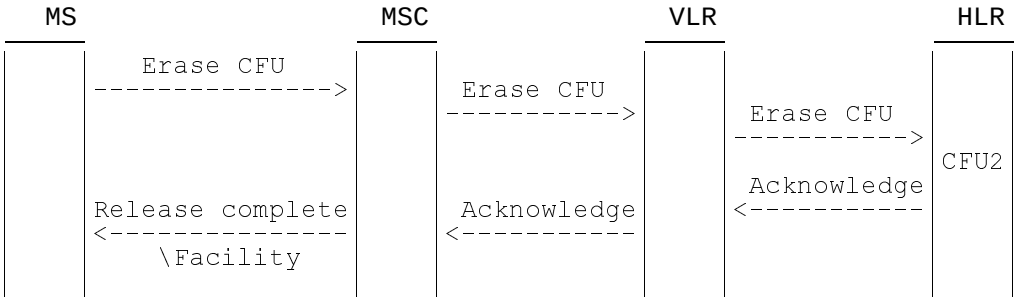
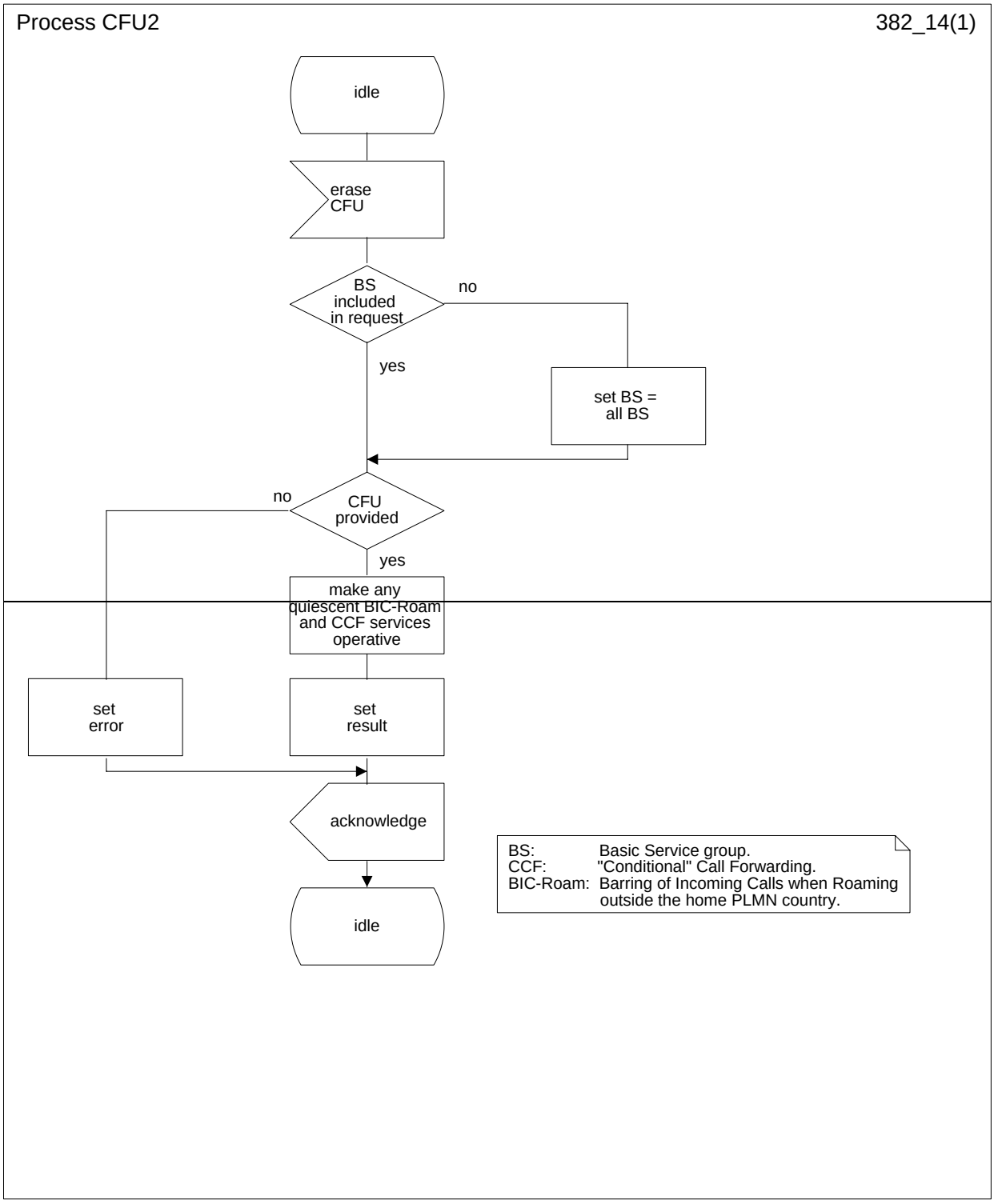


Figure 1.3: Erasure of call forwarding unconditional


Process CFU2
382_14(1)
idle
erase CFU
BS included in request
no
yes
set BS = all BS
CFU provided
no
yes
make any quiescent BIC-Roam and CCF services operative
set error
set result
acknowledge
idle
BS: Basic Service group.
CCF: "Conditional" Call Forwarding.
BIC-Roam: Barring of Incoming Calls when Roaming outside the home PLMN country.

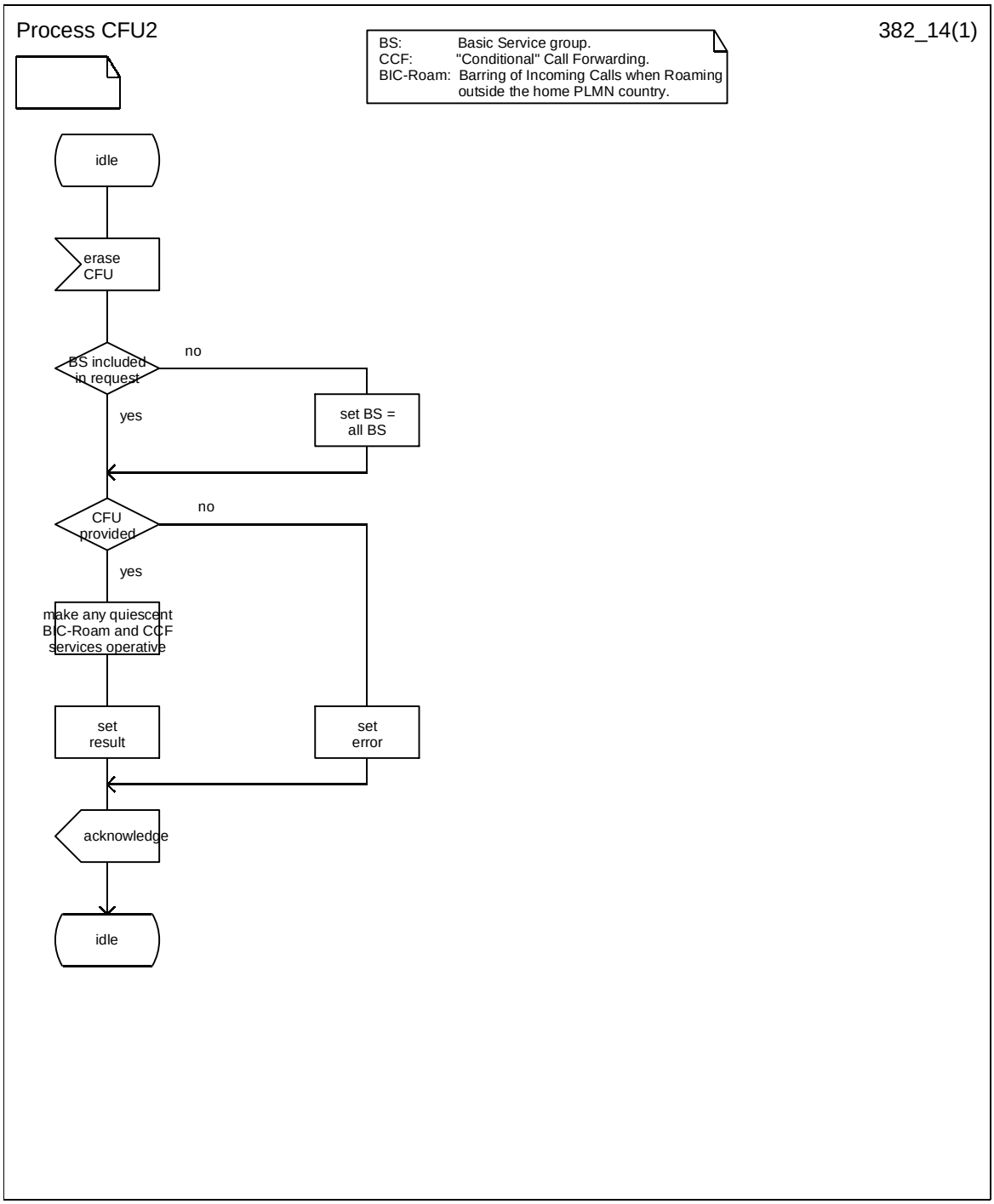


Figure 1.4: CFU2 Call forwarding unconditional erasure process

1.1.3 Activation

The network initially checks subscription to the basic service and registration status of the supplementary service, see figure 1.6.

Possible interaction situations between CFU and other supplementary services must then be checked. The SDL diagrams in figure 1.6 shows the function to be performed in the HLR in order to deal with the interactions between CFU and the call restriction and conditional call forwarding services. Also see 3G TS 22.004 and 3G TS 22.082. For interaction between CFU and other supplementary services (ie not call barring or call forwarding services), the reader is referred to the respective technical specification for those supplementary services.

The Basic Service Group Code

If the activation request received by the HLR doesn't contain any basic service group code, the activation request shall apply to all subscribed basic service groups against which a CFU forwarded-to number is registered. If a forwarded-to number is not registered against even a subset of the required basic service group, the request will be rejected.

Note that according to 3G TS 22.004, a request for activation shall still be accepted although the CFU supplementary service was already active for all basic service groups.

Notification to the subscriber

The network will return notification of acceptance, partial acceptance or rejection of the request to the mobile station.

The information flow for activation of CFU is shown in figure 1.5.

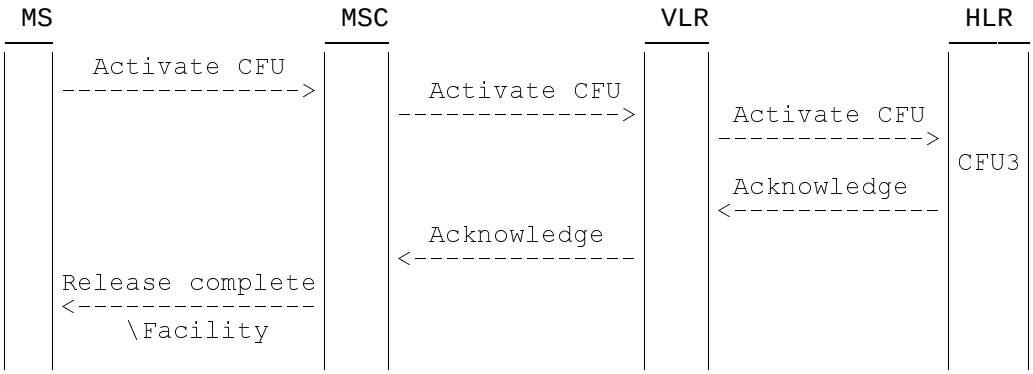
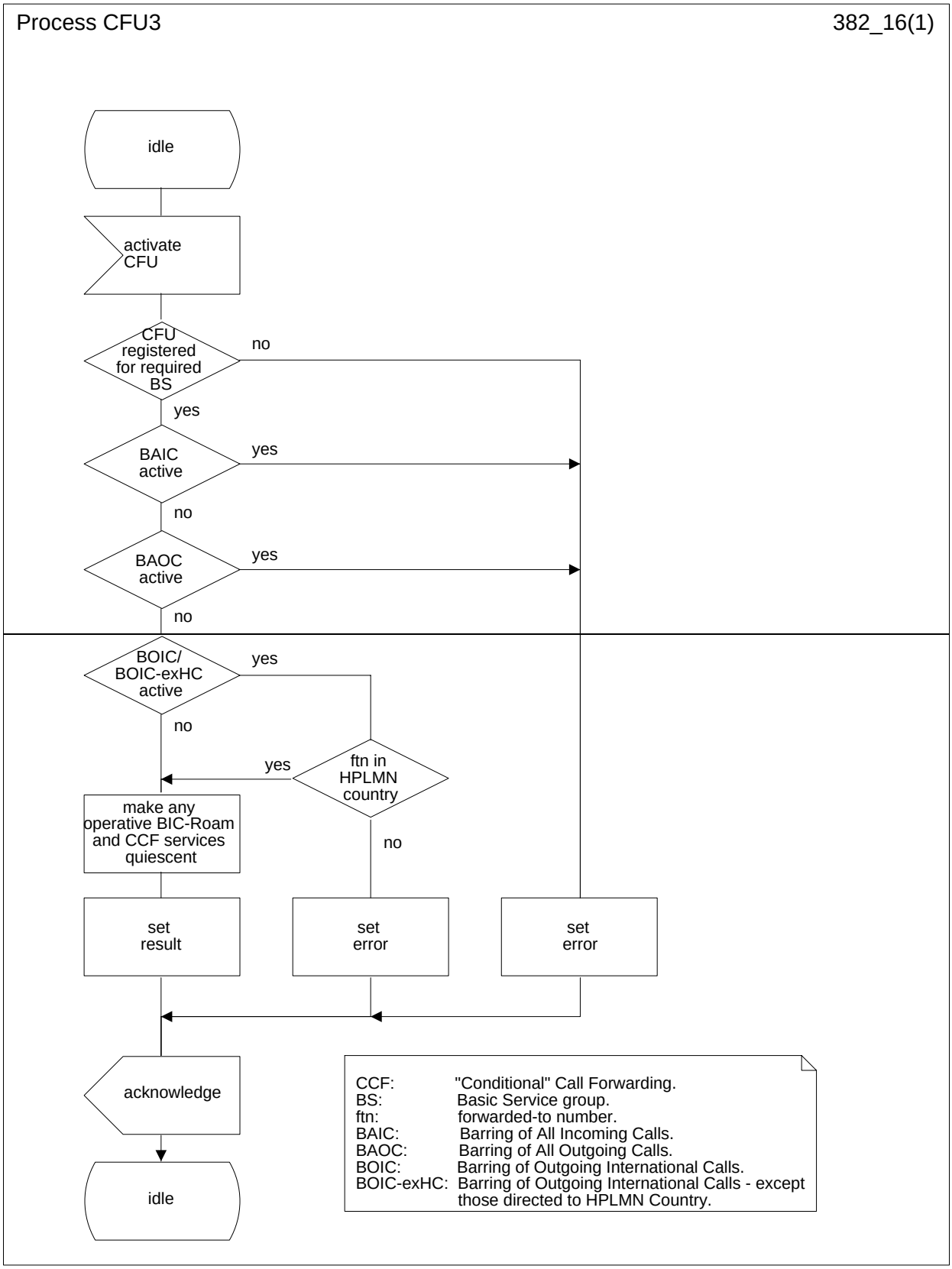


Figure 1.5: Activation of call forwarding unconditional


Process CFU3
382_16(1)
idle
activate CFU
CFU registered for required BS
no
yes
BAIC active
yes
no
BAOC active
yes
no
BOIC/ BOIC-exHC active
yes
no
ftn in HPLMN country
yes
no
make any operative BIC-Roam and CCF services quiescent
set result
set error
set error
acknowledge
idle
CCF: "Conditional" Call Forwarding.
BS: Basic Service group.
ftn: forwarded-to number.
BAIC: Barring of All Incoming Calls.
BAOC: Barring of All Outgoing Calls.
BOIC: Barring of Outgoing International Calls.
BOIC-exHC: Barring of Outgoing International Calls - except those directed to HPLMN Country.

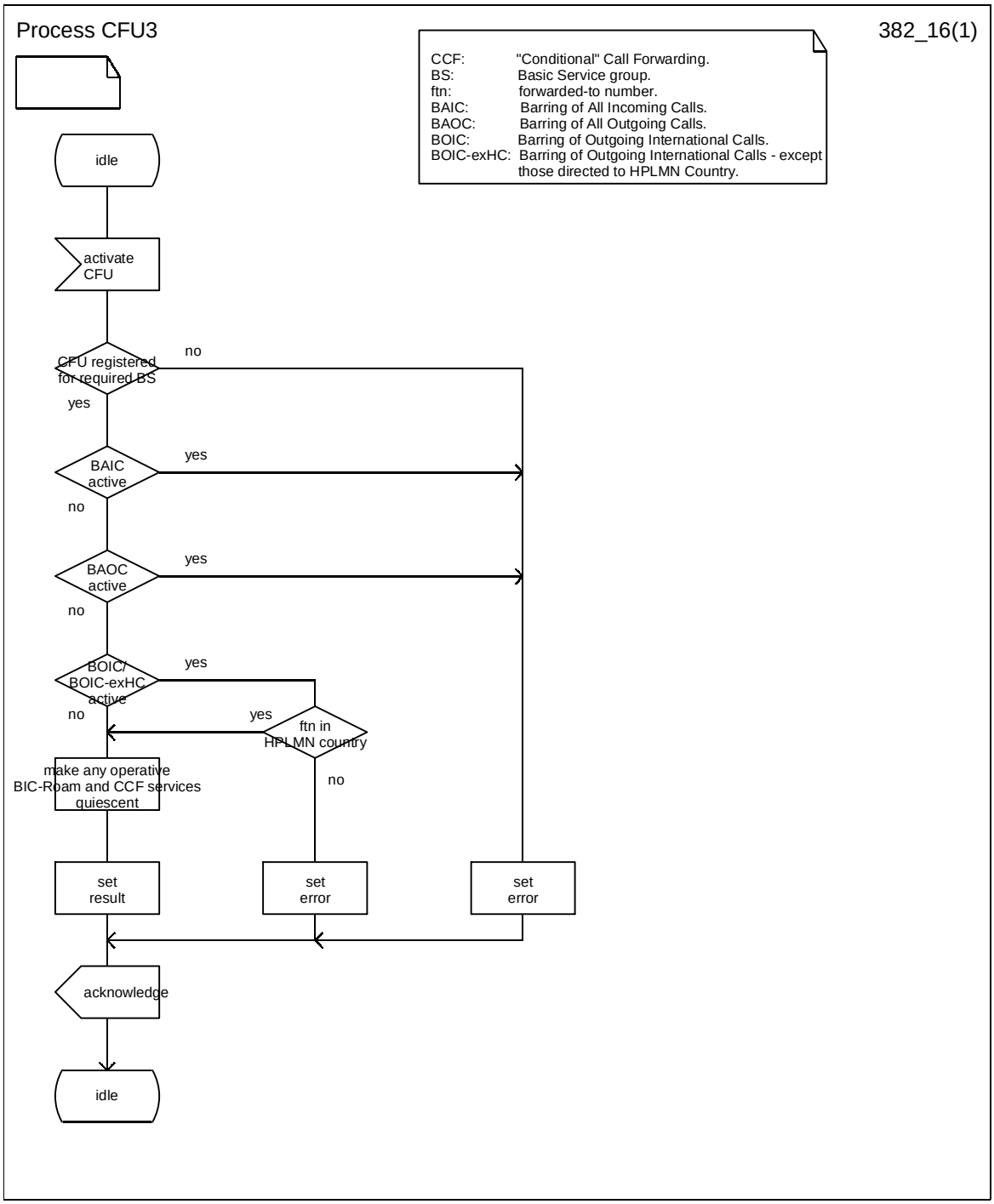


Figure 1.6: CFU3 Call forwarding unconditional activation process

1.1.4 Deactivation

The previous activation can be deactivated in either of the following three ways:

- the subscriber can specifically deactivate a previous activation (to a basic service group) with an appropriate control procedure;
- the subscriber can register information for CFU (to a basic service group), thus causing previous registrations and activations of CFU to be overridden (this shall be handled in the same way as an erasure (implying deactivation) immediately followed by a registration (implying activation));
- the service is deactivated as a result of withdrawal of the supplementary service (administrative handling).

Possible interaction situations between CFU and other supplementary services must be checked. The SDL diagram in figure 1.8 shows the function to be performed in the HLR in order to deal with the possible interactions between CFU and the conditional call forwarding services.

The Basic Service Group Code

The CFU deactivation request may specify a basic service group for which deactivation is required. If the deactivation request received by the HLR doesn't contain any basic service group code, the deactivation request shall apply to all basic services for which CFU is active, see figure 1.8.

If the deactivation request received by the HLR contains a basic service group code, only information related to the specified basic service group(s) is affected. Note that according to 3G TS 22.004, a request for deactivation shall still be accepted even if the CFU supplementary service was already deactive for all basic service groups.

The user shall receive a notification of acceptance or rejection of the CFU deactivation request.

The information flow for deactivation of call forwarding unconditional is shown in figure 1.7.

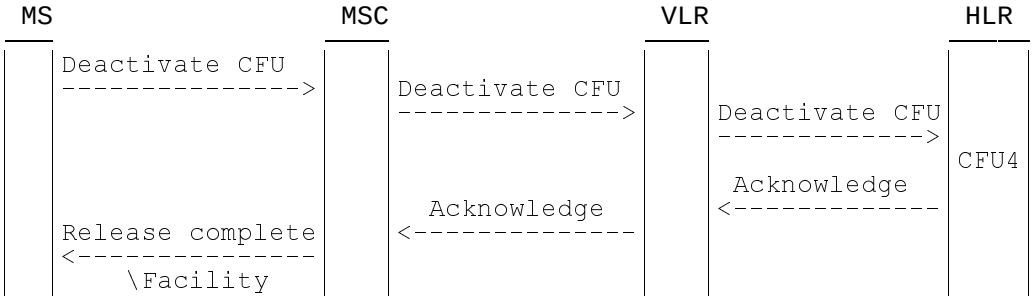
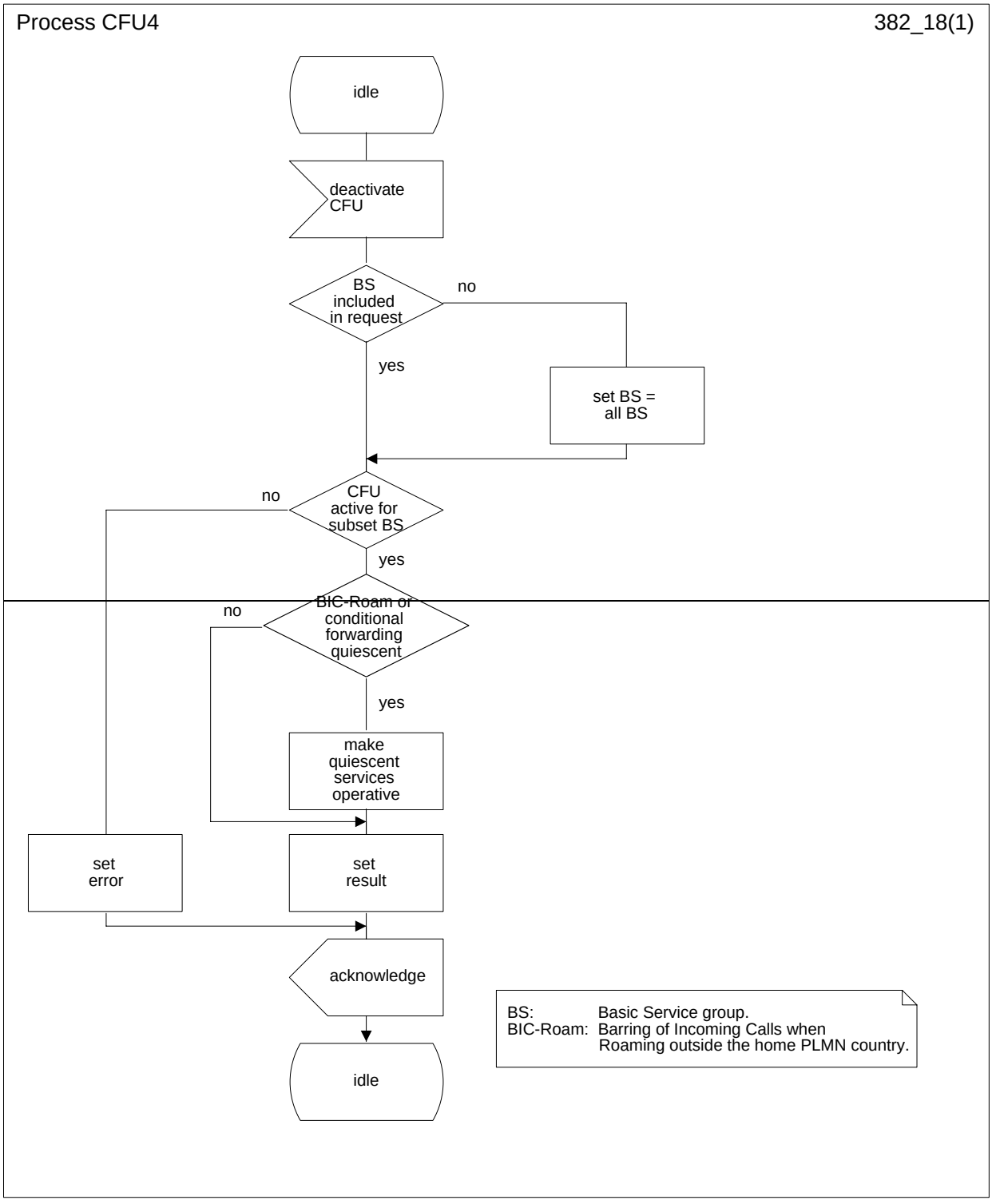


Figure 1.7: Deactivation of call forwarding unconditional


Process CFU4
382_18(1)
idle
deactivate CFU
BS included in request
no
yes
set BS = all BS
CFU active for subset BS
no
yes
BIC-Roam or conditional forwarding quiescent
no
yes
make quiescent services operative
set error
set result
acknowledge
idle
BS: Basic Service group.
BIC-Roam: Barring of Incoming Calls when Roaming outside the home PLMN country.

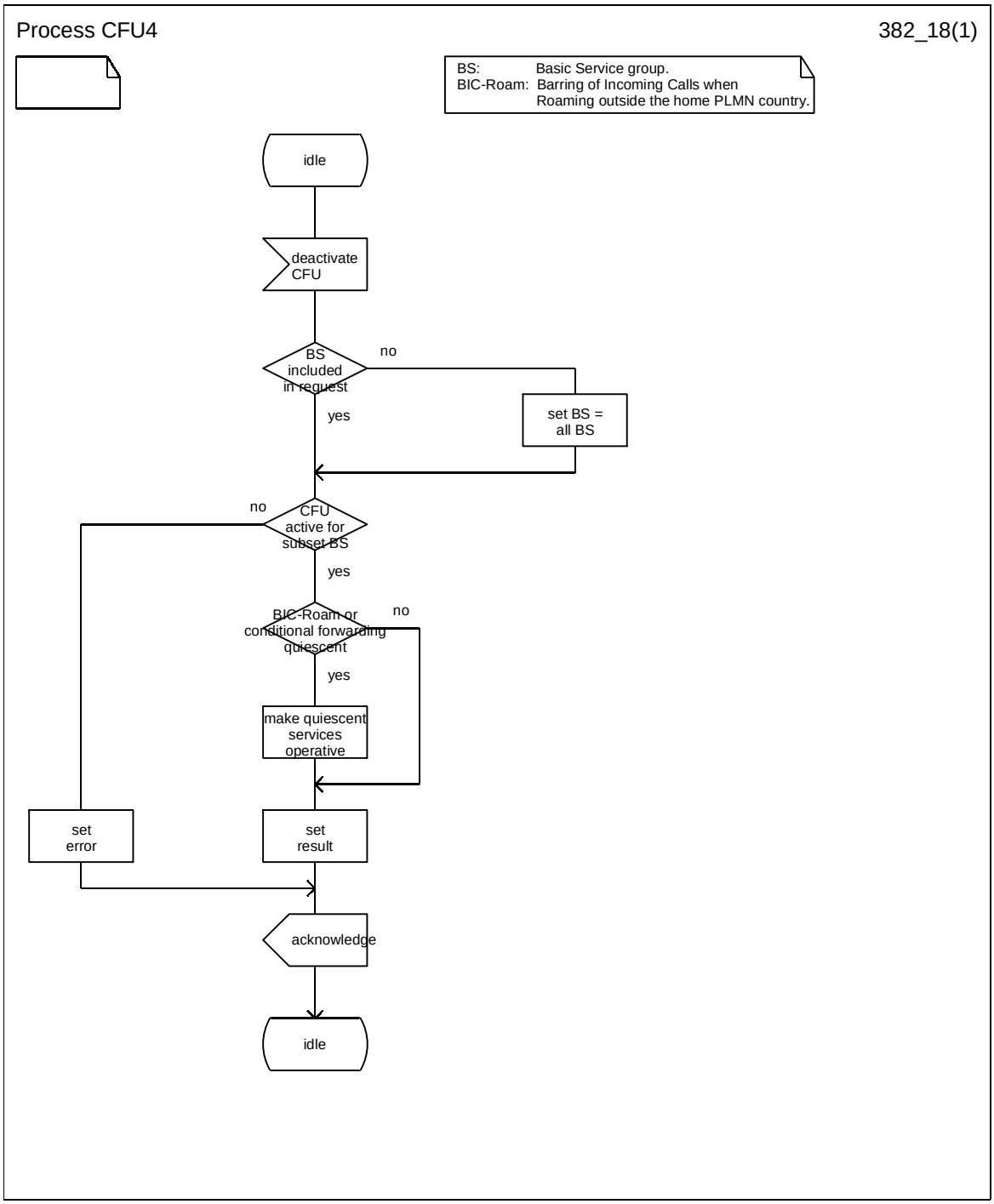


Figure 1.8: CFU4 Call forwarding unconditional deactivation process

1.1.5 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. Interrogation of CFU is handled by the HLR which returns the required information or error to the MS, see figure 1.9.

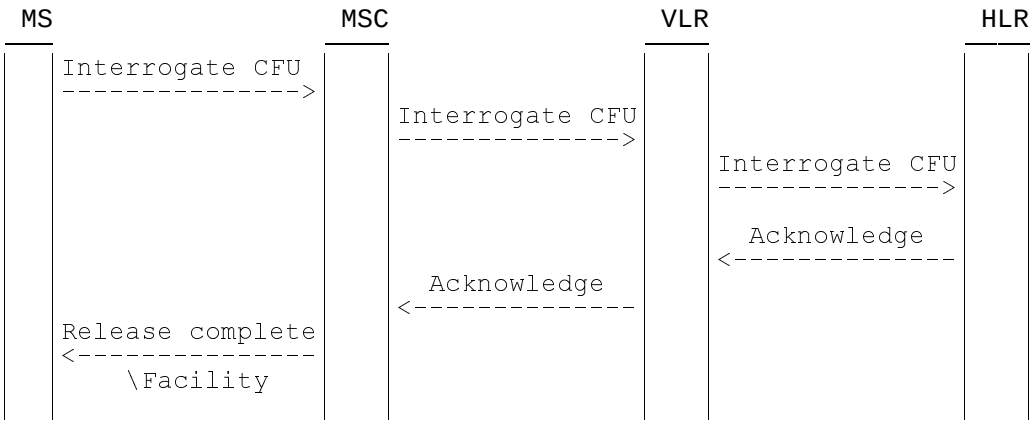


Figure 1.9: Interrogation of call forwarding unconditional

1.2 Functions and information flows

The following Mobile Additional Function has been identified for the PLMN:

MAF007

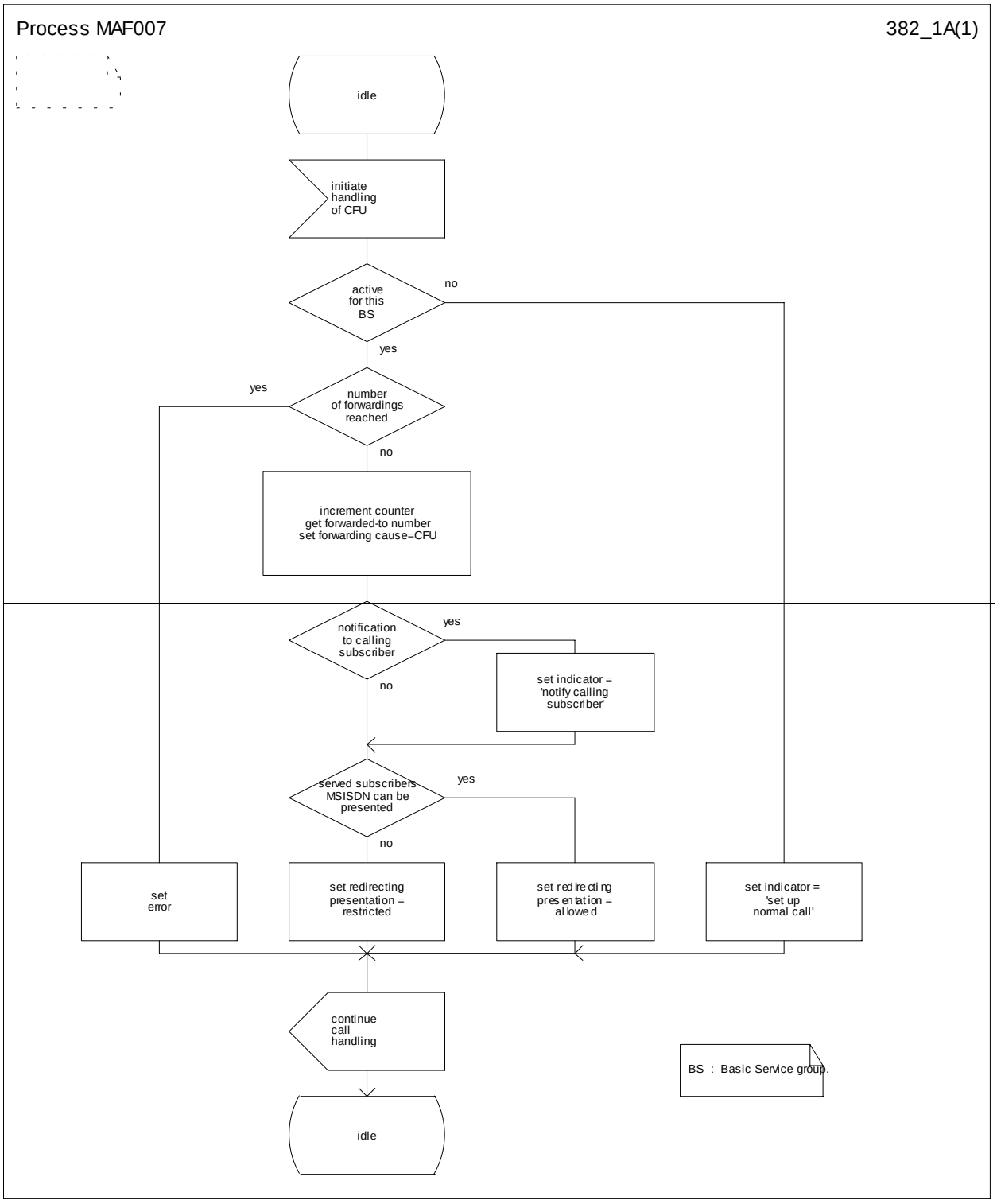
Call forwarding unconditional authorizations examination

The ability of a PLMN component to determine the authorizations relating to CFU.

See figure 1.10.

Location: HLR.

The information flow for call forwarding unconditional is shown in figure 1.11.


Process MAF007
382_1A(1)
idle
initiate handling of CFU
active for this BS
no
yes
number of forwardings reached
yes
no
increment counter
get forwarded-to number
set forwarding cause=CFU
notification to calling subscriber
yes
set indicator = 'notify calling subscriber'
no
served subscribers MSISDN can be presented
yes
no
set error
set redirecting presentation = restricted
set redirecting presentation = allowed
set indicator = 'set up normal call'
continue call handling
BS : Basic Service group.
idle

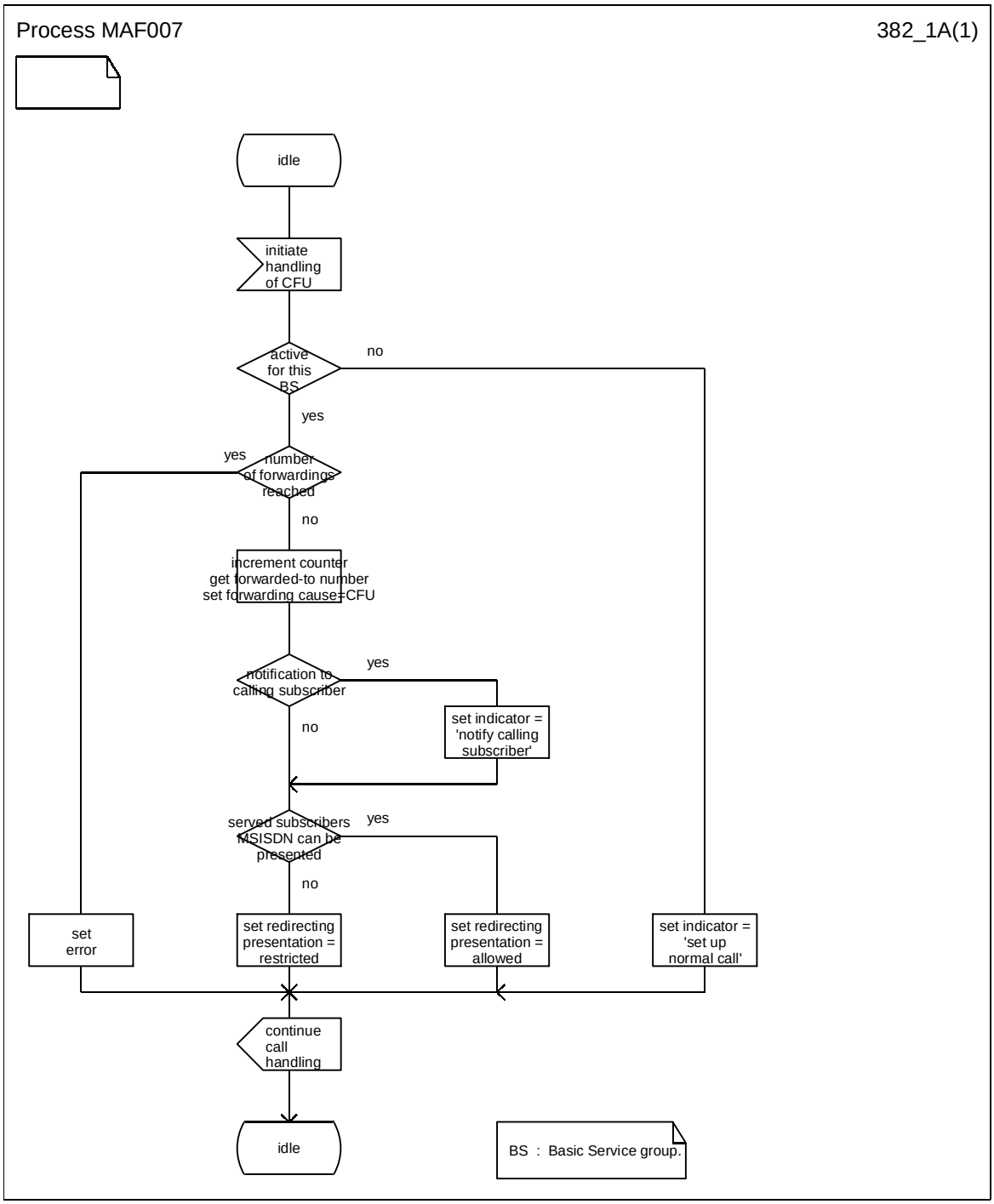
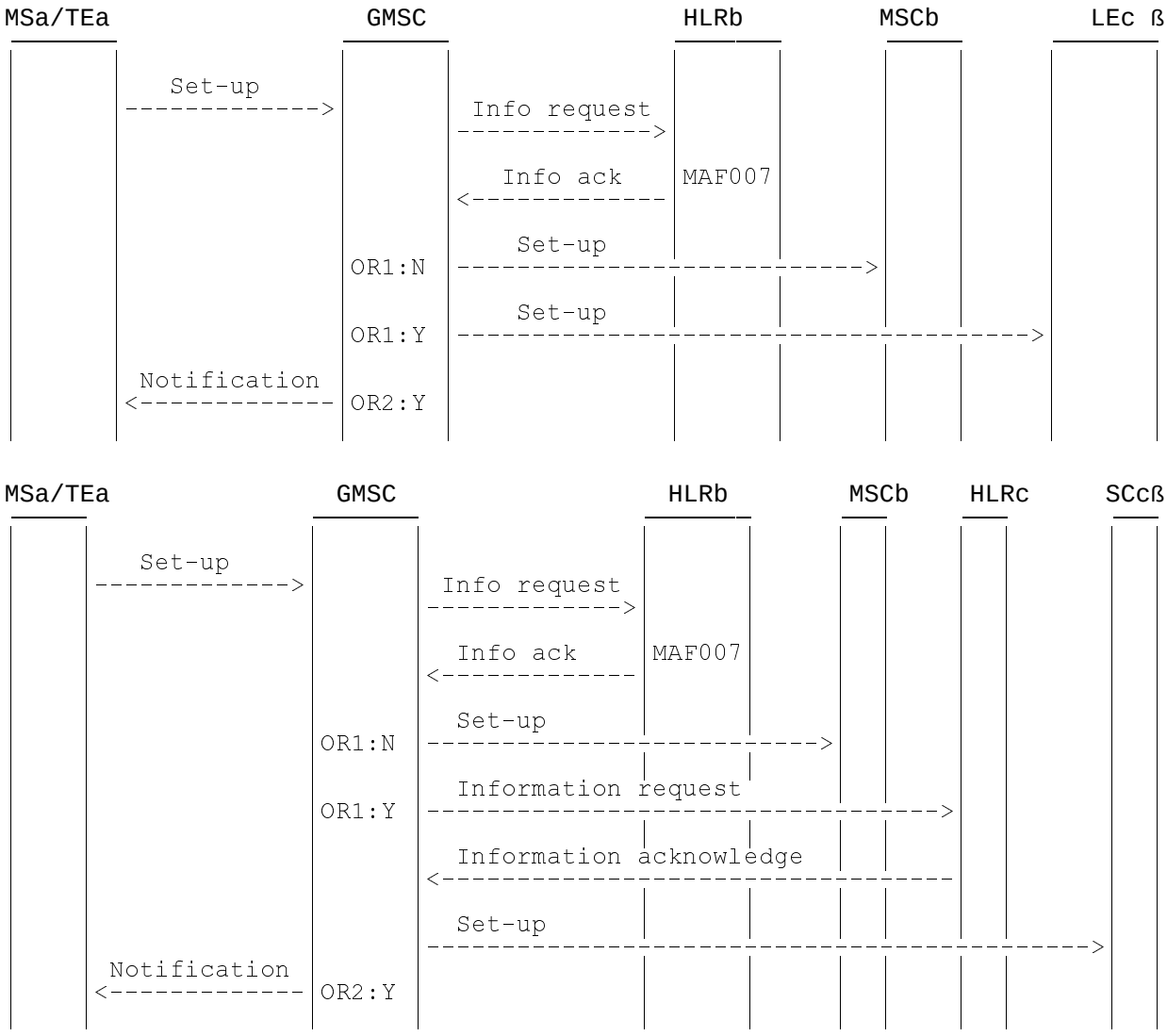


Figure 1.10: MAF007 Call forwarding unconditional authorisations examination (HLR)



NOTE: info: information Y: Yes
req: request N: No
ack: acknowledge
OR1: Forwarding requested
OR2: Notification to calling subscriber required

Figure 1.11: Information flow for call forwarding unconditional

1.3 Information stored in the HLR

The following logical states are applicable for CFU (refer to 3G TS 23.011 for an explanation of the notation):

Provisioning State	**Registration State**	**Activation State**	**HLR Induction State**
(Not Provisioned,	Not Registered,	Not Active,	Not Induced)
(Provisioned,	Not Registered,	Not Active,	Not Induced)
(Provisioned,	Registered,	Not Active,	Not Induced)
(Provisioned,	Registered,	Active and Quiescent,	Not Induced)
(Provisioned,	Registered,	Active and Operative,	Not Induced)

The registration and activation state may be different for each applicable elementary basic service group.

The provisioning state shall be on a per subscriber basis, and hence the same for all basic service groups.

The HLR shall store:

- the state of CFU (which shall be one of the valid states listed above) for each applicable elementary basic service group;
- the subscription option "notification to the calling party" on a per subscriber basis;

  This subscription option takes one of the following values:

  - no notification;
  - notification.
- the subscription option "MSISDN of the served subscriber can be presented to the forwarded-to subscriber" on a per subscriber basis;

  This subscription option takes one of the following values:

  - presentation restricted;
  - presentation allowed.

the registration parameter "forwarded-to number" (possibly including a forwarded-to sub-address) for each applicable elementary basic service group.

Note that the value "Active and Quiescent" of the activation state is required in case of interaction with Operator Determined Barring (see 3G TS 23.015).

1.4 State transition model

The following figure shows the successful cases of transition between the applicable logical states of CFU. The state changes are either caused by actions of the service provider, the mobile user or the network.

Note that error cases are not shown in the diagram as they normally do not cause a state change. Additionally, some successful requests may not cause a state change. Hence, they are not shown in the diagram.

The diagram only shows operations on an elementary basic service group.

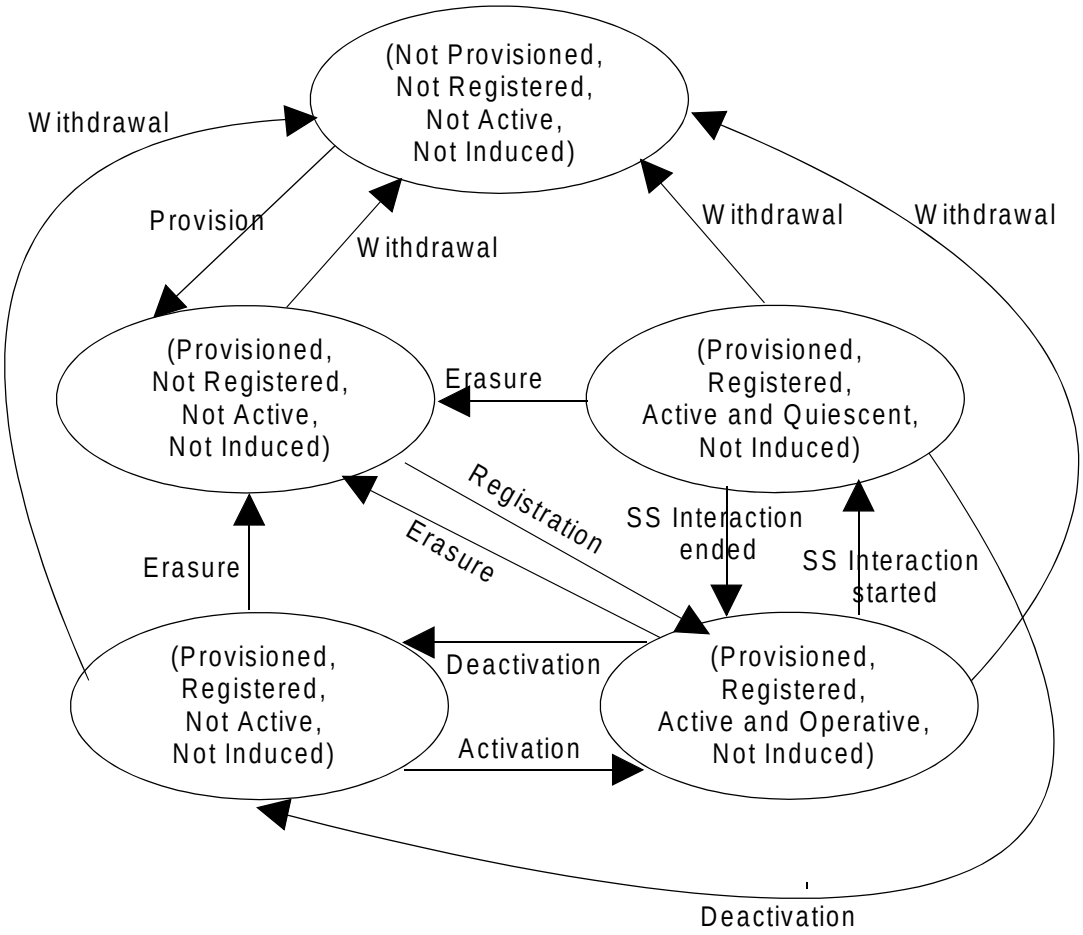


Figure 1.12: State transition model for CFU

1.5 Transfer of information from HLR to VLR

If the provisioning state for CFU is "Provisioned" then, when the subscriber registers on a VLR, the HLR shall send that VLR information about the logical state of CFU for all relevant elementary basic service groups.

If the logical state of CFU is changed while a subscriber is registered on a VLR then for the affected basic service groups, the HLR shall inform the VLR of the new logical state of CFU.

1.6 Information stored in the VLR

For CFU the VLR shall store the service state information received from the HLR for all relevant elementary basic service groups.

1.7 Handover

Handover will have no impact on the control procedure and the operation of the service.

1.8 Cross phase compatibility

1.8.1 MS, MSC, VLR or HLR only support Phase 1 control of SS by the subscriber

In response to a CFU interrogation request, if the MS or any network element involved is of Phase 1, only information concerning basic service groups for which the activation state has the value "Active and Operative" will be returned. This means, for example, that the subscriber will not be aware that the forwarded to number is registered if CFU is deactivated. A subaddress (if registered) will not be included in the response.

Note that if any network element involved is of Phase 1, CFU Registration requests which use a subaddress and all CFU Activation and Deactivation requests will be rejected, as these are not specified in Phase 1.

1.8.2 HLR only supports Phase 1 updating of subscriber information

The VLR shall ignore the subscription option "notification to the calling party" and the registration parameter "forwarded to number" when received from a Phase 1 HLR.

If the VLR receives the SS-Status parameter from a Phase 1 HLR it shall act if it has received the SS-Status parameter with the values shown in the following:

1) Activated => A bit = 1, Q bit = 0;

2) Deactivated => A bit = 0, Q bit = 0 or 1

1.8.3 VLR only supports Phase 1 updating of subscriber information

When passing CFU information to a Phase 1 VLR, the HLR shall send the service state information in a form which the VLR can accept, based on the logical state held in the HLR, as follows:

1) (Provisioned, Not Registered, Not Active, Not Induced)

   => Erased, Deactivated;

2) (Provisioned, Registered, Not Active, Not Induced)

   => Registered, Deactivated;

3) (Provisioned, Registered, Active and Operative, Not Induced)

   => Registered, Activated;

4) (Provisioned, Registered, Active and Quiescent, Not Induced)

   => Registered, Deactivated.

The HLR shall not pass a subaddress to a Phase 1 VLR.

1.8.4 GMSC only supports Phase 1 call handling

When a call is forwarded unconditionally, the HLR shall not pass the subaddress to a Phase 1 GMSC. Calls shall be forwarded without the subaddress.

1.8.5 GMSC does not support CAMEL or supports CAMEL Phase 1 only

If the activation state of CFU is "Active and Operative" and if the forwarded-to number is registered in a format other than international and if the GMSC does not support CAMEL or supports CAMEL Phase 1 only, then when a request for routeing information for a mobile terminated call is received in the HLR, CFU shall not be invoked, i.e. the mobile terminated call establishment will be continued towards the served mobile subscriber.

1.9 Contents of Messages

1.9.1 Messages on the C interface (MSC-HLR)

1.9.1.4 Send Routing Info

This message is specified in 3G TS 23.018.

Send Routing Info contains the following IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Long FTN supported	C	Shall be present if the GMSC supports Long Forwarded-to Numbers; otherwise shall be absent.

1.9.1.2 Send Routing Info ack

This message is specified in 3G TS 23.018.

Send Routing Info ack contains the following amendment to the Forwarded-to number IE and an additional IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Forwarded-to number	C	E.164 number of the C subscriber. Shall be present if the HLR has determined that the call is to be forwarded and at least one of the HLR and GMSC does not support Long Forwarded-to Numbers; otherwise shall be absent.
Long forwarded-to number	C	Number of the C subscriber. Shall be present if the HLR has determined that the call is to be forwarded and Long Forwarded-to Numbers are supported by the HLR and the GMSC; otherwise shall be absent.

1.9.2 Messages on the Um, B and D interfaces (MS – network)

1.9.2.1 RegisterSS

This message corresponds to the MAP_REGISTER_SS service specified in 3G TS 29.002.

Information element name	Required	Description
Long FTN supported	C	Shall be present if the MS supports Long Forwarded-to Numbers; otherwise shall be absent.

1.9.2.2 ActivateSS

This message corresponds to the MAP_ACTIVATE_SS service specified in 3G TS 29.002.

Information element name	Required	Description
Long FTN supported	C	Shall be present if the MS supports Long Forwarded-to Numbers; otherwise shall be absent.

1.9.2.3 InterrogateSS

This message corresponds to the MAP_INTERROGATE_SS service specified in 3G TS 29.002.

Information element name	Required	Description
Long FTN supported	C	Shall be present if the MS supports Long Forwarded-to Numbers; otherwise shall be absent.

1.9.3 Information flows on the J interface (HLR – gsmSCF)

1.9.3.1 Any Time Subscription Interrogation

This IF is specified in 3G TS 23.078.

Any Time Subscription Interrogation contains the following IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Long FTN supported	C	Shall be present if the gsmSCF supports Long Forwarded-to Numbers; otherwise shall be absent.

1.9.3.2 Any Time Subscription Interrogation ack

This IF is specified in 3G TS 23.078.

The Call forwarding SS data IE within the Any Time Subscription Interrogation ack IF contains the following amendment to the Forwarded-to number IE and an additional IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Forwarded-to number	C	Shall be present if at least one of the HLR and the gsmSCF does not support Long Forwarded-to Numbers; otherwise shall be absent.
Long forwarded-to number	C	Shall be present if the HLR and the gsmSCF support Long Forwarded-to Numbers; otherwise shall be absent.

1.9.3.3 Any Time Modification

This IF is specified in 3G TS 23.078.

Any Time Modification contains the following IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Long FTN supported	C	Shall be present if the gsmSCF supports Long Forwarded-to Numbers; otherwise shall be absent.

1.9.3.4 Any Time Modification ack

This IF is specified in 3G TS 23.078.

The Call forwarding SS data IE within the Any Time Modification ack IF contains the following amendment to the Forwarded-to number IE and an additional IE specific to Long Forwarded-to Numbers.

Information element name	Required	Description
Forwarded-to number	C	Shall be present if at least one of the HLR and the gsmSCF does not support Long Forwarded-to Numbers; otherwise shall be absent.
Long forwarded-to number	C	Shall be present if the HLR and the gsmSCF support Long Forwarded-to Numbers; otherwise shall be absent.

1.10 Exceptional Procedures

1.10.1 MS does not support Long Forwarded-to Numbers

The MS shall indicate whether it supports Long Forwarded-to Numbers in the RegisterSS, ActivateSS and InterrogateSS messages.

If the MS does not support Long Forwarded-to Numbers, and a long forwarded-to number is registered, the acknowledgement message shall contain a truncated version of the registered long forwarded-to number (i.e. the leading 15 digits of the registered long forwarded-to number).

1.10.2 HLR does not support Long Forwarded-to Numbers

The HLR shall not allow a subscriber to register a long forwarded-to number.

1.10.3 GMSC does not support Long Forwarded-to Numbers

The HLR can determine from the Send Routing Info message whether the GMSC supports Long Forwarded-to Numbers.

If the GMSC does not support Long Forwarded-to Numbers and the HLR identifies that CFU should be invoked, then:

- If the registered forwarded-to number contains a maximum of 15 digits then the HLR shall populate the Forwarded-to number parameter in the Send Routing Info ack message with the registered forwarded-to number.
- If the registered forwarded-to number contains more than 15 digits then, as a network option, the HLR can:

- Populate the Forwarded-to number parameter in the Send Routing Info ack message with an alternative forwarded-to number (containing a maximum of 15 digits), or
- Allow the call to continue without invoking CFU, or
- Release the call.

2 Call forwarding on mobile subscriber busy

2.1 Handling of call forwarding on mobile subscriber busy

2.1.1 Registration

The same rules apply for the registration of Call Forwarding on Mobile Subscriber Busy as were described for Call Forwarding Unconditional in subclause 1.1.1 above, with the exception of the checking of interaction with other supplementary services. Basic registration of information is illustrated in figure 2.2.

Supplementary Service Interaction

Possible interaction situations between CFB and other supplementary services must then be checked. This is described in figure 2.2. Also see 3G TS 22.004 and 3G TS 22.082. For interaction between CFB and other supplementary services (ie not call barring or call forwarding services), the reader is referred to the respective technical specification for those supplementary services.

Interaction with CAMEL Phase 2 or higher

Possible interaction between CFB and CAMEL Phase 2 or higher is described in figure 2.2. If CAMEL Phase 2 or higher is not supported in the HLR, processing continues from the "No" exit of the test "Result=Pass".

The information flow for registration of CFB is shown in figure 2.1.

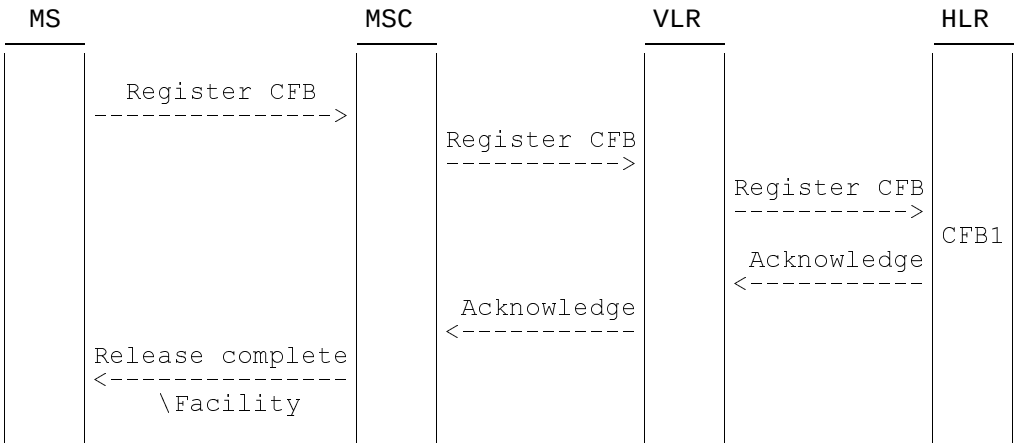
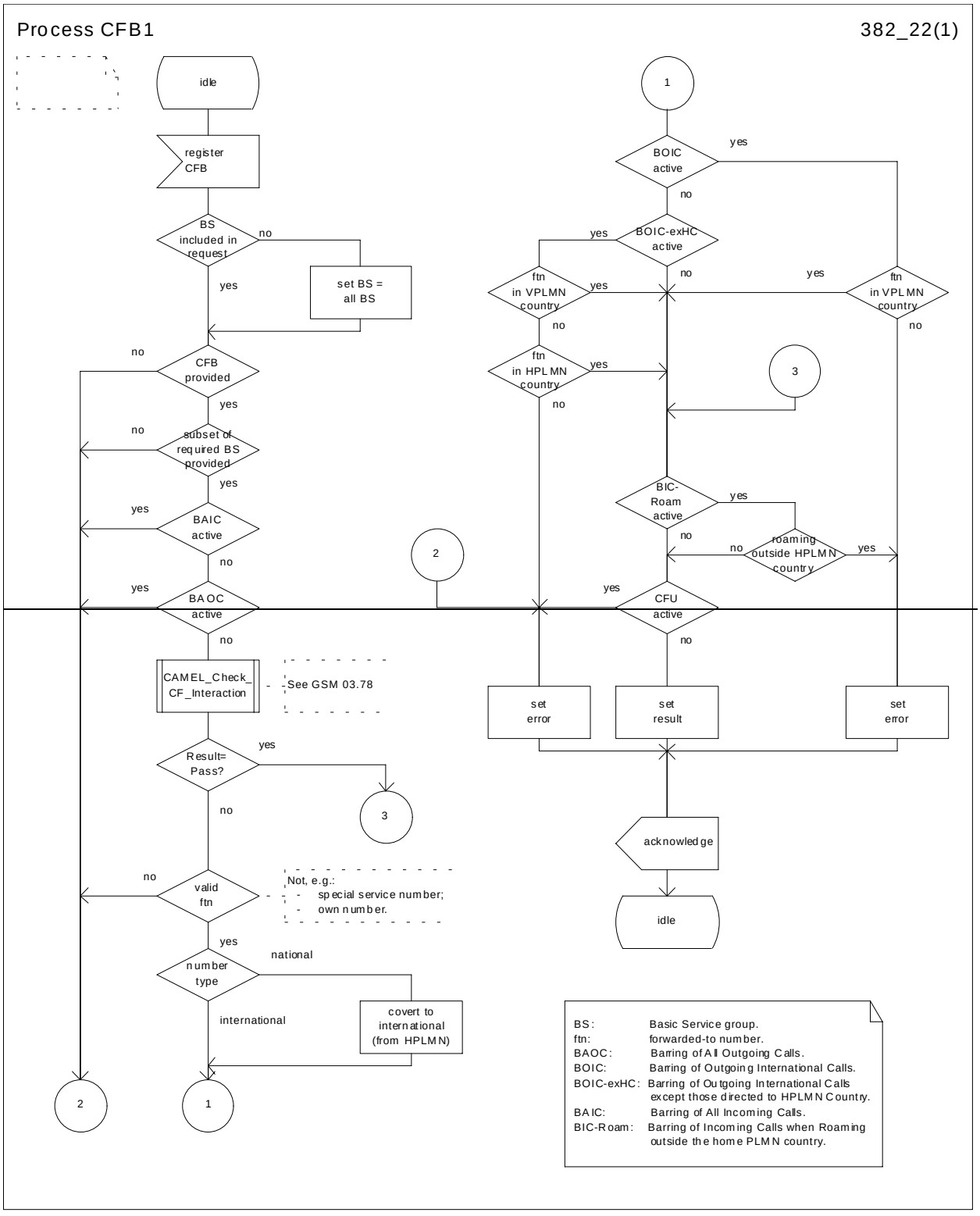


Figure 2.1: Registration of call forwarding on mobile subscriber busy


Process CFB1
382_22(1)
idle
register CFB
BS included in request
no
yes
set BS = all BS
CFB provided
no
yes
subset of required BS provided
no
yes
BAIC active
yes
no
BAOC active
yes
no
CAMEL_Check_ CF_Interaction
See GSM 03.78
Result= Pass?
yes
no
3
valid ftn
no
Not, e.g.:
- special service number;
- own number.
yes
number type
national
international
covert to international (from HPLMN)
2
1
2
1
BOIC active
yes
no
BOIC-exHC active
yes
no
ftn in VPLMN country
yes
no
ftn in HPLMN country
yes
no
3
ftn in VPLMN country
yes
no
BIC-Roam active
yes
no
roaming outside HPLMN country
no
yes
CFU active
yes
no
set error
set result
set error
acknowledge
idle
BS: Basic Service group.
ftn: forwarded-to number.
BAOC: Barring of All Outgoing Calls.
BOIC: Barring of Outgoing International Calls.
BOIC-exHC: Barring of Outgoing International Calls except those directed to HPLMN Country.
BAIC: Barring of All Incoming Calls.
BIC-Roam: Barring of Incoming Calls when Roaming outside the home PLMN country.

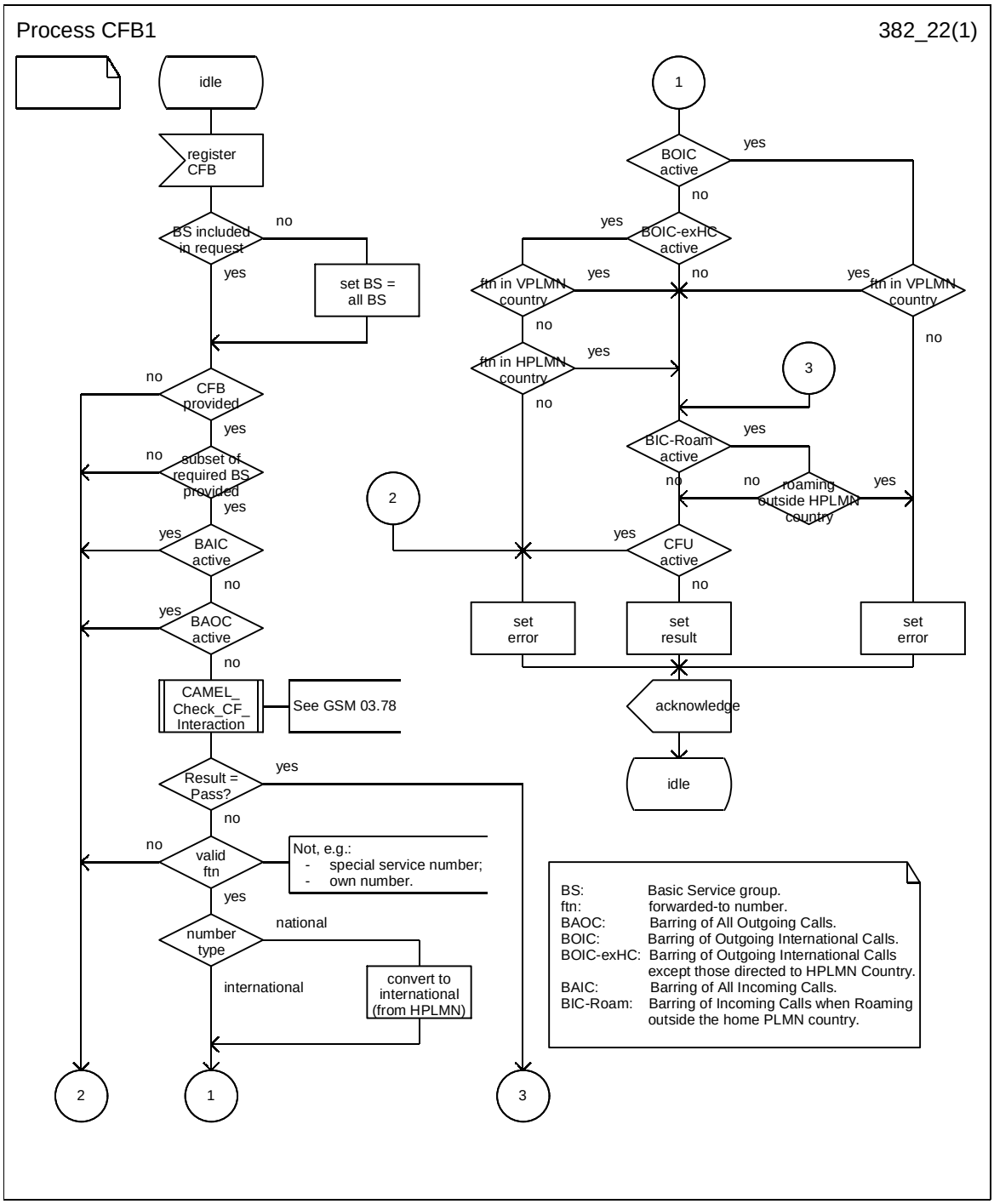


Figure 2.2: CFB1 Call forwarding on mobile subscriber busy registration process

2.1.2 Erasure

The same rules apply for the erasure of CFB as were described for CFU in subclause 1.1.2 above. However, no checks for interaction with other supplementary services are required for erasure of CFB, see figure 2.4.

The information flow for registration of CFB is shown in figure 2.3.

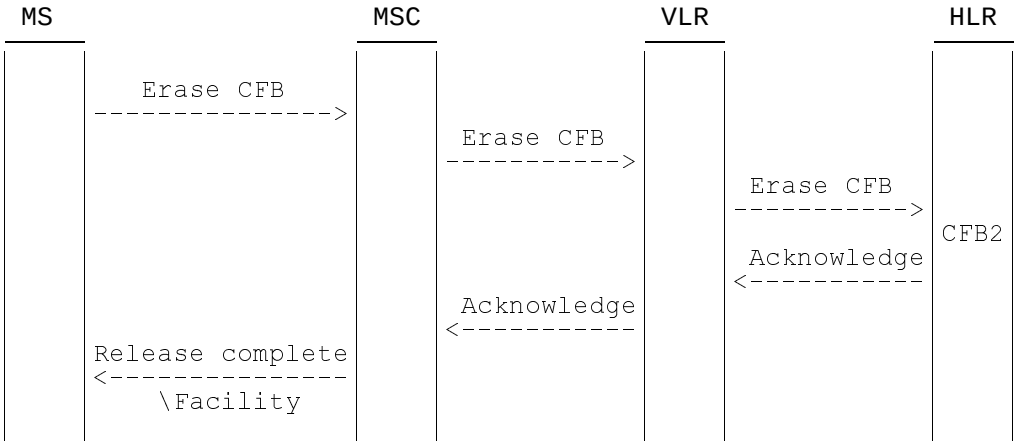
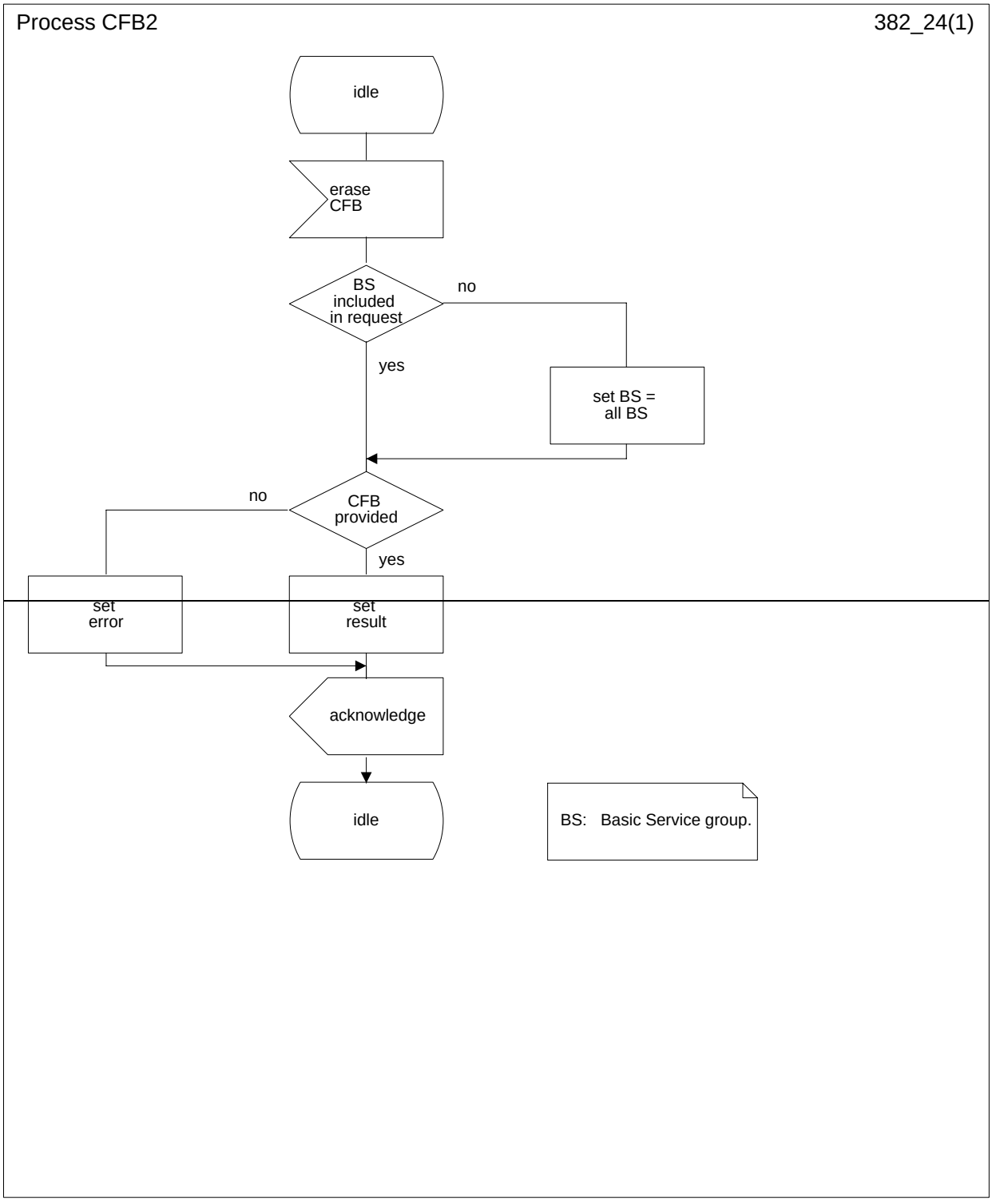


Figure 2.3: Erasure of call forwarding on mobile subscriber busy


Process CFB2
382_24(1)
idle
erase CFB
BS included in request
no
yes
set BS = all BS
CFB provided
no
yes
set error
set result
acknowledge
idle
BS: Basic Service group.

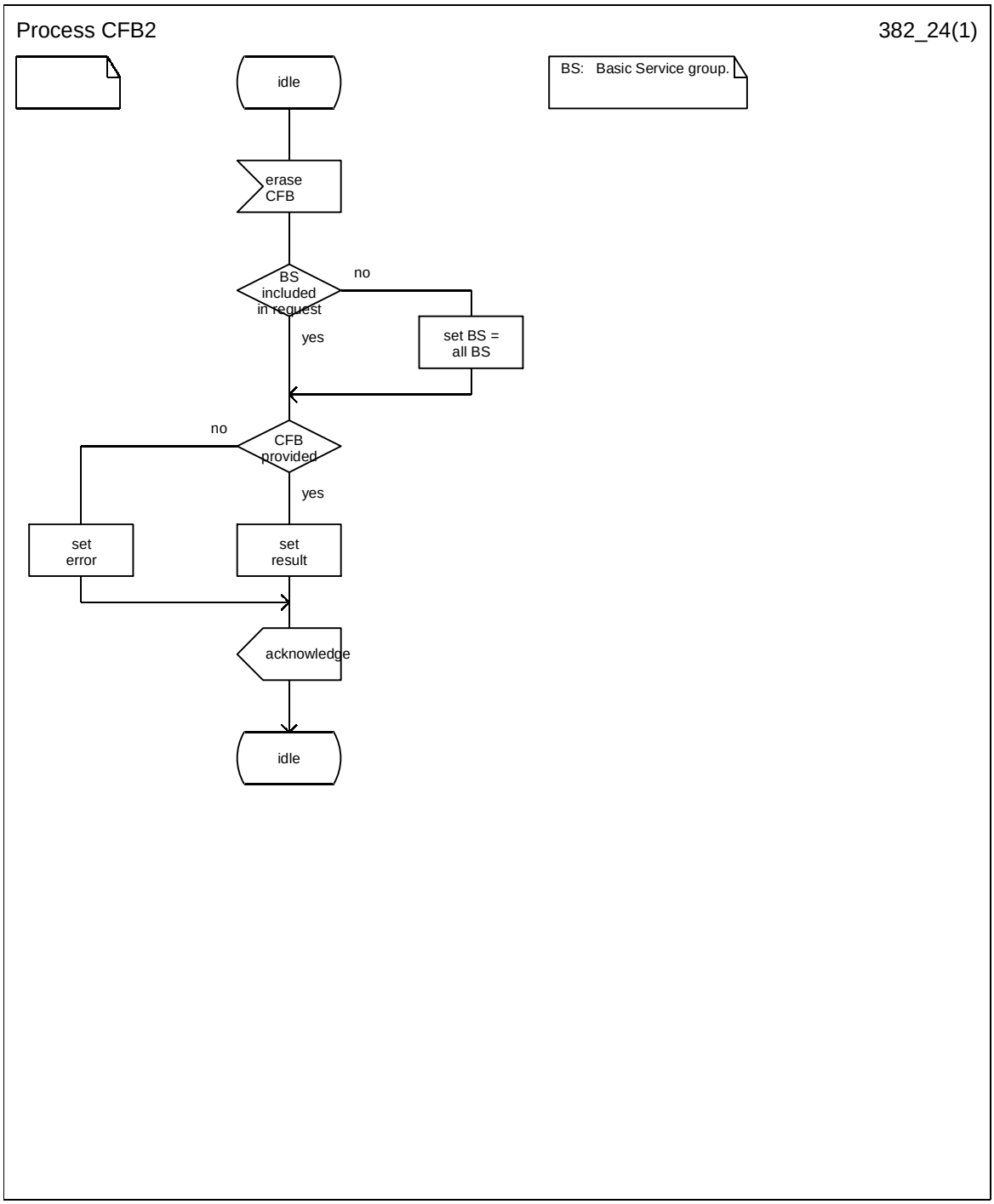


Figure 2.4: CFB2 Call forwarding on mobile subscriber busy erasure process

2.1.3 Activation

The same rules apply for the activation of CFB as were described for CFU in subclause 1.1.3 above, with the exception of the checking of interaction with other supplementary services. Basic activation of CFNRc is illustrated in figure 2.6.

Supplementary Service Interaction

Possible interaction situations between CFB and other supplementary services must then be checked. This is described in figure 2.6. Also see 3G TS 22.004 and 3G TS 22.082. For interaction between CFB and other supplementary services (ie not call barring or call forwarding services), the reader is referred to the respective technical specification for those supplementary services.

The information flow for activation of call forwarding on MS busy is shown in figure 2.5.

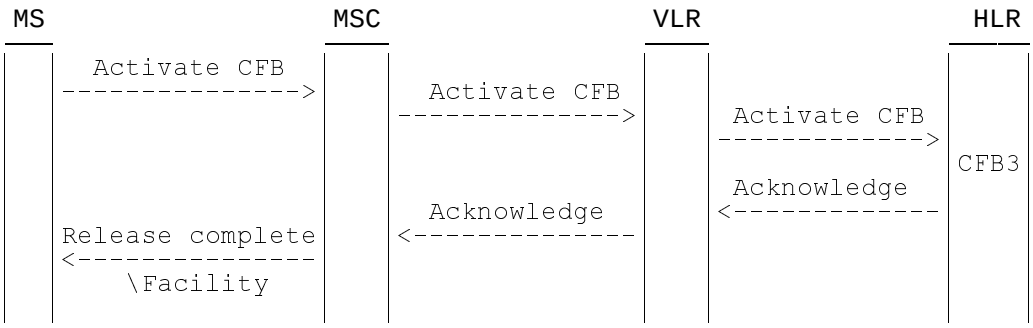
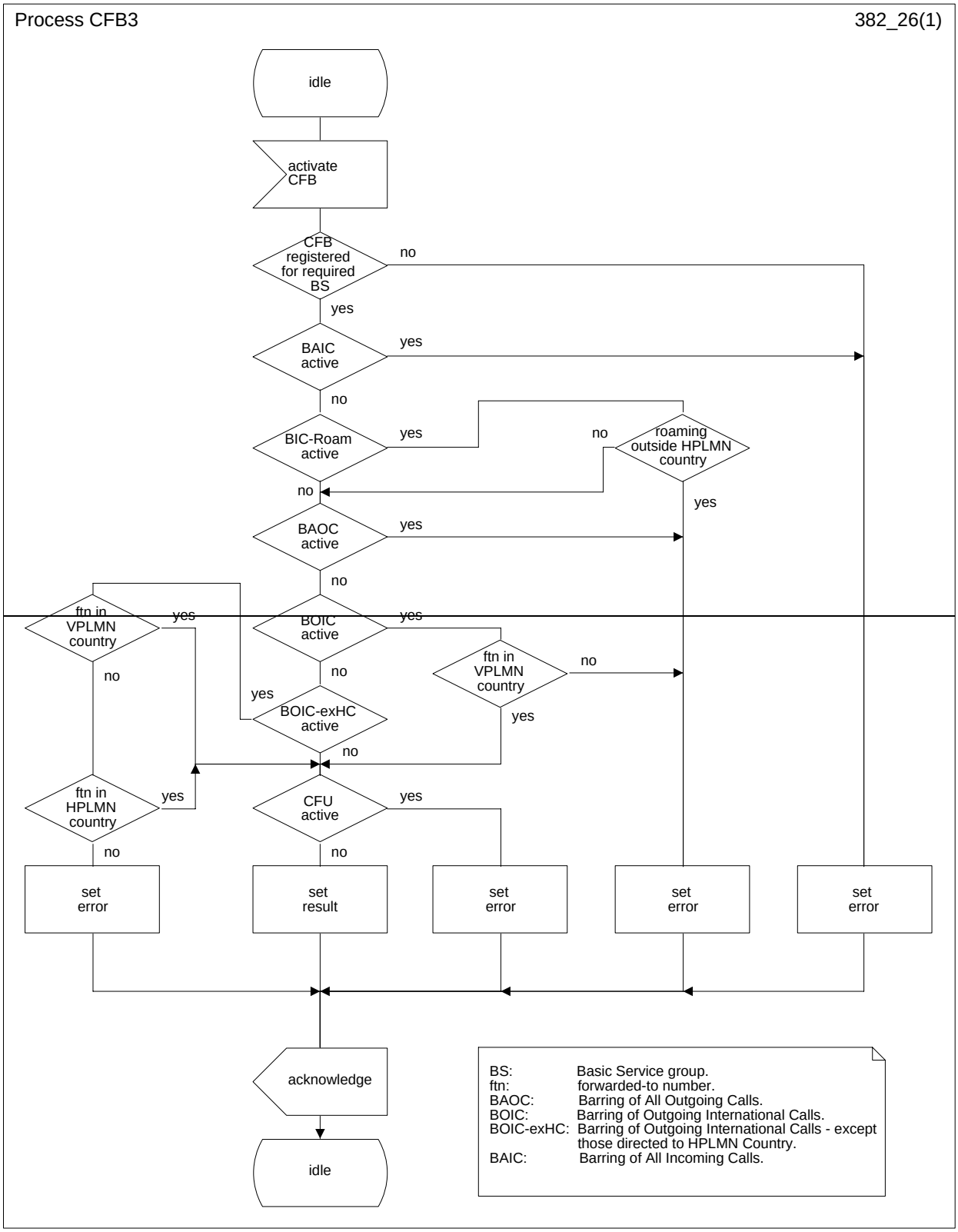


Figure 2.5: Activation of call forwarding on MS busy


Process CFB3
382_26(1)
idle
activate CFB
CFB registered for required BS
no
yes
BAIC active
yes
no
BIC-Roam active
yes
no
roaming outside HPLMN country
no
yes
BAOC active
yes
no
ftn in VPLMN country
yes
no
BOIC active
yes
no
ftn in VPLMN country
no
yes
BOIC-exHC active
yes
no
ftn in HPLMN country
yes
no
CFU active
yes
no
set error
set result
set error
set error
set error
acknowledge
idle
BS: Basic Service group.
ftn: forwarded-to number.
BAOC: Barring of All Outgoing Calls.
BOIC: Barring of Outgoing International Calls.
BOIC-exHC: Barring of Outgoing International Calls - except those directed to HPLMN Country.
BAIC: Barring of All Incoming Calls.

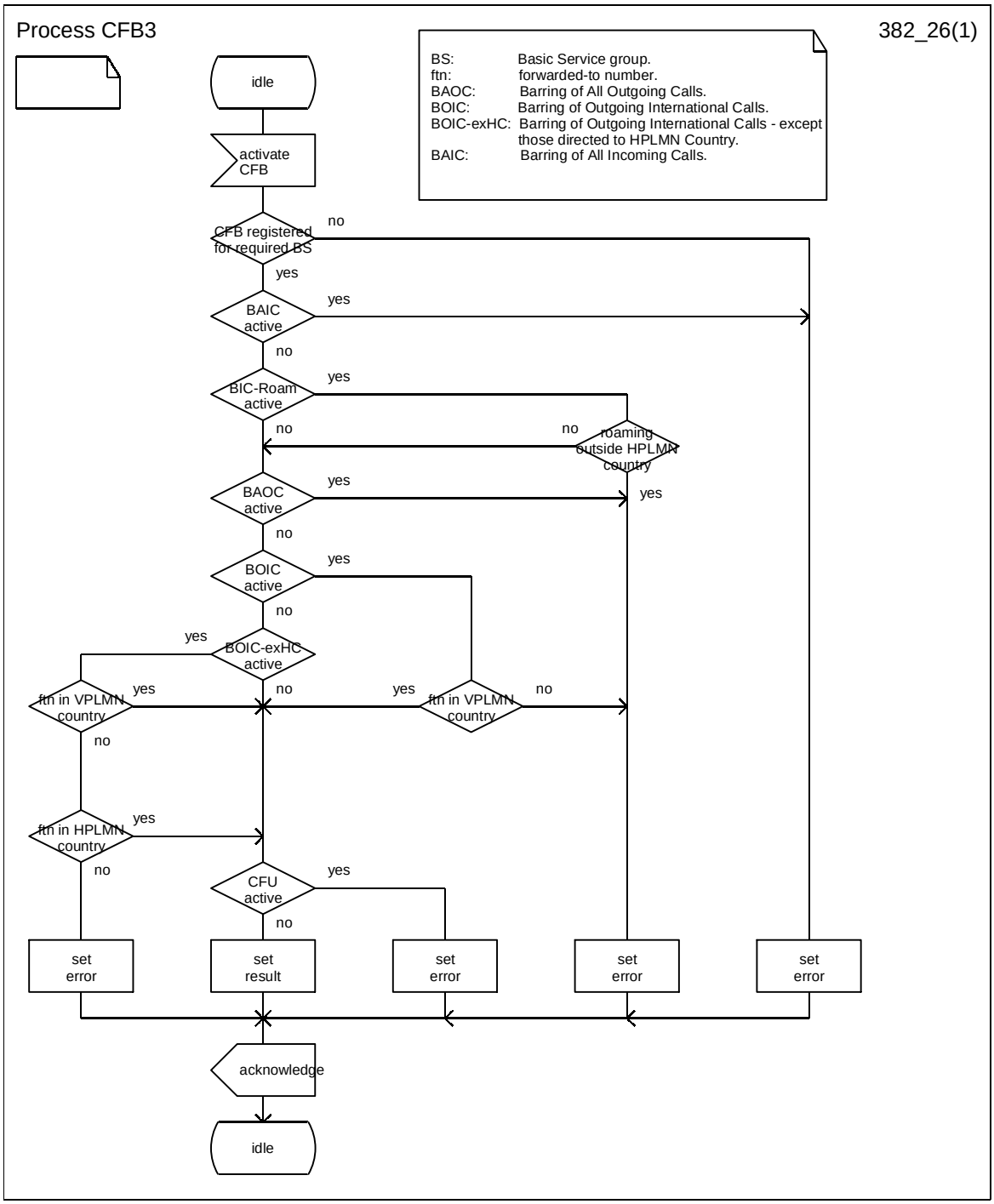


Figure 2.6: CFB3 Call forwarding on mobile subscriber busy activation process

2.1.4 Deactivation

The same rules apply for the deactivation of CFB as were described for CFU in subclause 1.1.4 above, see figure 2.8.

The information flow for deactivation of call forwarding on mobile subscriber busy is shown in figure 2.7.

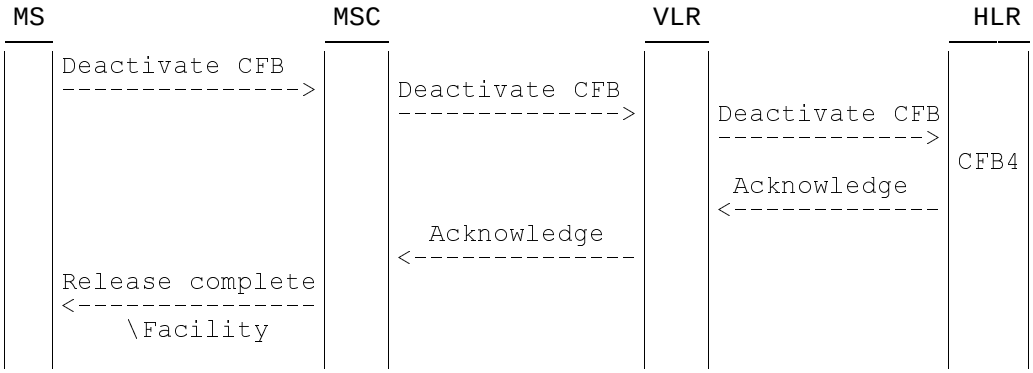
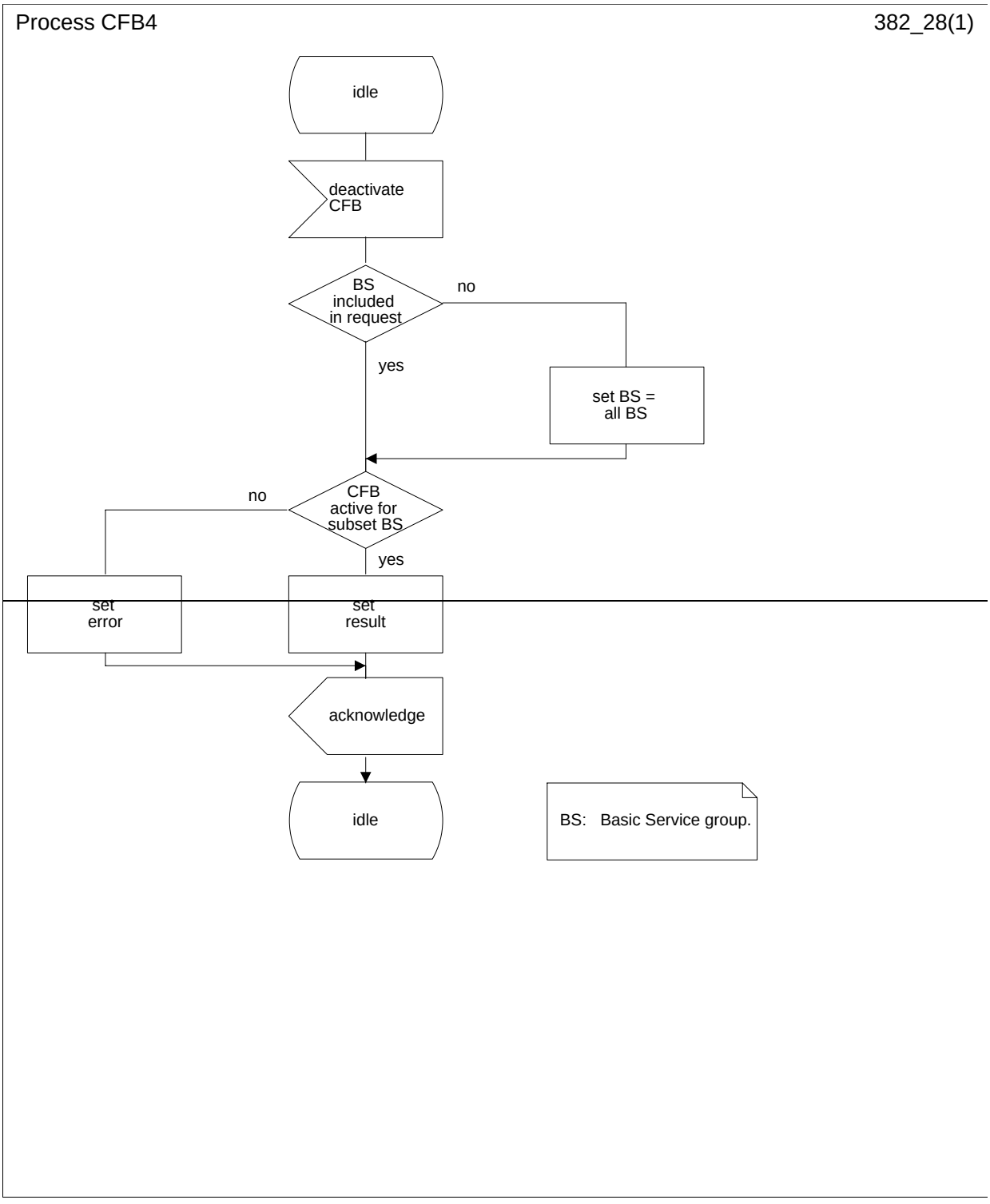


Figure 2.7: Deactivation of call forwarding on mobile subscriber busy


Process CFB4
382_28(1)
idle
deactivate CFB
BS included in request
no
yes
set BS = all BS
CFB active for subset BS
no
yes
set error
set result
acknowledge
idle
BS: Basic Service group.

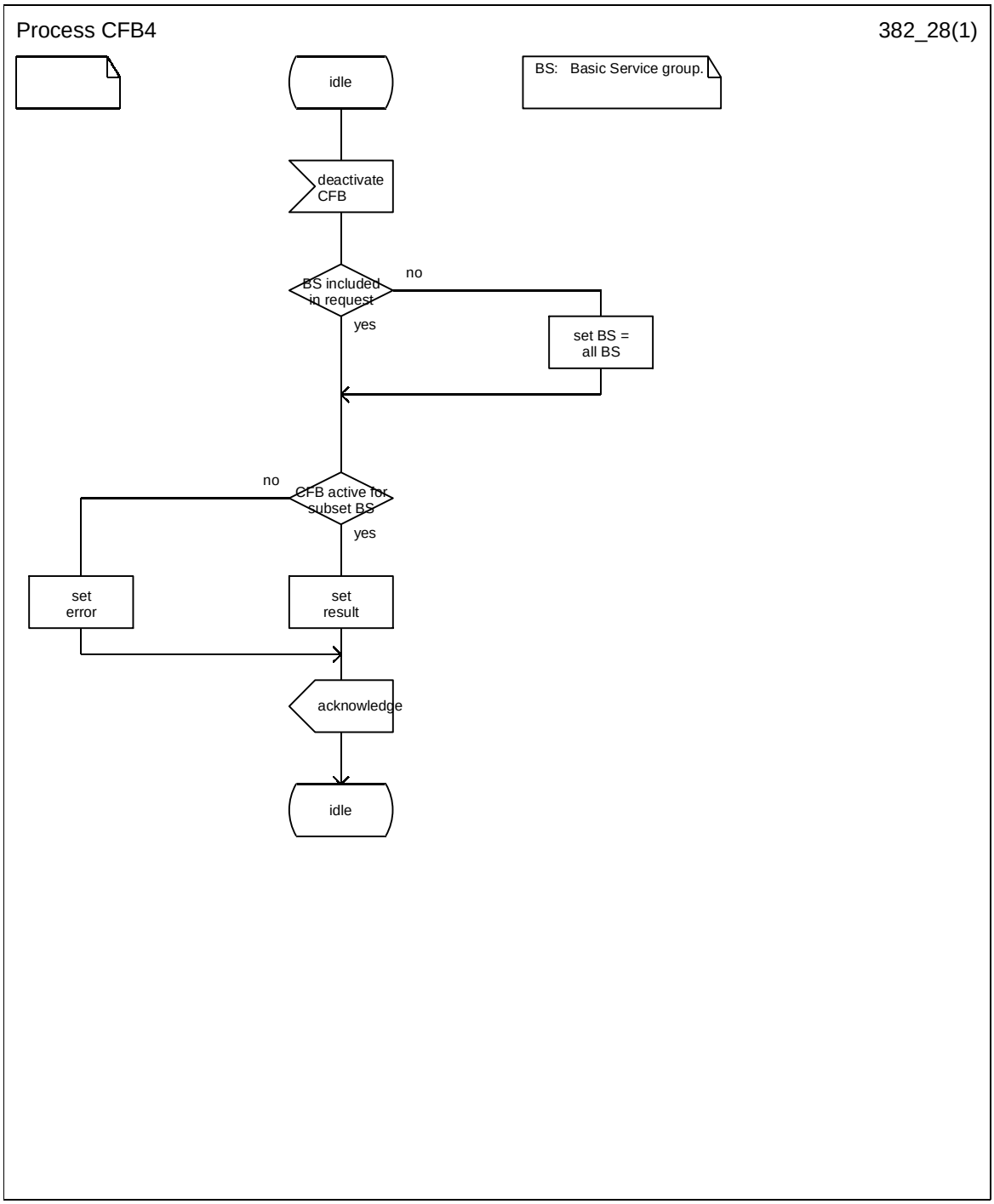


Figure 2.8: CFB4 Call forwarding on mobile subscriber busy deactivation process

2.1.5 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. Interrogation of CFB is handled by the VLR which returns the required information or error to the MS, see figure 2.9.

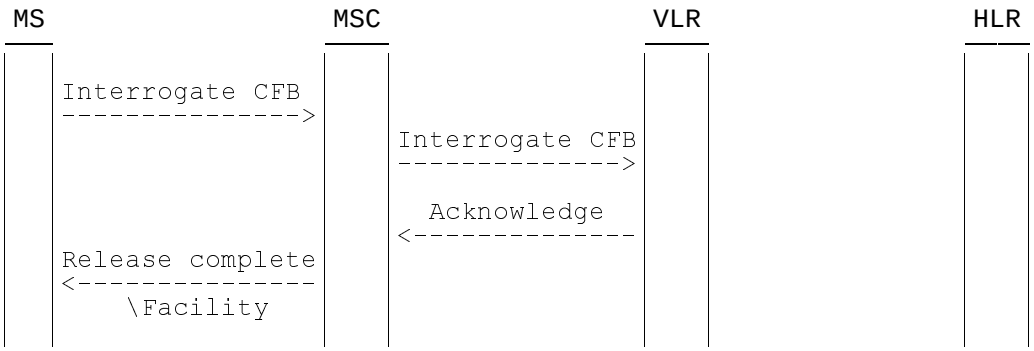


Figure 2.9: Interrogation of call forwarding on mobile subscriber busy

2.2 Functions and information flows

The following Mobile Additional Function has been identified for the PLMN:

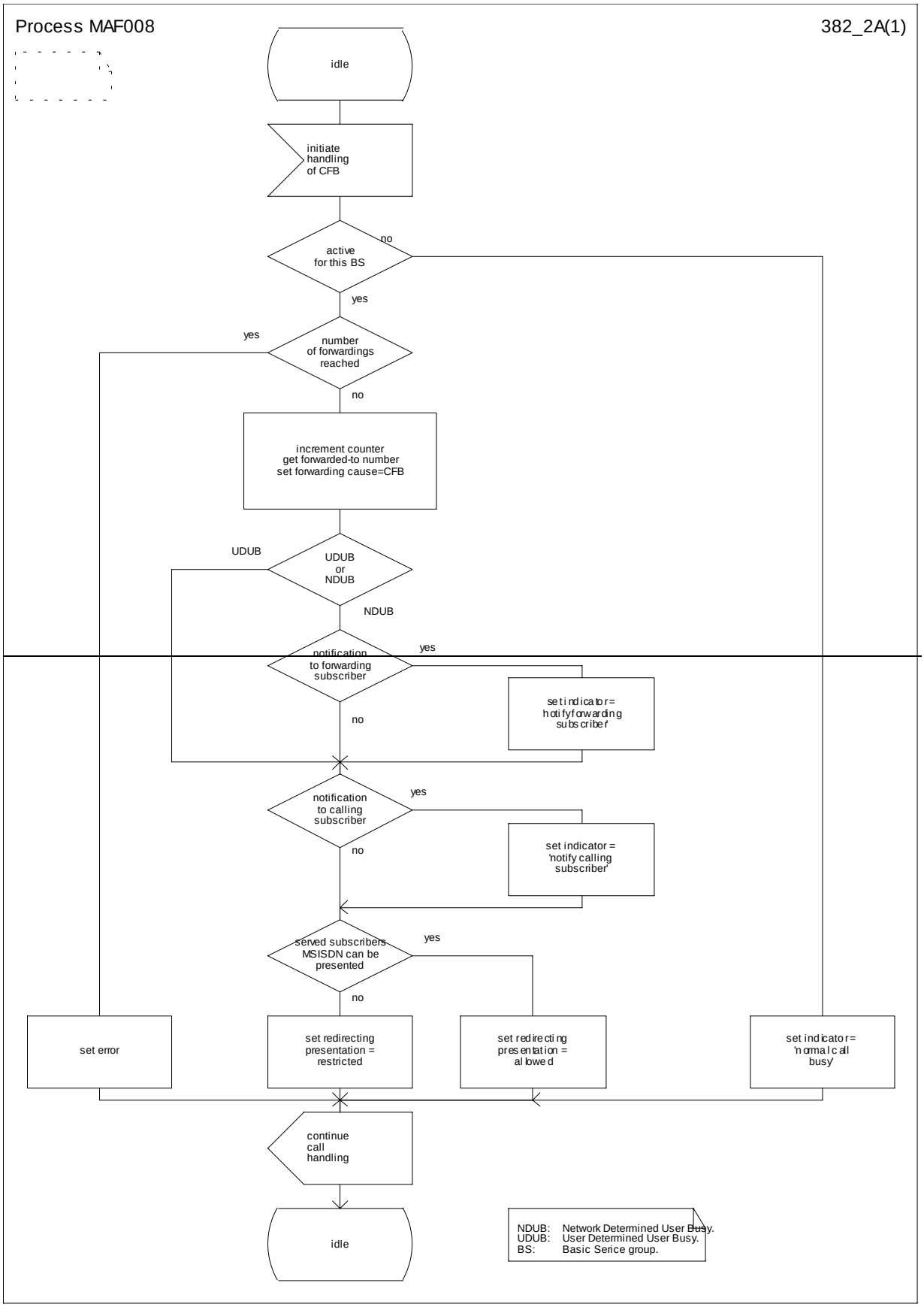
MAF008

Call forwarding on mobile subscriber busy authorizations examination

The ability of a PLMN component to determine the authorizations relating to call forwarding on mobile subscriber busy. See figure 2.10.

Location: VLR.

The information flows for forwarding to fixed terminal and to mobile station are shown in figures 2.11 & 2.12 and 2.13 & 2.14 respectively.


Process MAF008
382_2A(1)
idle
initiate handling of CFB
active for this BS
no
yes
number of forwardings reached
yes
no
increment counter
get forwarded-to number
set forwarding cause=CFB
UDUB or NDUB
UDUB
NDUB
notification to forwarding subscriber
yes
no
set indicator = 'notify forwarding subscriber'
notification to calling subscriber
yes
no
set indicator = 'notify calling subscriber'
served subscribers MSISDN can be presented
yes
no
set error
set redirecting presentation = restricted
set redirecting presentation = allowed
set indicator = 'normal call busy'
continue call handling
idle
NDUB: Network Determined User Busy.
UDUB: User Determined User Busy.
BS: Basic Serice group.

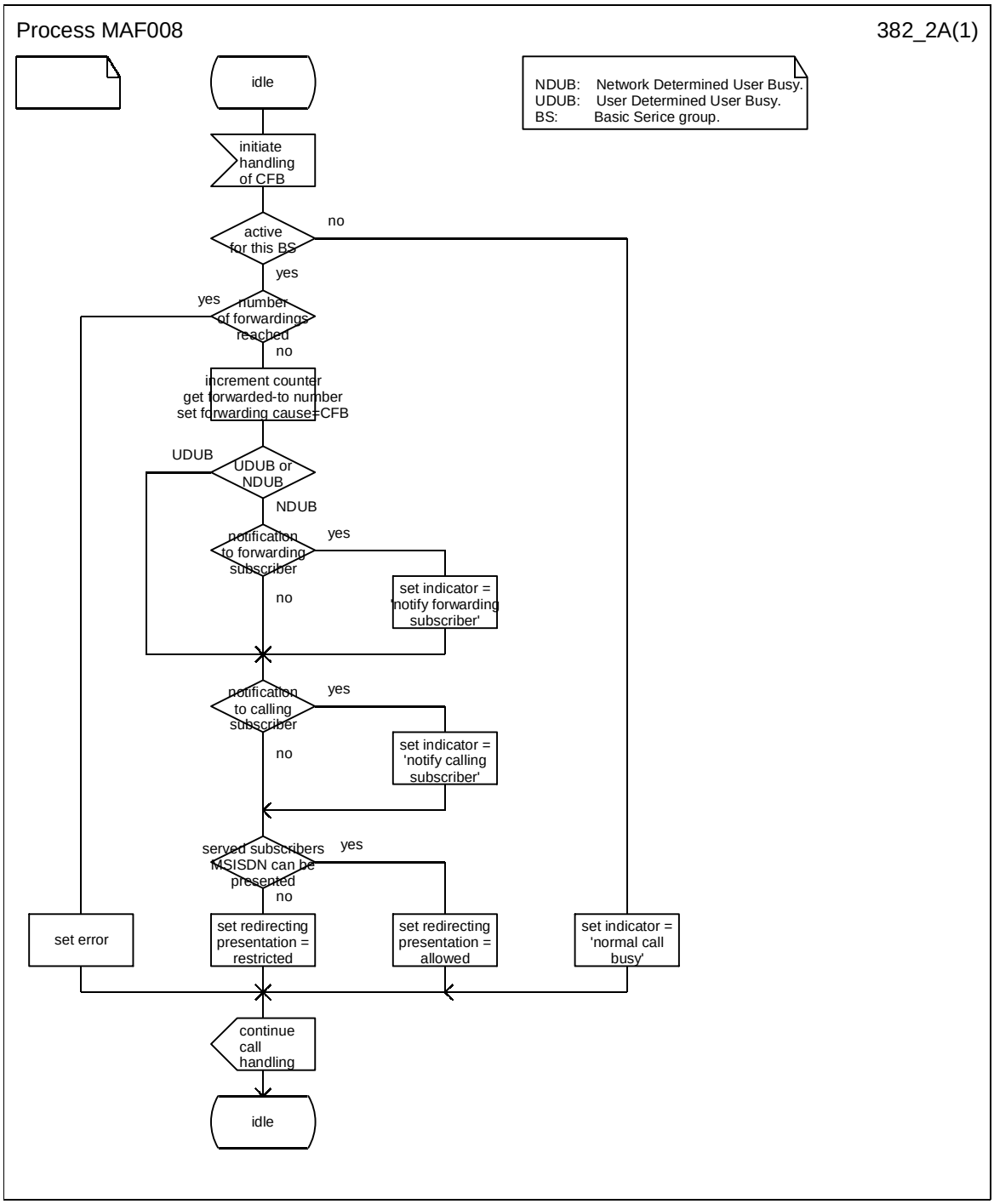
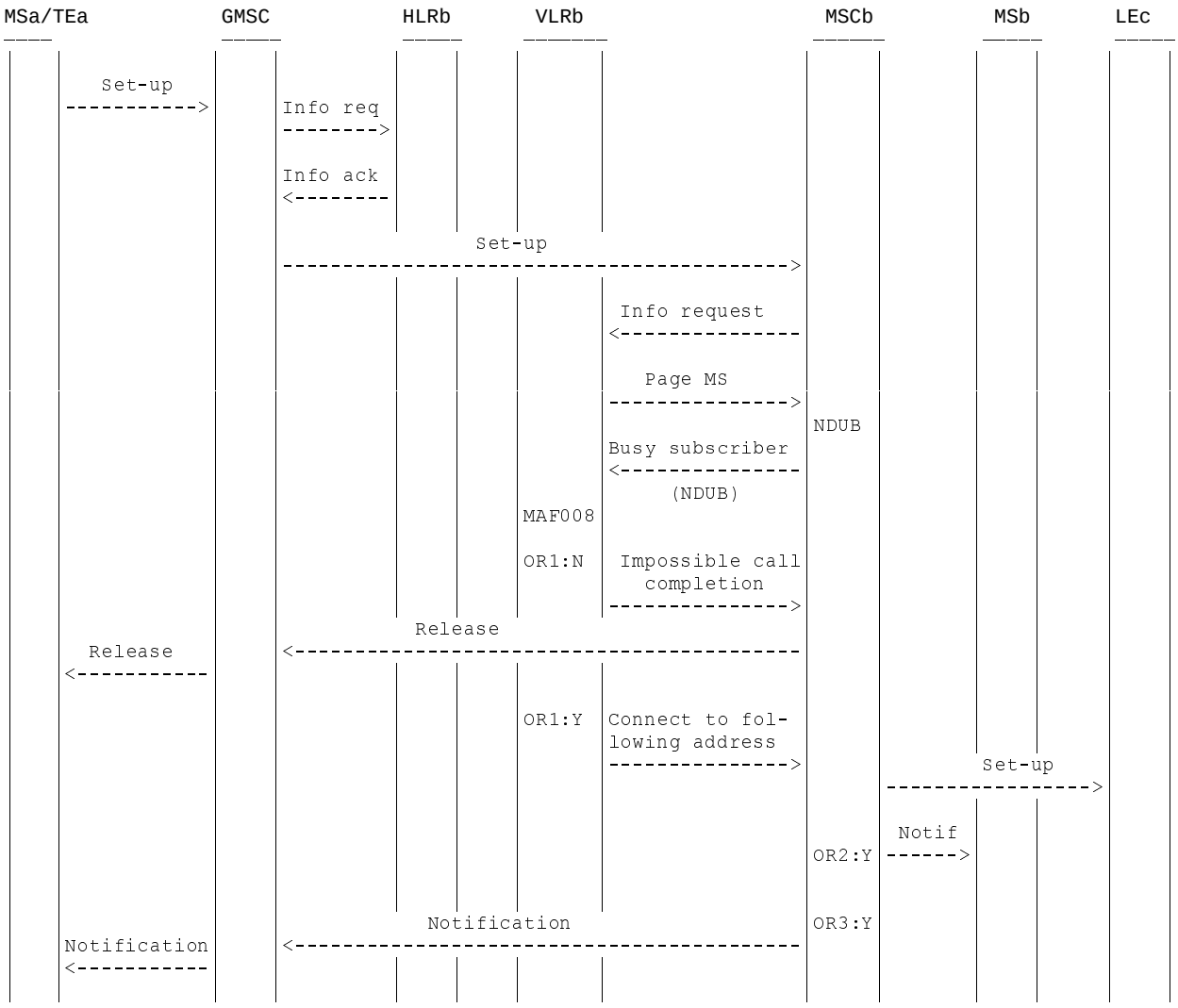


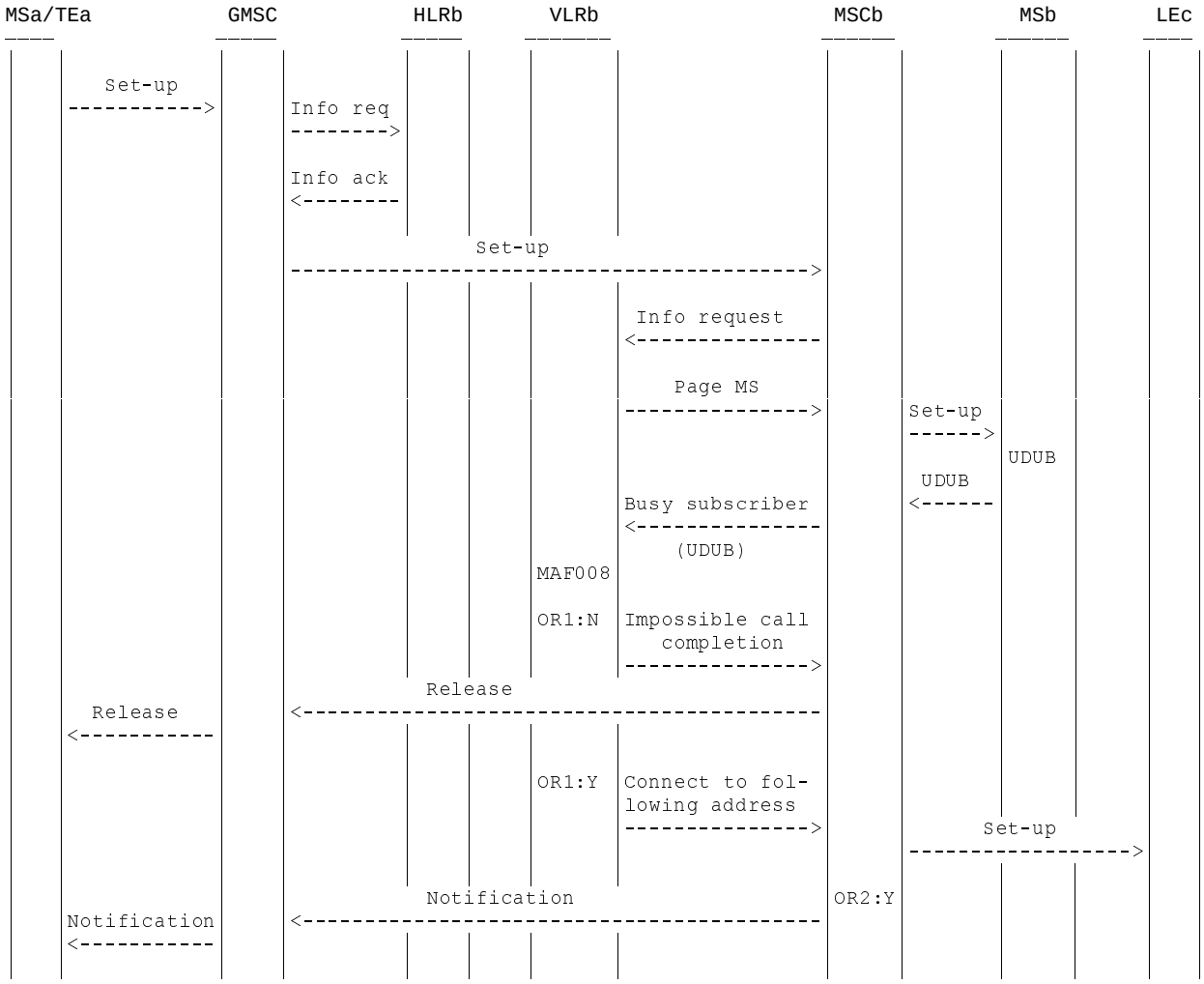
Figure 2.10: MAF008 Call forwarding on mobile subscriber busy authorisations examination (VLR)



NOTE: NDUB: Network Determined User Busy

info:	information	Y: Yes
req:	request	N: No
ack:	acknowledge	
notif:	notification	
OR1:	Call to be forwarded	
OR2:	Notification to forwarding subscriber required	
OR3:	Notification to calling subscriber required	

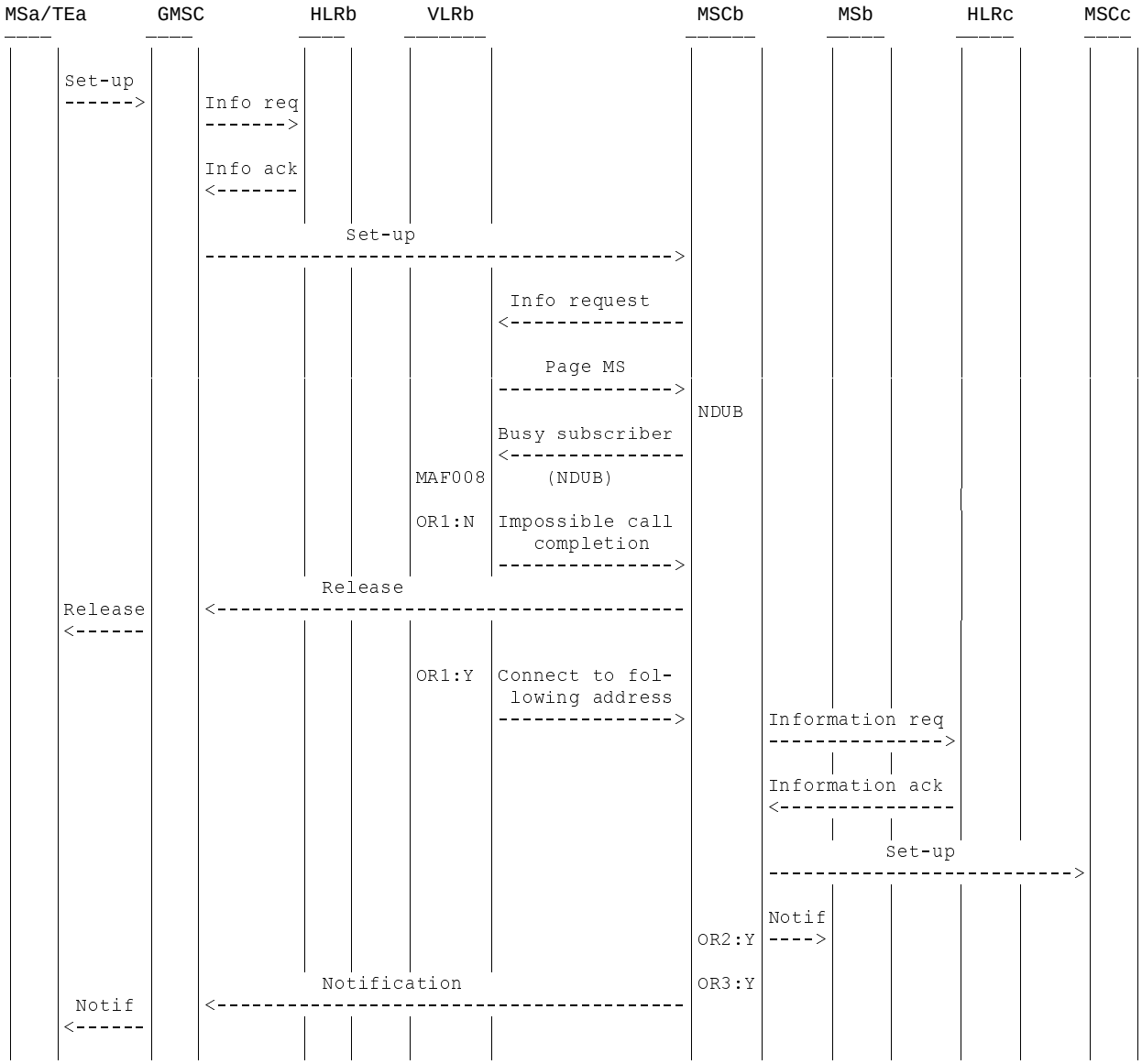
Figure 2.11: Information flow for call forwarding on mobile subscriber busy (to fixed terminal) (NDUB)



NOTE: UDUB: User Determined User Busy

info:	information	Y: Yes
req:	request	N: No
ack:	acknowledge	
notif:	notification	
OR1:	Call to be forwarded	
OR2:	Notification to calling subscriber required	

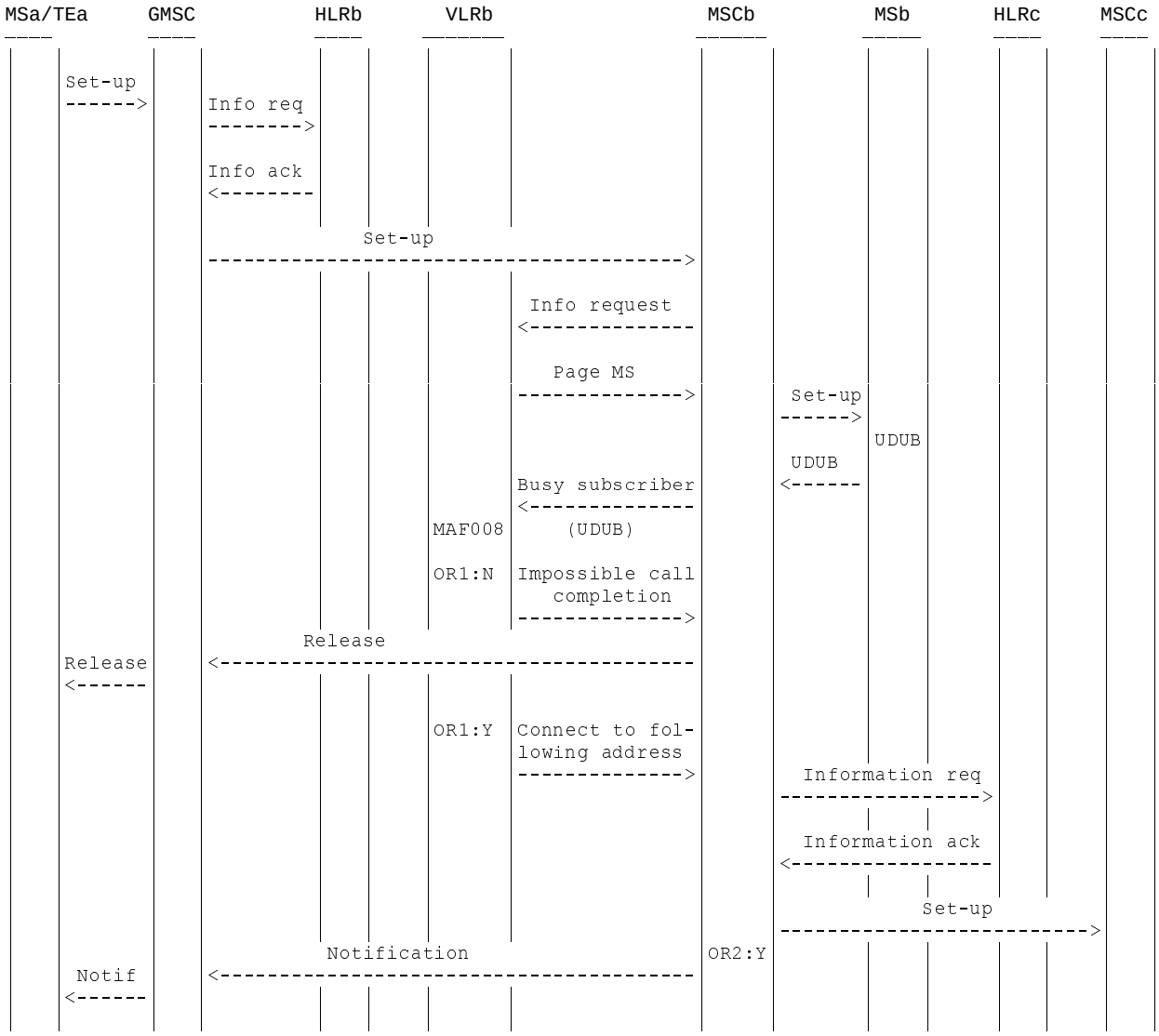
Figure 2.12: Information flow for call forwarding on mobile subscriber busy (to fixed terminal) (UDUB)



NOTE: NDUB: Network Determined User Busy

info:	information	Y: Yes
req:	request	N: No
ack:	acknowledge	
notif:	notification	
OR1:	Call to be forwarded	
OR2:	Notification to forwarding subscriber required	
OR3:	Notification to calling subscriber required	

Figure 2.13: Information flow for call forwarding on mobile subscriber busy (to mobile station) (NDUB)



NOTE: UDUB: User Determined User Busy

info:	information	Y: Yes
req:	request	N: No
ack:	acknowledge	
notif:	notification	
OR1:	Call to be forwarded	
OR2:	Notification to calling subscriber required	

Figure 2.14: Information flow for call forwarding on mobile subscriber busy (to mobile station) (UDUB)

2.3 Information stored in the HLR

The following logical states are applicable for CFB (refer to 3G TS 23.011 for an explanation of the notation):

Provisioning State	**Registration State**	**Activation State**	**HLR Induction State**
(Not Provisioned,	Not Registered,	Not Active,	Not Induced)
(Provisioned,	Not Registered,	Not Active,	Not Induced)
(Provisioned,	Registered,	Not Active,	Not Induced)
(Provisioned,	Registered,	Active and Quiescent,	Not Induced)
(Provisioned,	Registered,	Active and Operative,	Not Induced)

The registration and activation state may be different for each applicable elementary basic service group.

The provisioning state shall be on a per subscriber basis, and hence the same for all basic service groups.

The HLR shall store:

- the state of CFB (which shall be one of the valid states listed above) for each applicable elementary basic service group;
- the subscription option "notification to the calling party" on a per subscriber basis;

  This subscription option takes one of the following values:

  - no notification;
  - notification.
- the subscription option "notification to the forwarding party" on a per subscriber basis;

  This subscription option takes one of the following values:

  - no notification;
  - notification.

the subscription option " MSISDN of the served subscriber can be presented to the forwarded-to subscriber" on a per subscriber basis;

This subscription option takes one of the following values:

- presentation restricted;
- presentation allowed.

- the registration parameter "forwarded-to number" (possibly including a forwarded-to sub-address) for each applicable elementary basic service group.

2.4 State transition model

The following figure shows the successful cases of transition between the applicable logical states of CFB. The state changes are either caused by actions of the service provider, the mobile user or the network.

Note that error cases are not shown in the diagram as they normally do not cause a state change. Additionally, some successful requests may not cause a state change. Hence, they are not shown in the diagram. The diagram only shows operations on an elementary basic service group.

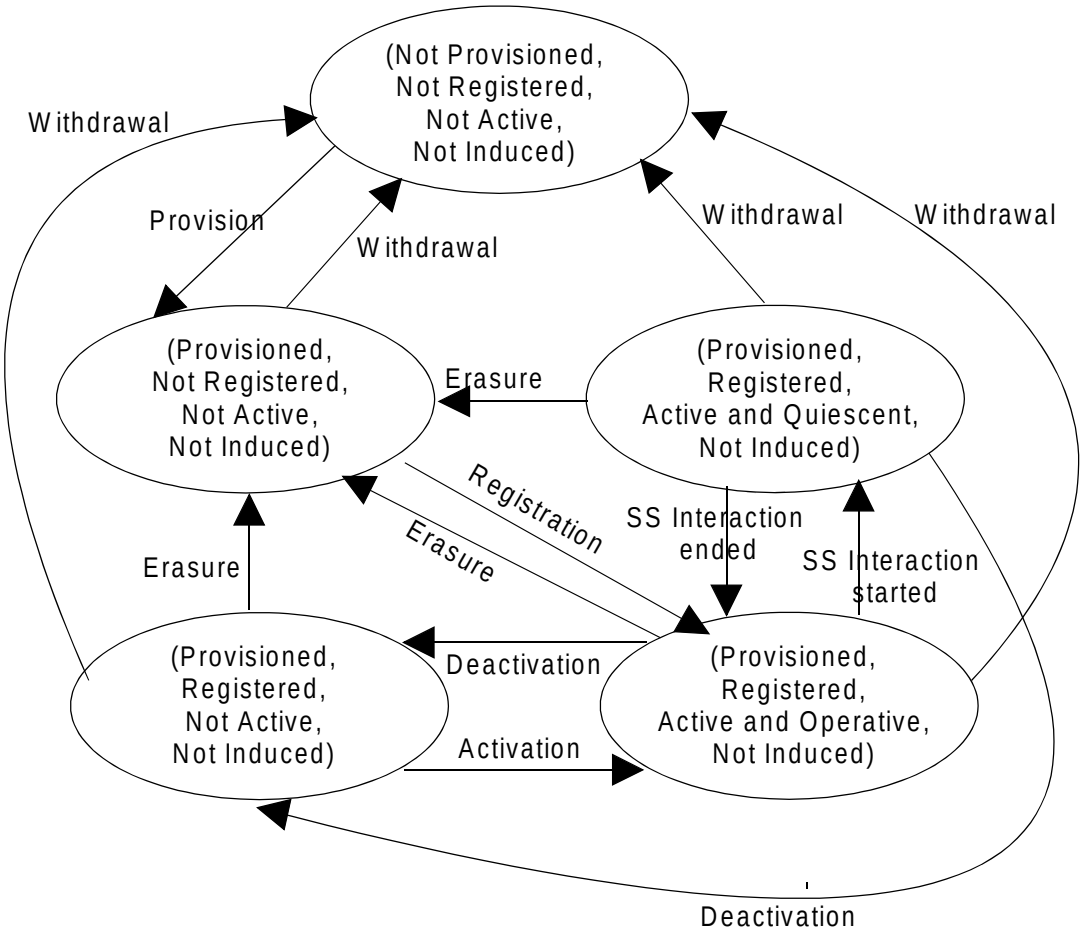


Figure 2.15: State transition model for CFB

2.5 Transfer of information from HLR to VLR

If the provisioning state for CFB is "Provisioned" then, when the subscriber registers on a VLR, the HLR shall send that VLR information about the logical state of CFB for all relevant elementary basic service groups.

If the registration state for CFB is "Registered" then, when the subscriber registers on a VLR, the HLR shall send that VLR the registration parameter "forwarded-to number" for all relevant elementary basic service groups and information about the subscription options "notification to the calling party", "notification to the forwarding party" and "MSISDN of the served subscriber can be presented to the forwarded-to subscriber".

If the logical state or the registration parameter "forwarded-to number" of CFB is changed while a subscriber is registered on a VLR then for the affected basic service groups, the HLR shall inform the VLR respectively of the new logical state or the new registration parameter of CFB.

If information about the subscription options "notification to the calling party" and "notification to the forwarding party" of CFB is changed while a subscriber is registered on a VLR and the registration state of CFB is "Registered" then the HLR shall inform the VLR of the new information about the subscription options of CFB.

2.6 Information stored in the VLR

For CFB the VLR shall store the service state information, the registration parameter "forward-to number" and the subscription options received from the HLR.

2.7 Handover

Handover will have no impact on the control procedure and the operation of the service.

2.8 Cross phase compatibility

2.8.1 MS, MSC, VLR or HLR only support Phase 1 control of SS by the subscriber

In response to a CFB interrogation request, if the MS or any network element involved is of Phase 1, only information concerning basic service groups for which the activation state has the value "Active and Operative" will be returned. This means that the subscriber will not be aware that the forwarded to number is registered if CFB is deactivated or active (quiescent). A subaddress (if registered) will not be included.

Note that if any network element involved is of Phase 1, CFB Registration requests which use a subaddress and all CFB Activation and Deactivation requests will be rejected, as these are not specified in Phase 1.

2.8.2 HLR only supports Phase 1 updating of subscriber information

If the VLR receives the SS-Status parameter from a Phase 1 HLR it shall act if it has received the SS-Status parameter with the values shown in the following:

1) Registered, Activated => P bit =1, R bit = 1, A bit = 1, Q bit = 0;
2) Registered, Deactivated => P bit =1, R bit = 1, A bit = 0, Q bit = 0 or 1;
3) Erased => P bit =1, R bit = 0, A bit = 0, Q bit = 0 or 1.

2.8.3 VLR only supports Phase 1 updating of subscriber information

When passing CFB information to a Phase 1 VLR, the HLR shall send the service state information in a form which the VLR can accept, based on the logical state held in the HLR, as follows:

1) (Provisioned, Not Registered, Not Active, Not Induced)

   => Erased, Deactivated;

2) (Provisioned, Registered, Not Active, Not Induced)

   => Registered, Deactivated;

3) (Provisioned, Registered, Active and Operative, Not Induced)

   => Registered, Activated;

4) (Provisioned, Registered, Active and Quiescent, Not Induced)

   => Registered, Deactivated.

The HLR shall not pass a subaddress to a Phase 1 VLR.

2.8.4 VLR only supports Phase 1 call handling

When a call is forwarded on busy, as the HLR does not pass the subaddress to the VLR, calls shall be forwarded without the subaddress.

2.8.5 VLR does not support CAMEL or supports CAMEL Phase 1 only

When passing CFB information to a VLR not supporting CAMEL or supporting CAMEL Phase 1 only, the HLR shall send the registration parameter "forwarded-to number" only if it is registered in a format which the VLR can accept, i.e. international format.

If the registration state for CFB is "Registered" and the forwarded-to number is registered in a format other than international, then when updating a VLR not supporting CAMEL or supporting CAMEL Phase 1 only the HLR shall modify the service state information of CFB as follows.

1) (Provisioned, Registered, Not Active, Not Induced)

   => (Provisioned, Not Registered, Not Active, Not Induced)

2) (Provisioned, Registered, Active and Operative, Not Induced)

   => (Provisioned, Not Registered, Not Active, Not Induced)

3) (Provisioned, Registered, Active and Quiescent, Not Induced)

   => (Provisioned, Not Registered, Not Active, Not Induced)

According to the definitions in subclause 2.5 no forwarded-to number will be passed to the VLR in these cases. The modification of the service state information sent to the VLR shall have no impact on the service state information stored in the HLR.

If the VLR supports Phase 1 updating of subscriber information only, a further translation of the service state information as defined in subclause 2.8.3 shall be performed by the HLR.

2.9 Contents of messages

The same additions apply for CFB as for CFU, see subclause 1.9. The following additions are specific to CFB.

2.9.1 Messages on the B interface (MSC-VLR)

2.9.1.1 Send Info For Incoming Call ack

This message is specified in 3G TS 23.018.

Send Info For Incoming Call ack contains the following amendment to the Forwarded-to number IE, specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Forwarded-to number	M	Number of the C subscriber.

2.9.2 Messages on the D interface (VLR-HLR)

2.9.2.1 Insert Subscriber Data

This message corresponds to the MAP-INSERT-SUBSCRIBER-DATA service specified in 3G TS 29.002.

Insert Subscriber Data contains the following IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Long forwarded-to number	C	Shall be present if the subscriber has a long forwarded-to number registered; otherwise shall be absent.

2.9.2.2 Insert Subscriber Data ack

This message corresponds to the MAP-INSERT-SUBSCRIBER-DATA service specified in 3G TS 29.002.

Insert Subscriber Data ack contains the following IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Long FTN supported	C	Shall be present if the VLR supports Long Forwarded-to Numbers; otherwise shall be absent.

C Conditional (The IE shall be sent, if available)

2.9.3 Messages on the E interface (VMSC-GMSC)

2.9.3.1 Resume Call Handling

This message is specified in 3G TS 23.079.

Resume Call Handling contains the following amendment to the Forwarded-to number IE and an additional IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Forwarded-to number	C	E.164 number of the C subscriber. Shall be present if the VMSC does not support Long Forwarded-to Numbers; otherwise shall be absent.
Long forwarded-to number	C	Number of the C subscriber. Shall be present if the VMSC supports Long Forwarded-to Numbers; otherwise shall be absent.

2.9.4 Messages on the MSC internal interface

2.9.4.1 Perform Call Forwarding

This message is specified in 3G TS 23.018.

Perform Call Forwarding contains the following amendment to the Forwarded-to number IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Forwarded-to number	M	Number of the C subscriber.

2.9.4.2 Perform Call Forwarding ack

This message is specified in 3G TS 23.018.

Perform Call Forwarding ack contains the following amendment to the Forwarded-to number IE specific to Long Forwarded-to Numbers:

Information element name	Required	Description
Forwarded-to number	M	Number of the C subscriber. NOTE: This number may be different from the Forwarded-to number received in the Perform Call Forwarding, as a result of CAMEL handling.

2.10 Support of Long Forwarded-to Numbers

2.10.1 MS does not support Long Forwarded-to Numbers

The handling for CFB is the same as that for CFU, see subclause 1.10.1.

2.10.2 HLR does not support Long Forwarded-to Numbers

The handling for CFB is the same as that for CFU, see subclause 1.10.2.

2.10.3 GMSC does not support Long Forwarded-to Numbers

The handling for CFB is the same as that for CFU, see subclause 1.10.3.

2.10.4 MSC/VLR does not support Long Forwarded-to Numbers

The VLR shall indicate whether it supports Long Forwarded-to Numbers in the Update Location message to the HLR. If the VLR does not support Long Forwarded-to Numbers, as a network option the HLR may:

- Send an Insert Subscriber Data message containing the Forwarded-to number parameter to the VLR with an alternative forwarded-to number (containing a maximum of 15 digits).
- If the registration state for CFB is "Registered" and the forwarded-to number contains more than 15 digits, the HLR shall send the VLR the following service state information:

  (Provisioned, Not Registered, Not Active, Not Induced)

For an MT call, if the following conditions are met then the HLR shall include the Forwarding interrogation required parameter in the first Send Routing Info ack:

- The GMSC supports Optimal Routeing and Long Forwarded-to Numbers;
- The MSC/VLR does not support Long Forwarded-to Numbers;
- CFB is active and operative;
- A long forwarded-to number is registered for CFB.

According to the rules of Optimal Routeing, when the GMSC receives a Resume Call Handling message from the MSC/VLR, it shall send a second Send Routing Info message to the HLR allowing the HLR to insert the correct long forwarded-to number.

3 Call forwarding on no reply

3.1 Handling of call forwarding on no reply

3.1.1 Registration

The same rules apply for the registration of Call Forwarding on No Reply as were described for Call Forwarding Unconditional in subclause 1.1.1 above, with the exceptions described below. Basic registration of information is illustrated in figure 3.2.

The No Reply Condition Timer

If a value for the no reply condition timer is not included in the registration request received from the MS, then the previous value set by the mobile user or the network operator applies.

Supplementary Service Interaction

Possible interaction situations between CFNRy and other supplementary services must then be checked. This is described in figure 3.2. Also see 3G TS 22.004 and 3G TS 22.082. For interaction between CFNRy and other supplementary services (ie not call barring or call forwarding services), the reader is referred to the respective technical specification for those supplementary services.

Interaction with CAMEL Phase 2 or higher

Possible interaction between CFNRy and CAMEL Phase 2 or higher is described in figure 3.2. If CAMEL Phase 2 or higher is not supported in the HLR, processing continues from the "No" exit of the test "Result=Pass".

The information flow for registration of call forwarding on no reply is shown in figure 3.1.

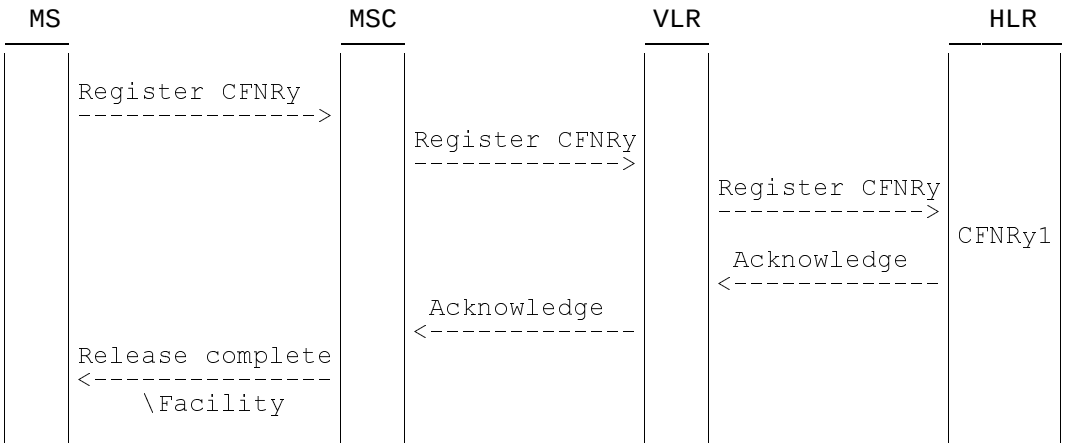
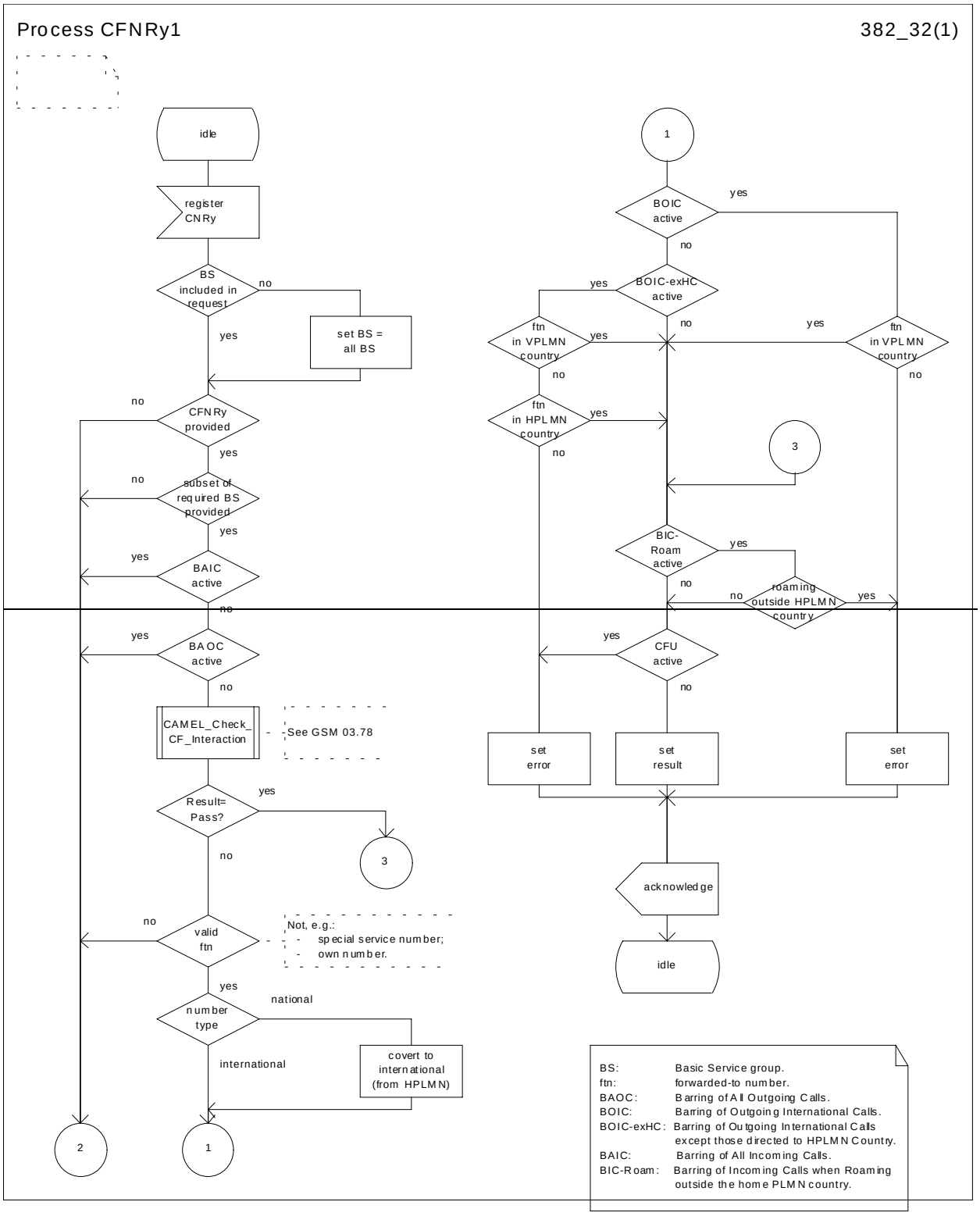


Figure 3.1: Registration of call forwarding on no reply


Process CFNRy1
382_32(1)
idle
register CNRy
BS included in request
no
yes
set BS = all BS
CFNRy provided
no
yes
subset of required BS provided
no
yes
BAIC active
yes
no
BAOC active
yes
no
CAMEL_Check_ CF_Interaction
See GSM 03.78
Result= Pass?
yes
no
3
valid ftn
no
Not, e.g.:
- special service number;
- own number.
yes
number type
national
international
covert to international (from HPLMN)
2
1
1
BOIC active
yes
no
BOIC-exHC active
yes
no
ftn in VPLMN country
yes
no
ftn in HPLMN country
yes
no
ftn in VPLMN country
yes
no
3
BIC-Roam active
yes
no
roaming outside HPLMN country
no
yes
CFU active
yes
no
set error
set result
set error
acknowledge
idle
BS: Basic Service group.
ftn: forwarded-to number.
BAOC: Barring of All Outgoing Calls.
BOIC: Barring of Outgoing International Calls.
BOIC-exHC: Barring of Outgoing International Calls except those directed to HPLMN Country.
BAIC: Barring of All Incoming Calls.
BIC-Roam: Barring of Incoming Calls when Roaming outside the home PLMN country.

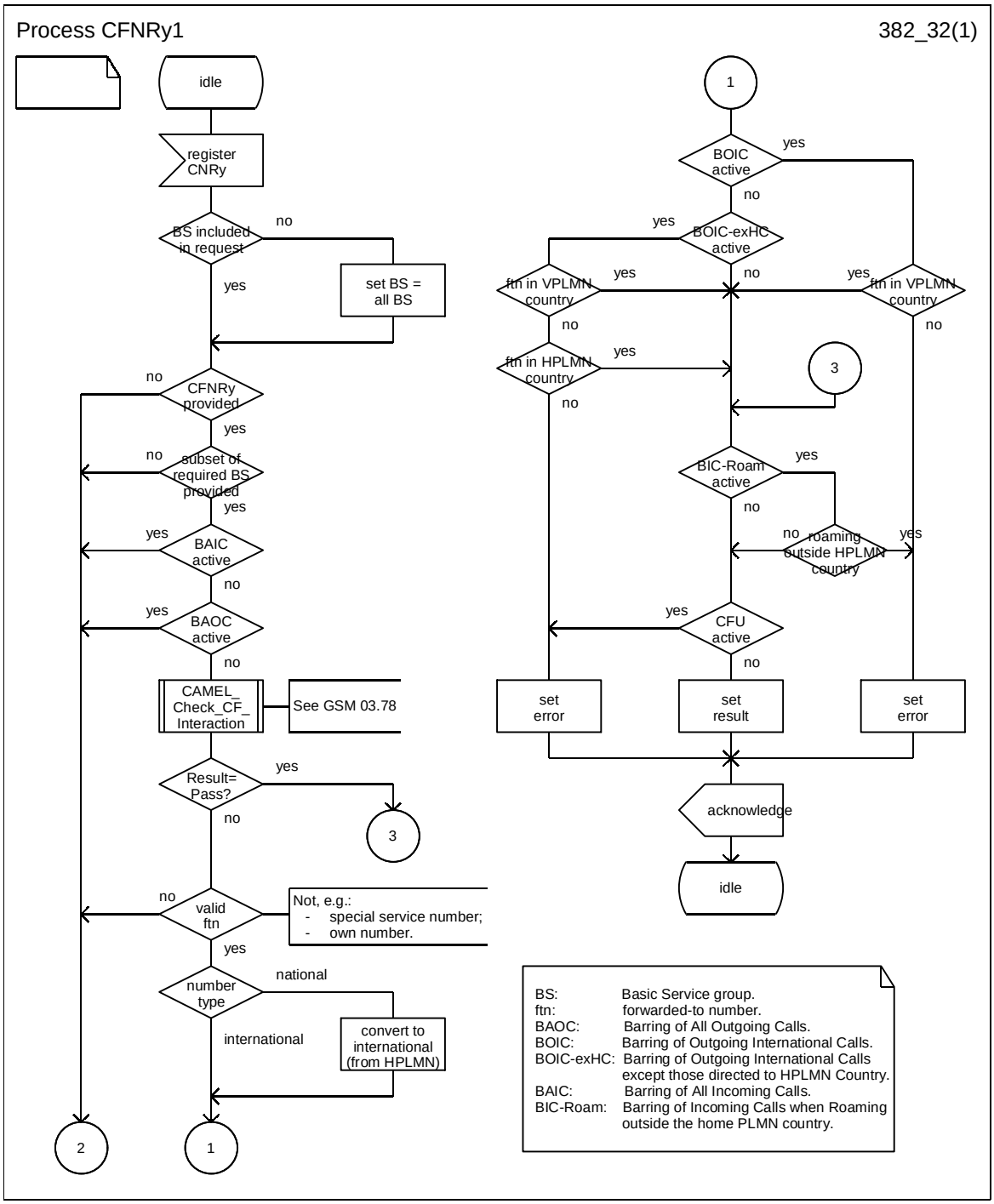


Figure 3.2: CFNRy1 Call forwarding on no reply registration process

3.1.2 Erasure

The same rules apply for the erasure of Call Forwarding on No Reply as were described for Call Forwarding Unconditional in subclause 1.1.2 above. However, no checks for interaction with other supplementary services are required for erasure of CFNRy, see figures 3.3 and 3.4.

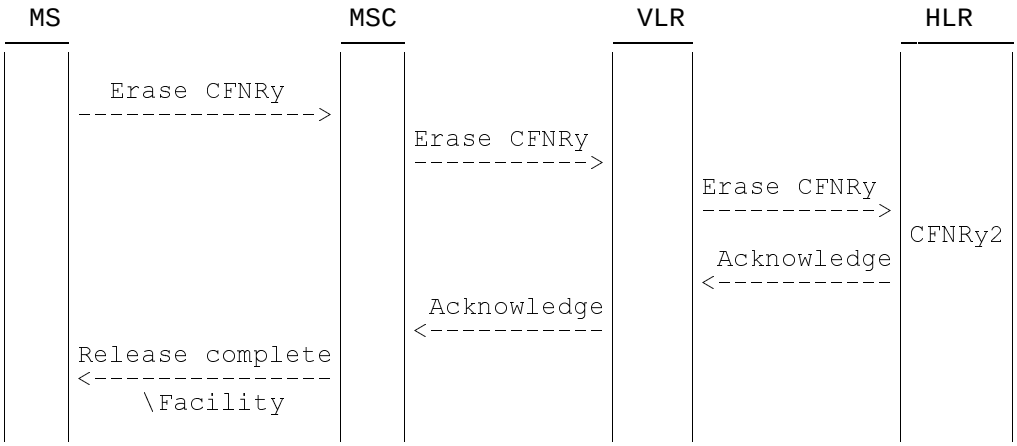
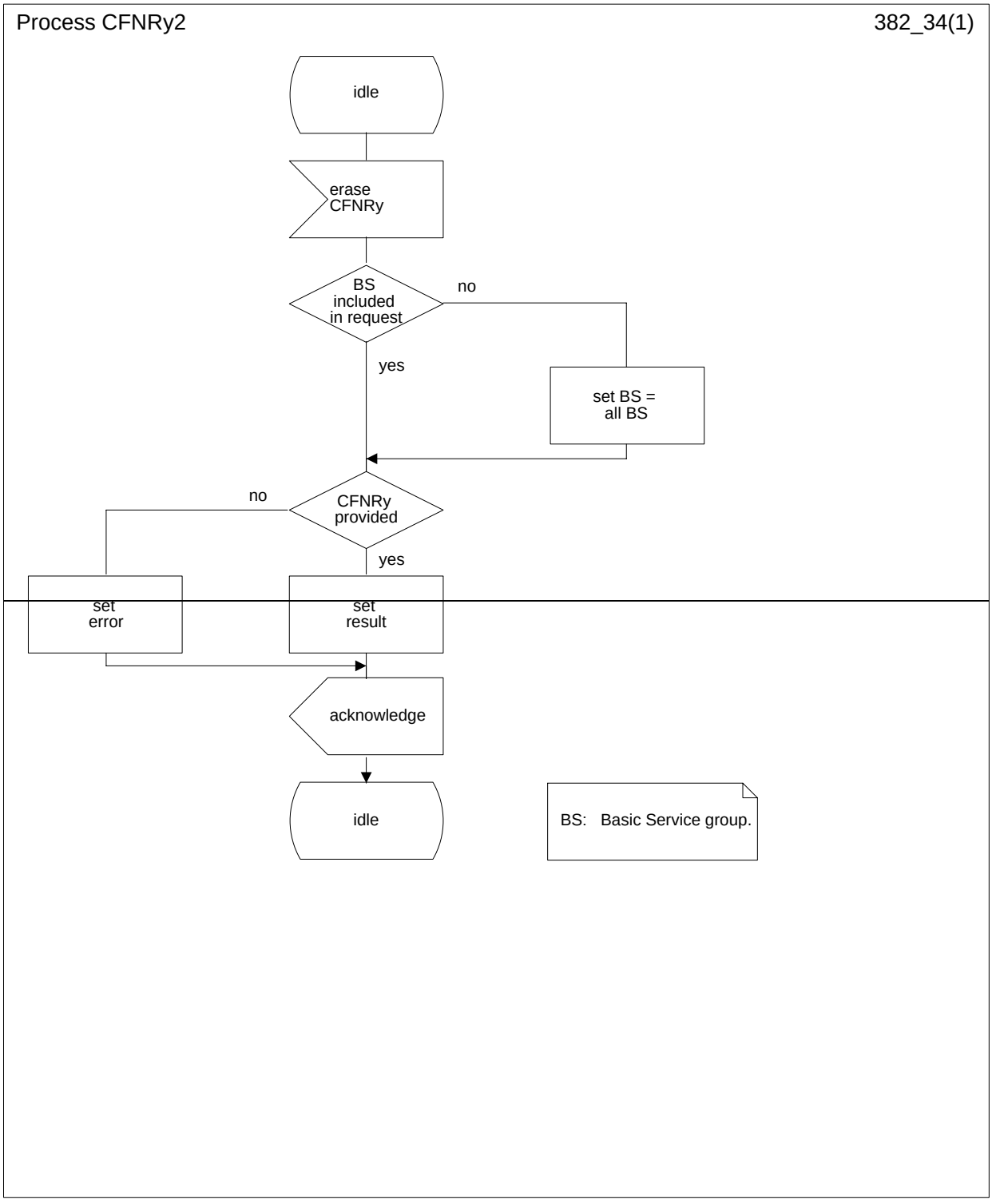


Figure 3.3: Erasure of call forwarding on no reply


Process CFNRy2
382_34(1)
idle
erase CFNRy
BS included in request
no
yes
set BS = all BS
CFNRy provided
no
yes
set error
set result
acknowledge
idle
BS: Basic Service group.

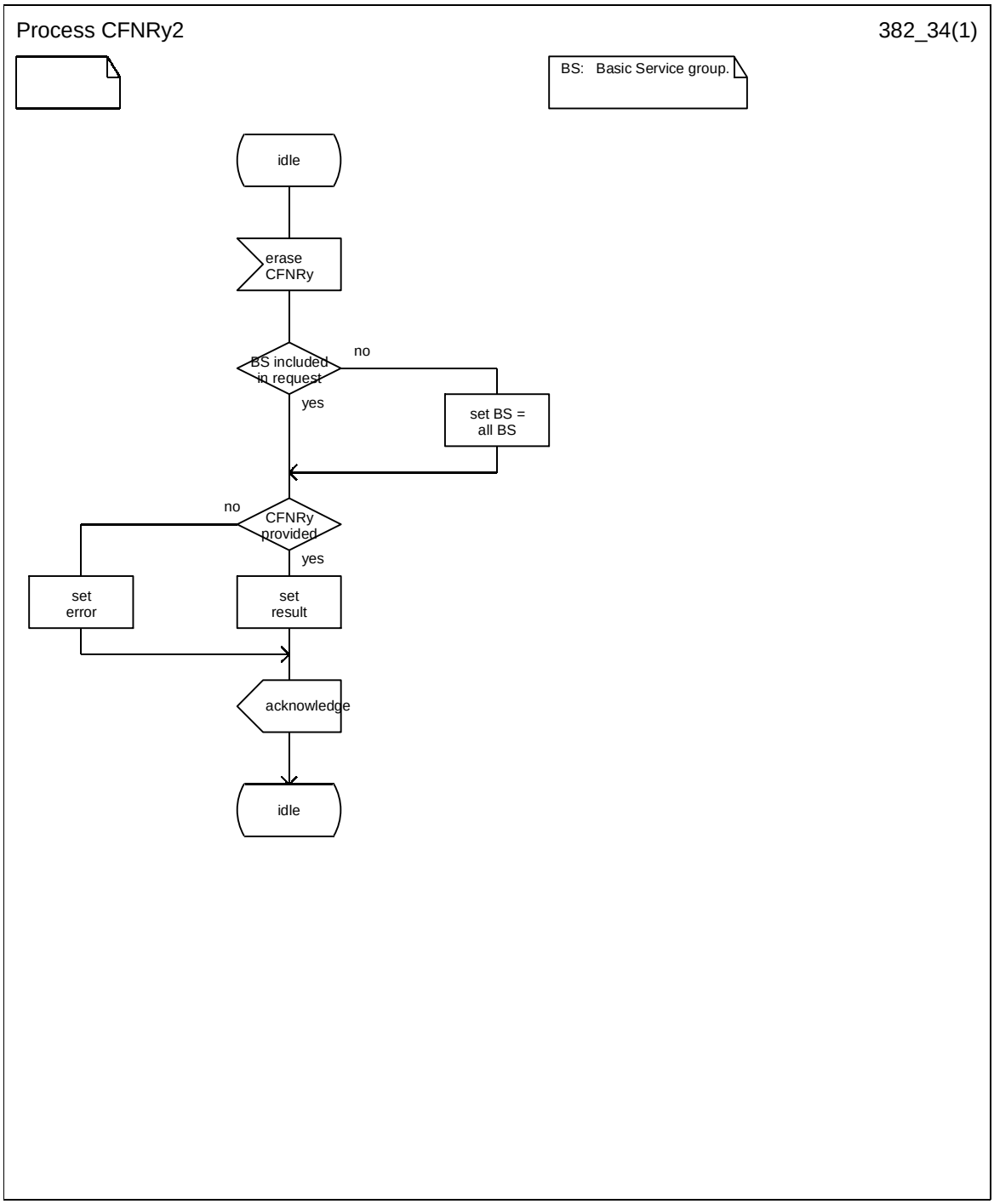


Figure 3.4: CFNRy2 Call forwarding on no reply erasure process

3.1.3 Activation

The same rules apply for the activation of Call Forwarding on No Reply as were described for Call Forwarding Unconditional in subclause 1.1.3 above, with the exception of the checking of interaction with other supplementary services. Basic activation of CFNRy is illustrated in figure 3.6.

Supplementary Service Interaction

Possible interaction situations between CFNRy and other supplementary services must then be checked. This is described in figure 3.6. Also see 3G TS 22.004 and 3G TS 22.082. For interaction between CFNRy and other supplementary services (ie not call barring or call forwarding services), the reader is referred to the respective technical specification for those supplementary services.

The information flow for activation of CFNRy is shown in figure 3.5.

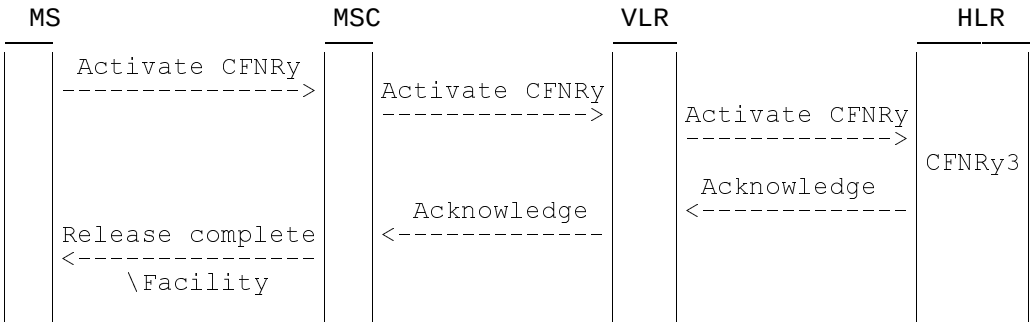
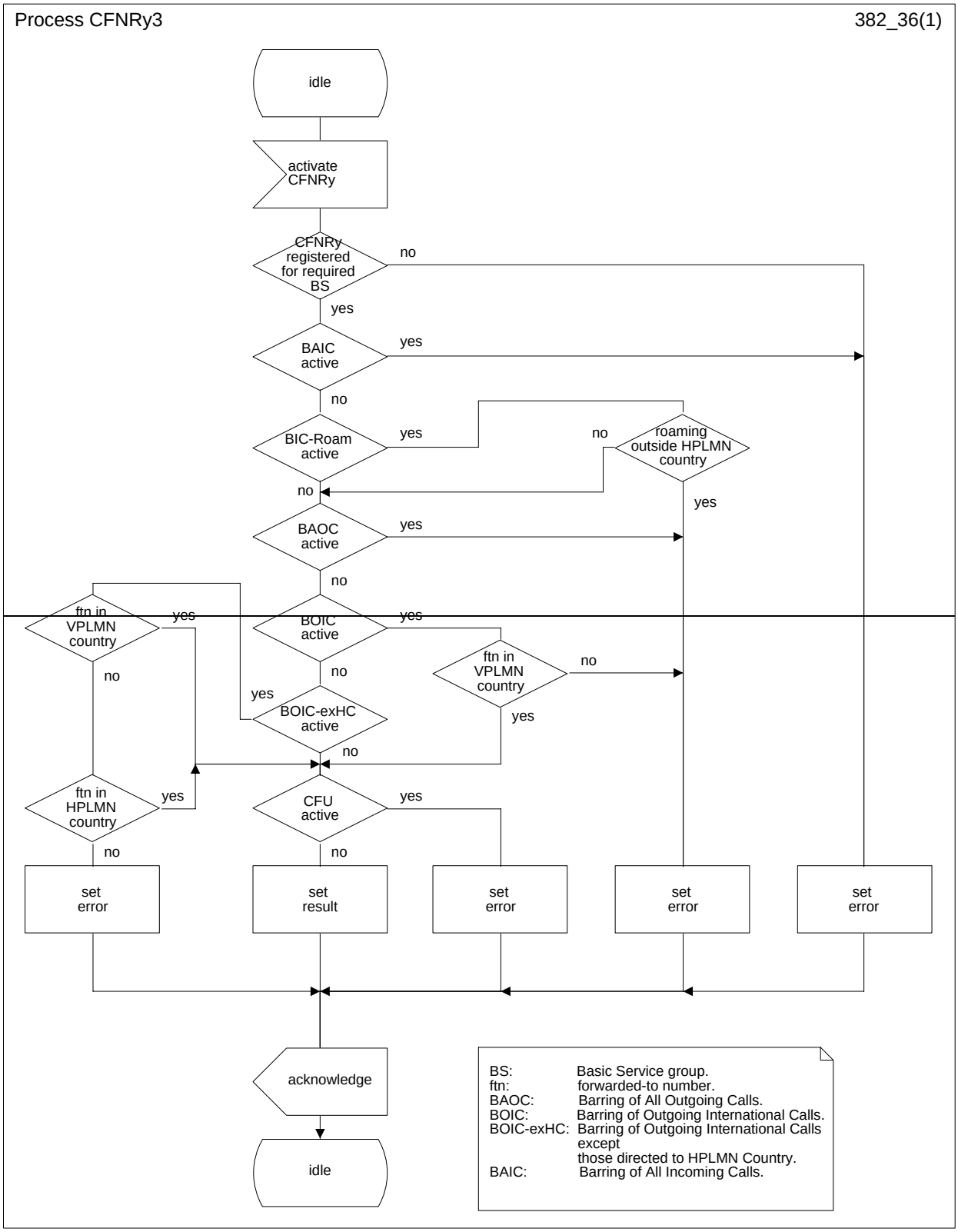


Figure 3.5: Activation of call forwarding on no reply


Process CFNRy3
382_36(1)
idle
activate CFNRy
CFNRy registered for required BS
no
yes
BAIC active
yes
no
BIC-Roam active
yes
no
roaming outside HPLMN country
no
yes
BAOC active
yes
no
ftn in VPLMN country
yes
no
BOIC active
yes
no
ftn in VPLMN country
no
yes
BOIC-exHC active
yes
no
ftn in HPLMN country
yes
no
CFU active
yes
no
set error
set result
set error
set error
set error
acknowledge
idle
BS: Basic Service group.
ftn: forwarded-to number.
BAOC: Barring of All Outgoing Calls.
BOIC: Barring of Outgoing International Calls.
BOIC-exHC: Barring of Outgoing International Calls except those directed to HPLMN Country.
BAIC: Barring of All Incoming Calls.

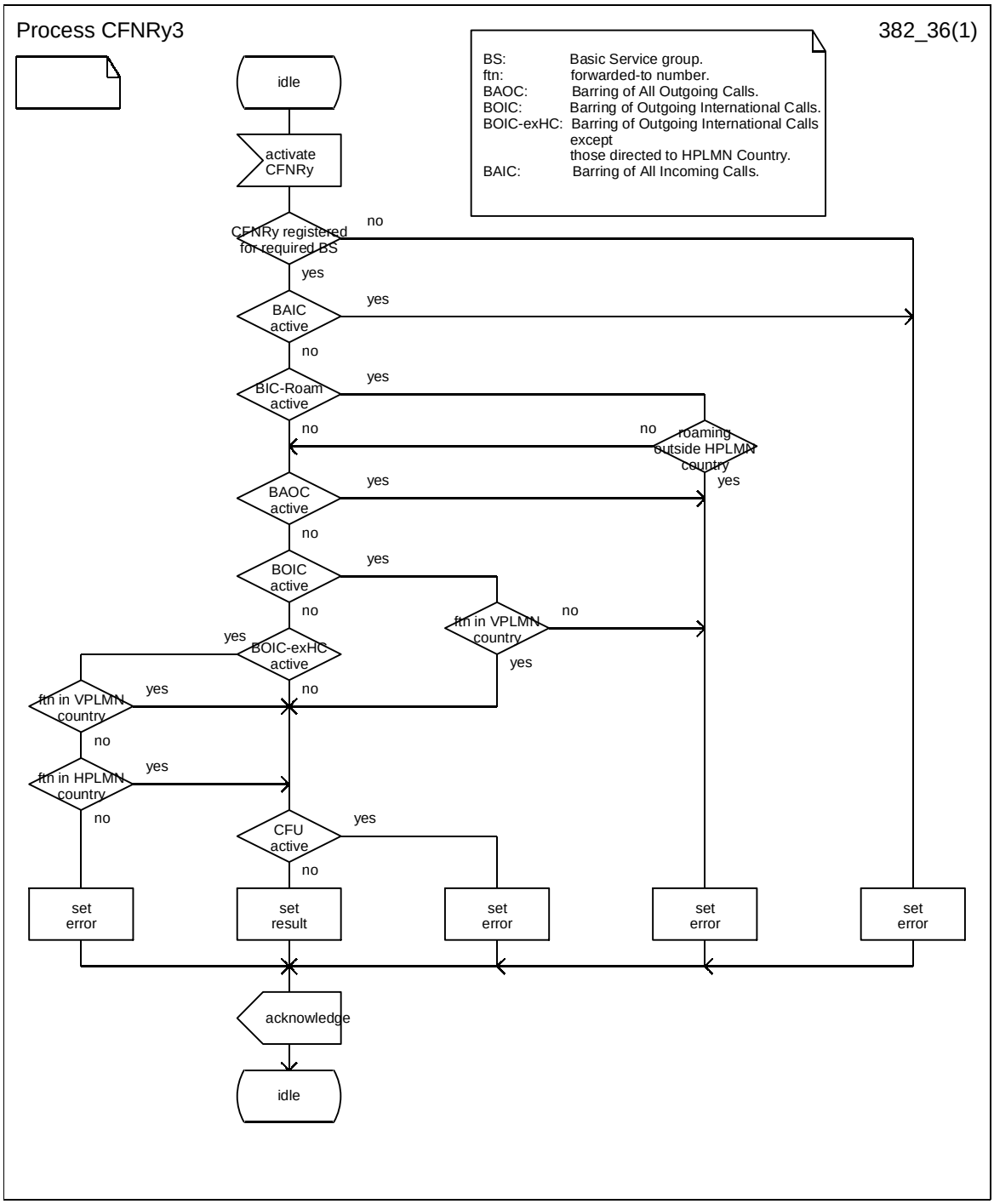


Figure 3.6: CFNRy3 Call forwarding on no reply activation process

3.1.4 Deactivation

The same rules apply for the deactivation of CFNRy as were described for CFU in subclause 1.1.4 above, see figure 3.7 and 3.8.

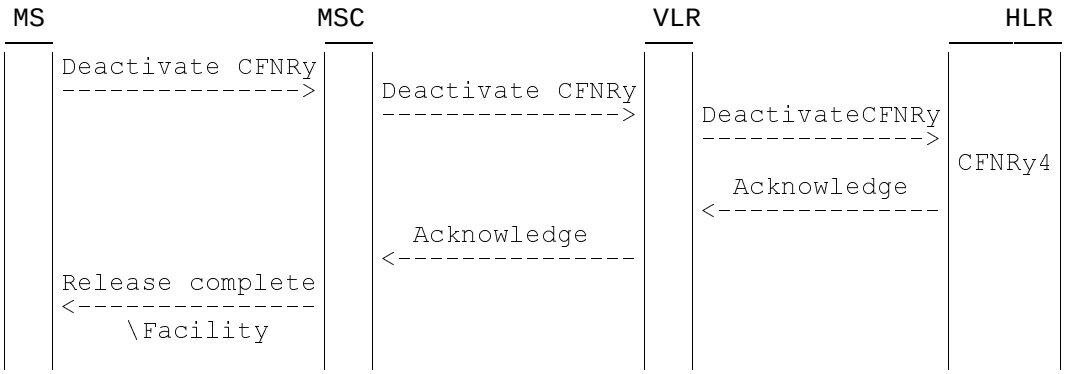
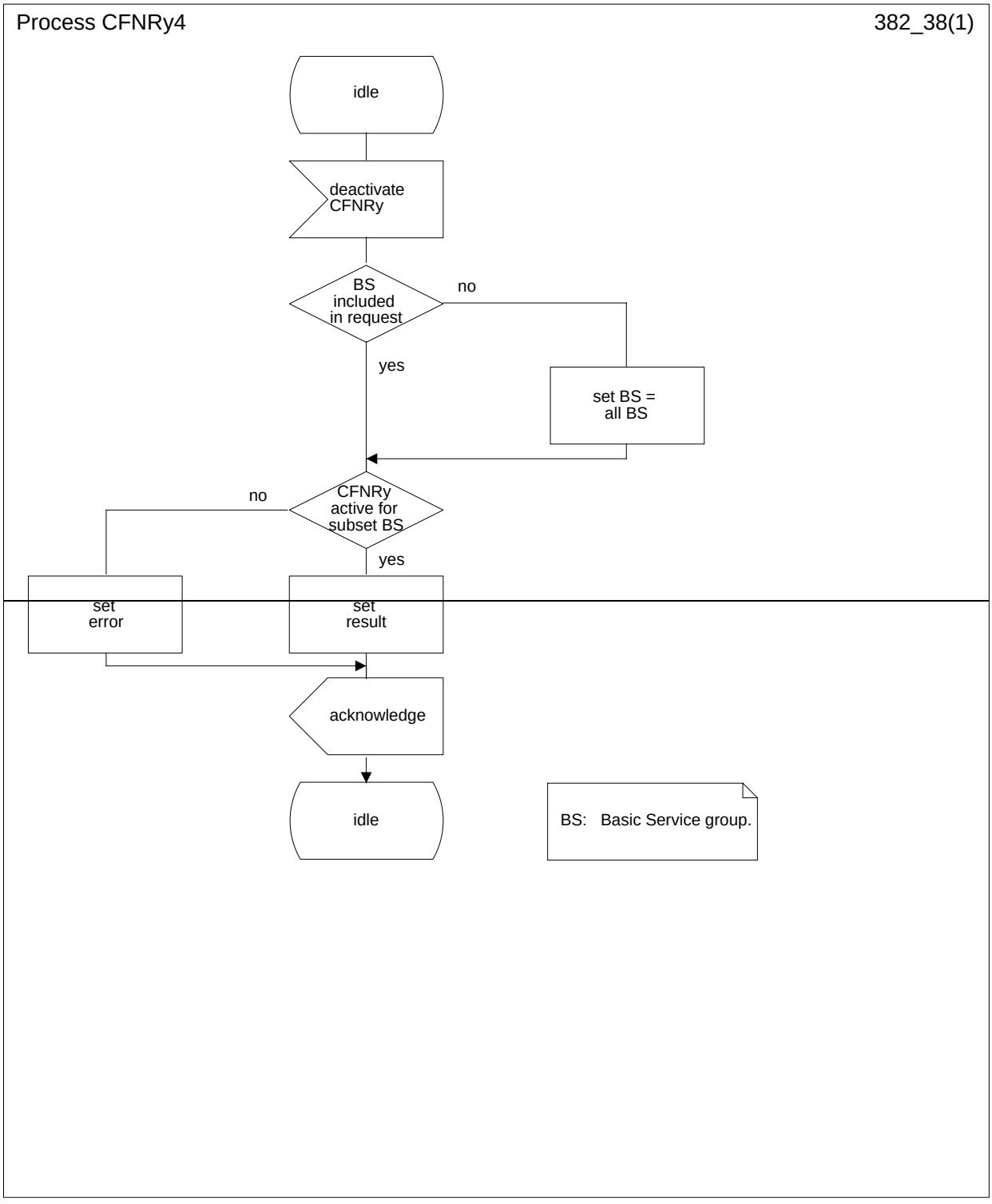


Figure 3.7: Deactivation of call forwarding on no reply


Process CFNRy4
382_38(1)
idle
deactivate CFNRy
BS included in request
no
yes
set BS = all BS
CFNRy active for subset BS
no
yes
set error
set result
acknowledge
idle
BS: Basic Service group.

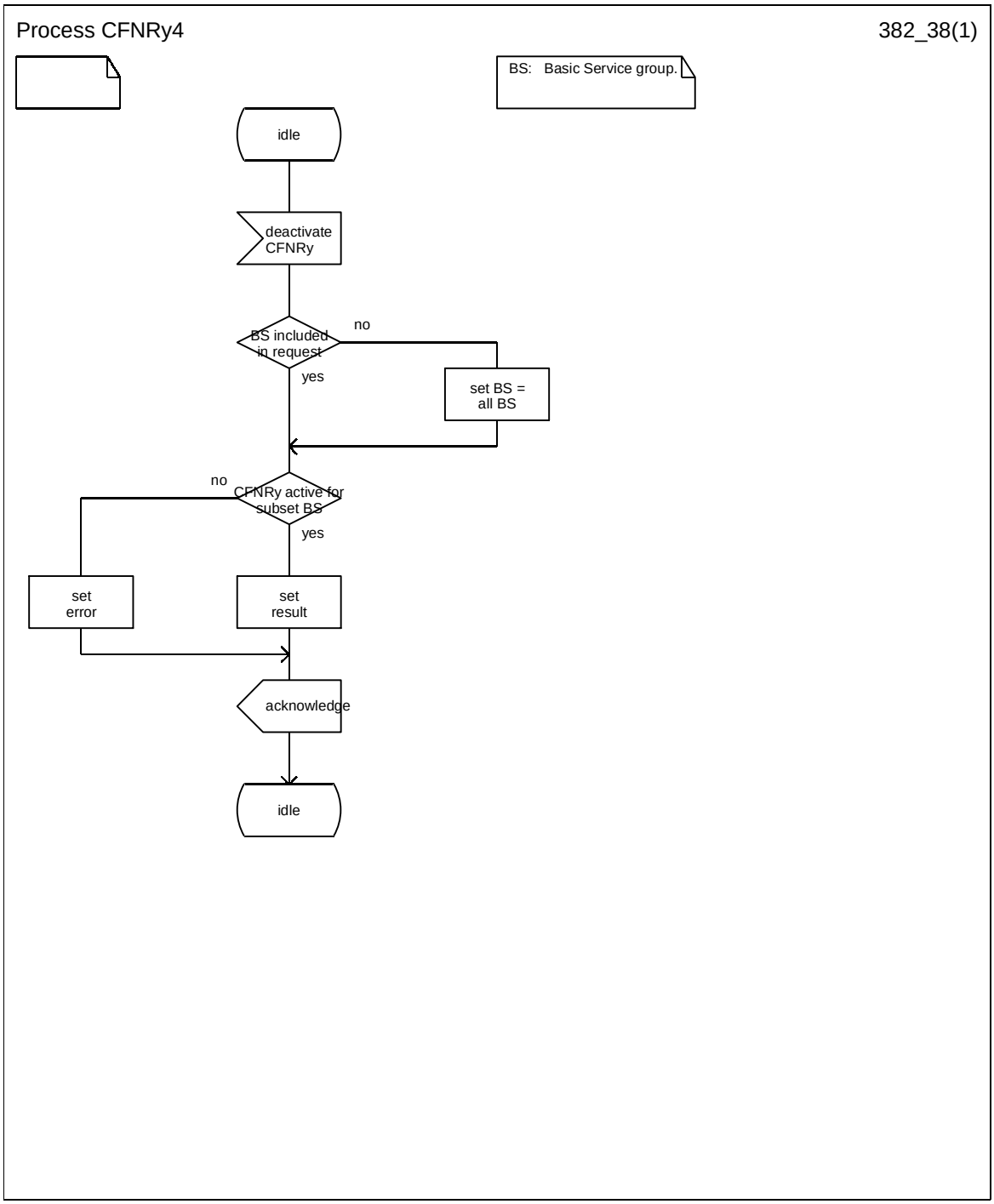


Figure 3.8: CFNRy4 Call forwarding on no reply deactivation process

3.1.5 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. Interrogation of CFNRy is handled by the VLR which returns the required information or error to the MS, see figure 3.9.

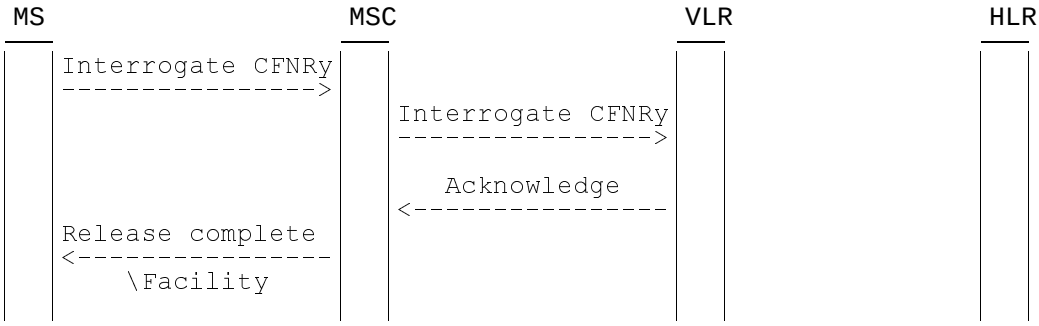


Figure 3.9: Interrogation of call forwarding on no reply

3.2 Functions and information flows

The following Mobile Additional Function has been identified for the PLMN:

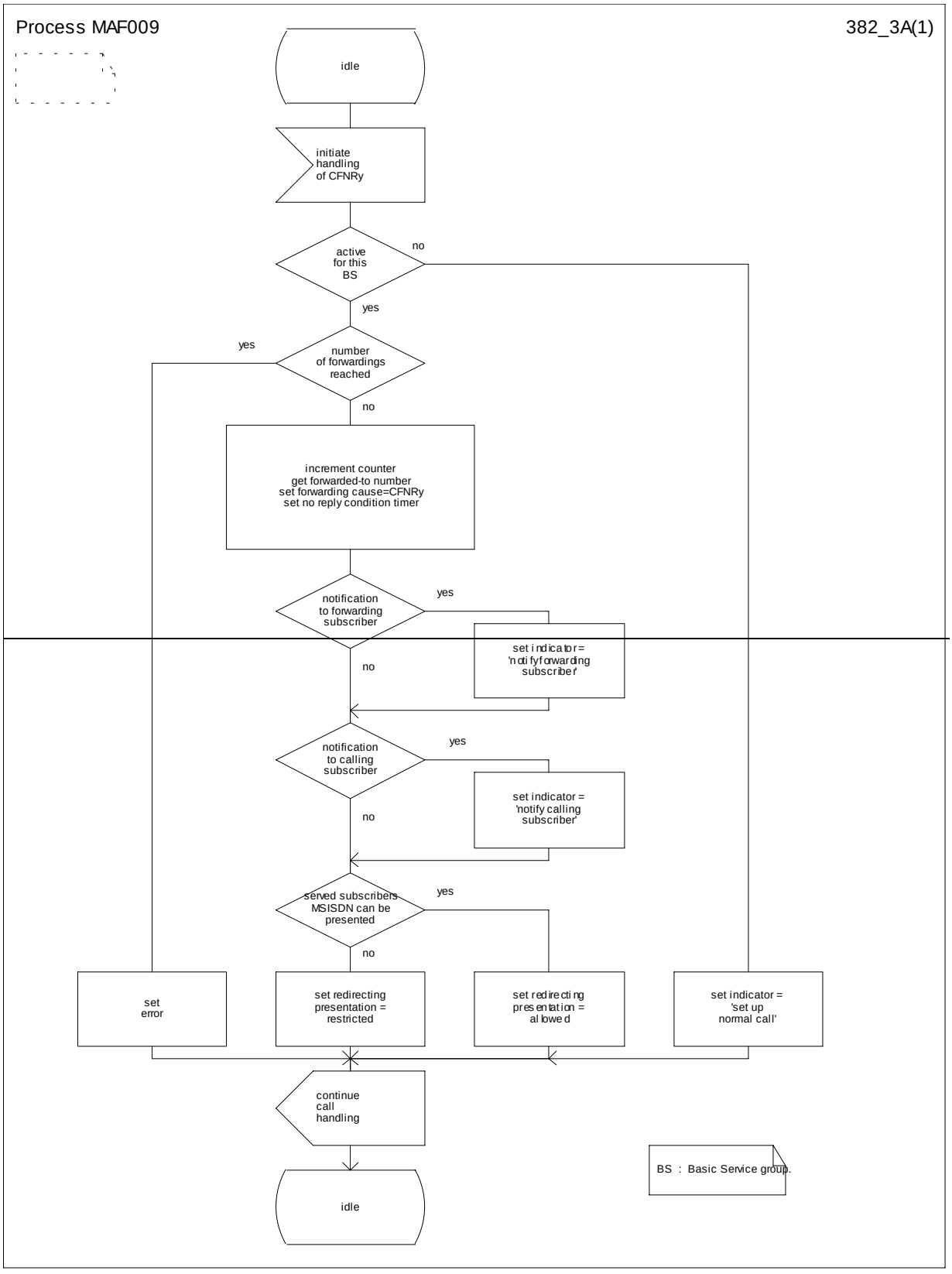
MAF009

Call forwarding on no reply authorizations examination

The ability of a PLMN component to determine the authorizations relating to call forwarding on no reply. See figure 3.10.

Location: VLR.

The information flows for forwarding to fixed terminal and to mobile station are shown in figures 3.11 and 3.12 respectively.


Process MAF009
382_3A(1)
idle
initiate handling of CFNRy
active for this BS
no
yes
number of forwardings reached
yes
no
increment counter
get forwarded-to number
set forwarding cause=CFNRy
set no reply condition timer
notification to forwarding subscriber
yes
set indicator = 'notify forwarding subscriber'
no
notification to calling subscriber
yes
set indicator = 'notify calling subscriber'
no
served subscribers MSISDN can be presented
yes
no
set error
set redirecting presentation = restricted
set redirecting presentation = allowed
set indicator = 'set up normal call'
continue call handling
idle
BS : Basic Service group.

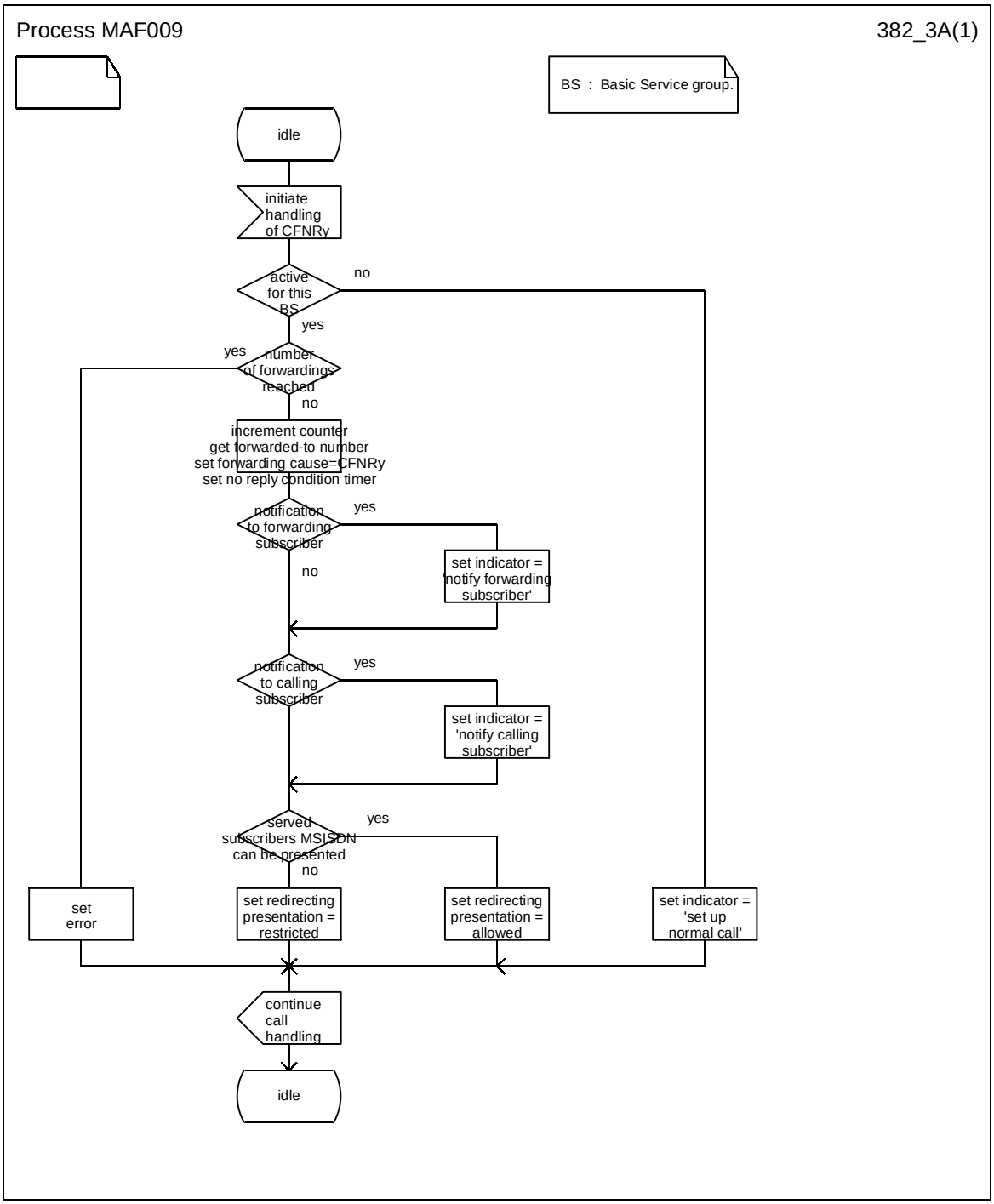
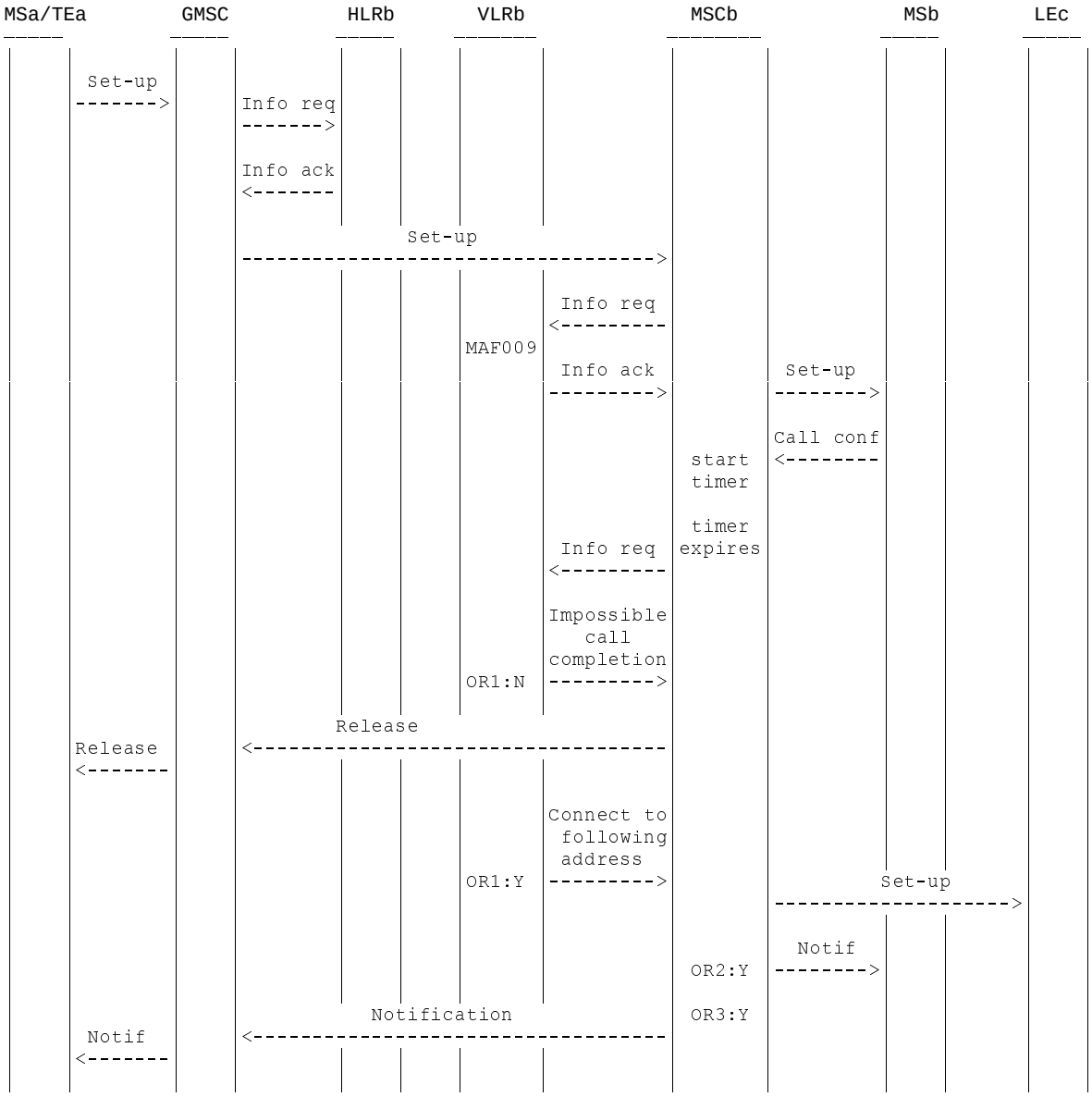


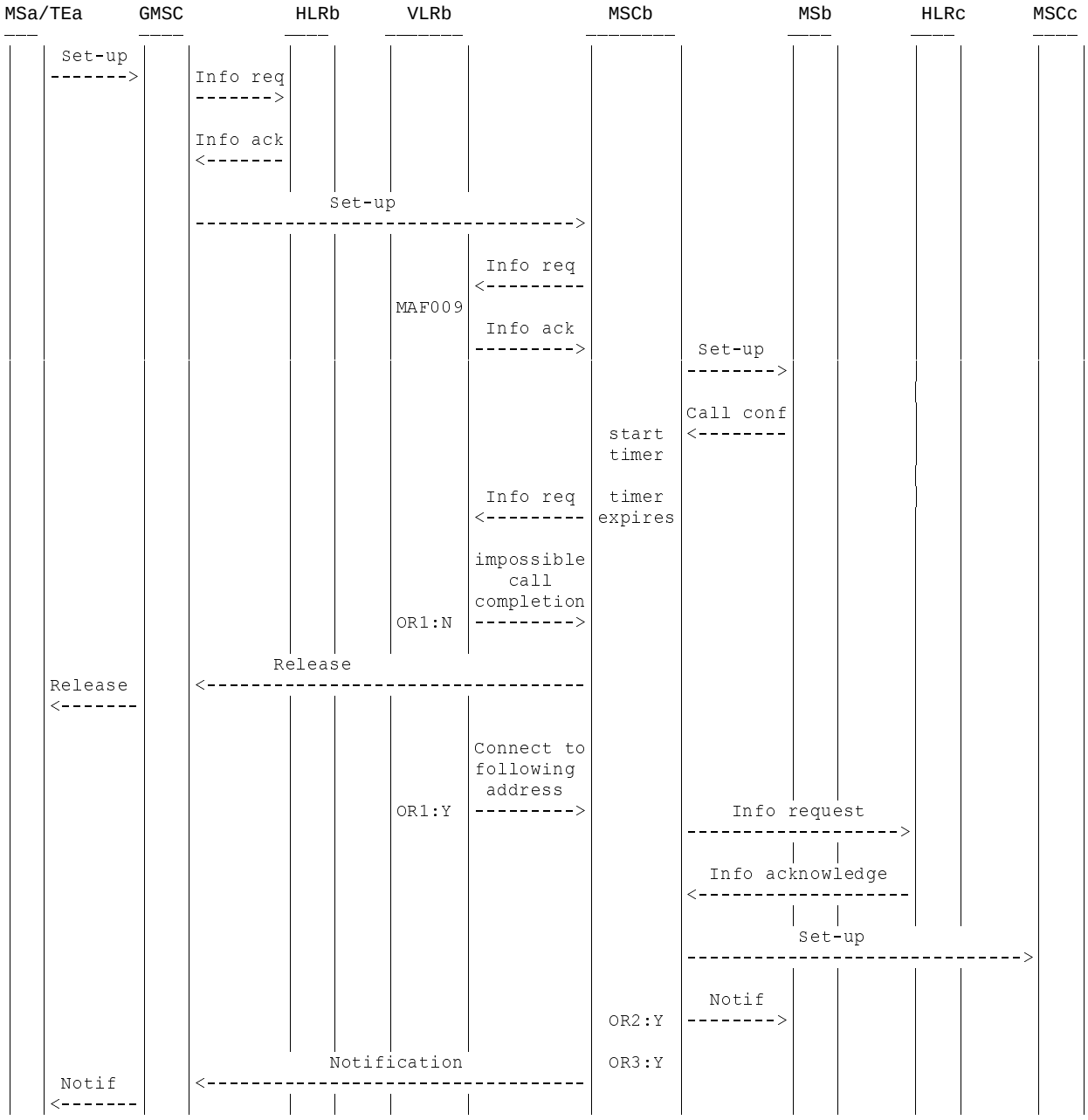
Figure 3.10: MAF009 Call forwarding on no reply authorisations examination (VLR)



NOTE:

info:	information	Y: Yes
req:	request	N: No
ack:	acknowledge	
notif:	notification	
conf:	confirmation	
OR1:	Call to be forwarded	
OR2:	Notification to forwarding subscriber required	
OR3:	Notification to calling subscriber required	

Figure 3.11: Information flow for call forwarding on no reply (to fixed terminal)



NOTE:

info:	information	Y: Yes
req:	request	N: no
ack:	acknowledge	
notif:	notification	
conf:	confirmation	
OR1:	Call to be forwarded	
OR2:	Notification to forwarding subscriber required	
OR3:	Notification to calling subscriber required	

Figure 3.12: Information flow for call forwarding on no reply (to mobile station)

3.3 Information stored in the HLR

The following logical states are applicable for CFNRy (refer to 3G TS 23.011 for an explanation of the notation):

Provisioning State	**Registration State**	**Activation State**	**HLR Induction State**
(Not Provisioned,	Not Registered,	Not Active,	Not Induced)
(Provisioned,	Not Registered,	Not Active,	Not Induced)
(Provisioned,	Registered,	Not Active,	Not Induced)
(Provisioned,	Registered,	Active and Quiescent,	Not Induced)
(Provisioned,	Registered,	Active and Operative,	Not Induced)

The registration and activation state may be different for each applicable elementary basic service group.

The provisioning state shall be on a per subscriber basis, and hence the same for all basic service groups.

The HLR shall store:

- the state of CFNRy (which shall be one of the valid states listed above) for each applicable elementary basic service group;
- the subscription option "notification to the calling party" on a per subscriber basis;

  This subscription option takes one of the following values:

  - no notification;
  - notification.
- the subscription option "notification to the forwarding party" on a per subscriber basis;

  This subscription option takes one of the following values:

  - no notification;
  - notification.
- the subscription option "MSISDN of the served subscriber can be presented to the forwarded-to subscriber" on a per subscriber basis;

  This subscription option takes one of the following values:

  - presentation restricted;
  - presentation allowed.
- the registration parameter "forwarded-to number" (possibly including a forwarded-to sub-address) for each applicable elementary basic service group;
- the registration parameter "no reply condition timer" for each applicable elementary basic service group.

  This parameter may take values in the range 5 - 30 seconds in steps of 5 seconds.

3.4 State transition model

The following figure shows the successful cases of transition between the applicable logical states of CFNRy. The state changes are either caused by actions of the service provider, the mobile user or the network.

Note that error cases are not shown in the diagram as they normally do not cause a state change. Additionally, some successful requests may not cause a state change. Hence, they are not shown in the diagram. The diagram only shows operations on an elementary basic service group.

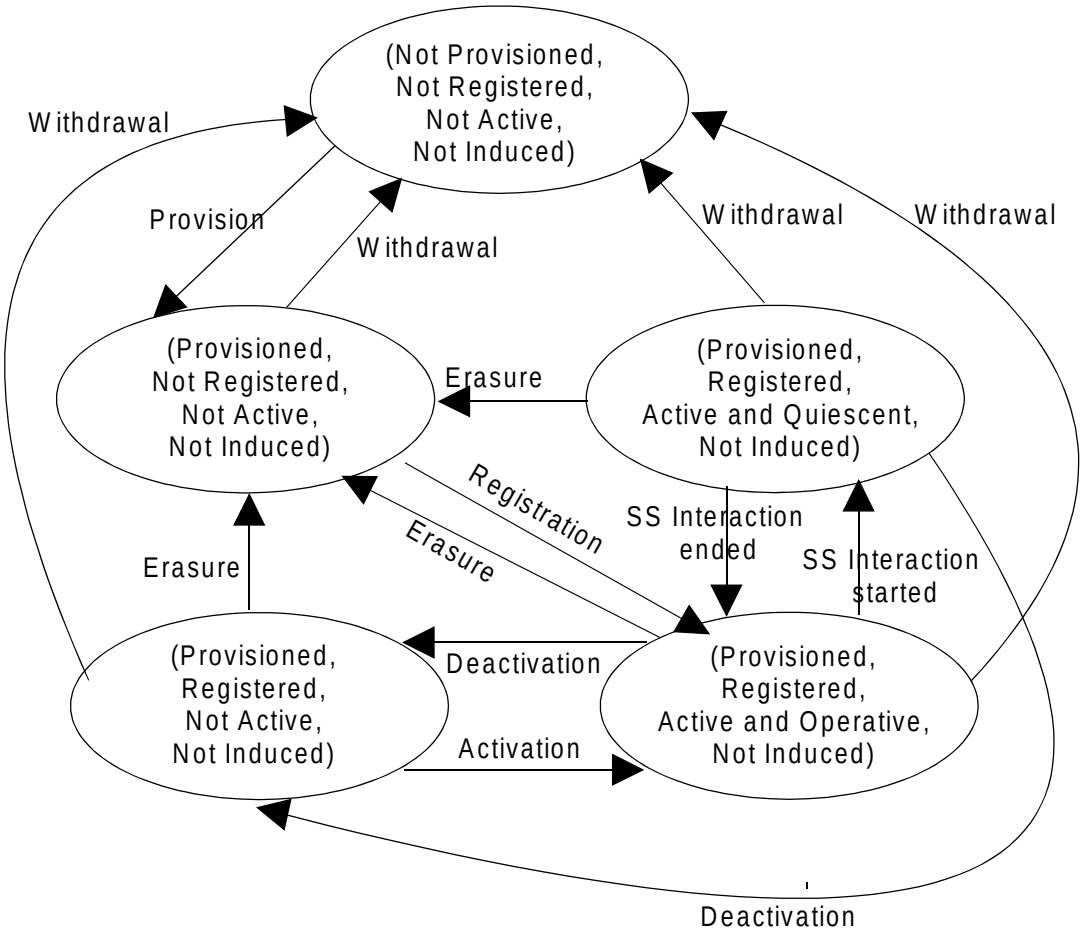


Figure 3.13: State transition model for CFNRy

3.5 Transfer of information from HLR to VLR

If the provisioning state for CFNRy is "Provisioned" then, when the subscriber registers on a VLR, the HLR shall send that VLR information about the logical state of CFNRy for all relevant elementary basic service groups.

If the registration state for CFNRy is "Registered" then, when the subscriber registers on a VLR, the HLR shall send that VLR the registration parameter "forwarded-to number" and "no reply condition timer" for all relevant elementary basic service groups and information about the subscription options "notification to the calling party", "notification to the forwarding party" and "MSISDN of the served subscriber can be presented to the forwarded-to subscriber".

If the logical state, the registration parameter "forwarded-to number" or the registration parameter "no reply condition timer" of CFNRy is changed while a subscriber is registered on a VLR then for the affected basic service groups, the HLR shall inform the VLR respectively of the new logical state or the new registration parameter of CFNRy.

If information about the subscription options "notification to the calling party" and "notification to the forwarding party" of CFNRy is changed while a subscriber is registered on a VLR and the registration state of CFNRy is "Registered" then the HLR shall inform the VLR of the new information about the subscription options of CFNRy.

3.6 Information stored in the VLR

For CFNRy the VLR shall store the service state information, the registration parameter "forward-to number", the registration parameter "no reply condition timer" and the subscription options received from the HLR.

3.7 Handover

Handover will have no impact on the control procedure and the operation of the service.

3.8 Cross phase compatibility

3.8.1 MS, MSC, VLR or HLR only support Phase 1 control of SS by the subscriber

In response to a CFNRy interrogation request, if the MS or any network element involved is of Phase 1, only information concerning basic service groups for which the activation state has the value "Active and Operative" will be returned. This means that the subscriber will not be aware that the forwarded to number is registered if CFNRy is deactivated or active (quiescent). A subaddress (if registered) will not be included.

Note that if any network element involved is of Phase 1, CFNRy Registration requests which use a subaddress and all CFNRy Activation and Deactivation requests will be rejected, as these are not specified in Phase 1.

3.8.2 HLR only supports Phase 1 updating of subscriber information

If the VLR receives the SS-Status parameter from a Phase 1 HLR it shall act if it has received the SS-Status parameter with the values shown in the following:

1) Registered, Activated => P bit =1, R bit = 1, A bit = 1, Q bit = 0;
2) Registered, Deactivated => P bit =1, R bit = 1, A bit = 0, Q bit = 0 or 1;
3) Erased => P bit =1, R bit = 0, A bit = 0, Q bit = 0 or 1.

3.8.3 VLR only supports Phase 1 updating of subscriber information

When passing CFNRy information to a Phase 1 VLR, the HLR shall send the service state information in a form which the VLR can accept, based on the logical state held in the HLR, as follows:

1) (Provisioned, Not Registered, Not Active, Not Induced)

   => Erased, Deactivated;

2) (Provisioned, Registered, Not Active, Not Induced)

   => Registered, Deactivated;

3) (Provisioned, Registered, Active and Operative, Not Induced)

   => Registered, Activated;

4) (Provisioned, Registered, Active and Quiescent, Not Induced)

   => Registered, Deactivated.

The HLR shall not pass a subaddress to a Phase 1 VLR.

3.8.4 VLR only supports Phase 1 call handling

When a call is forwarded on no reply, as the HLR does not pass the subaddress to the VLR, calls shall be forwarded without the subaddress.

3.8.5 VLR does not support CAMEL or supports CAMEL Phase 1 only

When passing CFNRy information to a VLR not supporting CAMEL or supporting CAMEL Phase 1 only, the HLR shall send the registration parameter "forwarded-to number" only if it is registered in a format which the VLR can accept, i.e. international format.

If the registration state for CFNRy is "Registered" and the forwarded-to number is registered in a format other than international, then when updating a VLR not supporting CAMEL or supporting CAMEL Phase 1 only the HLR shall modify the service state information of CFNRy as follows.

1) (Provisioned, Registered, Not Active, Not Induced)

   => (Provisioned, Not Registered, Not Active, Not Induced)

2) (Provisioned, Registered, Active and Operative, Not Induced)

   => (Provisioned, Not Registered, Not Active, Not Induced)

3) (Provisioned, Registered, Active and Quiescent, Not Induced)

   => (Provisioned, Not Registered, Not Active, Not Induced)

According to the definitions in subclause 3.5 no forwarded-to number will be passed to the VLR in these cases. The modification of the service state information sent to the VLR shall have no impact on the service state information stored in the HLR.

If the VLR supports Phase 1 updating of subscriber information only, a further translation of the service state information as defined in subclause 3.8.3 shall be performed by the HLR.

3.9 Contents of messages

The same additions apply for CFNRy as for CFB, see subclause 2.9.

3.10 Support of Long Forwarded-to Numbers

The handling for CFNRy is the same as that for CFB, see subclause 2.10.

4 Call forwarding on mobile subscriber not reachable

4.1 Handling of call forwarding on mobile subscriber not reachable

4.1.1 Registration

The same rules apply for the registration of Call Forwarding on Mobile Subscriber Not Reachable as were described for Call Forwarding Unconditional in subclause 1.1.1 above, with the exception of the checking of interaction with other supplementary services. Basic registration of information is illustrated in figure 4.2.

Supplementary Service Interaction

Possible interaction situations between CFNRc and other supplementary services must then be checked. This is described in figure 4.2. Also see 3G TS 22.004 and 3G TS 22.082. For interaction between CFNRc and other supplementary services (ie not call barring or call forwarding services), the reader is referred to the respective technical specification for those supplementary services.

Interaction with CAMEL Phase 2 or higher

Possible interaction between CFNRc and CAMEL Phase 2 or higher is described in figure 4.2. If CAMEL Phase 2 or higher is not supported in the HLR, processing continues from the "No" exit of the test "Result=Pass".

The information flow for registration of call forwarding on mobile subscriber not reachable is shown in figure 4.1.

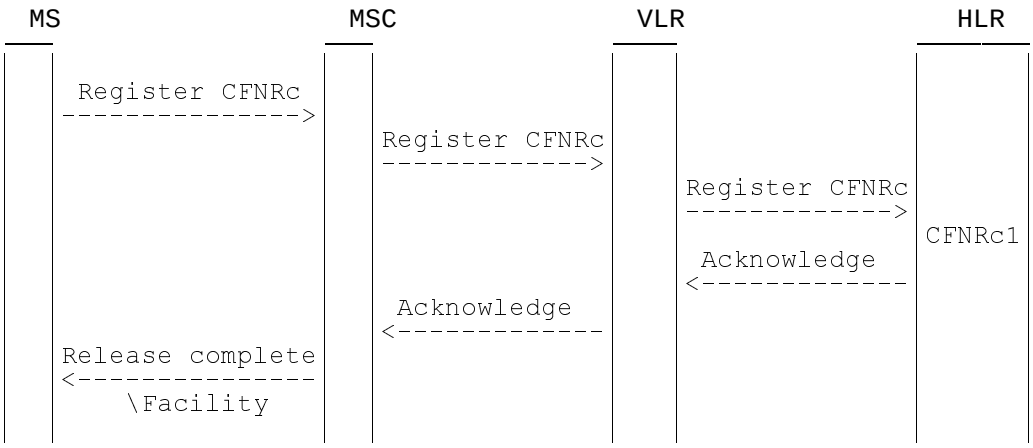
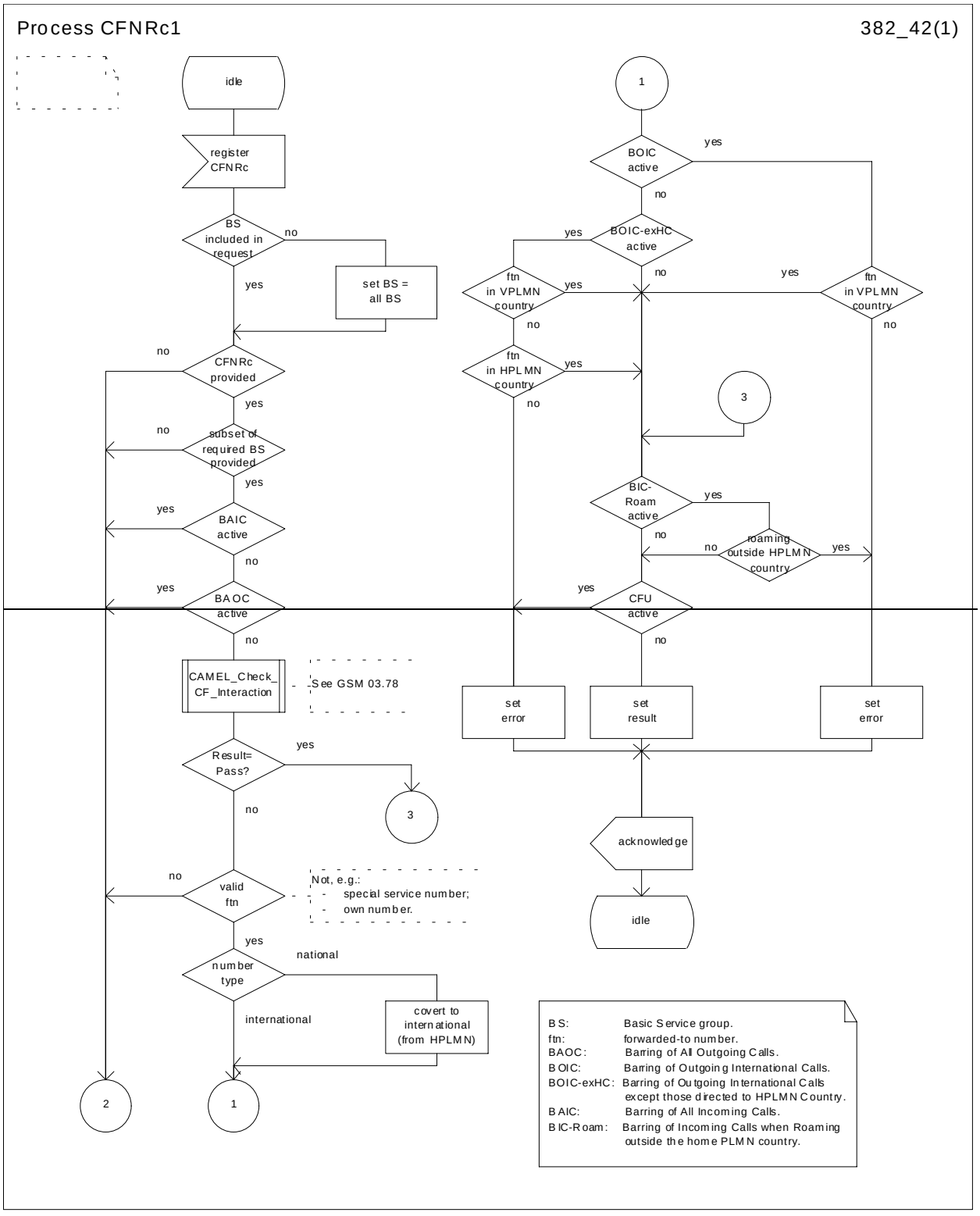


Figure 4.1: Registration of call forwarding on mobile subscriber not reachable


Process CFNRc1
382_42(1)
idle
register CFNRc
BS included in request
no
yes
set BS = all BS
CFNRc provided
no
yes
subset of required BS provided
no
yes
BAIC active
yes
no
BAOC active
yes
no
CAMEL_Check_ CF_Interaction
See GSM 03.78
Result= Pass?
yes
no
3
valid ftn
no
Not, e.g.:
- special service number;
- own number.
yes
number type
national
international
covert to international (from HPLMN)
2
1
1
BOIC active
yes
no
BOIC-exHC active
yes
no
ftn in VPLMN country
yes
no
ftn in HPLMN country
yes
no
yes
ftn in VPLMN country
no
3
BIC-Roam active
yes
no
roaming outside HPLMN country
no
yes
CFU active
yes
no
set error
set result
set error
acknowledge
idle
BS: Basic Service group.
ftn: forwarded-to number.
BAOC: Barring of All Outgoing Calls.
BOIC: Barring of Outgoing International Calls.
BOIC-exHC: Barring of Outgoing International Calls except those directed to HPLMN Country.
BAIC: Barring of All Incoming Calls.
BIC-Roam: Barring of Incoming Calls when Roaming outside the home PLMN country.

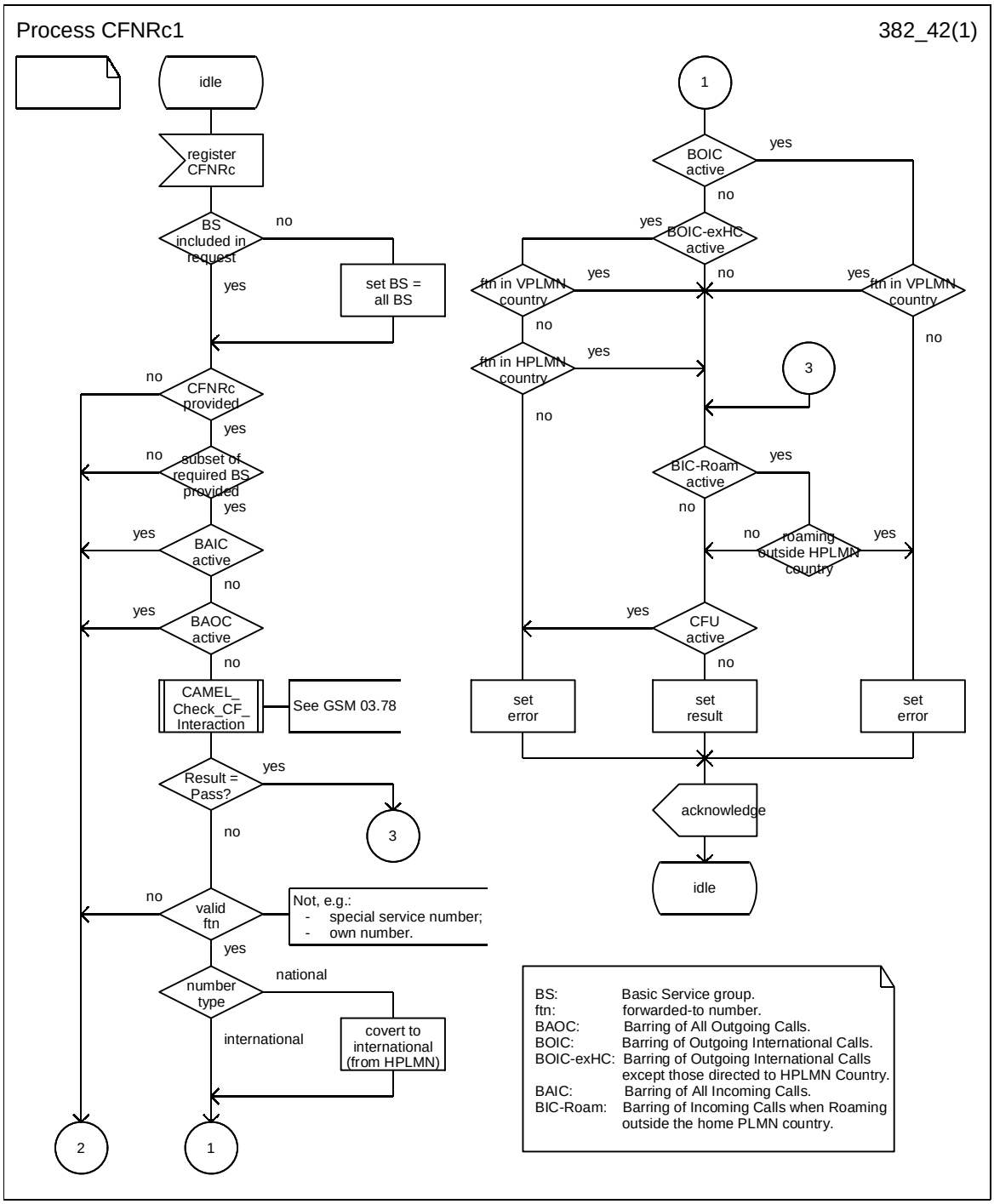


Figure 4.2: CFNRc1 Call forwarding on mobile subscriber not reachable registration process

4.1.2 Erasure

The same rules apply for the erasure of CFNRc as were described for CFU in subclause 1.1.2 above. However, no checks for interaction with other supplementary services are required for erasure of CFNRc, see figure 4.4.

The information flow for registration of CFNRc is shown in figure 4.3.

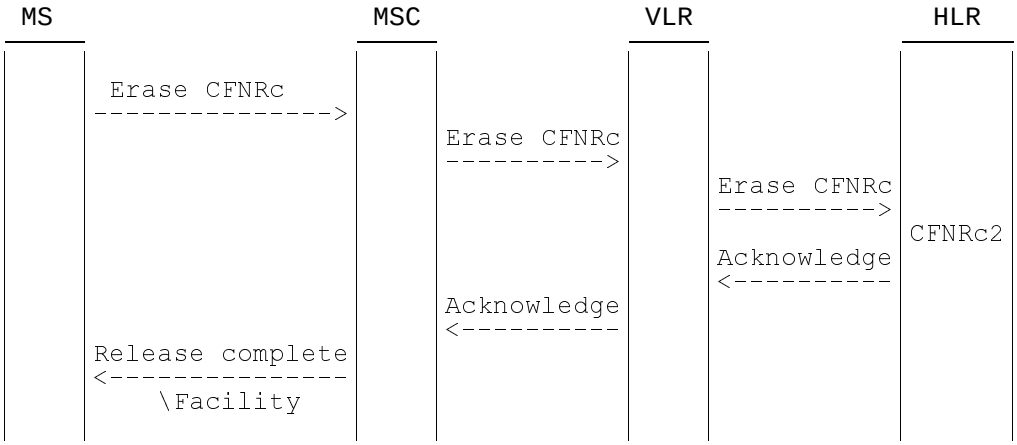
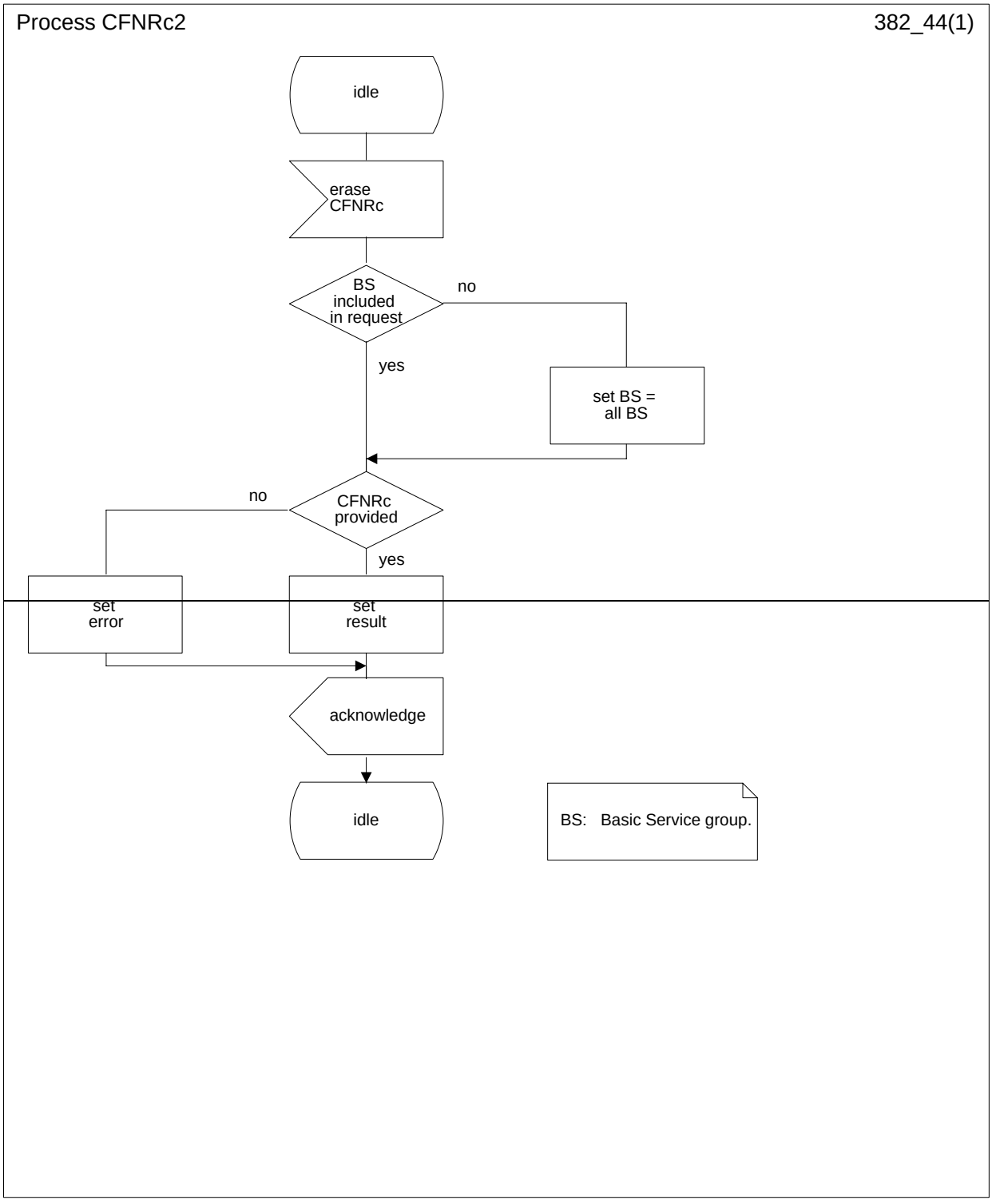


Figure 4.3: Erasure of call forwarding on mobile subscriber not reachable


Process CFNRc2
382_44(1)
idle
erase CFNRc
BS included in request
no
yes
set BS = all BS
CFNRc provided
no
yes
set error
set result
acknowledge
idle
BS: Basic Service group.

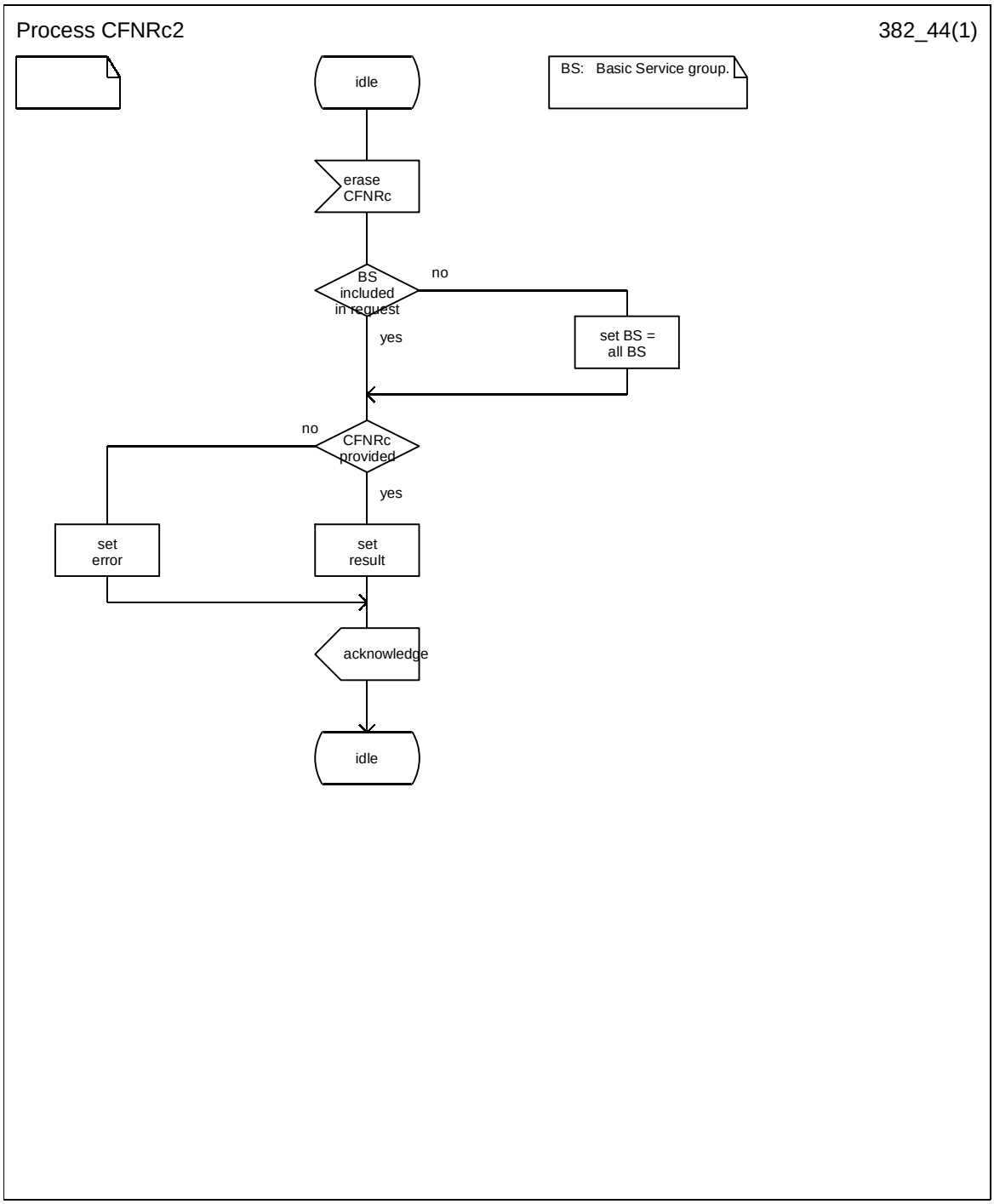


Figure 4.4: CFNRc2 Call forwarding on mobile subscriber not reachable erasure process

4.1.3 Activation

The same rules apply for the activation of CFNRc as were described for CFU in subclause 1.1.3 above, with the exception of the checking of interaction with other supplementary services. Basic activation of CFNRc is illustrated in figure 4.6.

Supplementary Service Interaction

Possible interaction situations between CFNRc and other supplementary services must then be checked. This is described in figure 4.6. Also see 3G TS 22.004 and 3G TS 22.082. For interaction between CFNRc and other supplementary services (i.e. not call barring or call forwarding services), the reader is referred to the respective technical specification for those supplementary services.

The information flow for activation of call forwarding on MS not reachable is shown in figure 4.5.

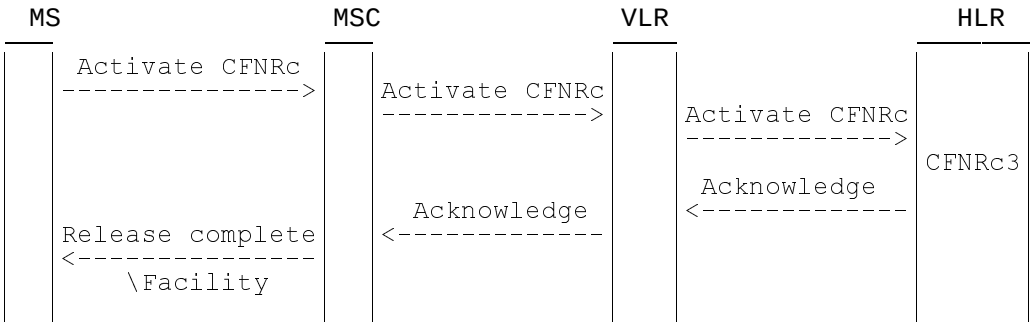
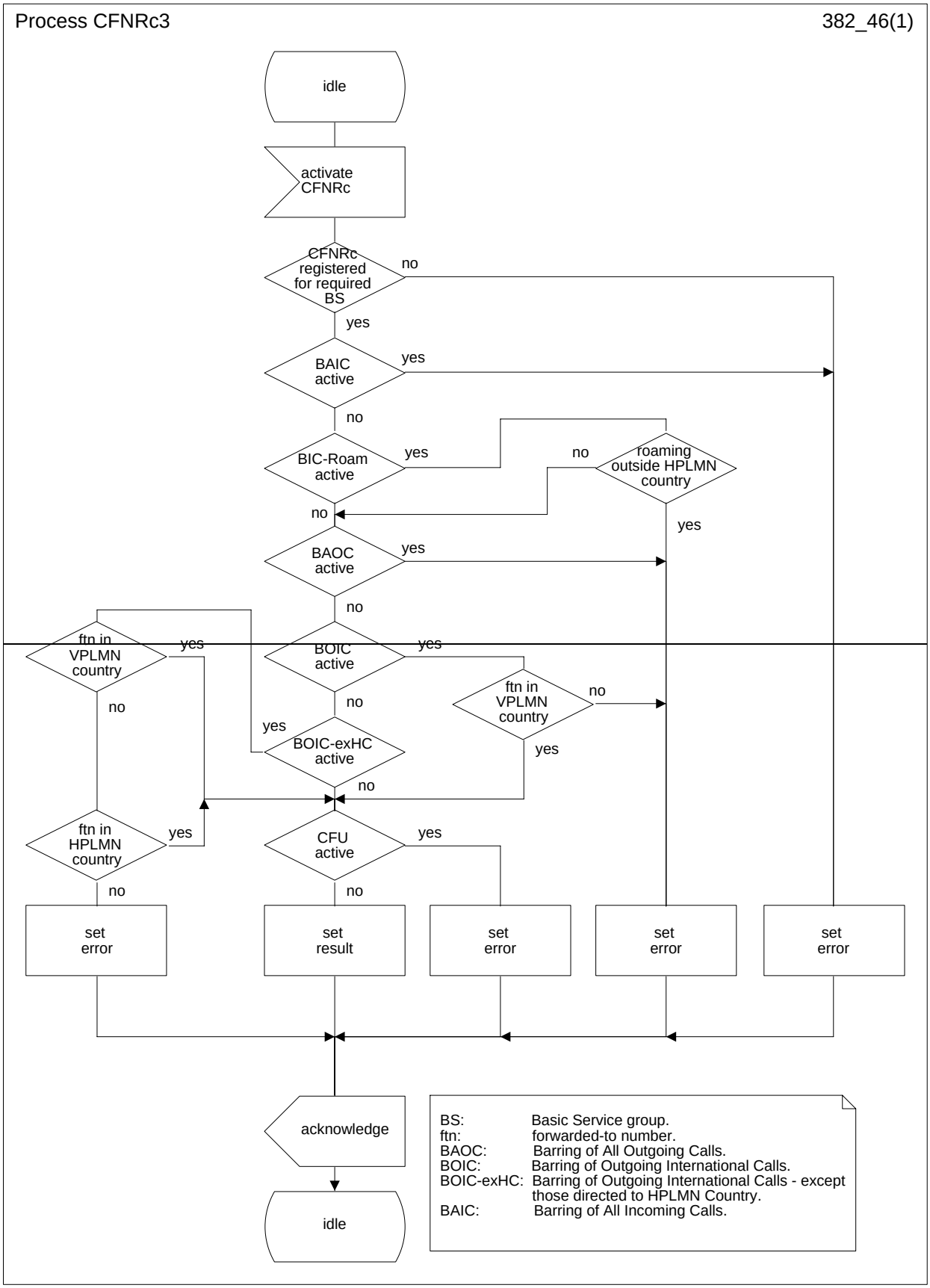


Figure 4.5: Activation of call forwarding on MS not reachable


Process CFNRc3
382_46(1)
idle
activate CFNRc
CFNRc registered for required BS
no
yes
BAIC active
yes
no
BIC-Roam active
yes
no
roaming outside HPLMN country
no
yes
BAOC active
yes
no
ftn in VPLMN country
yes
BOIC active
yes
no
ftn in VPLMN country
no
yes
BOIC-exHC active
yes
no
ftn in HPLMN country
yes
CFU active
yes
no
no
set error
set result
set error
set error
set error
acknowledge
idle
BS: Basic Service group.
ftn: forwarded-to number.
BAOC: Barring of All Outgoing Calls.
BOIC: Barring of Outgoing International Calls.
BOIC-exHC: Barring of Outgoing International Calls - except those directed to HPLMN Country.
BAIC: Barring of All Incoming Calls.

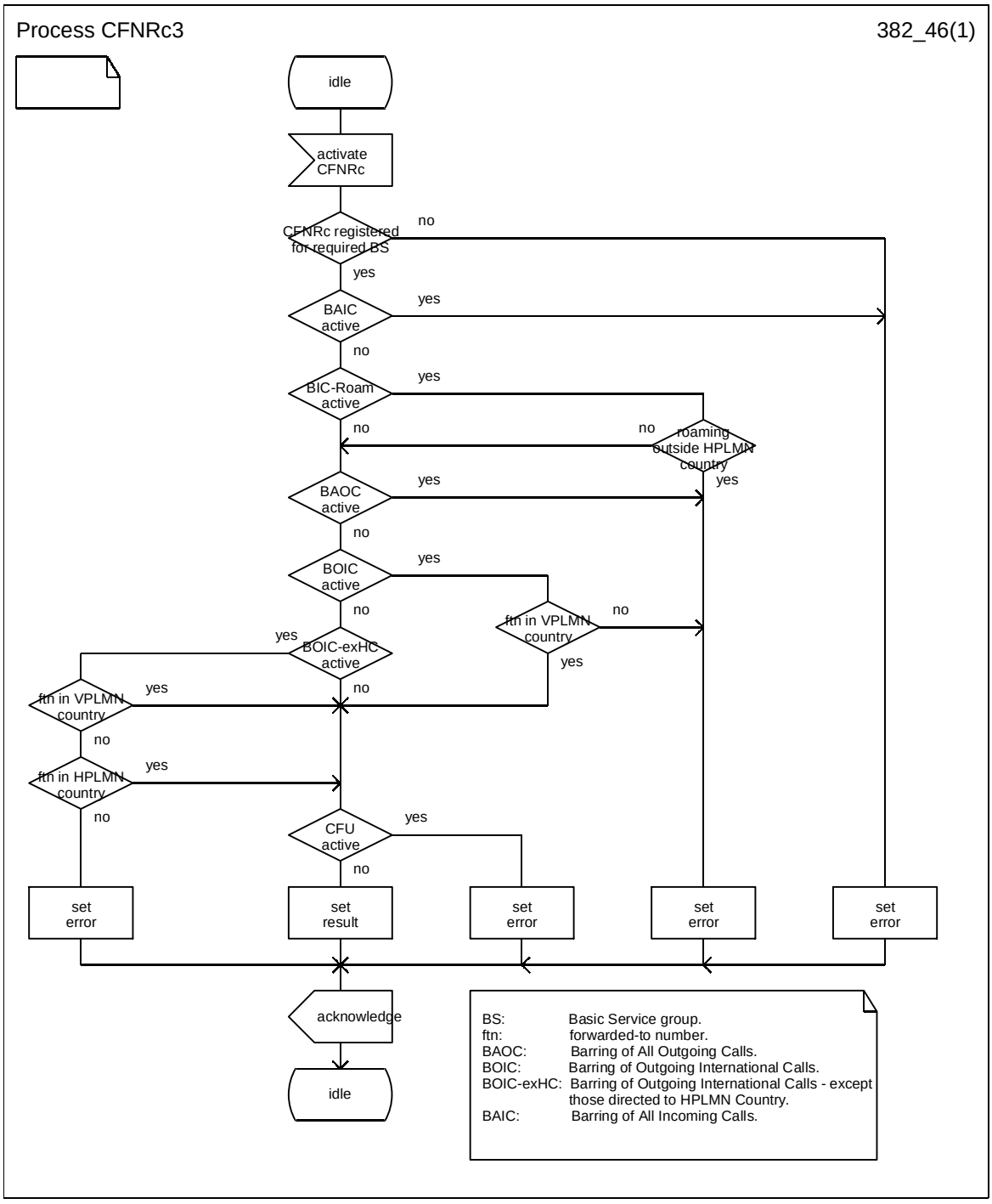


Figure 4.6: CFNRc3 Call forwarding on mobile subscriber not reachable activation process

4.1.4 Deactivation

The same rules apply for the deactivation of CFNRc as were described for CFU in subclause 1.1.4 above, see figure 4.8.

The information flow for deactivation of call forwarding on mobile subscriber not reachable is shown in figure 4.7.

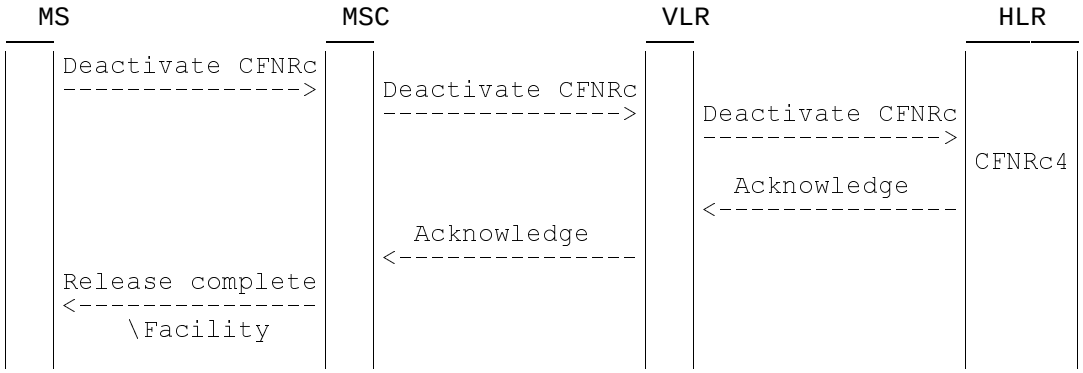
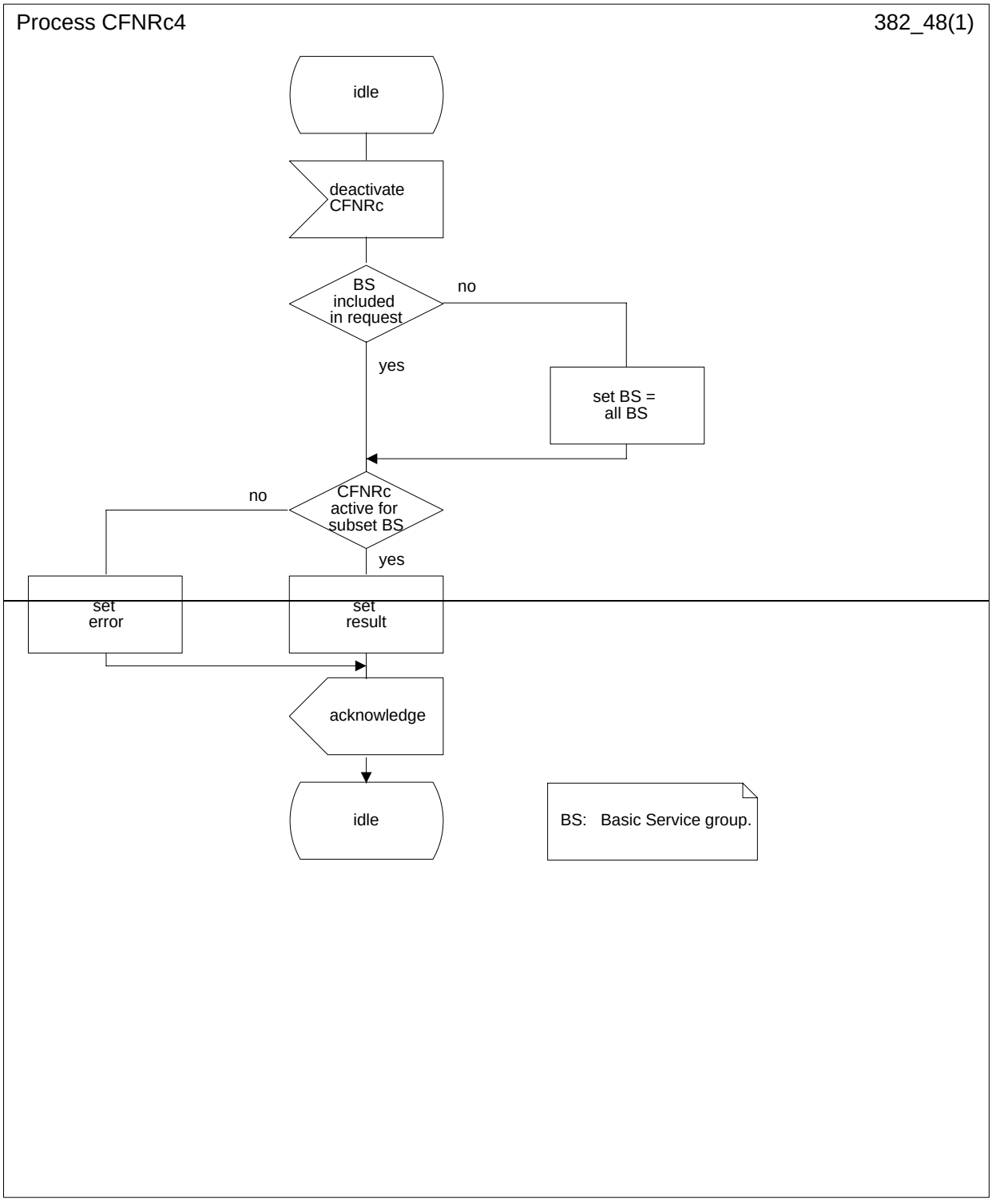


Figure 4.7: Deactivation of call forwarding on mobile subscriber not reachable


Process CFNRc4
382_48(1)
idle
deactivate CFNRc
BS included in request
no
yes
set BS = all BS
CFNRc active for subset BS
no
yes
set error
set result
acknowledge
idle
BS: Basic Service group.

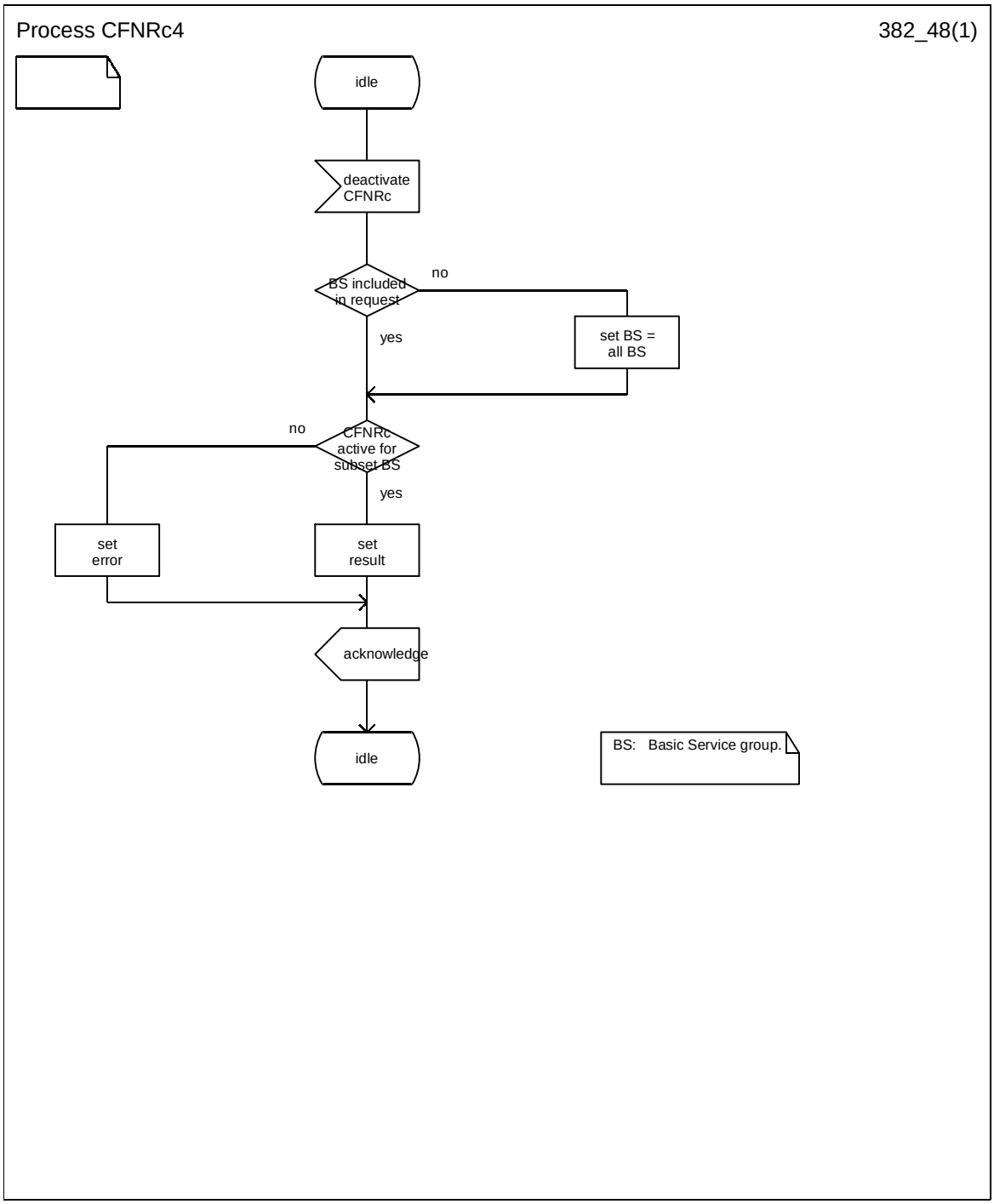


Figure 4.8: CFNRc4 Call forwarding on mobile subscriber not reachable deactivation process

4.1.5 Interrogation

Data request

The data request procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. Interrogation of CFNRc is handled by the VLR which returns the required information or error to the MS, see figure 4.9.

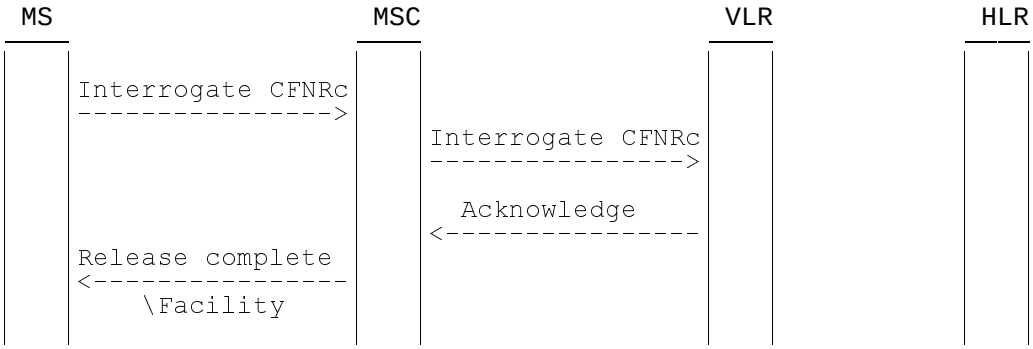


Figure 4.9: Interrogation of call forwarding on mobile subscriber not reachable

4.2 Functions and information flows

4.2.1 Call re-routed from VLR

The following Mobile Additional Function has been identified for the PLMN:

MAF010

Examination of call forwarding on mobile subscriber not reachable authorizations

The ability of a PLMN component to determine the authorizations relating to call forwarding on mobile subscriber not reachable in case the mobile subscriber is not reachable in the VLR, in case of no paging response or radio congestion. See figure 4.10.

Location: VLR.

The information flows for forwarding to fixed terminal and to mobile station are shown in figures 4.11 and 4.12 respectively. These flows represent the case where the mobile subscriber is not reachable in the VLR, and that this fact was not detected at interrogation from the HLR. This situation occurs if the MSC requests the VLR to provide information for a mobile terminating call towards a subscriber who is detached in the VLR.

Figures 4.13 and 4.14 show the information flows in case of no paging response.

Figures 4.15 and 4.16 show the information flows in case of radio congestion.

4.2.2 Call re-routed from HLR

The following Mobile Additional Function has been identified for the PLMN:

MAF010

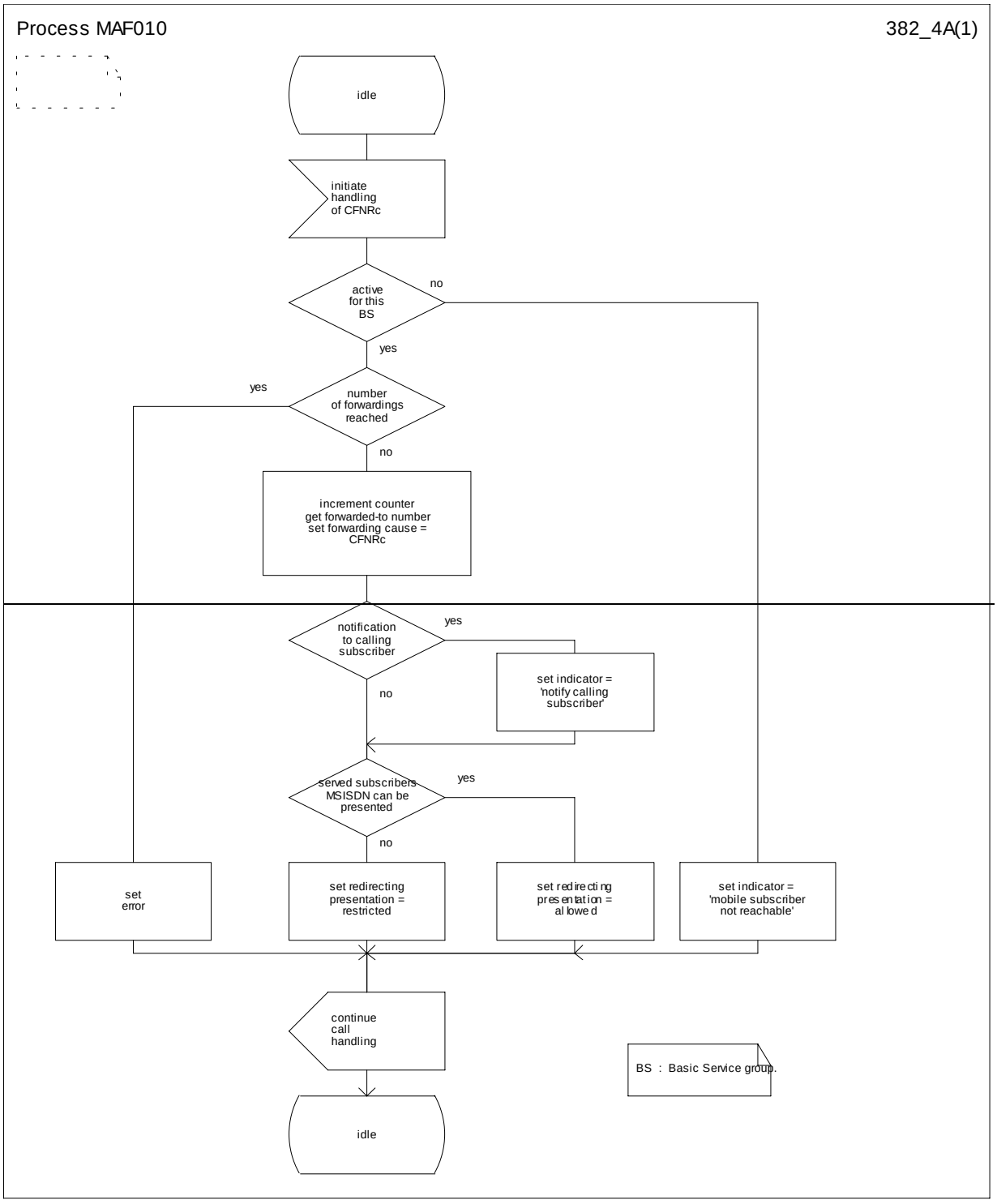
Examination of call forwarding on mobile subscriber not reachable authorizations

The ability of a PLMN component to determine the authorizations relating to call forwarding on mobile subscriber not reachable in case the mobile subscriber is deregistered or purged in the HLR or not reachable in the VLR. See figure 4.10.

Location: HLR.

The information flows for forwarding to fixed terminal and to mobile station are shown in figures 4.17 and 4.18 respectively. These flows represent the case where the call is re-routed from the HLR because information from the VLR indicates that the subscriber cannot be reached in the VLR. This situation occurs if the VLR detects at roaming number request time that the subscriber concerned is detached or that there is no roaming number available.

Figures 4.19 and 4.20 show the information flows for forwarding to fixed terminal and to mobile station respectively in case where the call is re-routed by the HLR because the subscriber is deregistered or purged in the HLR.


Process MAF010
382_4A(1)
idle
initiate handling of CFNRc
active for this BS
no
yes
number of forwardings reached
yes
no
increment counter get forwarded-to number set forwarding cause = CFNRc
notification to calling subscriber
yes
set indicator = 'notify calling subscriber'
no
served subscribers MSISDN can be presented
yes
no
set error
set redirecting presentation = restricted
set redirecting presentation = allowed
set indicator = 'mobile subscriber not reachable'
continue call handling
BS : Basic Service group.
idle

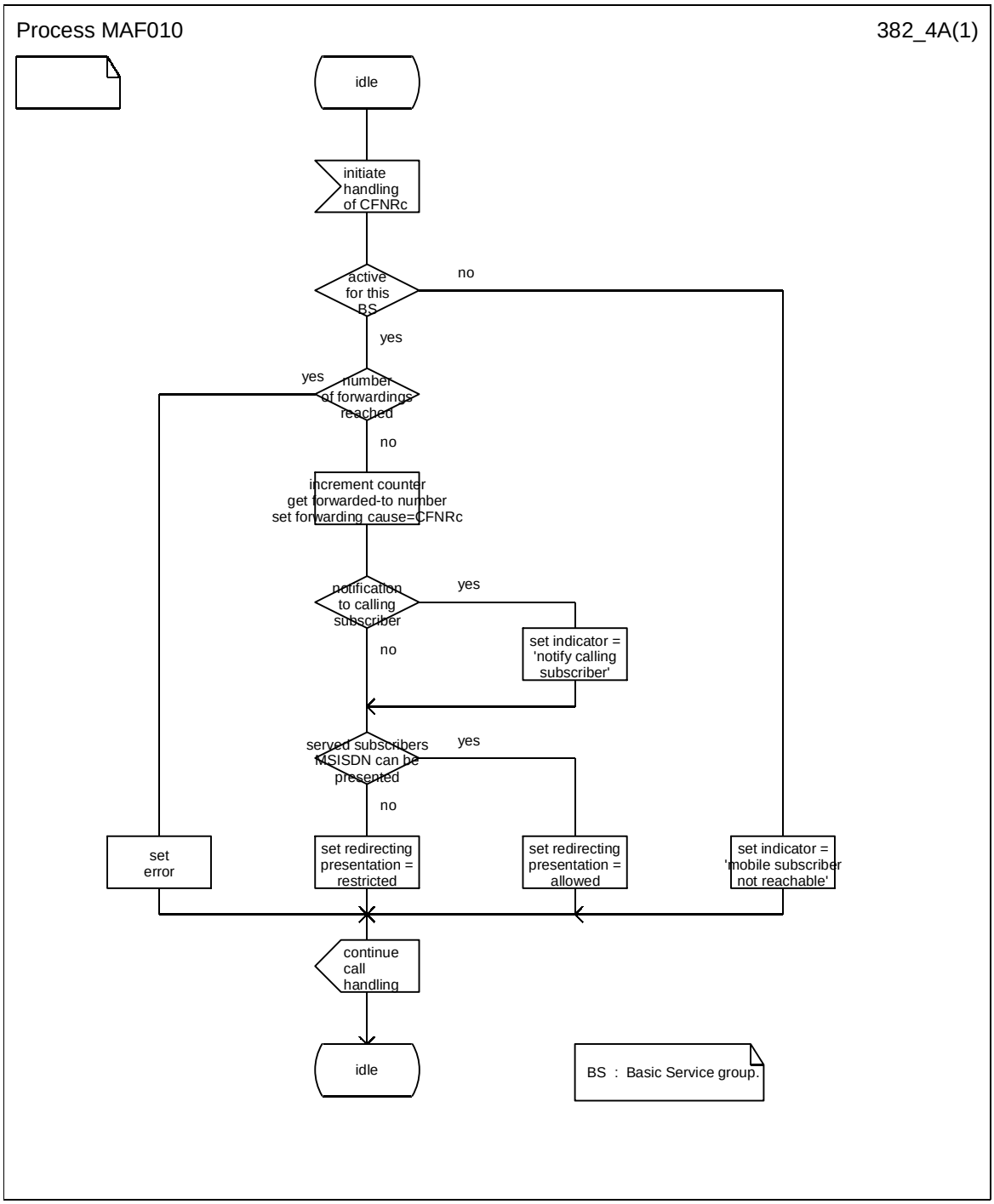

Process MAF010
382_4A(1)
idle
initiate handling of CFNRc
active for this BS
no
yes
yes
number of forwardings reached
no
increment counter
get forwarded-to number
set forwarding cause=CFNRc
notification to calling subscriber
yes
set indicator = 'notify calling subscriber'
no
served subscribers MSISDN can be presented
yes
no
set error
set redirecting presentation = restricted
set redirecting presentation = allowed
set indicator = 'mobile subscriber not reachable'
continue call handling
idle
BS : Basic Service group.

Figure 4.10: MAF010 Call forwarding on mobile subscriber not reachable authorisations examination (VLR and HLR)

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000431
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.083	CR	004	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#09	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: N4 **Date:** 2000-06-26

Subject: SDL refresh

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

The SDL diagrams in this document have been replaced, without any semantic changes due to the following reasons:

- In the previous version, the diagrams contained nothing but garbage when viewed on-screen.
- Some of the diagrams were, if not impossible, very hard to print.
- A binary version of the SDL diagrams, suitable for standard tools, is needed to assure a qualitative handling of the diagrams in the future. Telelogic Tau SDL Suite (formerly known as SDT) versions of the diagrams have been created and made available, providing a new fresh base for future changes. For obvious reasons, the binary version, to be regarded as the source, should be mirrored in the document. Therefore, the diagrams replacing the previous versions are printouts of the binary versions.

Clauses affected: All figures in the document, containing an SDL diagram.

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:

ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

1.2.1.2 Behaviour during the "Waiting" State

Expiry of Timer T3

If no acceptance is received by the network within the time period T3 (timer T3 expires) the waiting call shall be forwarded on no reply and clearing shall be initiated towards the controlling user B. The call waiting service is resumed for further incoming calls.

Expiry of Timer T2

If call forwarding on no reply is not active and no acceptance is received within the time period T2 (timer T2 expires), the waiting call shall be cleared by the network towards the controlling user B and the calling user C. The call waiting service is resumed for further incoming calls.

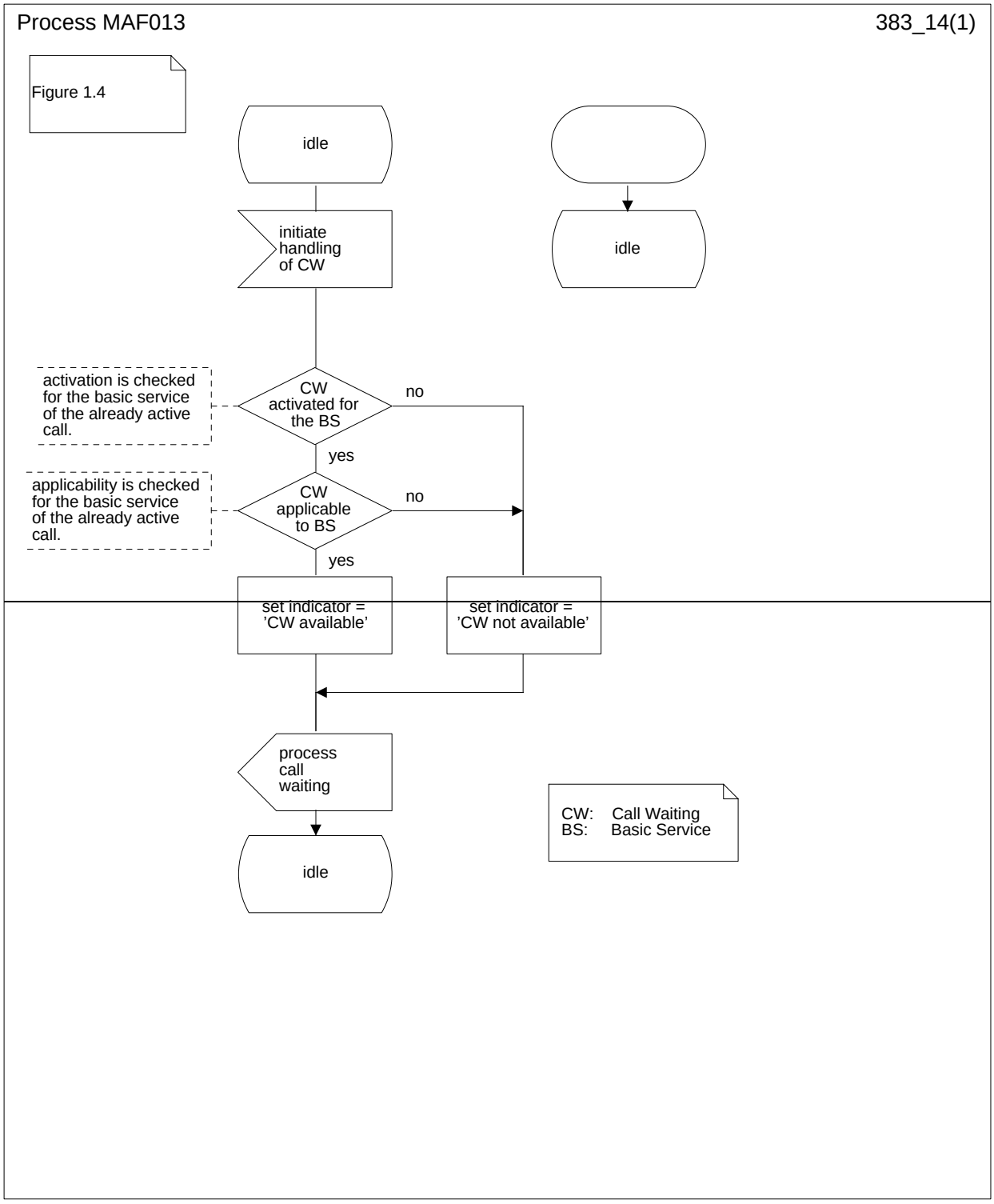
Other Events

The following events are treated as described in subclause 1.2.1.1:

- release of active call;
- release of call by user C;
- call hold service;
- indication of UDUB;
- rejection of call from user C.

Acceptance of waiting call

A precondition for the acceptance of the waiting call is that there is no other call in the (active, idle) state. The user can achieve this by releasing active calls, or using the call hold service. When user B accepts the call from user C it becomes the (active, idle) call. Timer T2 or T3 is stopped. The call waiting service is resumed for further incoming calls.


Process MAF013
383_14(1)
Figure 1.4
idle
initiate handling of CW
idle
activation is checked for the basic service of the already active call.
CW activated for the BS
no
yes
applicability is checked for the basic service of the already active call.
CW applicable to BS
no
yes
set indicator = 'CW available'
set indicator = 'CW not available'
process call waiting
idle
CW: Call Waiting
BS: Basic Service

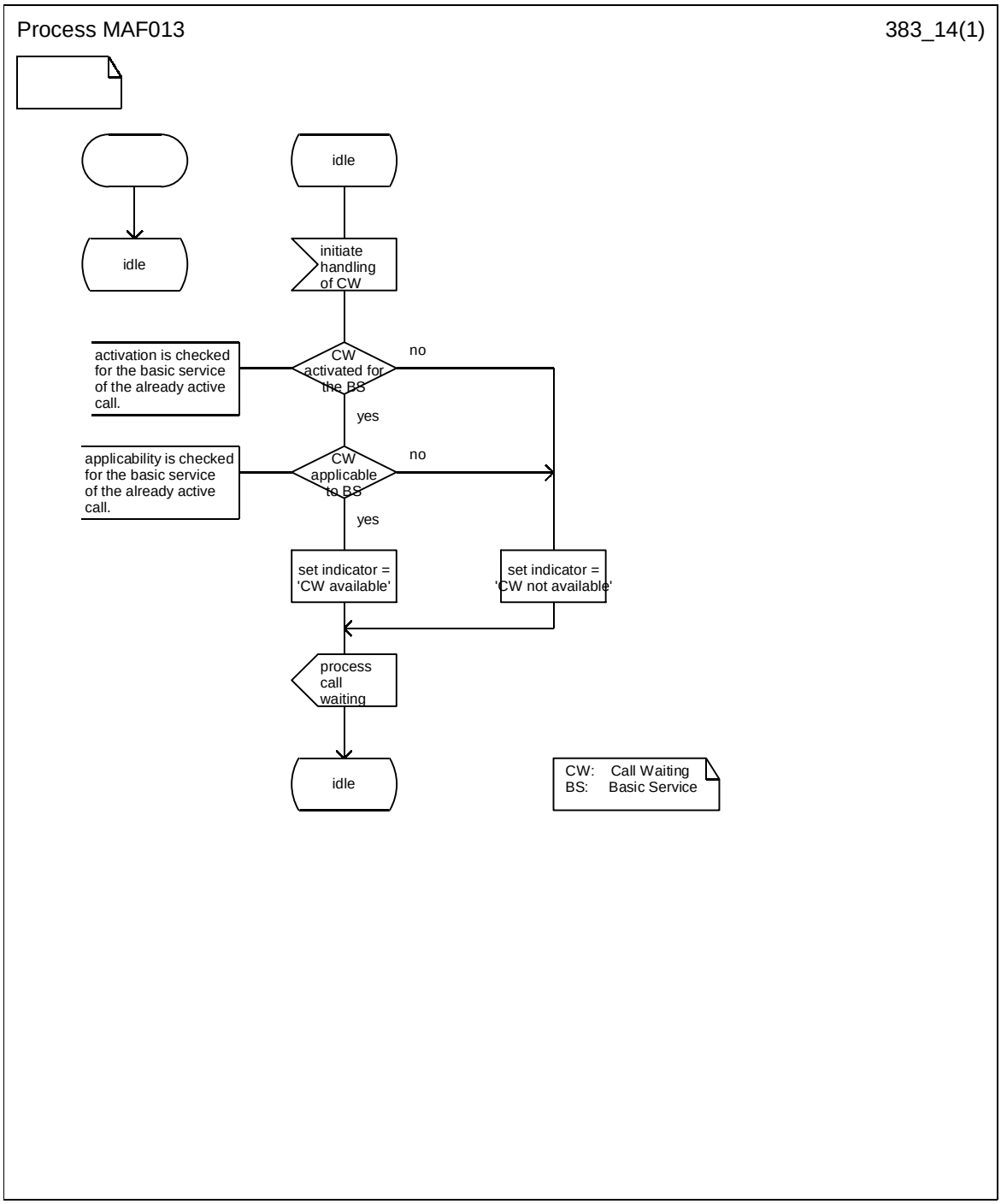
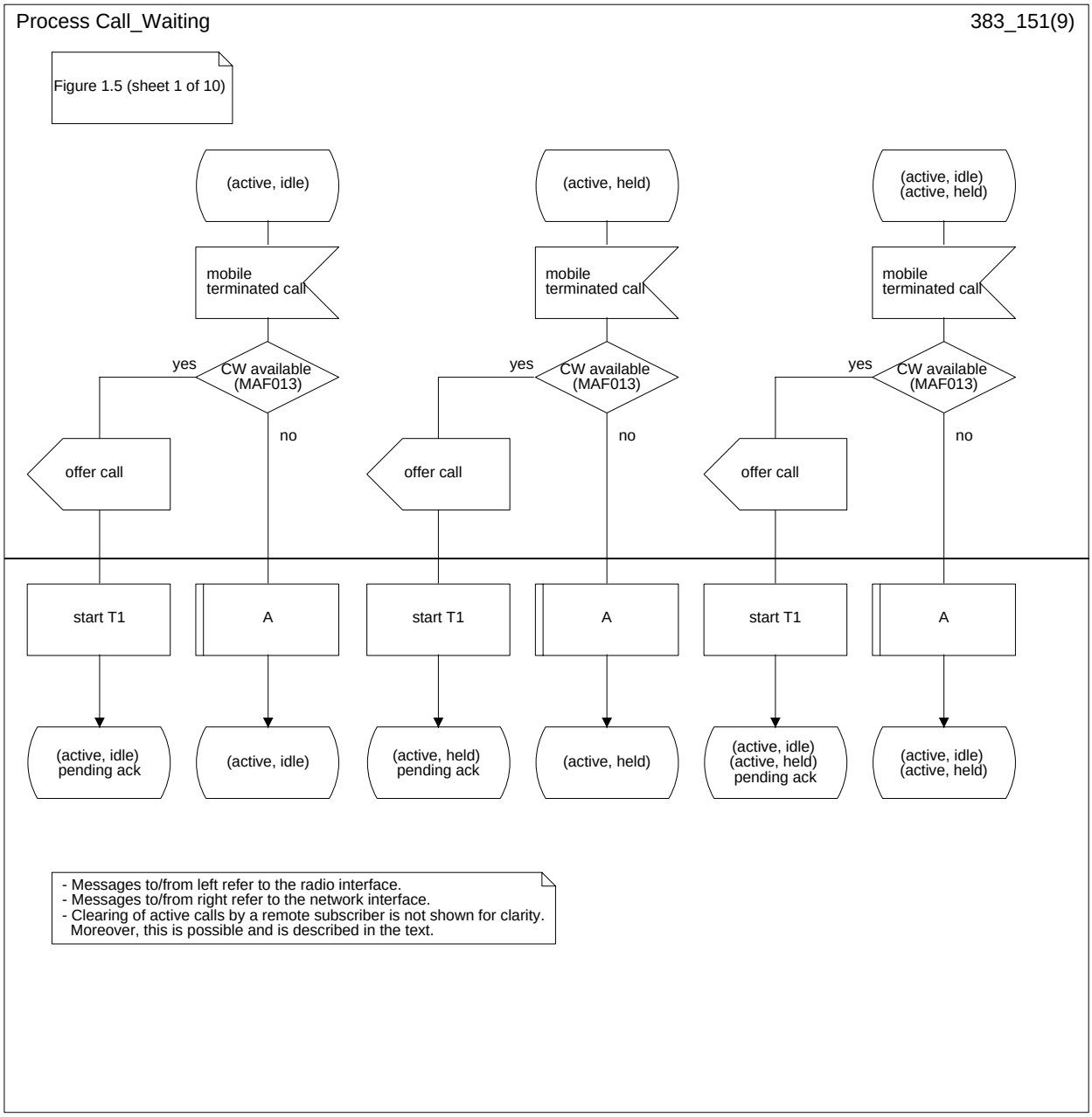


Figure 1.4: MAF013 Call waiting related authorisations examination (VLR)


Process Call_Waiting
383_151(9)
Figure 1.5 (sheet 1 of 10)
(active, idle)
mobile terminated call
yes
CW available (MAF013)
no
offer call
start T1
A
(active, idle) pending ack
(active, idle)
(active, held)
mobile terminated call
yes
CW available (MAF013)
no
offer call
start T1
A
(active, held) pending ack
(active, held)
(active, idle) (active, held)
mobile terminated call
yes
CW available (MAF013)
no
offer call
start T1
A
(active, idle) (active, held) pending ack
(active, idle) (active, held)
- Messages to/from left refer to the radio interface.
- Messages to/from right refer to the network interface.
- Clearing of active calls by a remote subscriber is not shown for clarity. Moreover, this is possible and is described in the text.

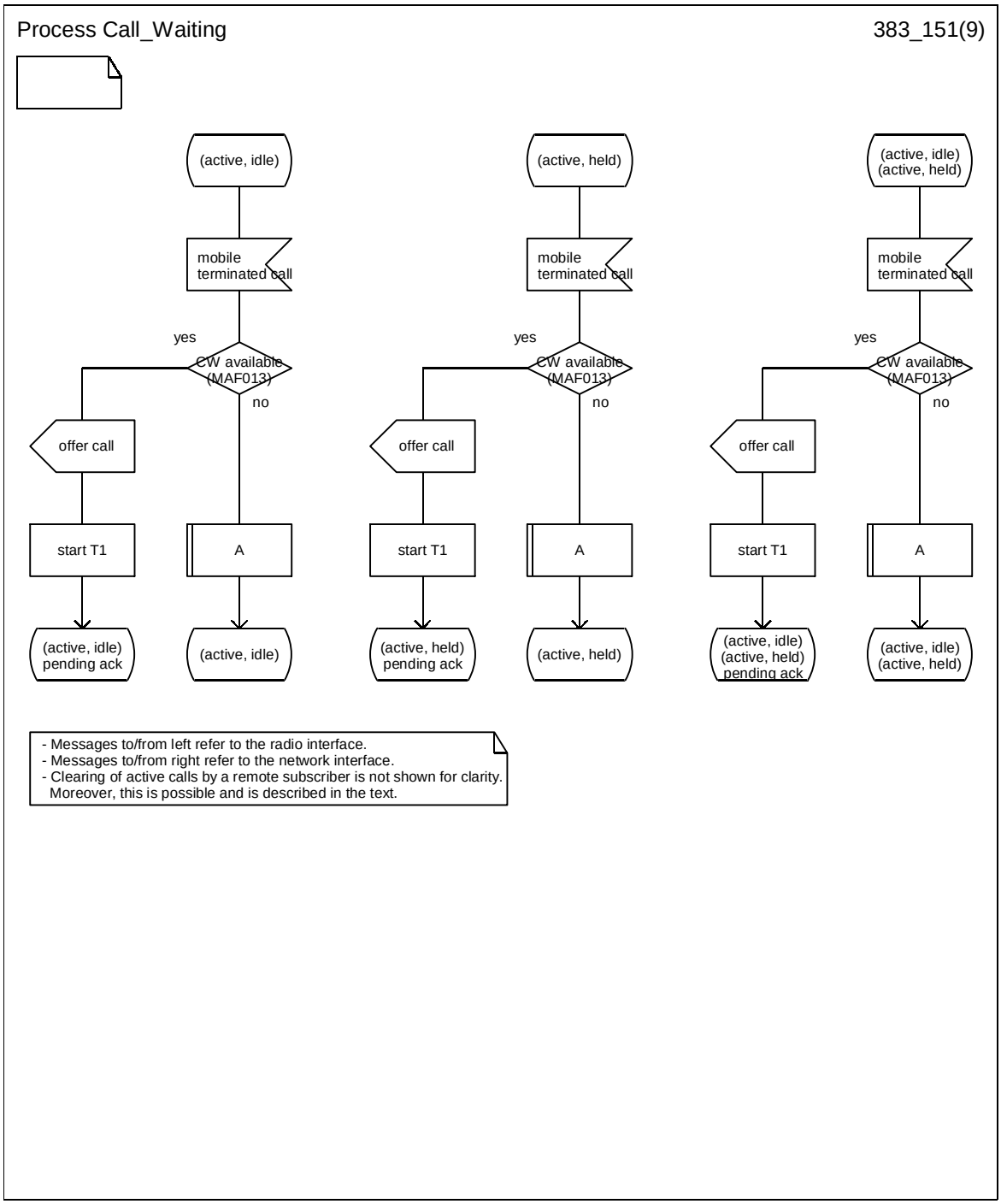
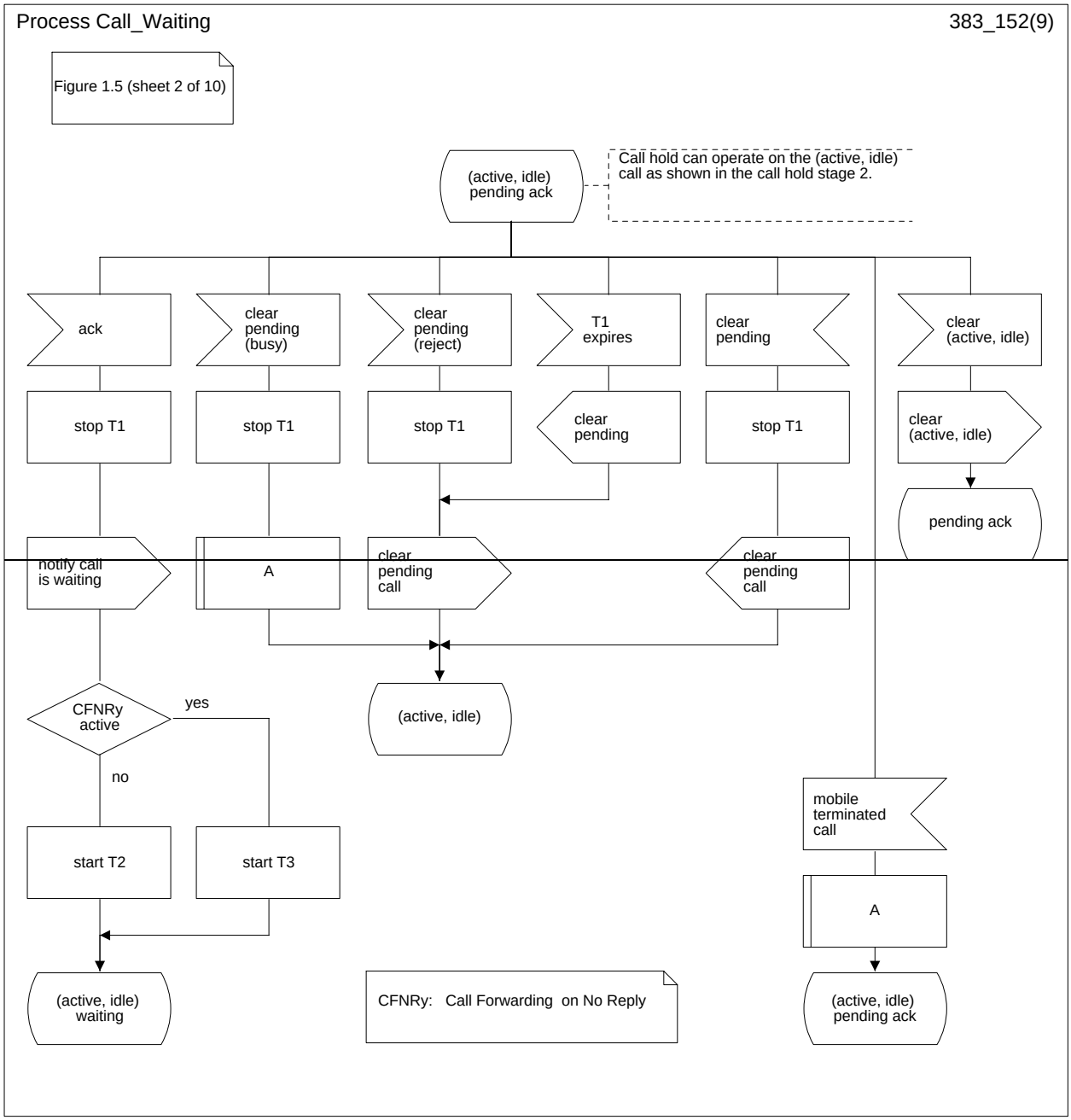


Figure 1.5 (sheet 1 of 10): Overall SDL diagram of call waiting


Process Call_Waiting
383_152(9)
Figure 1.5 (sheet 2 of 10)
(active, idle)
pending ack
Call hold can operate on the (active, idle)
call as shown in the call hold stage 2.
ack
clear
pending
(busy)
clear
pending
(reject)
T1
expires
clear
pending
clear
(active, idle)
stop T1
stop T1
stop T1
clear
pending
stop T1
clear
(active, idle)
pending ack
notify call
is waiting
A
clear
pending
call
clear
pending
call
CFNRy
active
yes
(active, idle)
no
mobile
terminated
call
start T2
start T3
A
(active, idle)
waiting
CFNRy: Call Forwarding on No Reply
(active, idle)
pending ack

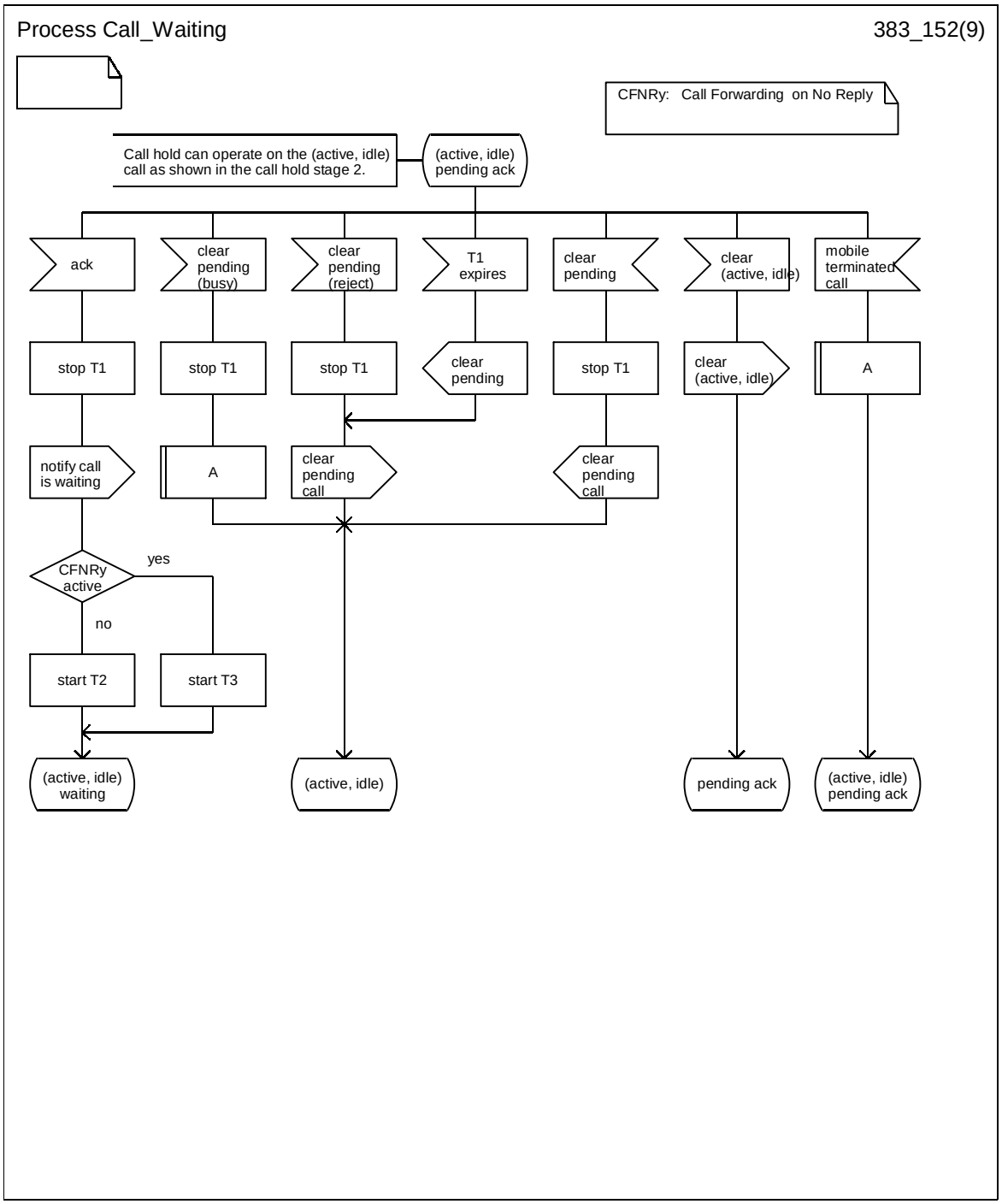
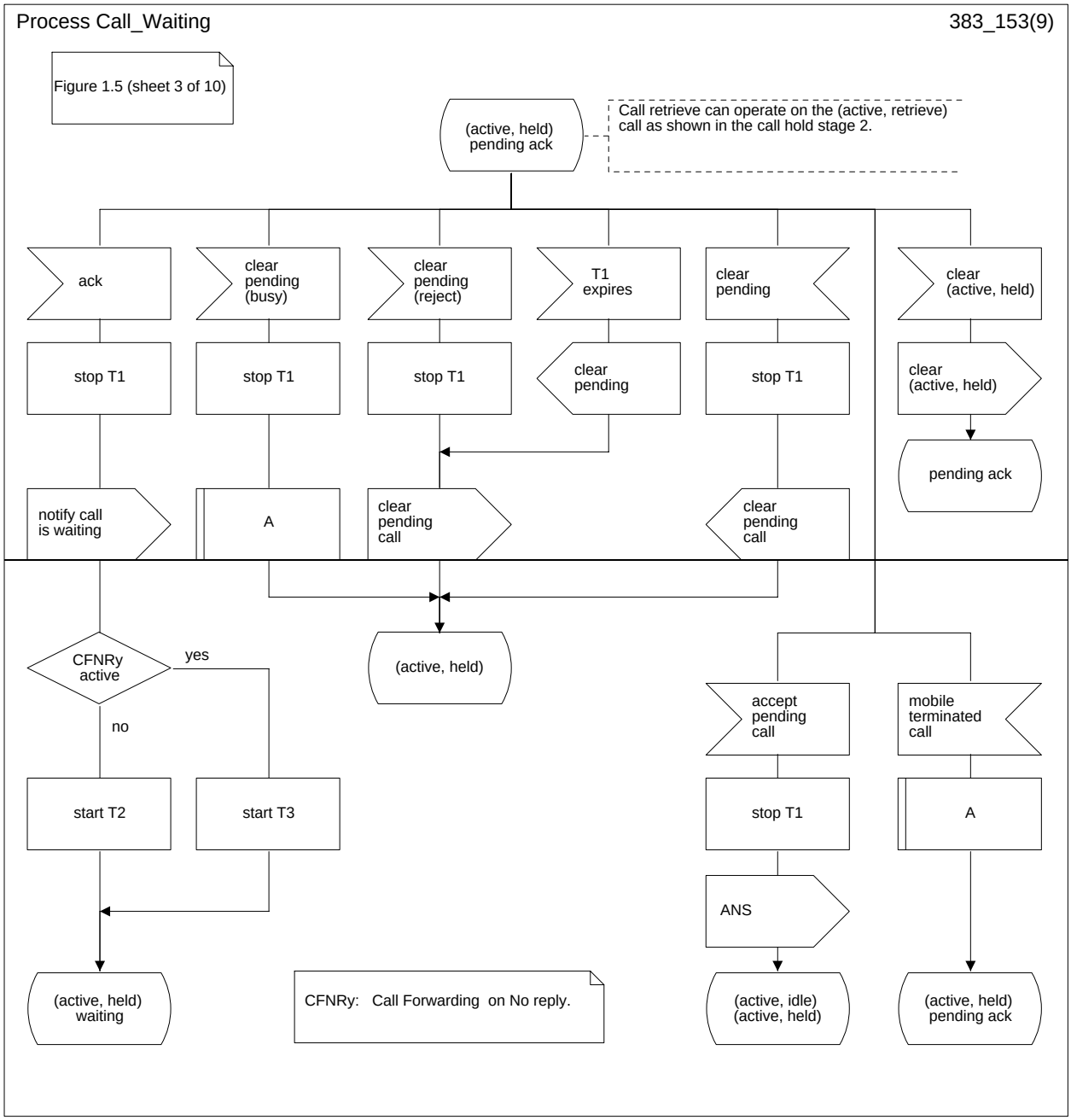


Figure 1.5 (sheet 2 of 10): Overall SDL diagram of call waiting


Process Call_Waiting
383_153(9)
Figure 1.5 (sheet 3 of 10)
(active, held)
pending ack
Call retrieve can operate on the (active, retrieve)
call as shown in the call hold stage 2.
ack
clear
pending
(busy)
clear
pending
(reject)
T1
expires
clear
pending
clear
(active, held)
stop T1
stop T1
stop T1
clear
pending
stop T1
clear
(active, held)
pending ack
notify call
is waiting
A
clear
pending
call
clear
pending
call
(active, held)
CFNRy
active
yes
no
accept
pending
call
mobile
terminated
call
start T2
start T3
stop T1
A
ANS
(active, held)
waiting
CFNRy: Call Forwarding on No reply.
(active, idle)
(active, held)
(active, held)
pending ack

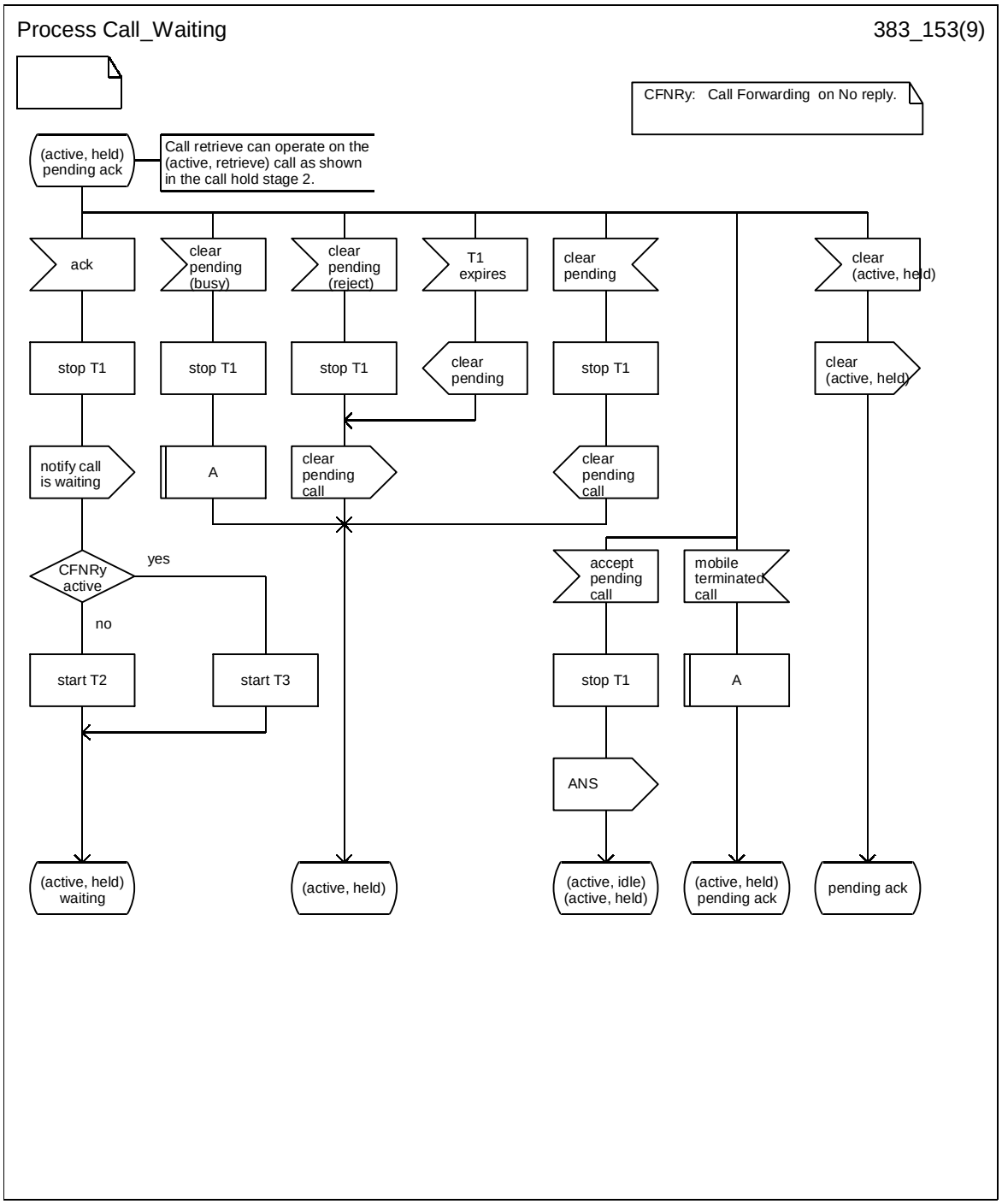
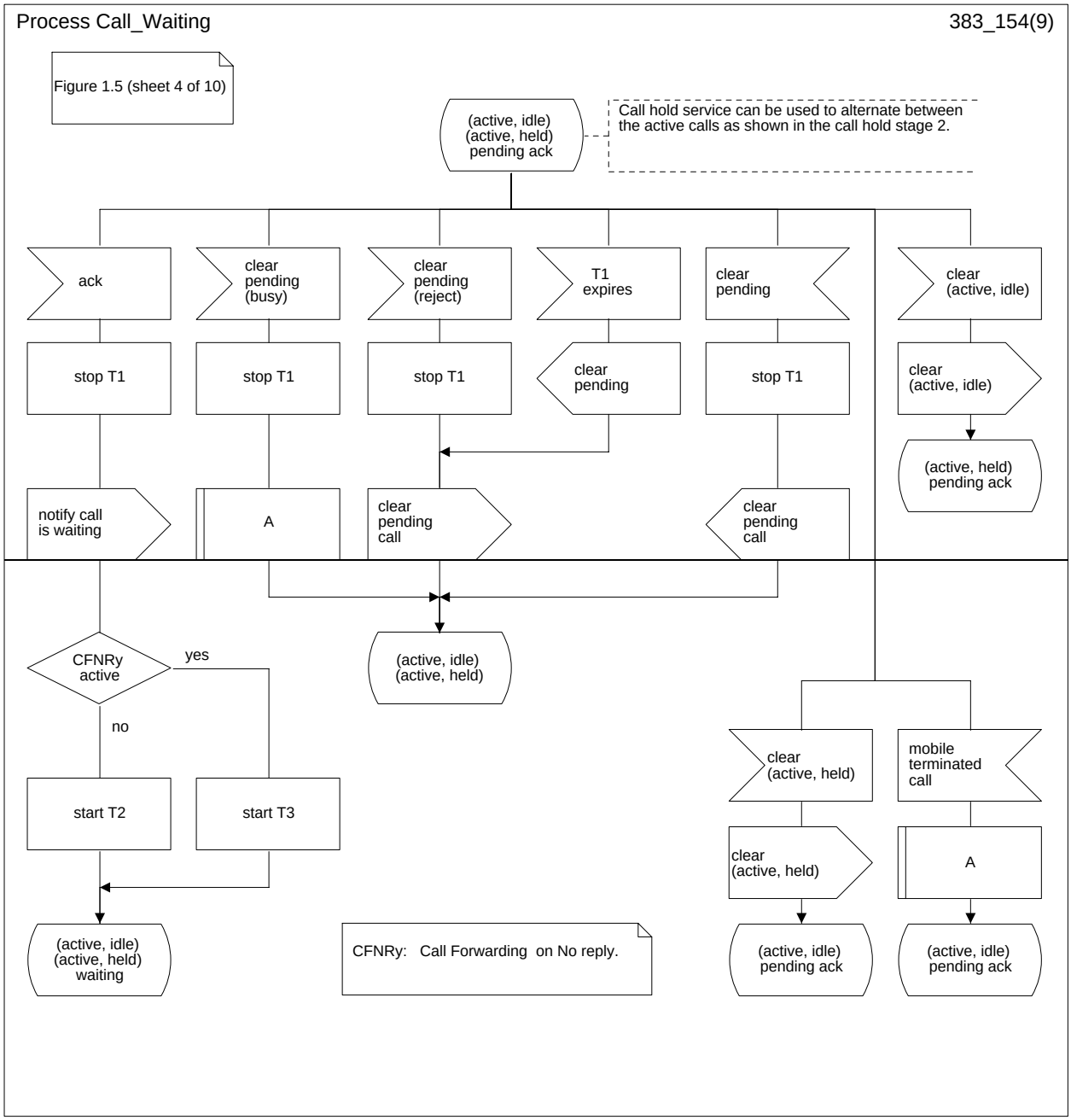


Figure 1.5 (sheet 3 of 10): Overall SDL diagram of call waiting


Process Call_Waiting
383_154(9)
Figure 1.5 (sheet 4 of 10)
(active, idle)
(active, held)
pending ack
Call hold service can be used to alternate between the active calls as shown in the call hold stage 2.
ack
clear pending (busy)
clear pending (reject)
T1 expires
clear pending
clear (active, idle)
stop T1
stop T1
stop T1
clear pending
stop T1
clear (active, idle)
(active, held) pending ack
notify call is waiting
A
clear pending call
clear pending call
(active, idle) (active, held)
CFNRy active
yes
no
start T2
start T3
(active, idle) (active, held) waiting
clear (active, held)
mobile terminated call
clear (active, held)
A
(active, idle) pending ack
(active, idle) pending ack
CFNRy: Call Forwarding on No reply.

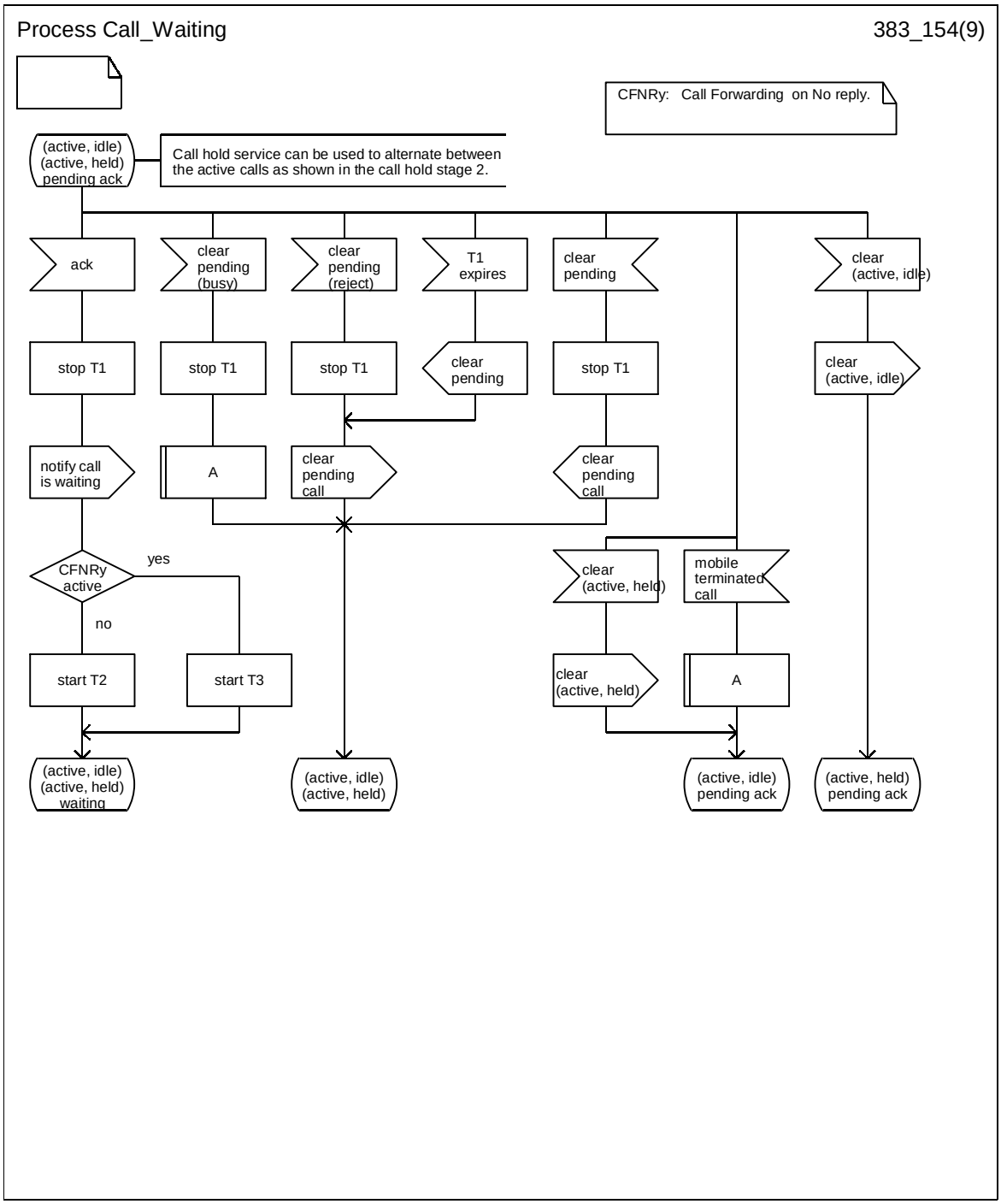
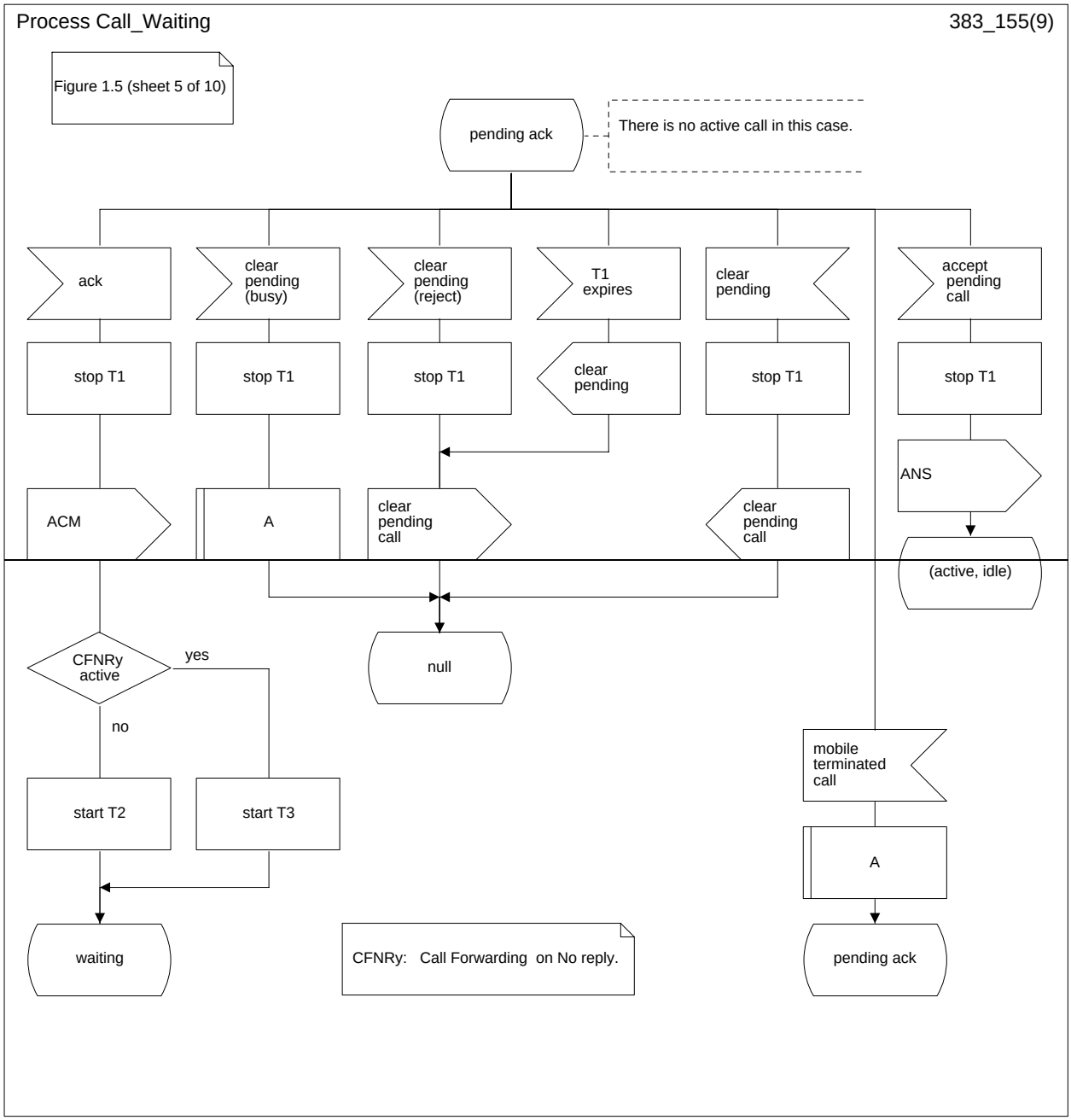


Figure 1.5 (sheet 4 of 10): Overall SDL diagram of call waiting


Process Call_Waiting
383_155(9)
Figure 1.5 (sheet 5 of 10)
pending ack
There is no active call in this case.
ack
clear pending (busy)
clear pending (reject)
T1 expires
clear pending
accept pending call
stop T1
stop T1
stop T1
clear pending
stop T1
stop T1
ANS
ACM
A
clear pending call
clear pending call
(active, idle)
null
CFNRy active
yes
no
start T2
start T3
mobile terminated call
A
waiting
CFNRy: Call Forwarding on No reply.
pending ack

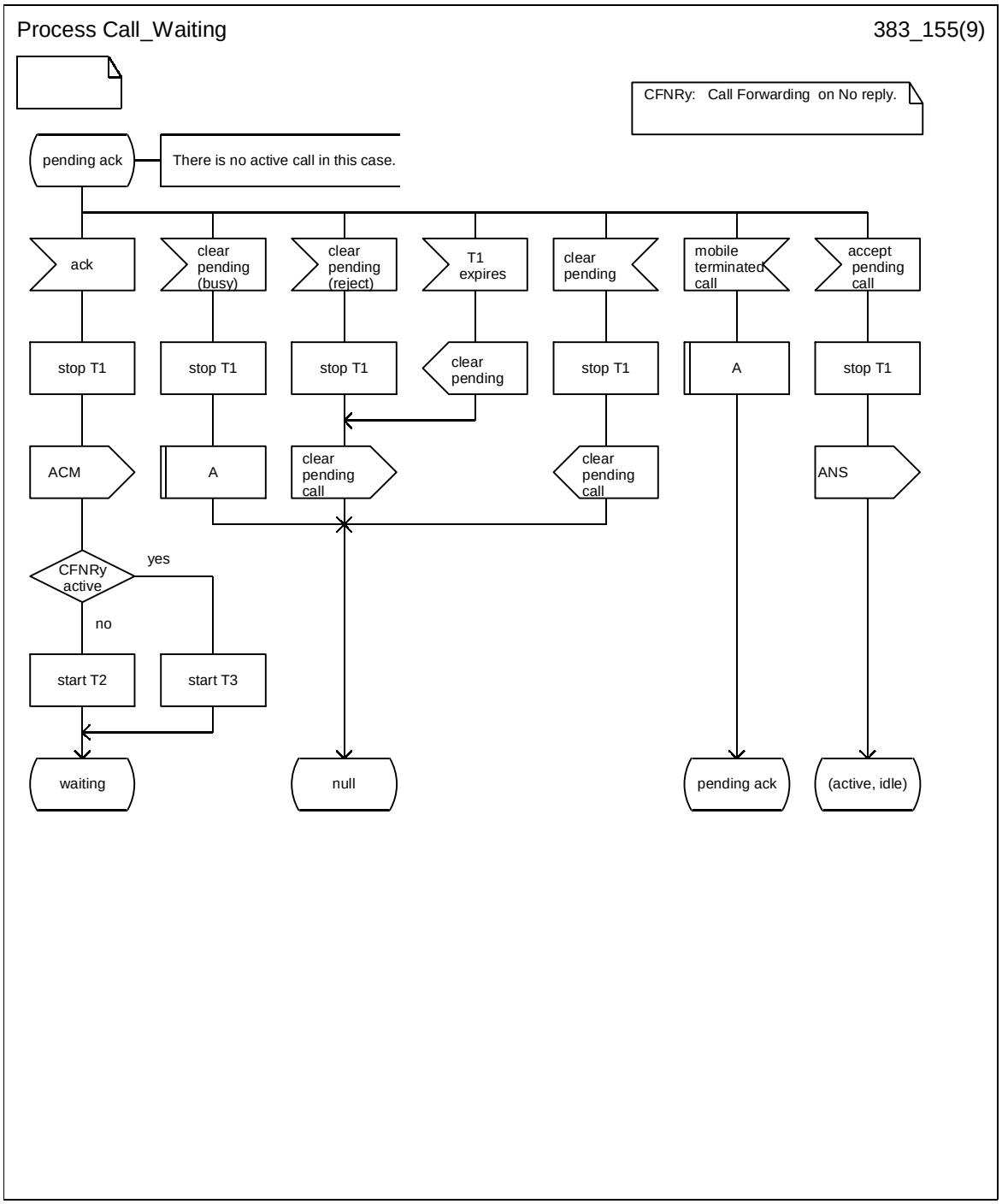
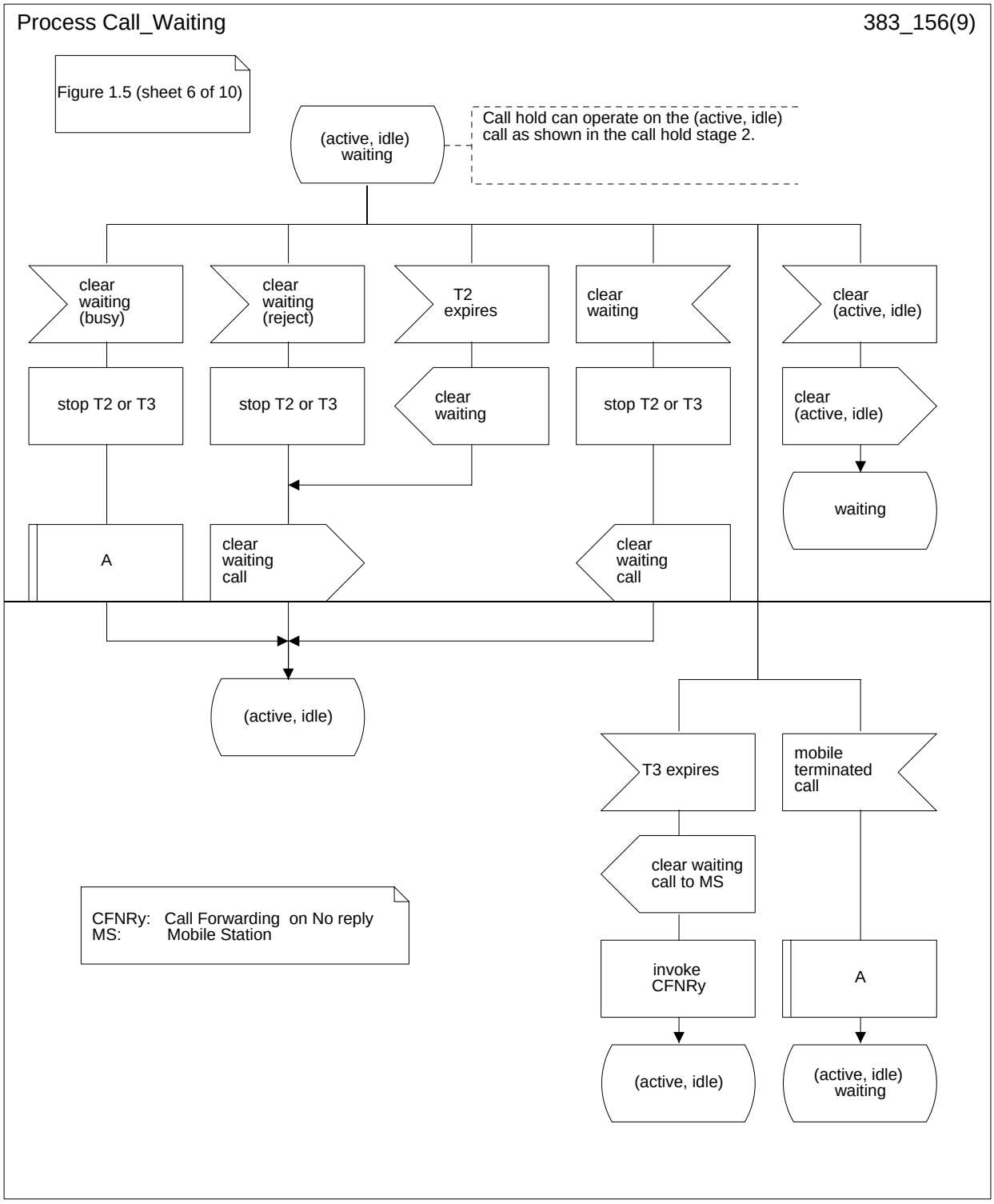


Figure 1.5 (sheet 5 of 10): Overall SDL diagram of call waiting


Process Call_Waiting
383_156(9)
Figure 1.5 (sheet 6 of 10)
(active, idle)
waiting
Call hold can operate on the (active, idle)
call as shown in the call hold stage 2.
clear
waiting
(busy)
clear
waiting
(reject)
T2
expires
clear
waiting
clear
(active, idle)
stop T2 or T3
stop T2 or T3
clear
waiting
stop T2 or T3
clear
(active, idle)
waiting
A
clear
waiting
call
clear
waiting
call
(active, idle)
T3 expires
mobile
terminated
call
clear waiting
call to MS
invoke
CFNRy
A
(active, idle)
(active, idle)
waiting
CFNRy: Call Forwarding on No reply
MS: Mobile Station

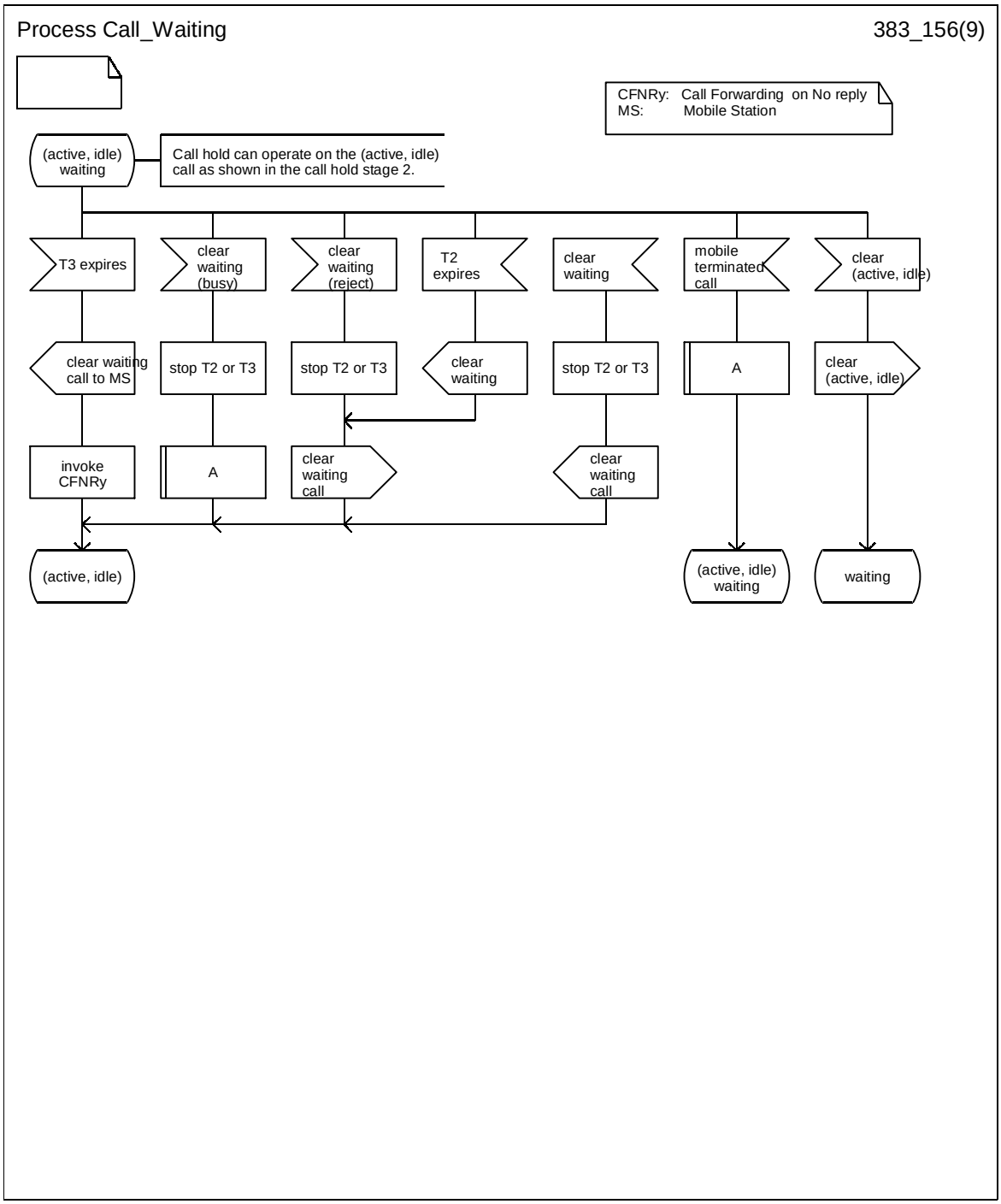
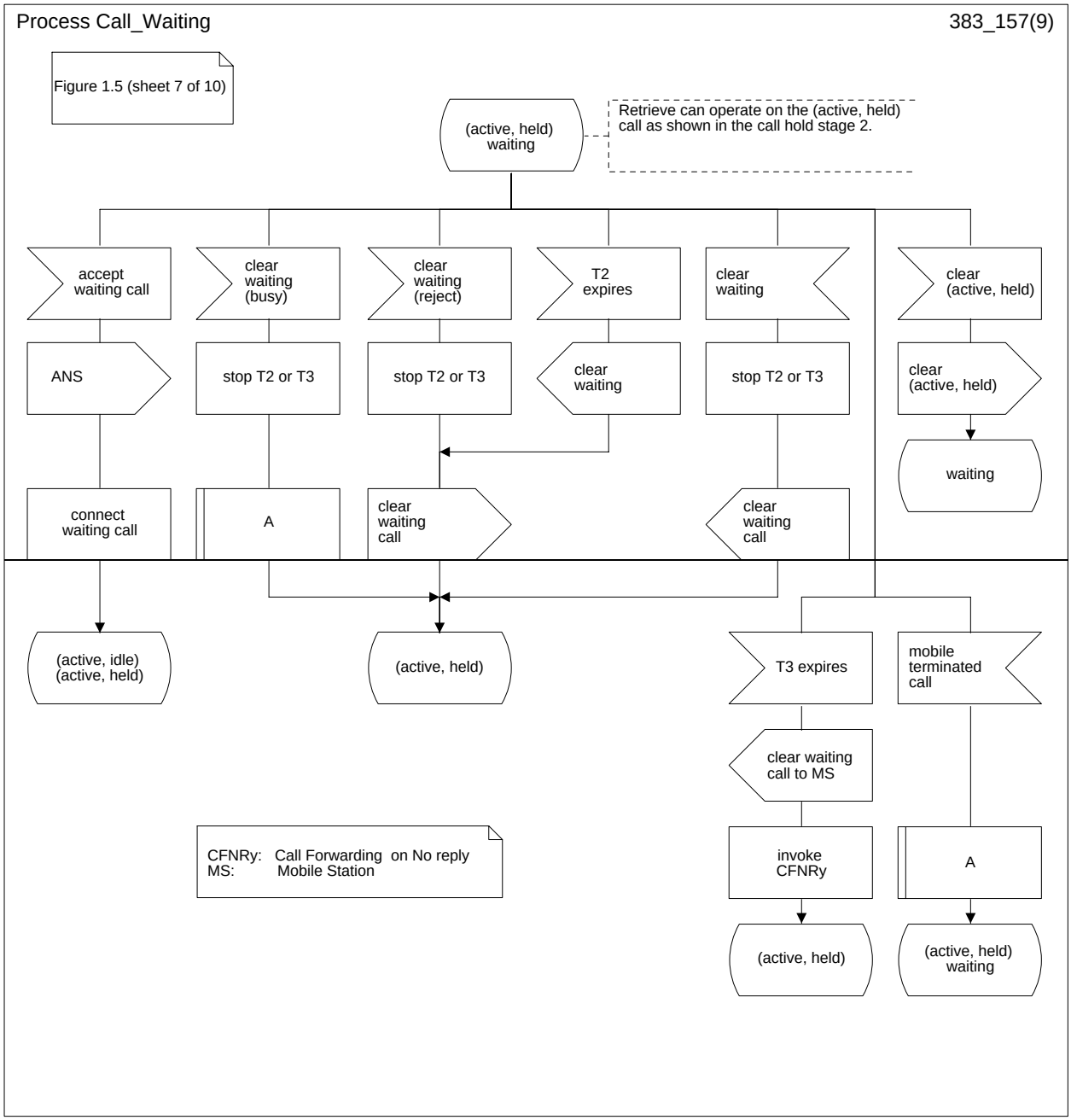


Figure 1.5 (sheet 6 of 10): Overall SDL diagram of call waiting


Process Call_Waiting
383_157(9)
Figure 1.5 (sheet 7 of 10)
(active, held)
waiting
Retrieve can operate on the (active, held)
call as shown in the call hold stage 2.
accept
waiting call
clear
waiting
(busy)
clear
waiting
(reject)
T2
expires
clear
waiting
clear
(active, held)
ANS
stop T2 or T3
stop T2 or T3
clear
waiting
stop T2 or T3
clear
(active, held)
waiting
connect
waiting call
A
clear
waiting
call
clear
waiting
call
(active, idle)
(active, held)
(active, held)
T3 expires
mobile
terminated
call
clear waiting
call to MS
CFNRy: Call Forwarding on No reply
MS: Mobile Station
invoke
CFNRy
A
(active, held)
(active, held)
waiting

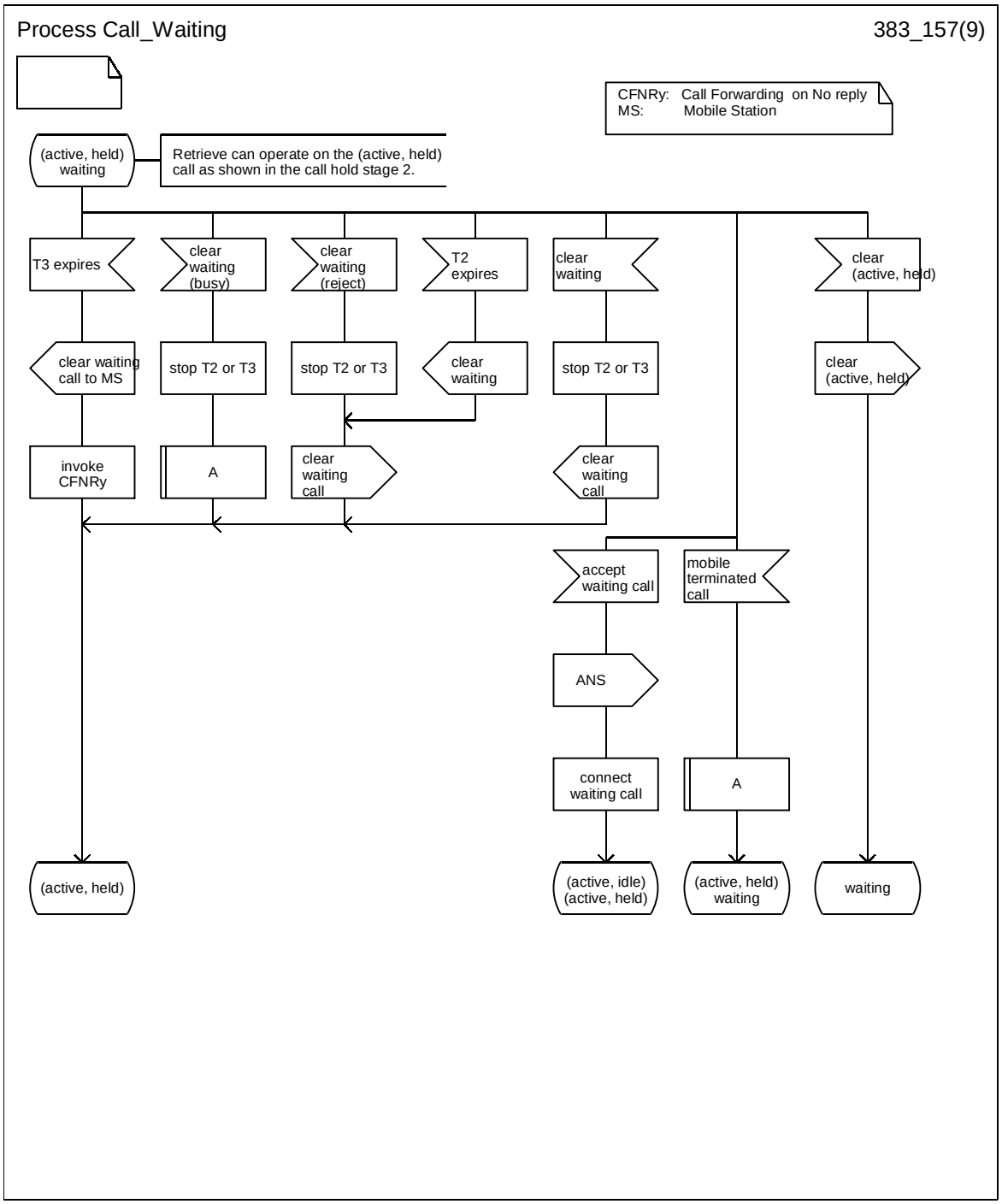
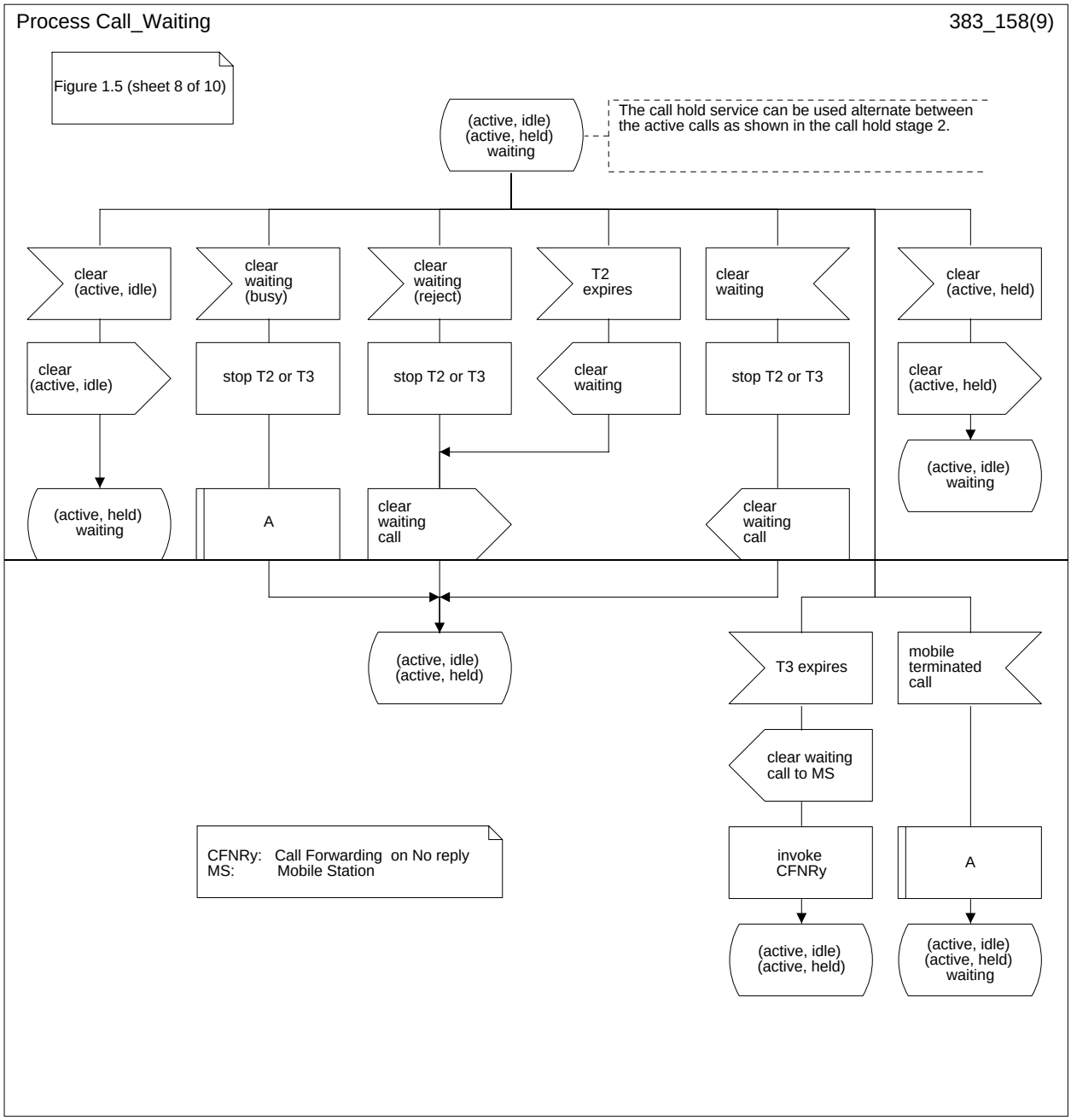


Figure 1.5 (sheet 7 of 10): Overall SDL diagram of call waiting


Process Call_Waiting
383_158(9)
Figure 1.5 (sheet 8 of 10)
(active, idle)
(active, held)
waiting
The call hold service can be used alternate between the active calls as shown in the call hold stage 2.
clear
(active, idle)
clear
waiting
(busy)
clear
waiting
(reject)
T2
expires
clear
waiting
clear
(active, held)
clear
(active, idle)
stop T2 or T3
stop T2 or T3
clear
waiting
stop T2 or T3
clear
(active, held)
(active, held)
waiting
A
clear
waiting
call
clear
waiting
call
(active, idle)
waiting
(active, idle)
(active, held)
T3 expires
mobile
terminated
call
clear waiting
call to MS
CFNRy: Call Forwarding on No reply
MS: Mobile Station
invoke
CFNRy
A
(active, idle)
(active, held)
(active, idle)
(active, held)
waiting

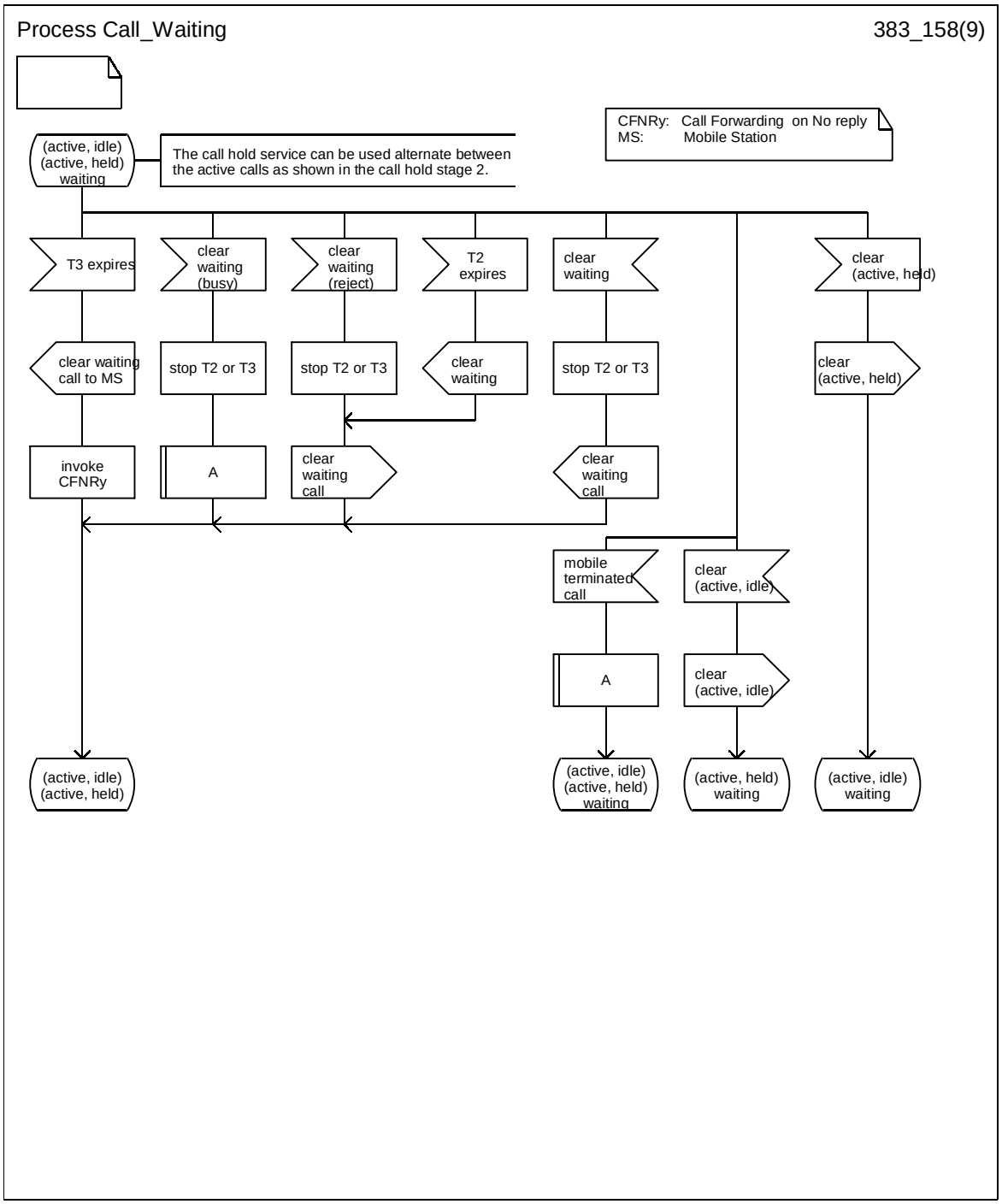
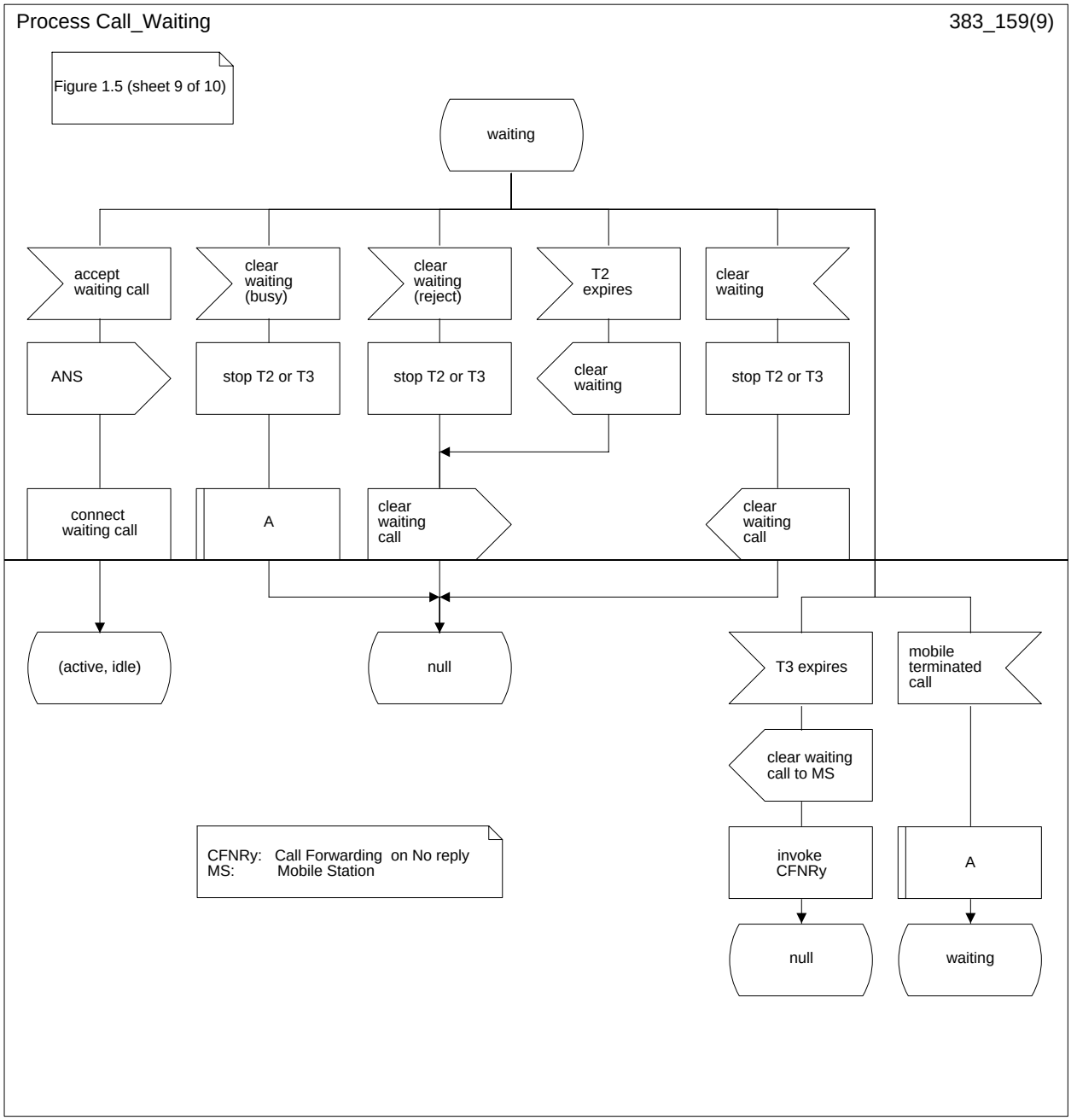


Figure 1.5 (sheet 8 of 10): Overall SDL diagram of call waiting


Process Call_Waiting
383_159(9)
Figure 1.5 (sheet 9 of 10)
waiting
accept waiting call
clear waiting (busy)
clear waiting (reject)
T2 expires
clear waiting
ANS
stop T2 or T3
stop T2 or T3
clear waiting
stop T2 or T3
connect waiting call
A
clear waiting call
clear waiting call
(active, idle)
null
T3 expires
mobile terminated call
clear waiting call to MS
CFNRy: Call Forwarding on No reply
MS: Mobile Station
invoke CFNRy
A
null
waiting

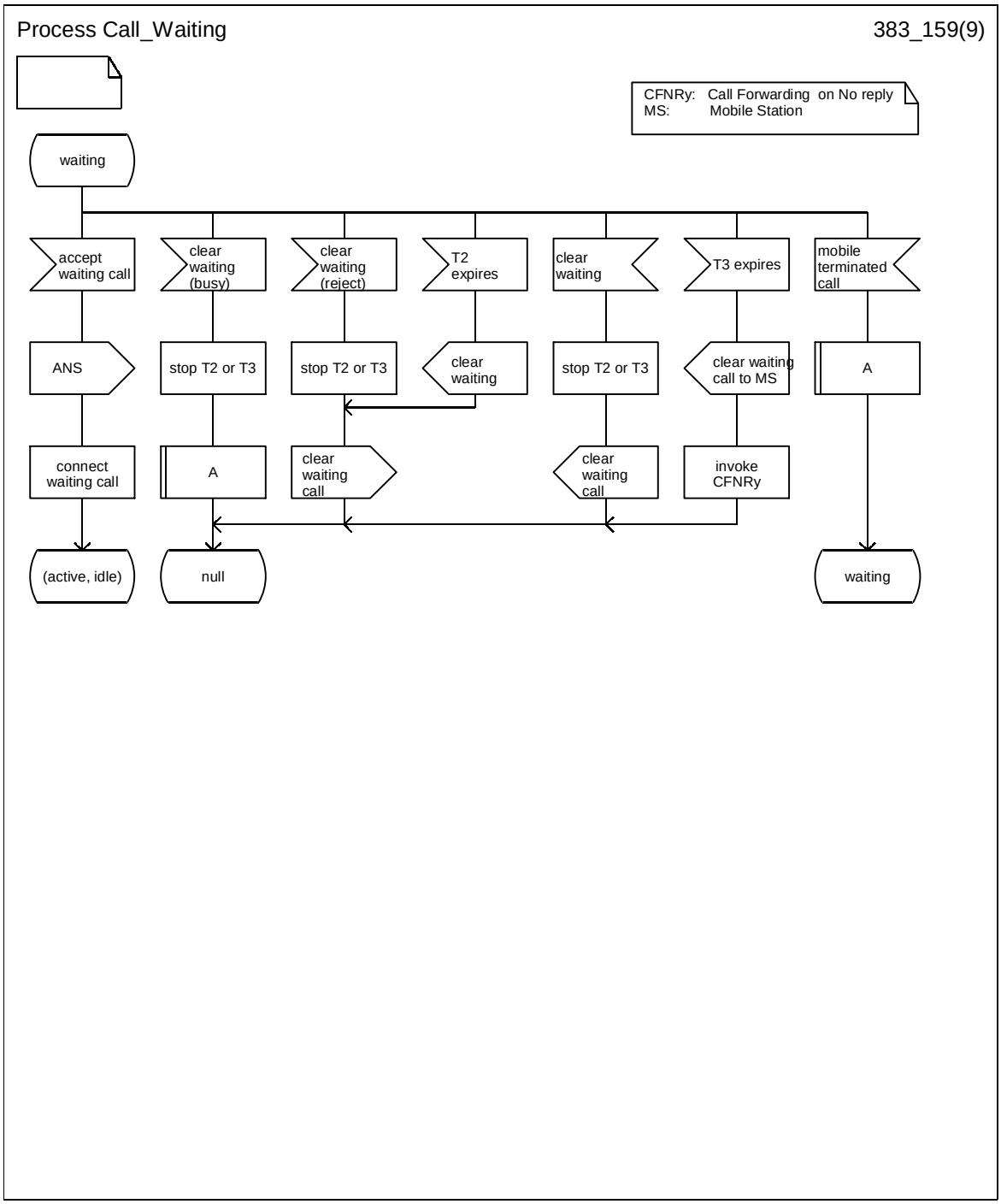
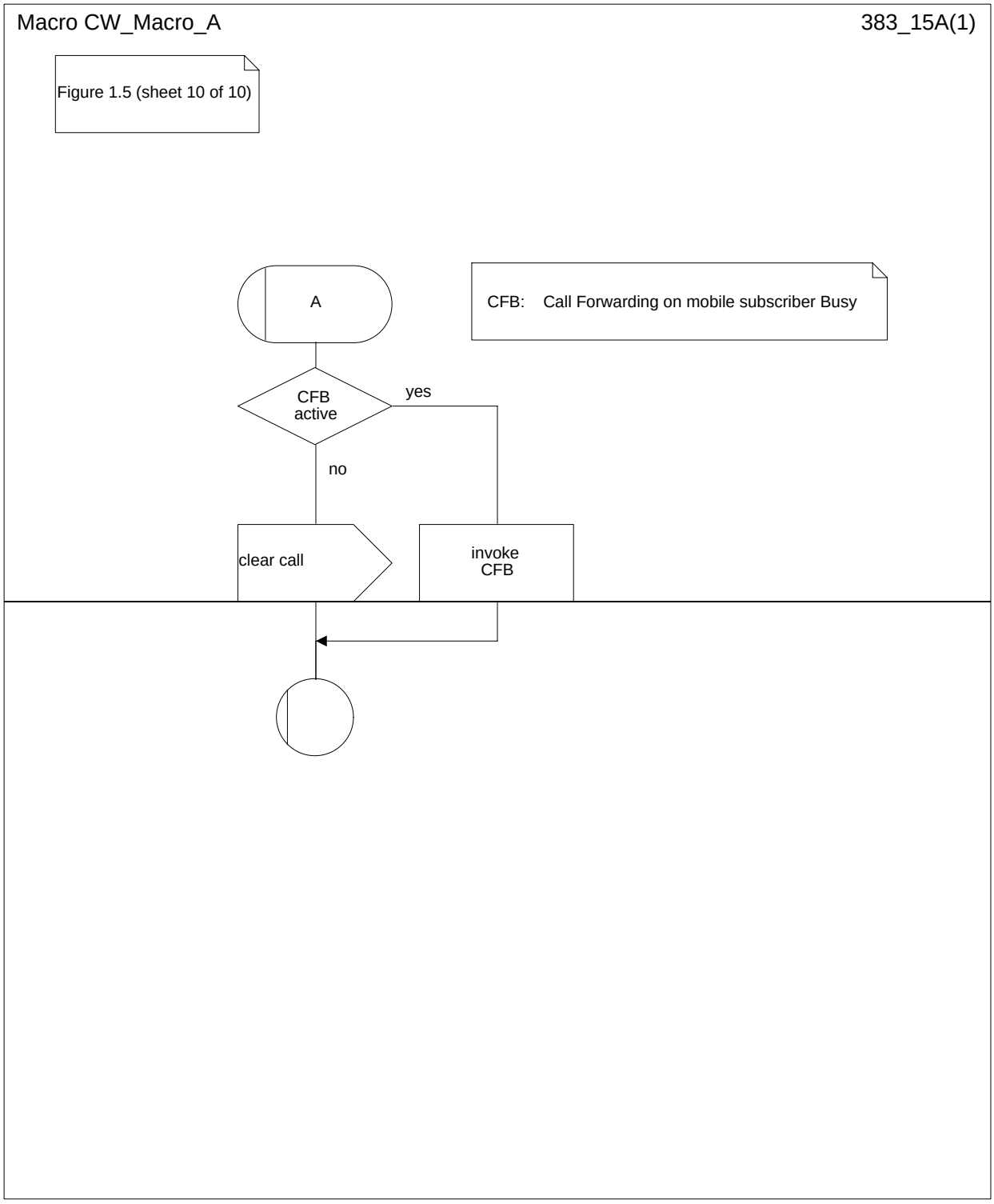


Figure 1.5 (sheet 9 of 10): Overall SDL diagram of call waiting


Macro CW_Macro_A
383_15A(1)
Figure 1.5 (sheet 10 of 10)
A
CFB: Call Forwarding on mobile subscriber Busy
CFB active
yes
no
clear call
invoke CFB

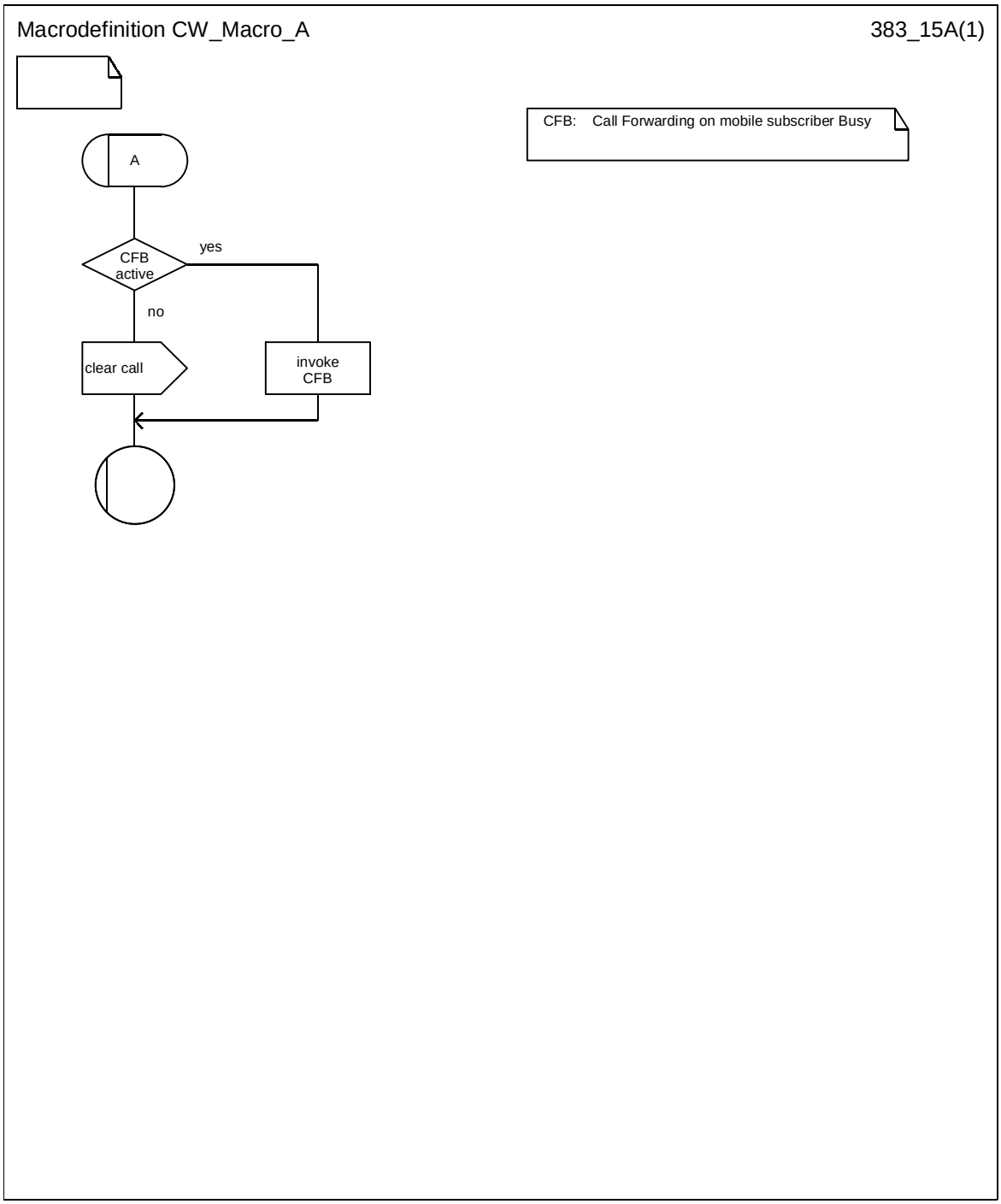
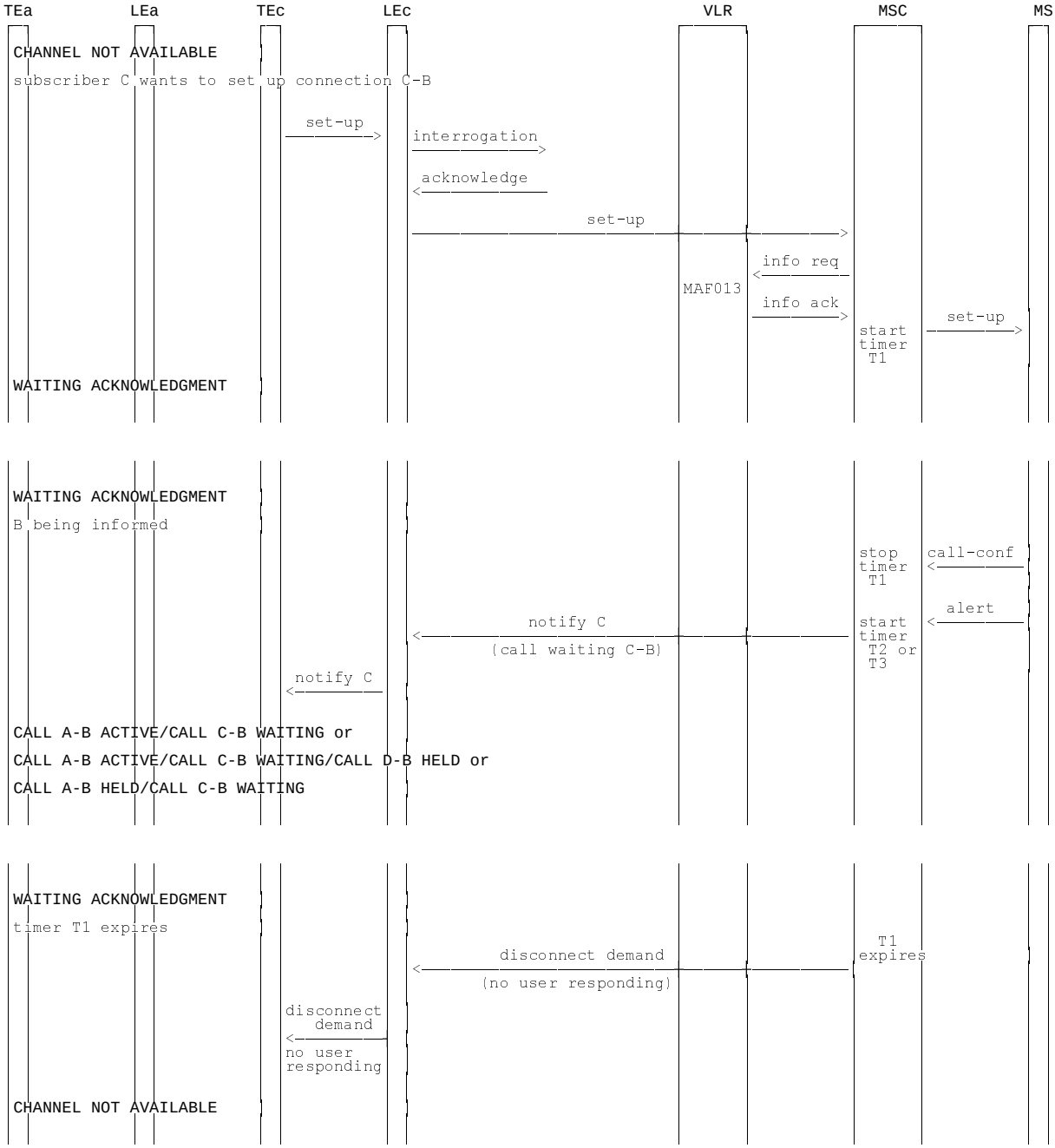
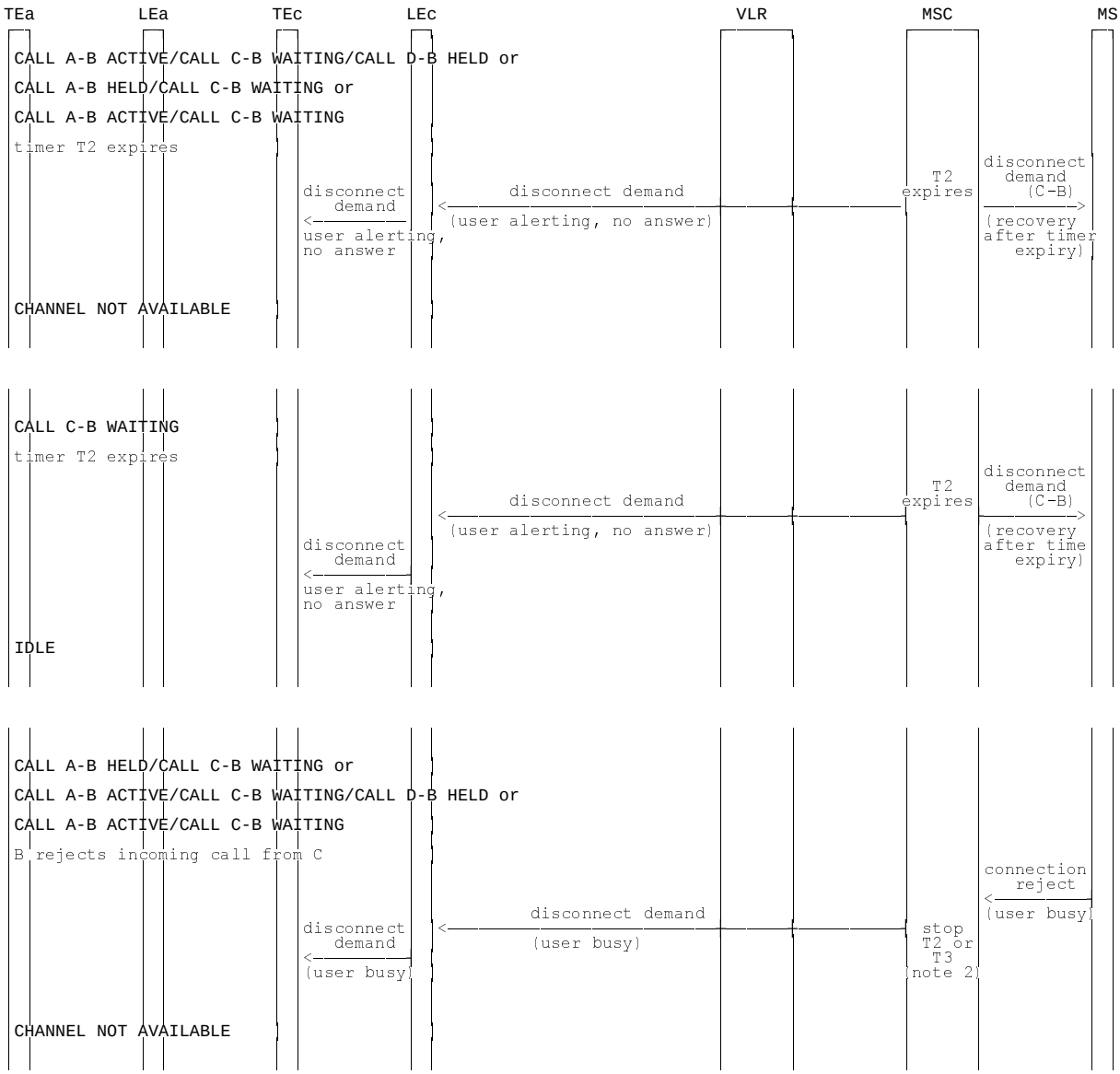


Figure 1.5 (sheet 10 of 10): Overall SDL diagram of call waiting



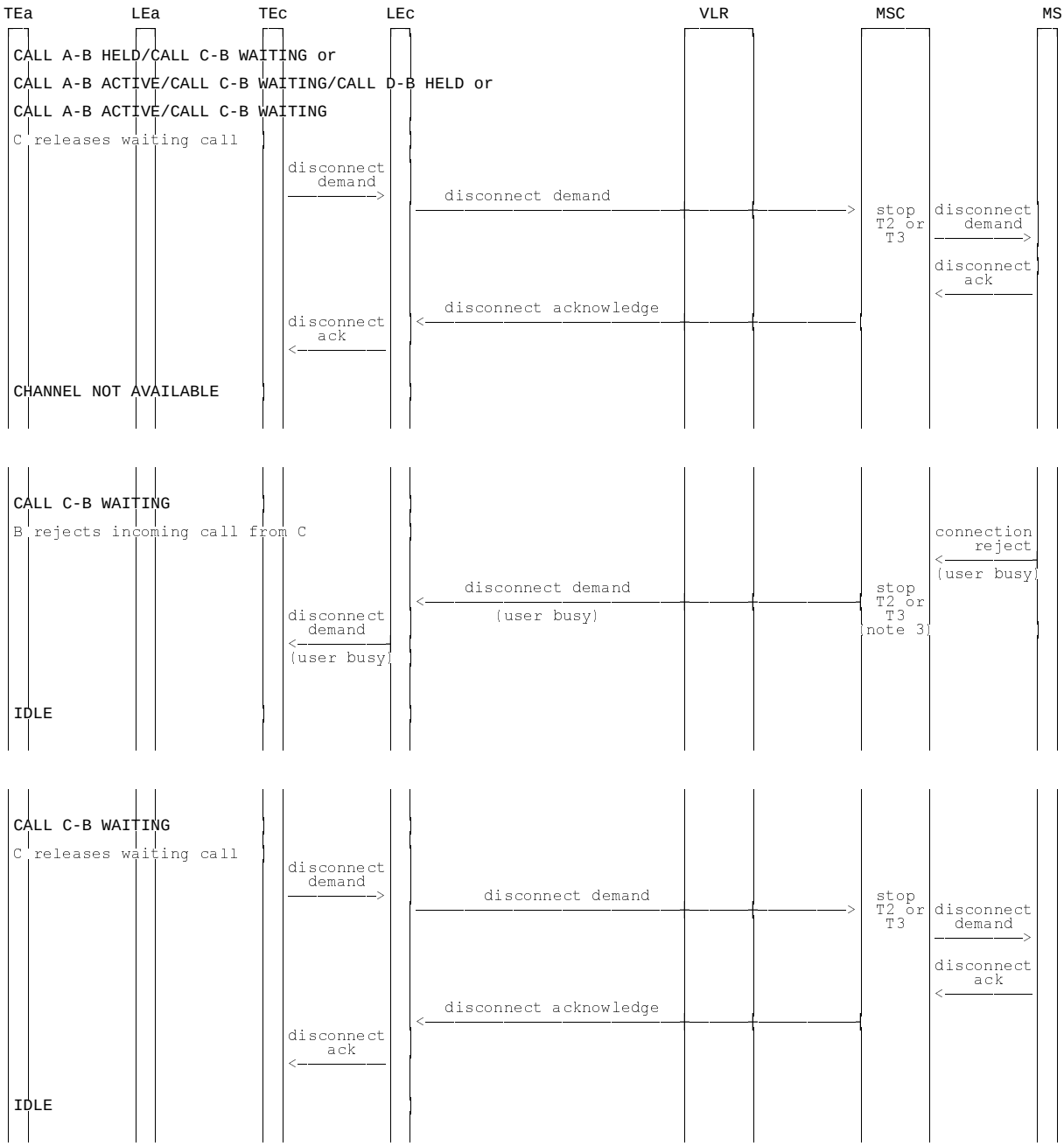
NOTE 1: info req: information request
info ack: information acknowledge

Figure 1.6 (sheet 1 of 7): Information flow for call waiting



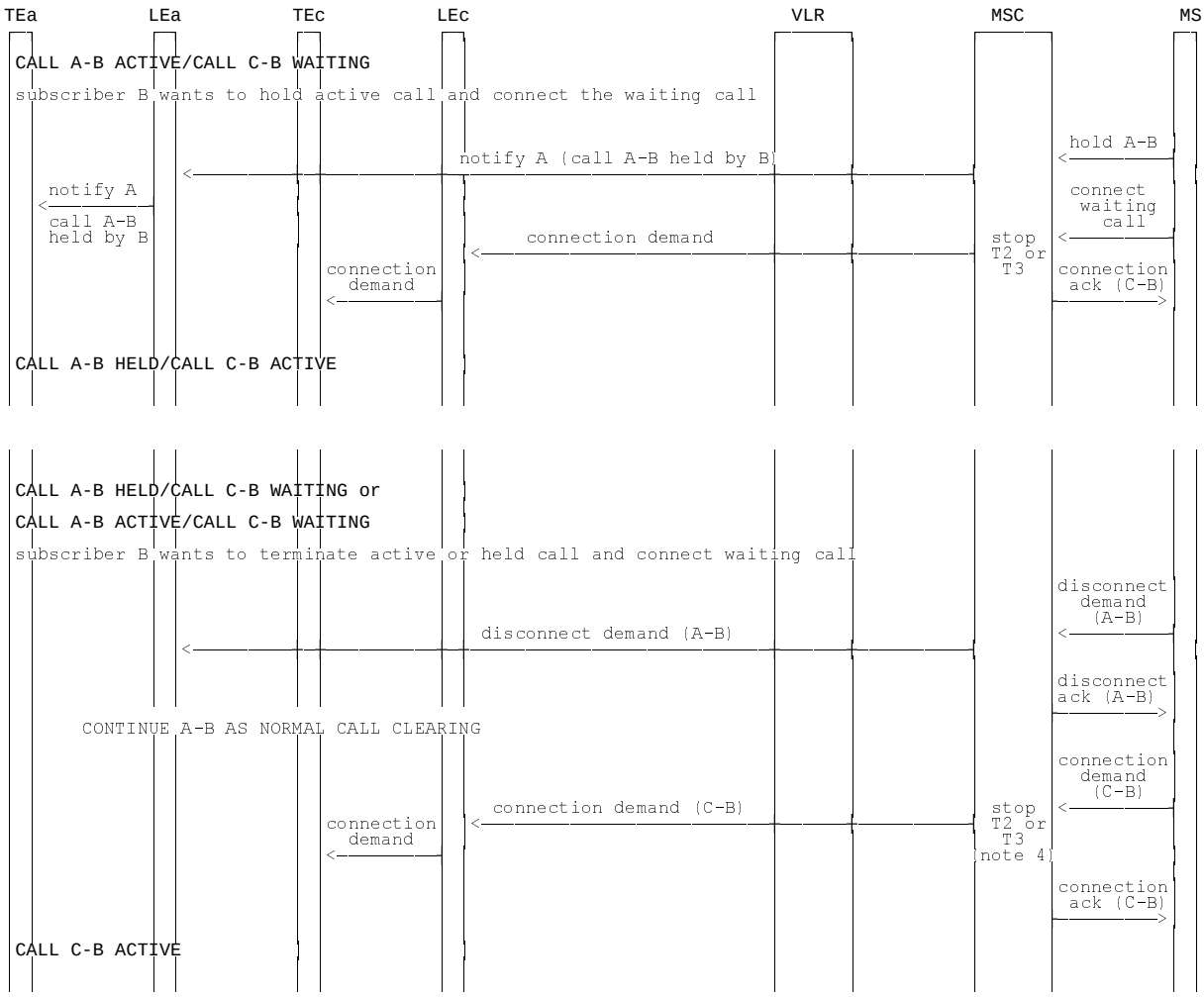
NOTE 2: The call shall be forwarded on mobile subscriber busy at this stage if activated.

Figure 1.6 (sheet 2 of 7): Information flow for call waiting



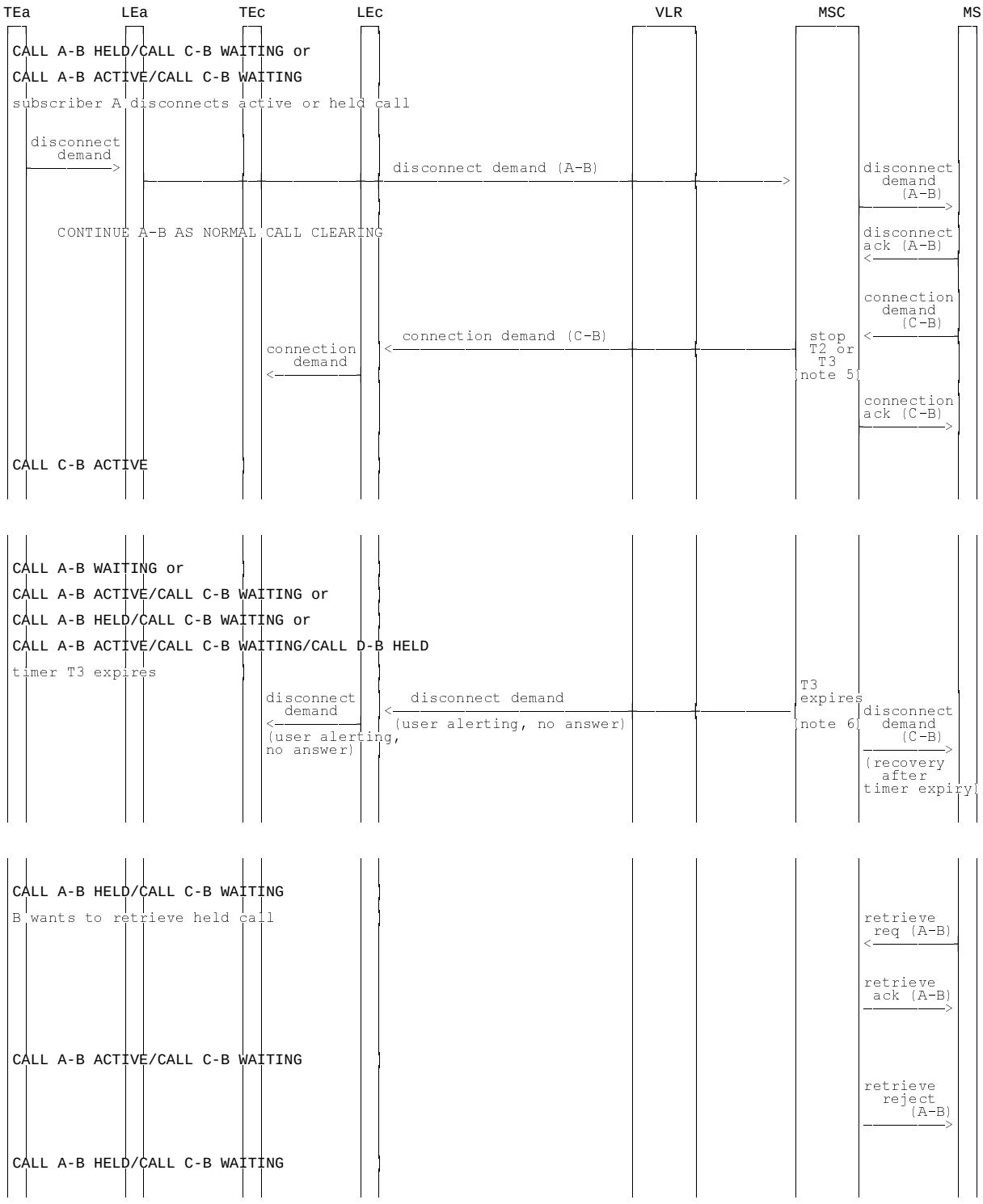
NOTE 3: The call shall be forwarded on mobile subscriber busy at this stage if activated.

Figure 1.6 (sheet 3 of 7): Information flow for call waiting



NOTE 4: If T2 or if applicable T3 expires before reception of connection demand in the MSC then call c-b shall be released with cause no reply and if it was T3 which expired the waiting call from C shall be forwarded on no reply.

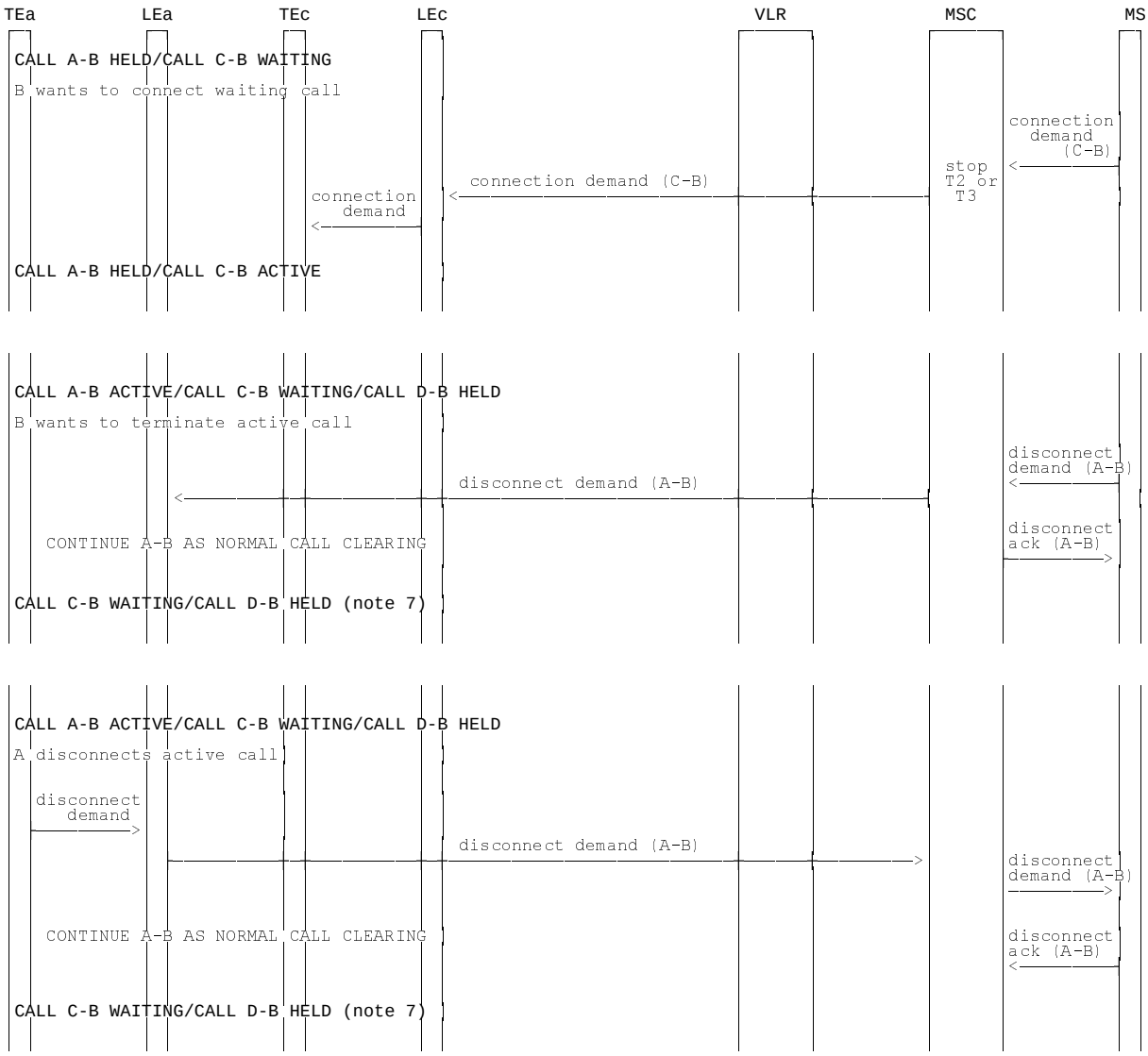
Figure 1.6 (sheet 4 of 7): Information flow for call waiting



NOTE 5: The call shall be forwarded on mobile subscriber busy at this stage if activated.

NOTE 6: The call shall be forwarded on no reply.

Figure 1.6 (sheet 5 of 7): Information flow for call waiting



NOTE 7: This state can be treated as CALL C-B WAITING/CALL A-B HELD.

Figure 1.6 (sheet 6 of 7): Information flow for call waiting

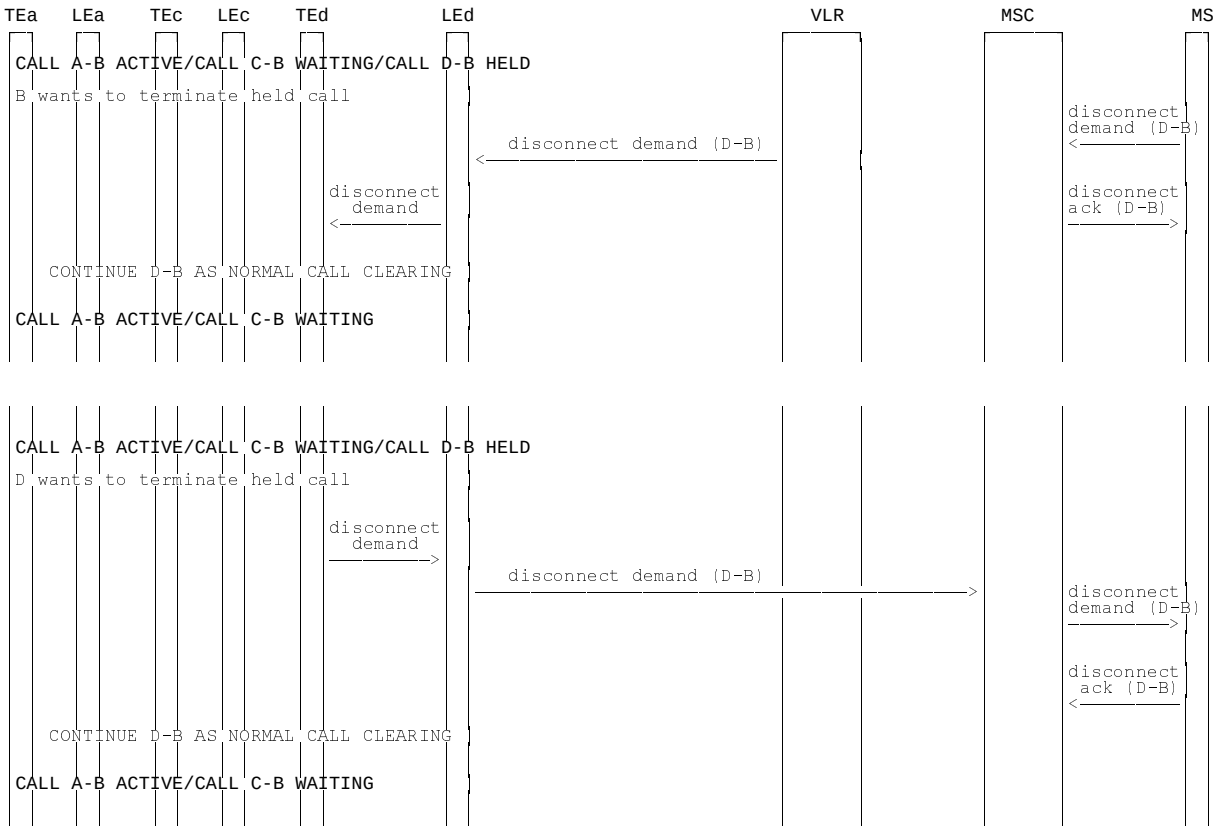


Figure 1.6 (sheet 7 of 7): Information flow for call waiting

1.3 Information stored in the HLR

Call waiting may have the following logical states (refer to TS 23.011 for an explanation of the notation):

Provisioning State	**Registration State**	**Activation State**	**HLR Induction State**
(Not Provisioned,	Not Applicable,	Not Active,	Not Induced)
(Provisioned,	Not Applicable,	Not Active,	Not Induced)
(Provisioned,	Not Applicable,	Active and Operative,	Not Induced)

The activation state may be different for each applicable elementary basic service group.

The provisioning state shall be on a per subscriber basis, and hence the same for all basic service groups.

The HLR shall store the logical state of the call waiting service (which shall be one of the valid states listed above) on a per elementary basic service group.

1.4 State transition model

The following figure shows the successful cases of transition between the applicable logical states of call waiting. The state changes are either caused by actions of the service provider or the mobile user.

Note that error cases are not shown in the diagram as they normally do not cause a state change. Additionally, some successful requests may not cause a state change. Hence they are not shown in the diagram.

The diagram only shows operations on elementary basic service groups.

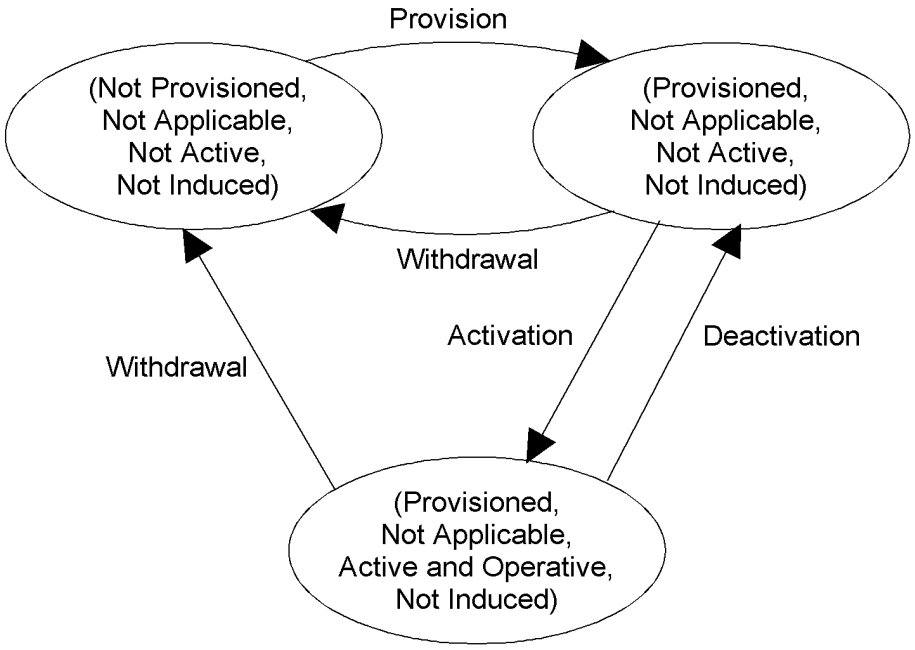


Figure 1.7: State transition model for call waiting

1.5 Transfer of information from HLR to VLR

If the provisioning state for call waiting is "Provisioned" then, when the subscriber registers on a VLR, the HLR shall send that VLR information about the logical state of call waiting.

If the logical state of call waiting is changed while a subscriber is registered on a VLR, then the HLR shall inform the VLR of the new logical state of call waiting.

1.6 Information stored in the VLR

For call waiting, the VLR shall store the service state information received from the HLR.

1.7 Handover

Handover will have no impact on the control procedures and the operation of the service.

2 Call hold (HOLD)

2.1 Functions and information flows

The following Mobile Additional Function has been identified for the call hold service:

MAF024

Call hold related authorizations examination

The ability of a PLMN component to determine the authorizations relating to call hold. See figure 2.1.

Location: VLR

The overall SDL-diagram of call hold is shown in figure 2.2.

The information flows are shown in figure 2.3. In these flows it is assumed that the served user is a mobile user and that other users are fixed network users.

Description of overall SDL-diagram for call hold

In the SDL-diagrams the states are dimensioned in two dimensions. The first dimension is a normal basic call state e.g. null or active. The second dimension is an auxiliary state associated with hold.

Three auxiliary states are used:

i) idle;

ii) hold request (abbreviated hold req);

- a request has been made for the hold function

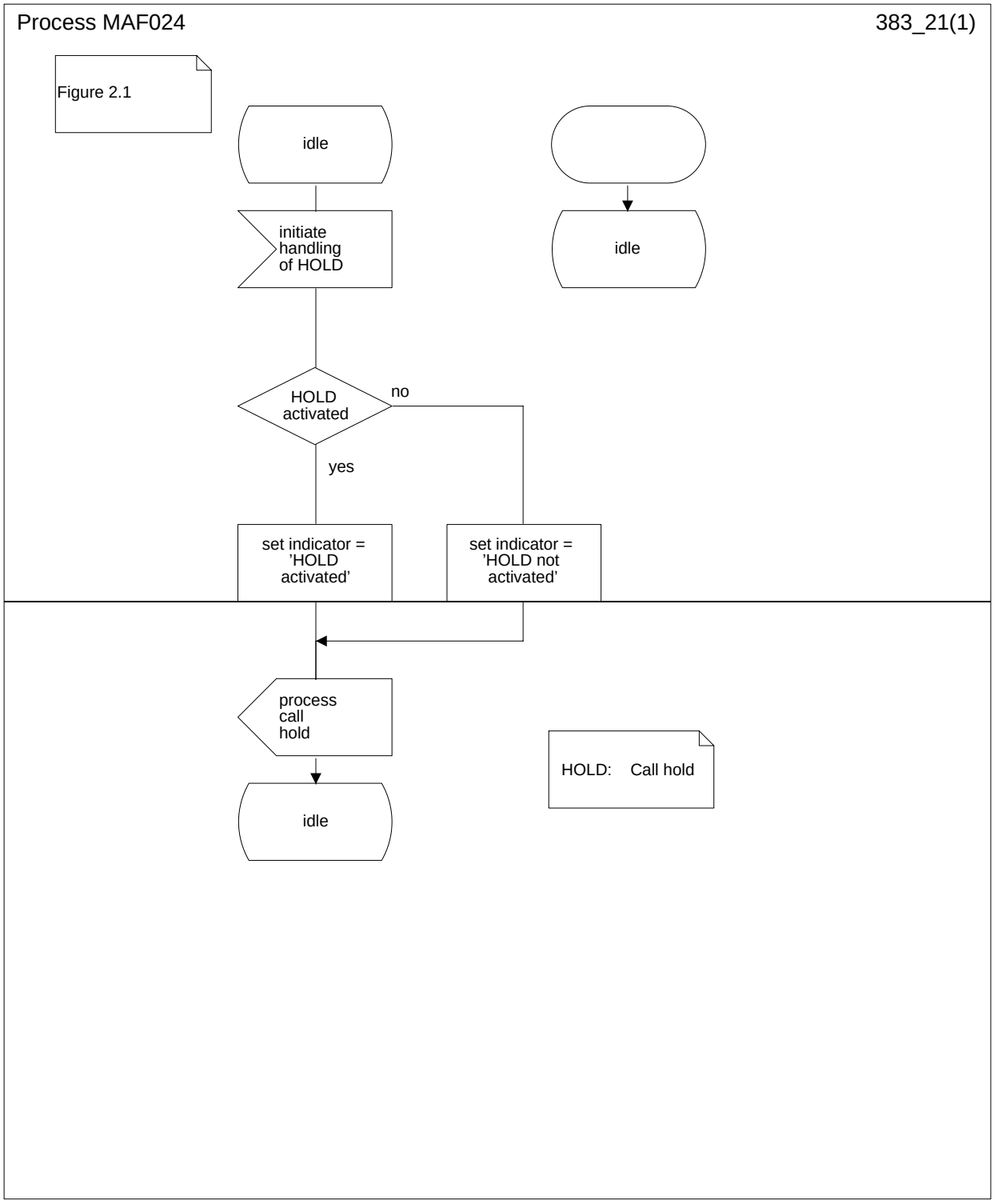
iii) call held (abbreviated held);

- the call is held.

Several two-dimensional states in connection with hold are possible e.g. (active, idle), (active, held) or (null, idle).

When the served user wants to shuttle between an (active, idle) call and an (active, held) call, this is achieved by a hold request for the first call immediately followed by a retrieve request for the second. To avoid having two calls on hold at the same time, the reception of the retrieve request is supervised by a timer T (T = 5 s).

The network may receive hold and retrieve requests not included in this overall SDL. These requests will be rejected by the network. For handling requests other then hold and retrieve requests look at descriptions of the other GSM supplementary services.


Process MAF024
383_21(1)
Figure 2.1
idle
initiate handling of HOLD
HOLD activated
no
yes
set indicator = 'HOLD activated'
set indicator = 'HOLD not activated'
process call hold
idle
idle
HOLD: Call hold

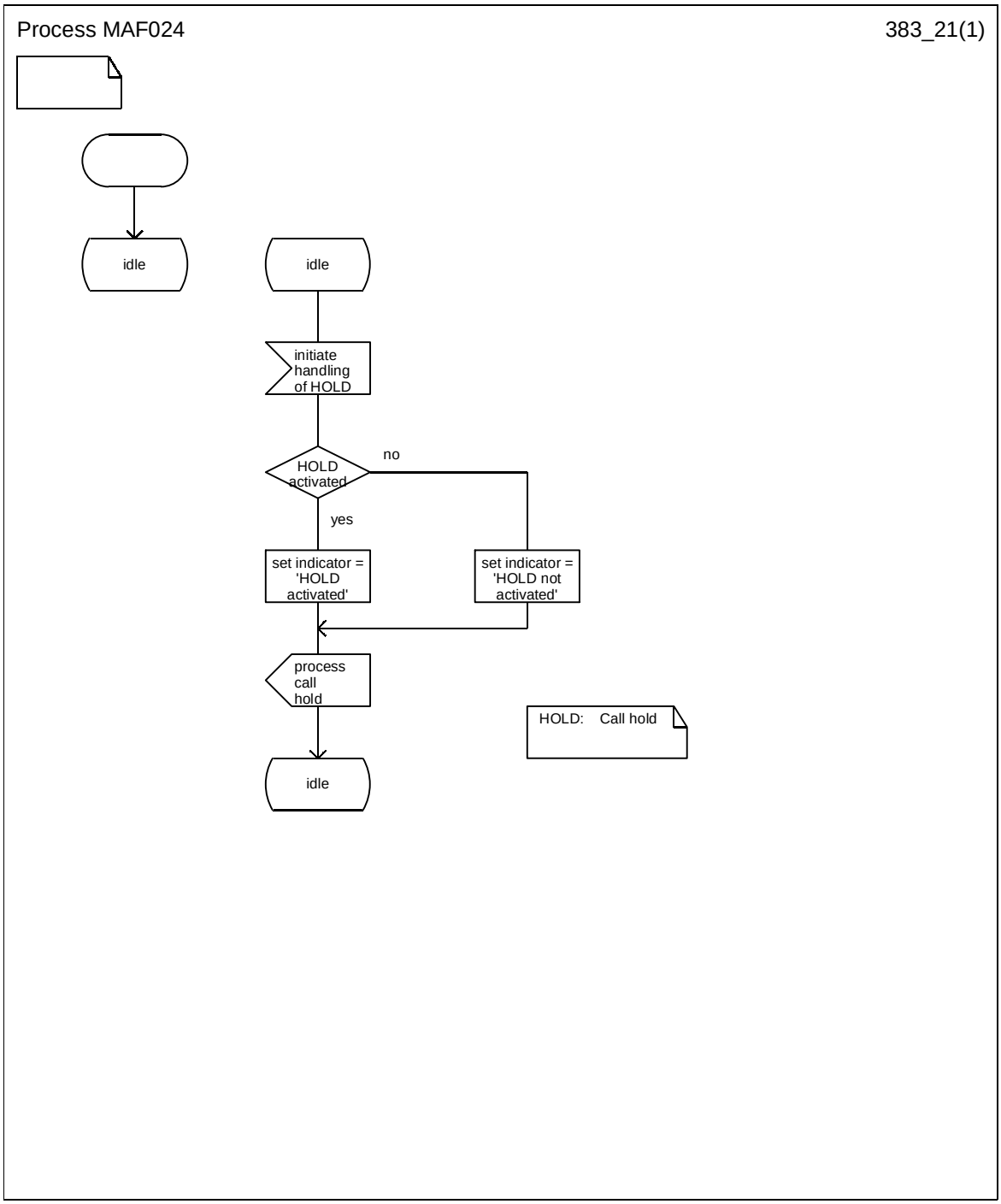
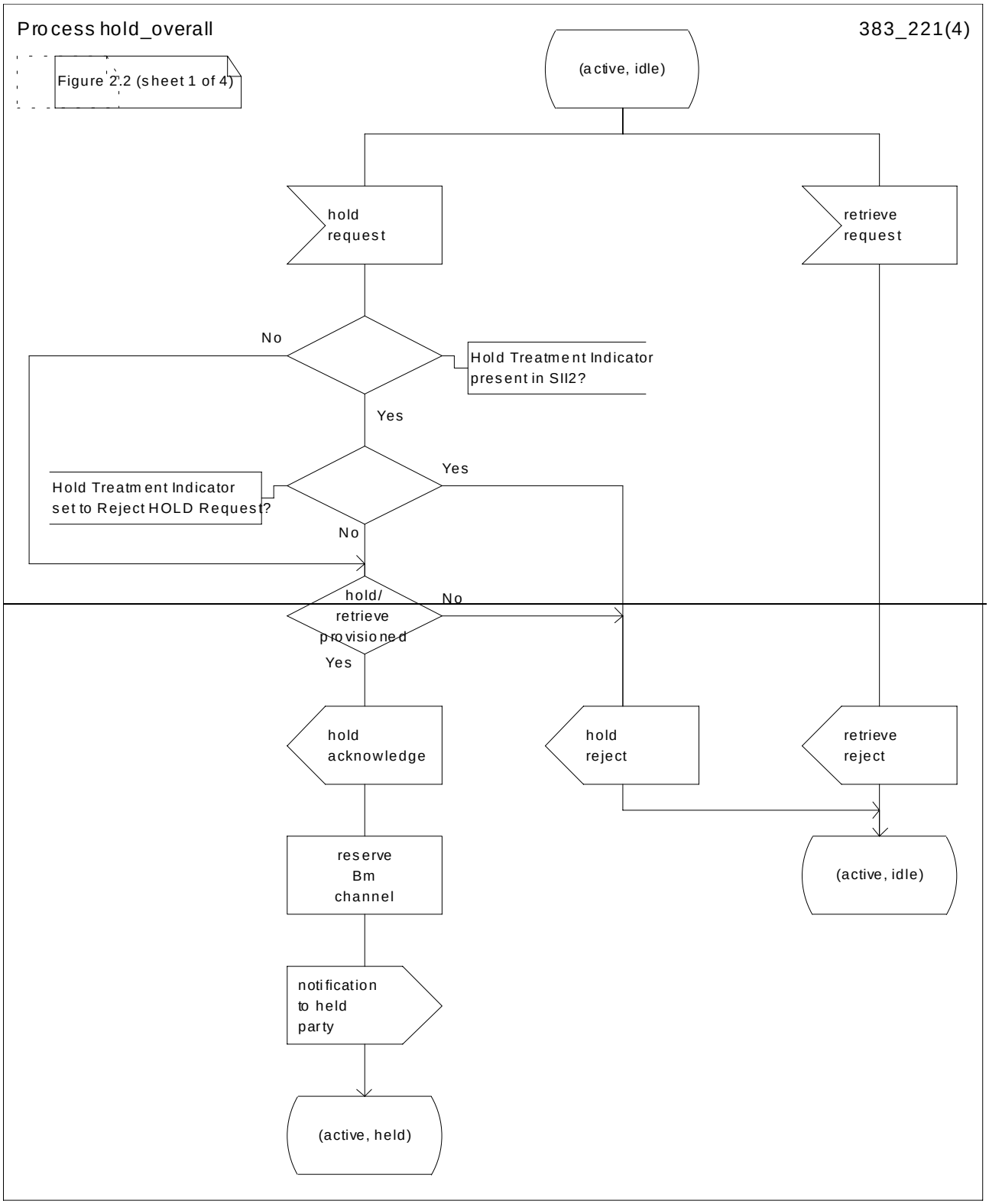


Figure 2.1: MAF024 Call hold related authorisations examination (VLR)


Process hold_overall
383_221(4)
Figure 2.2 (sheet 1 of 4)
(active, idle)
hold request
retrieve request
No
Hold Treatment Indicator present in SII2?
Yes
Yes
Hold Treatment Indicator set to Reject HOLD Request?
No
hold/ retrieve provisioned
No
Yes
hold acknowledge
hold reject
retrieve reject
reserve Bm channel
(active, idle)
notification to held party
(active, held)

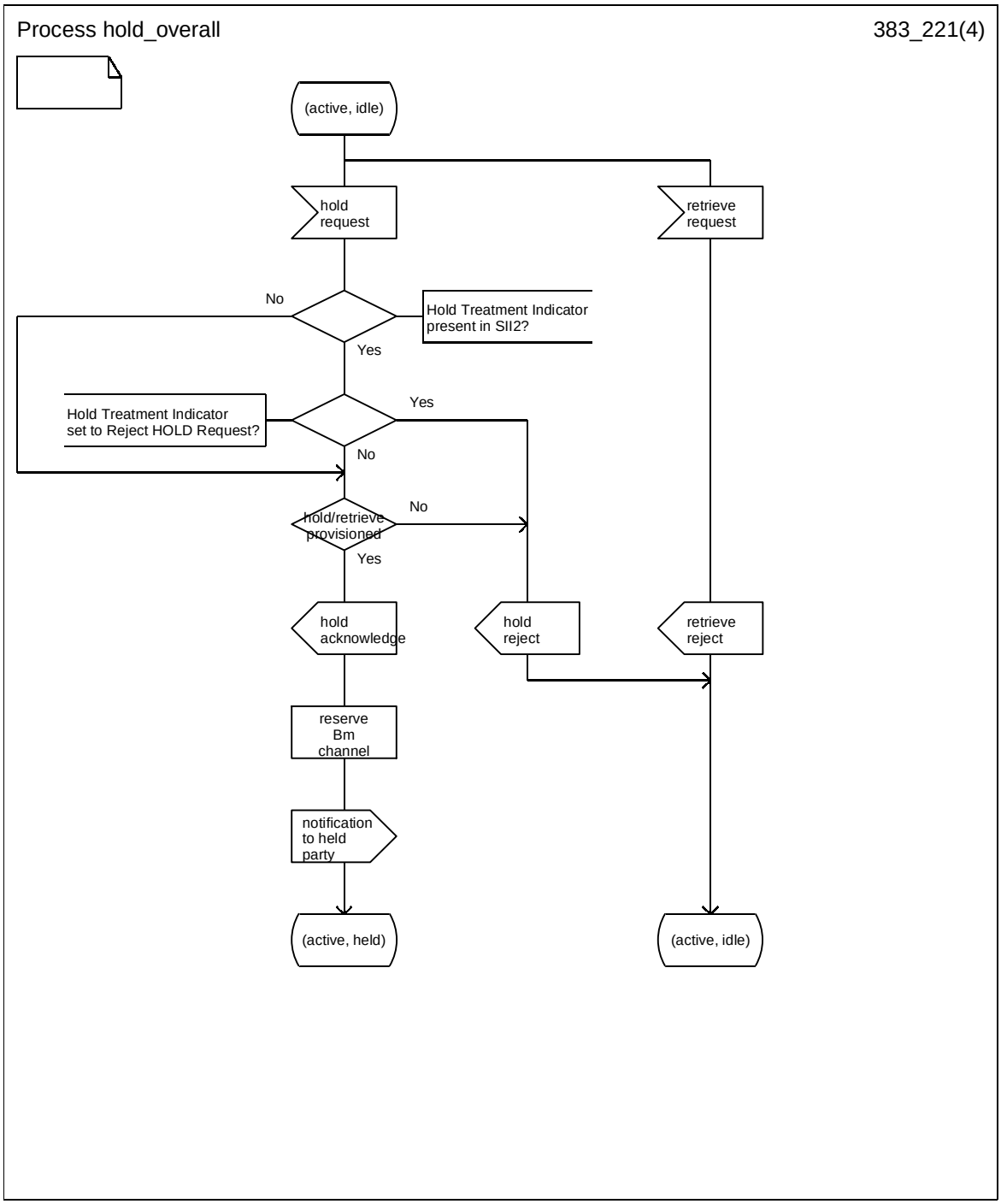
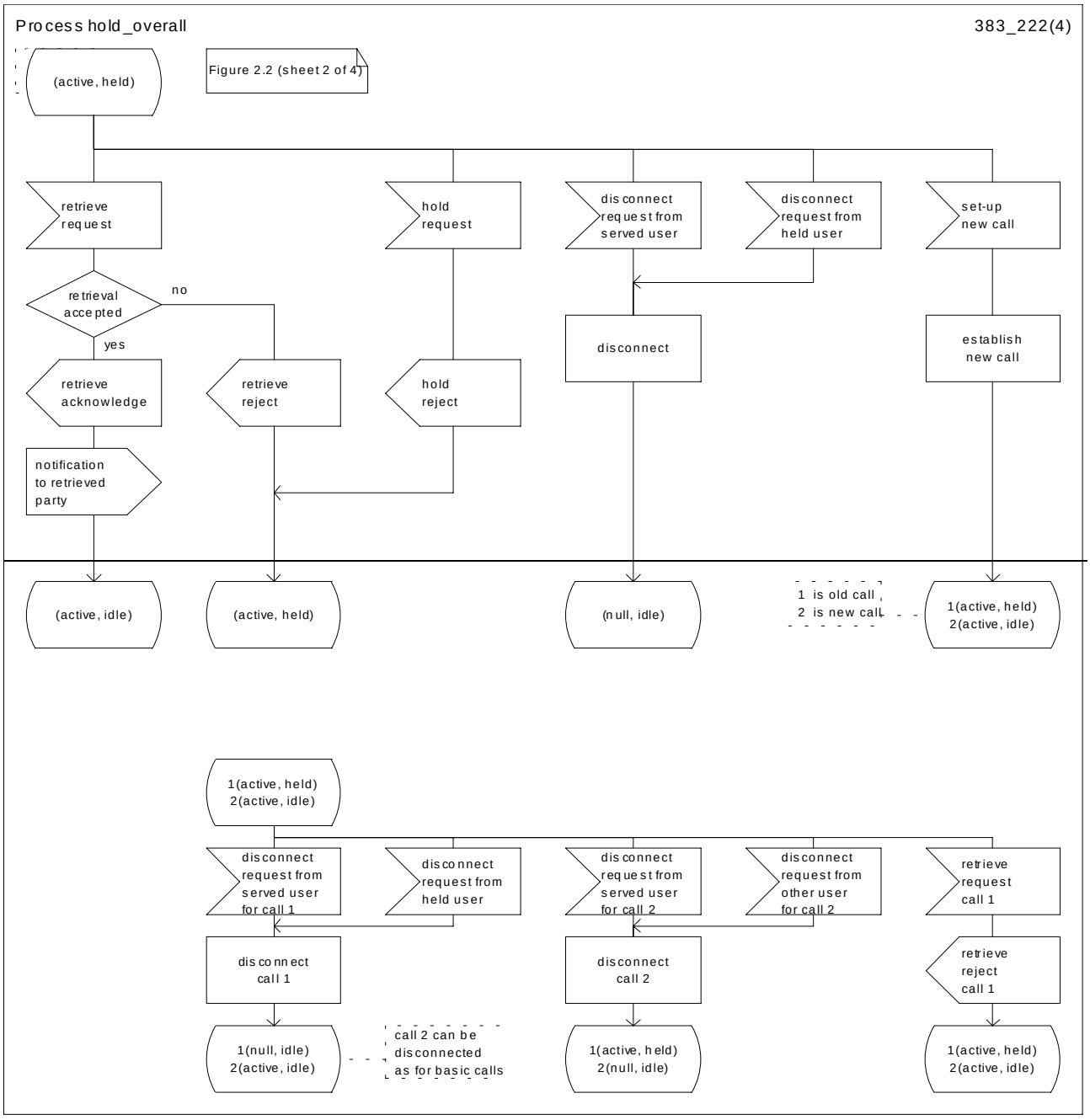


Figure 2.2 (sheet 1 of 4): Overall SDL diagram of call hold


Process hold_overall
383_222(4)
(active, held)
Figure 2.2 (sheet 2 of 4)
retrieve request
hold request
disconnect request from served user
disconnect request from held user
set-up new call
retrieval accepted
no
yes
disconnect
establish new call
retrieve acknowledge
retrieve reject
hold reject
notification to retrieved party
(active, idle)
(active, held)
(null, idle)
1 is old call ,
2 is new call
1(active, held)
2(active, idle)
1(active, held)
2(active, idle)
disconnect request from served user for call 1
disconnect request from held user
disconnect request from served user for call 2
disconnect request from other user for call 2
retrieve request call 1
disconnect call 1
disconnect call 2
retrieve reject call 1
1(null, idle)
2(active, idle)
call 2 can be disconnected as for basic calls
1(active, held)
2(null, idle)
1(active, held)
2(active, idle)

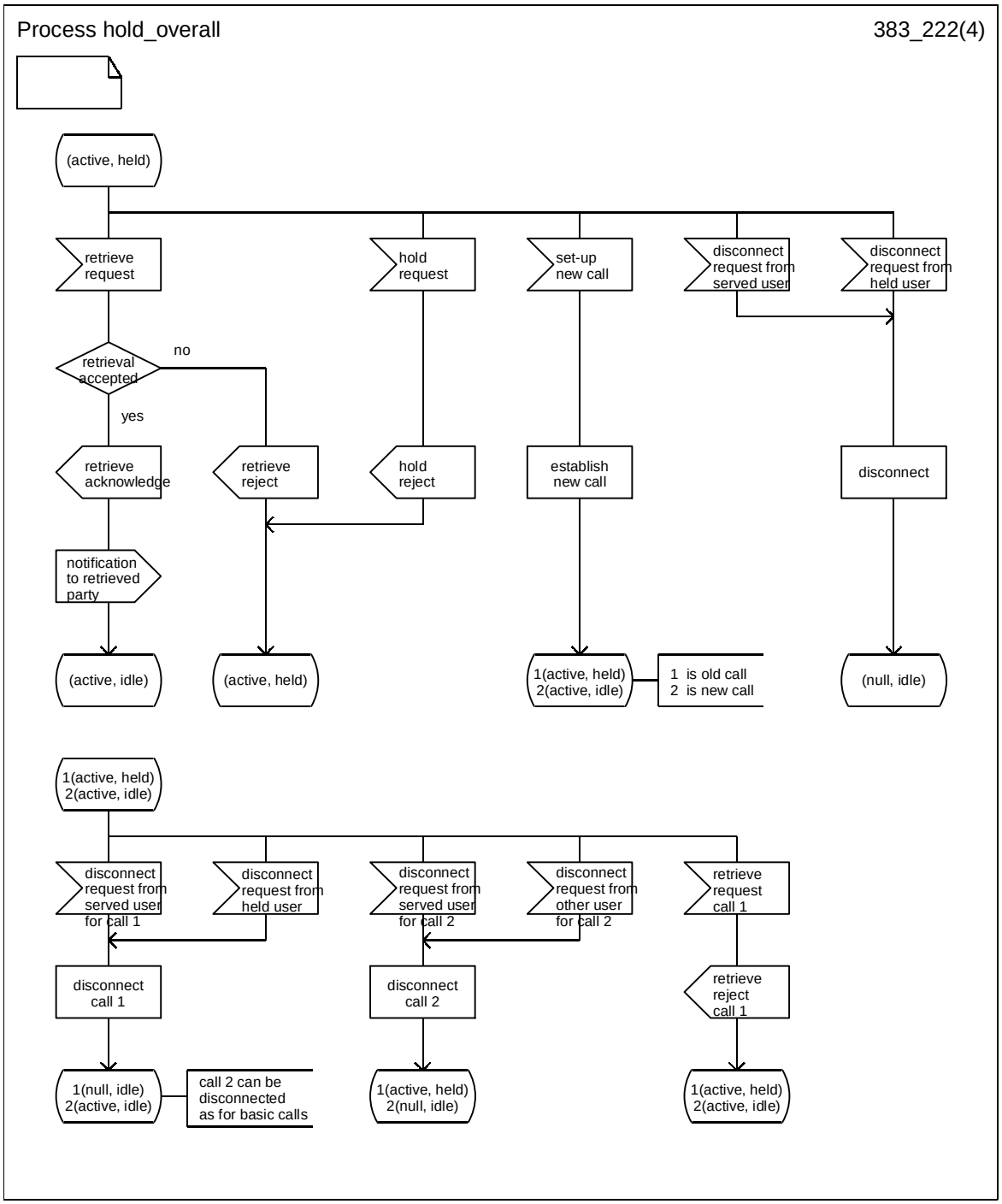
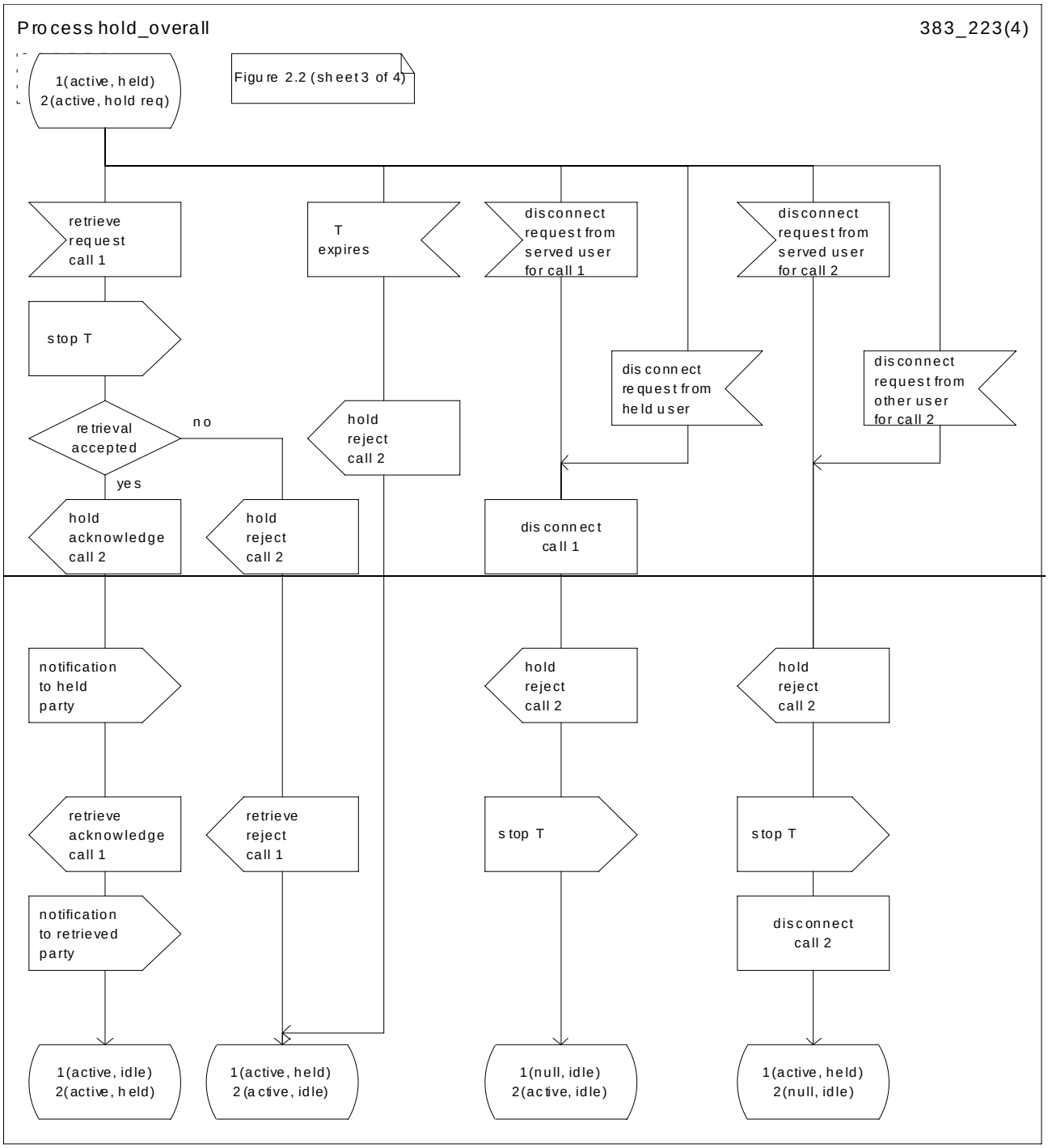


Figure 2.2 (sheet 2 of 4): Overall SDL diagram of call hold


Process hold_overall
383_223(4)
1(active, held)
2(active, hold req)
Figure 2.2 (sheet 3 of 4)
retrieve request call 1
T expires
disconnect request from served user for call 1
disconnect request from served user for call 2
stop T
disconnect request from held user
disconnect request from other user for call 2
retrieval accepted
no
yes
hold reject call 2
hold acknowledge call 2
hold reject call 2
disconnect call 1
notification to held party
hold reject call 2
hold reject call 2
retrieve acknowledge call 1
retrieve reject call 1
stop T
stop T
notification to retrieved party
disconnect call 2
1(active, idle)
2(active, held)
1(active, held)
2(active, idle)
1(null, idle)
2(active, idle)
1(active, held)
2(null, idle)

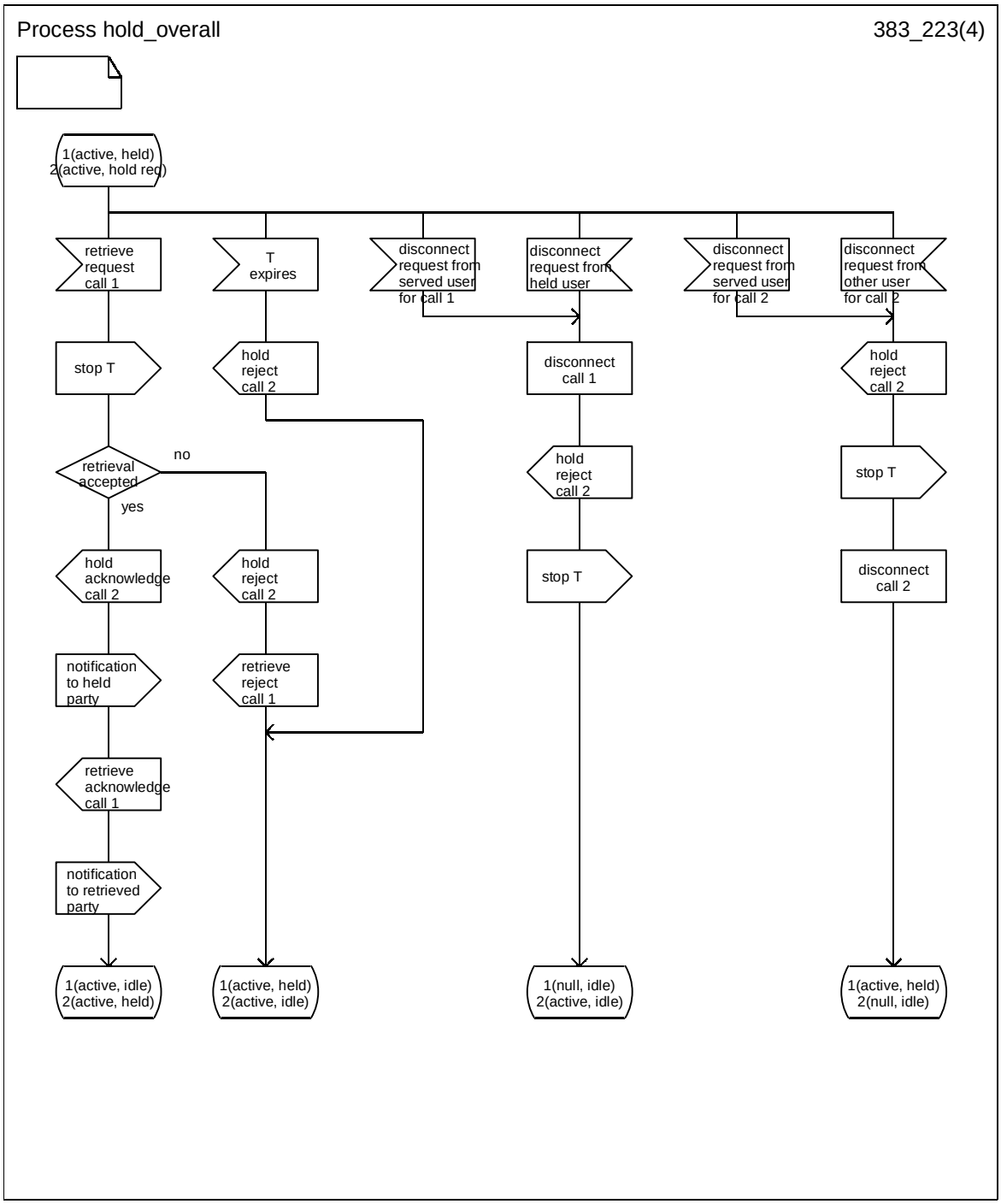
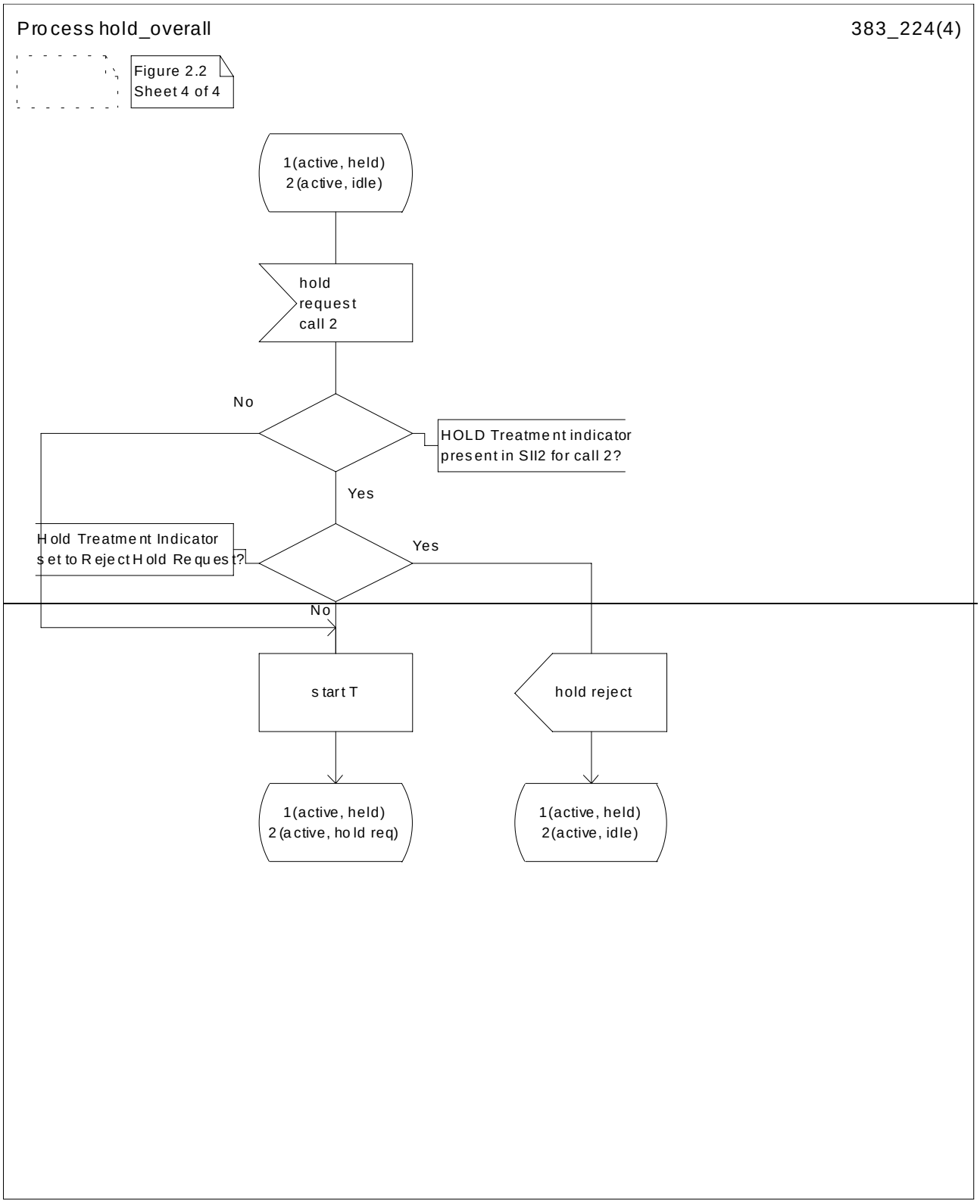


Figure 2.2 (sheet 3 of 4): Overall SDL diagram of call hold


Process hold_overall
383_224(4)
Figure 2.2
Sheet 4 of 4
1(active, held)
2(active, idle)
hold
request
call 2
No
HOLD Treatment indicator
present in SII2 for call 2?
Yes
Hold Treatment Indicator
set to Reject Hold Request?
Yes
No
start T
hold reject
1(active, held)
2(active, hold req)
1(active, held)
2(active, idle)

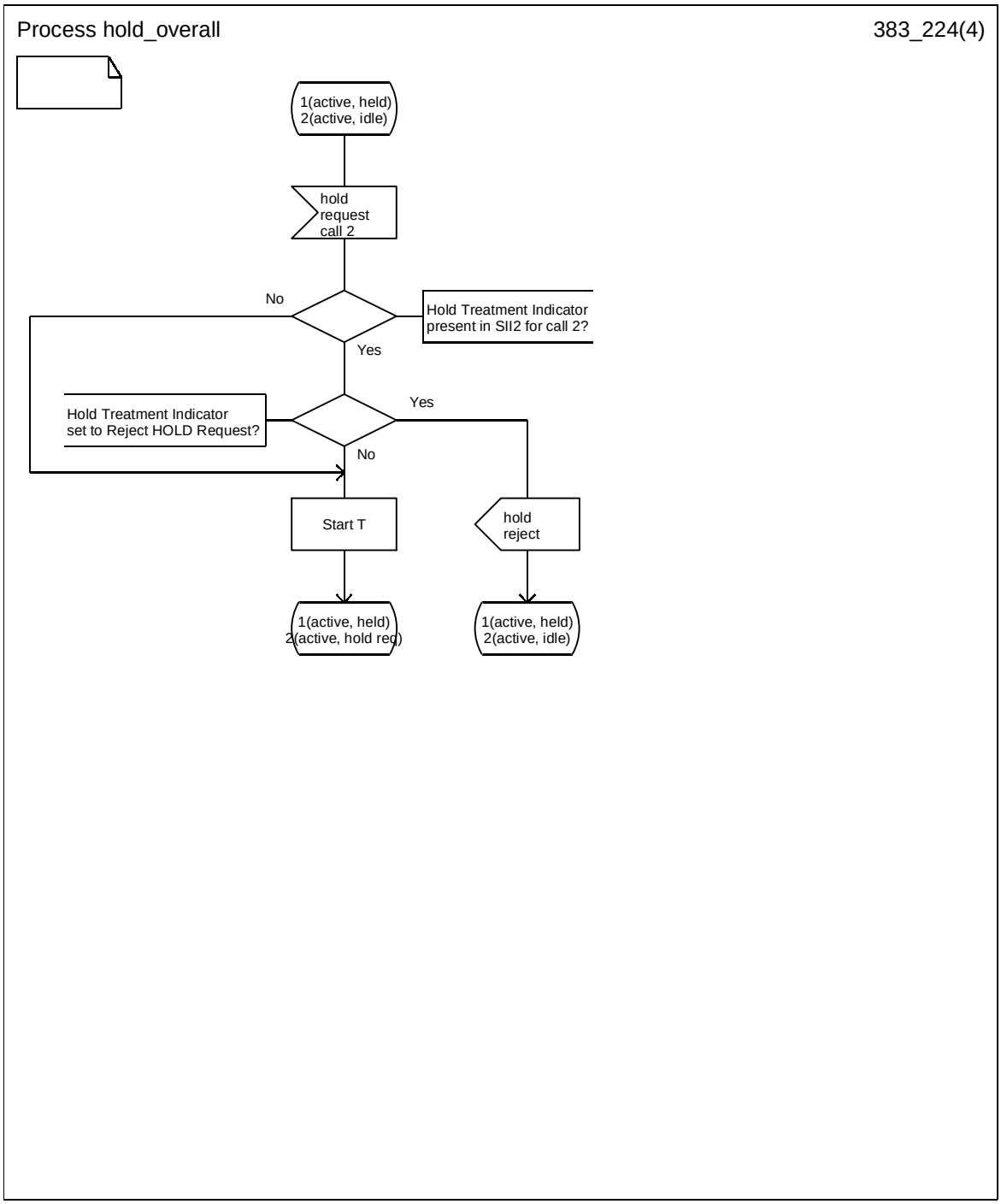


Figure 2.2 (sheet 4 of 4): Overall SDL diagram of call hold

3GPP/SMG Meeting WG4 Meeting 4
Seattle, USA, 28th August - 1st September 2000

Document N4-000571
(revision of N4-000465)

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.083	CR	005r1	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:	TSG-N#9	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: N4 **Date:** 08/08/2000

Subject: Inclusion of call hold in basic call handling.

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change: To clarify the interactions between call hold and basic call handling.

Clauses affected:

Other specs affected:				
	Other 3G core specifications	X	→ List of CRs:	23.018-055r1 (N4000570) 23.135-003 (N4000572)
	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:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

******First Modified Section ******

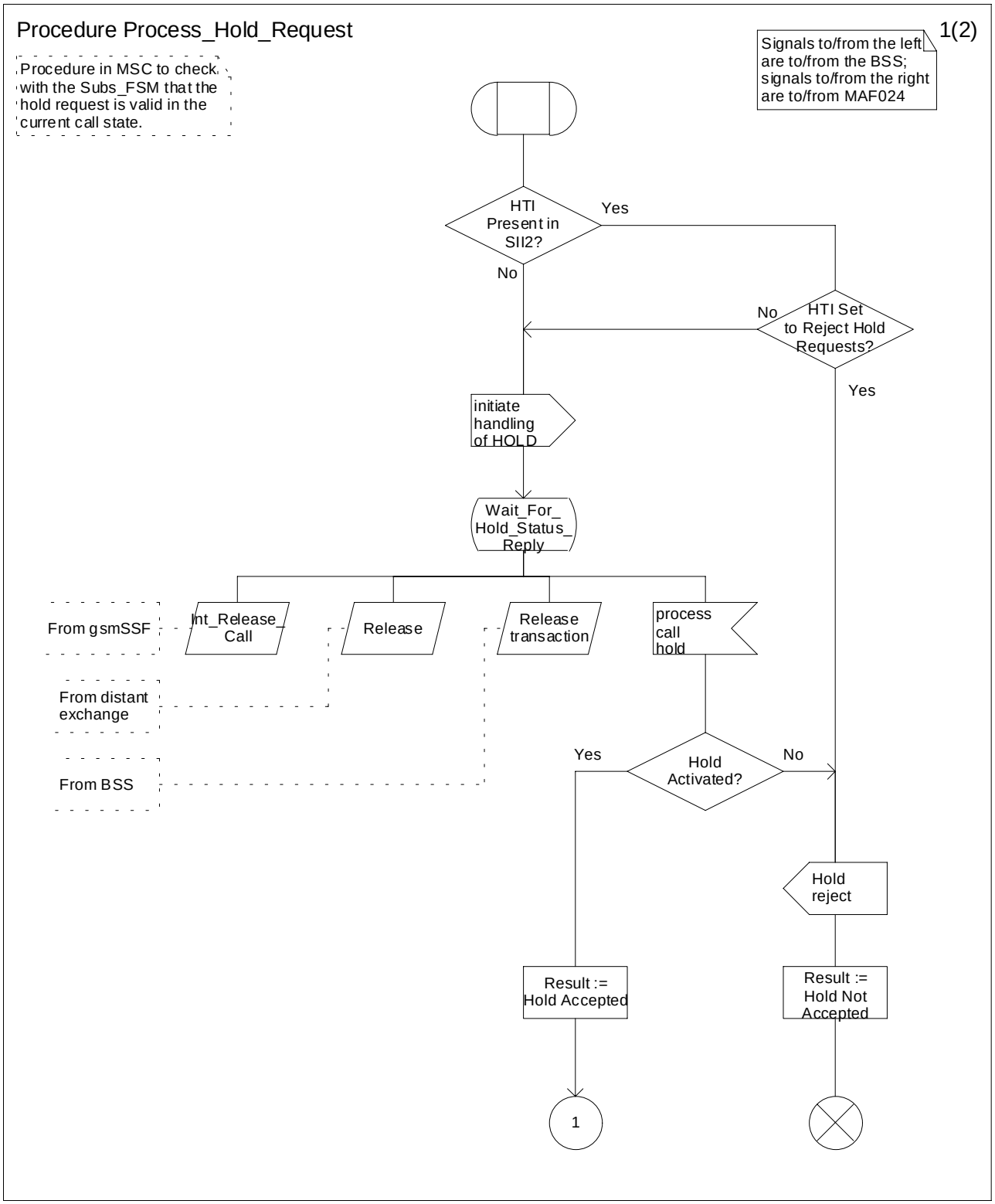


Figure x: Procedure Process_Hold_Request (Sheet 1)

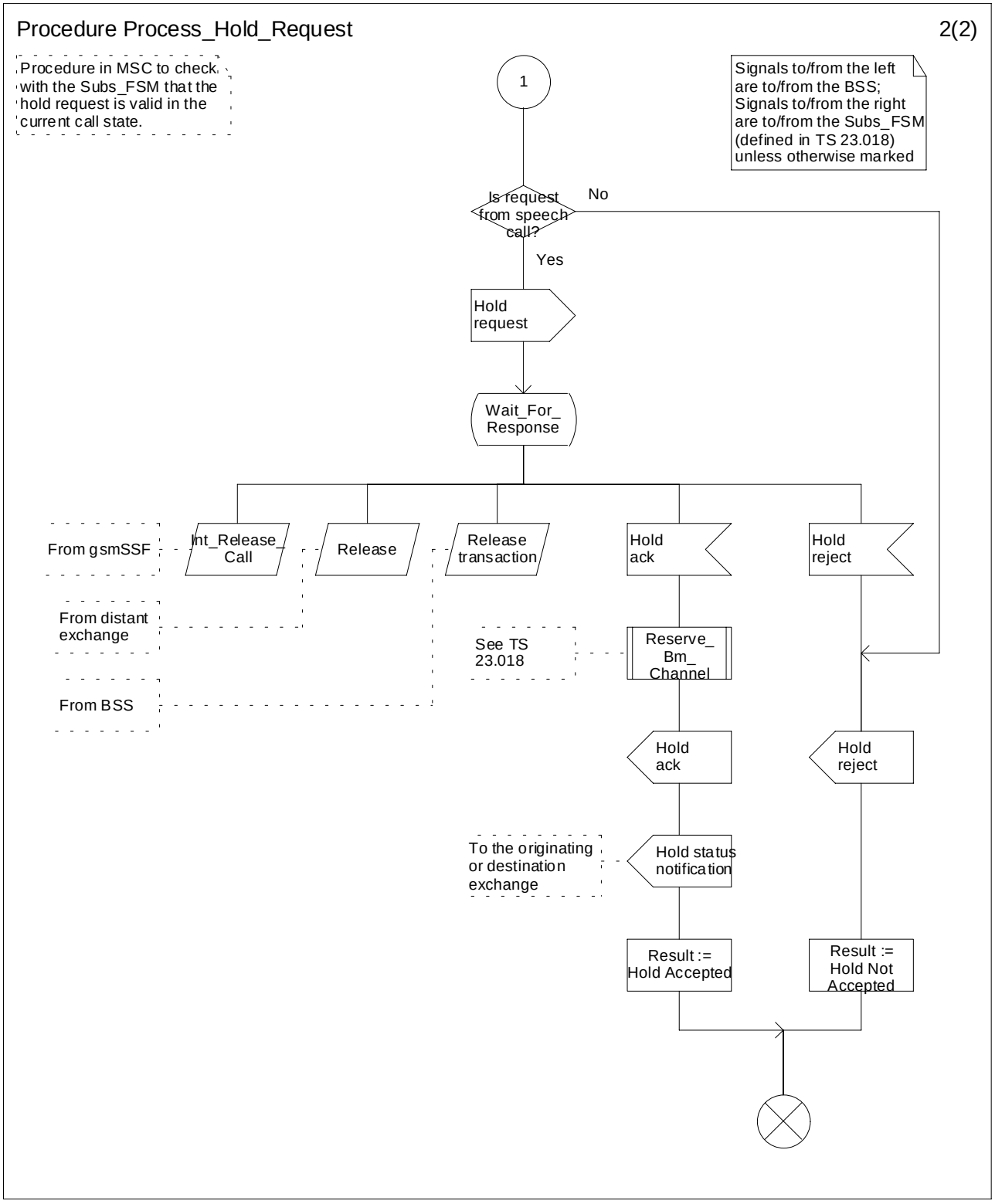
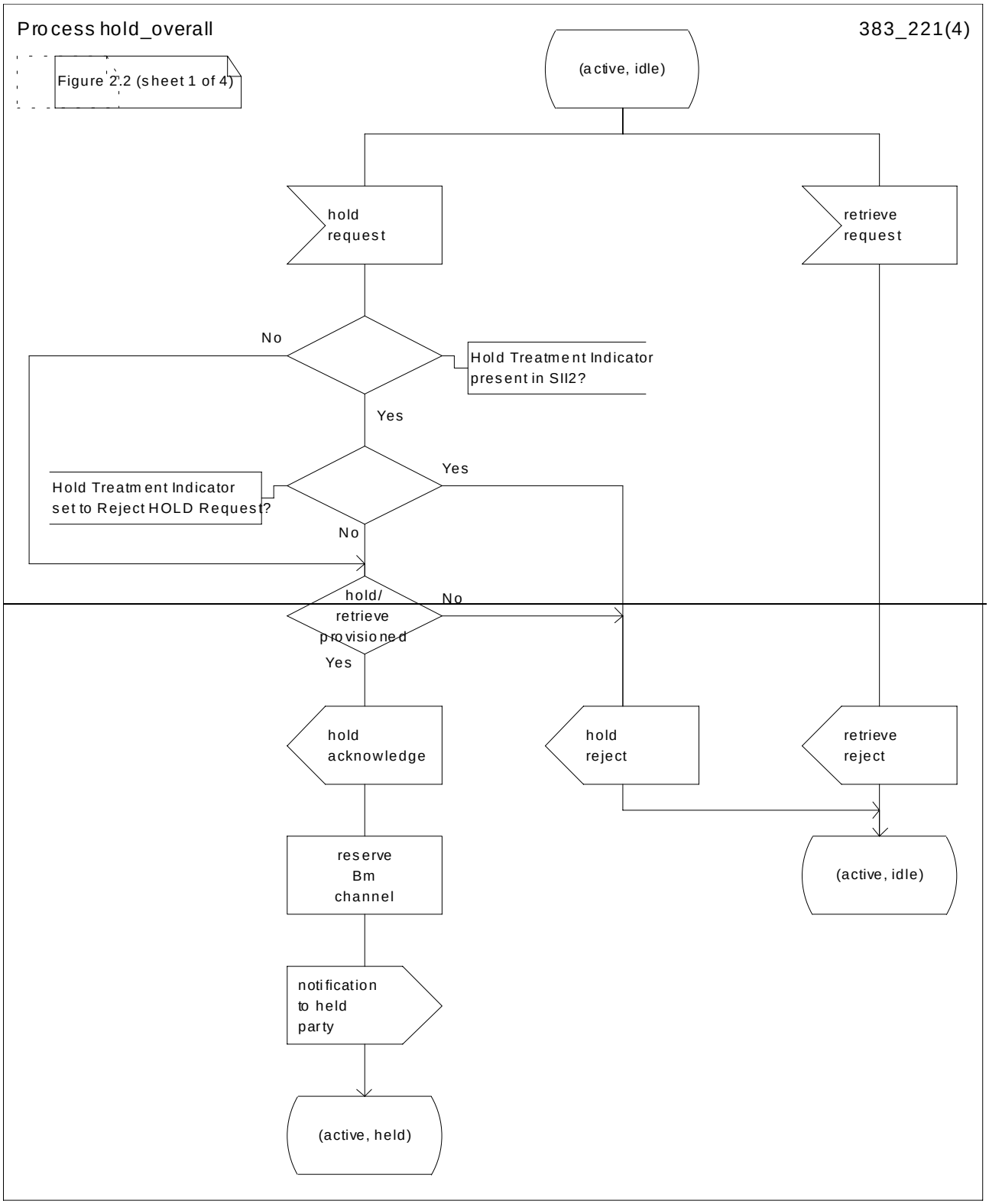
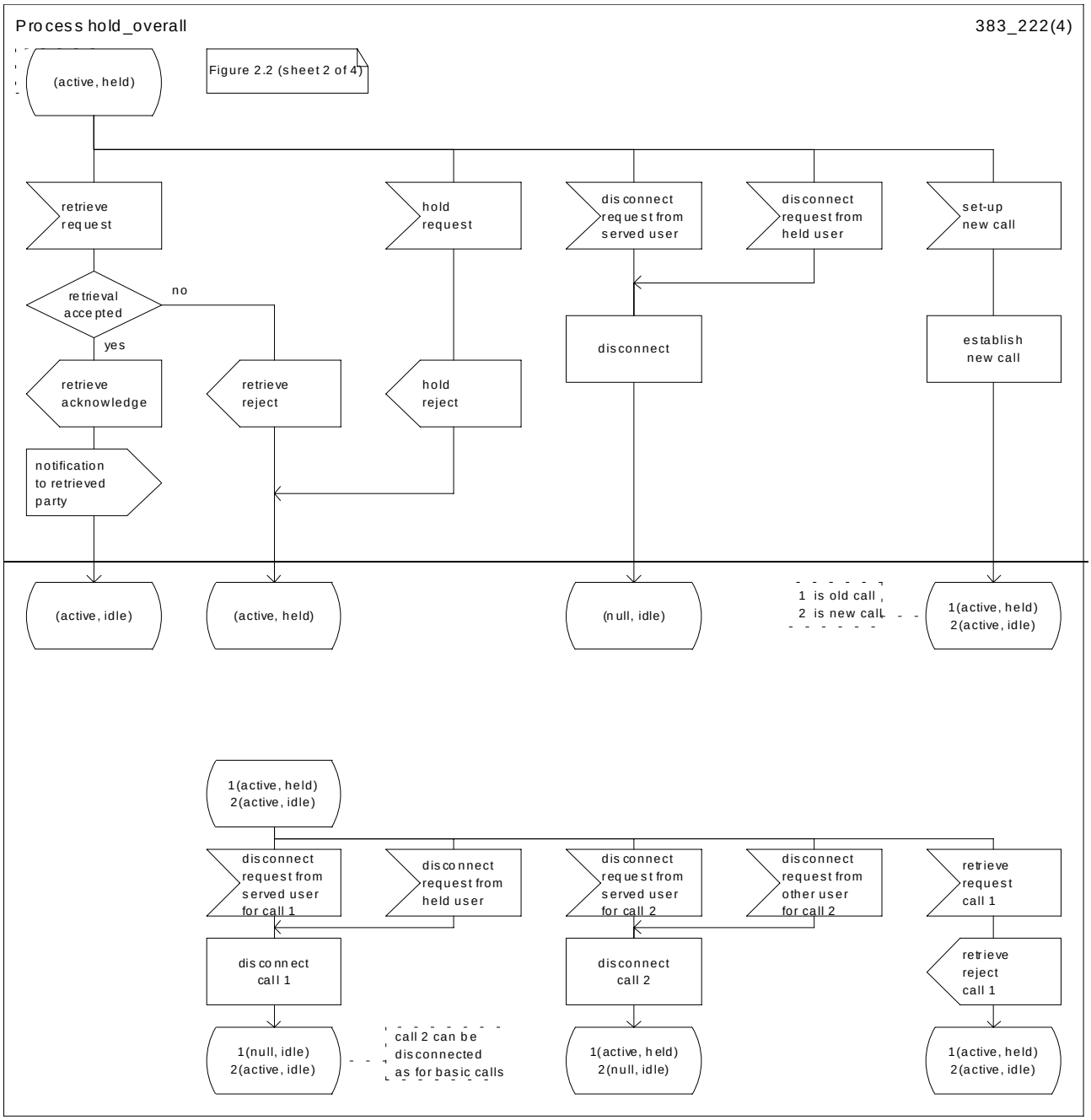


Figure x: Procedure Process_Hold_Request (Sheet 2)



~~Figure 2.2 (sheet 1 of 4): Overall SDL diagram of call hold~~



~~Figure 2.2 (sheet 2 of 4): Overall SDL diagram of call hold~~

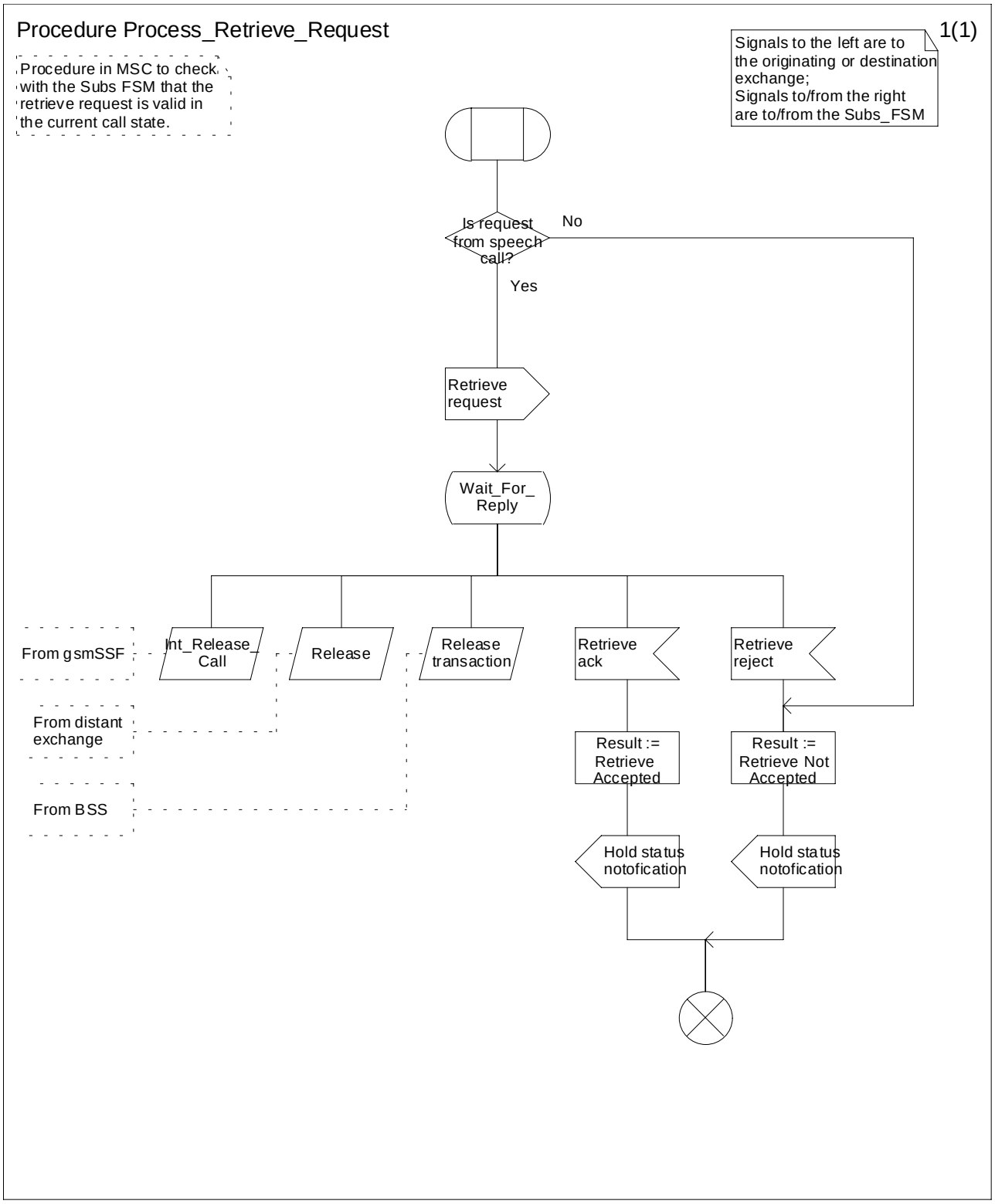
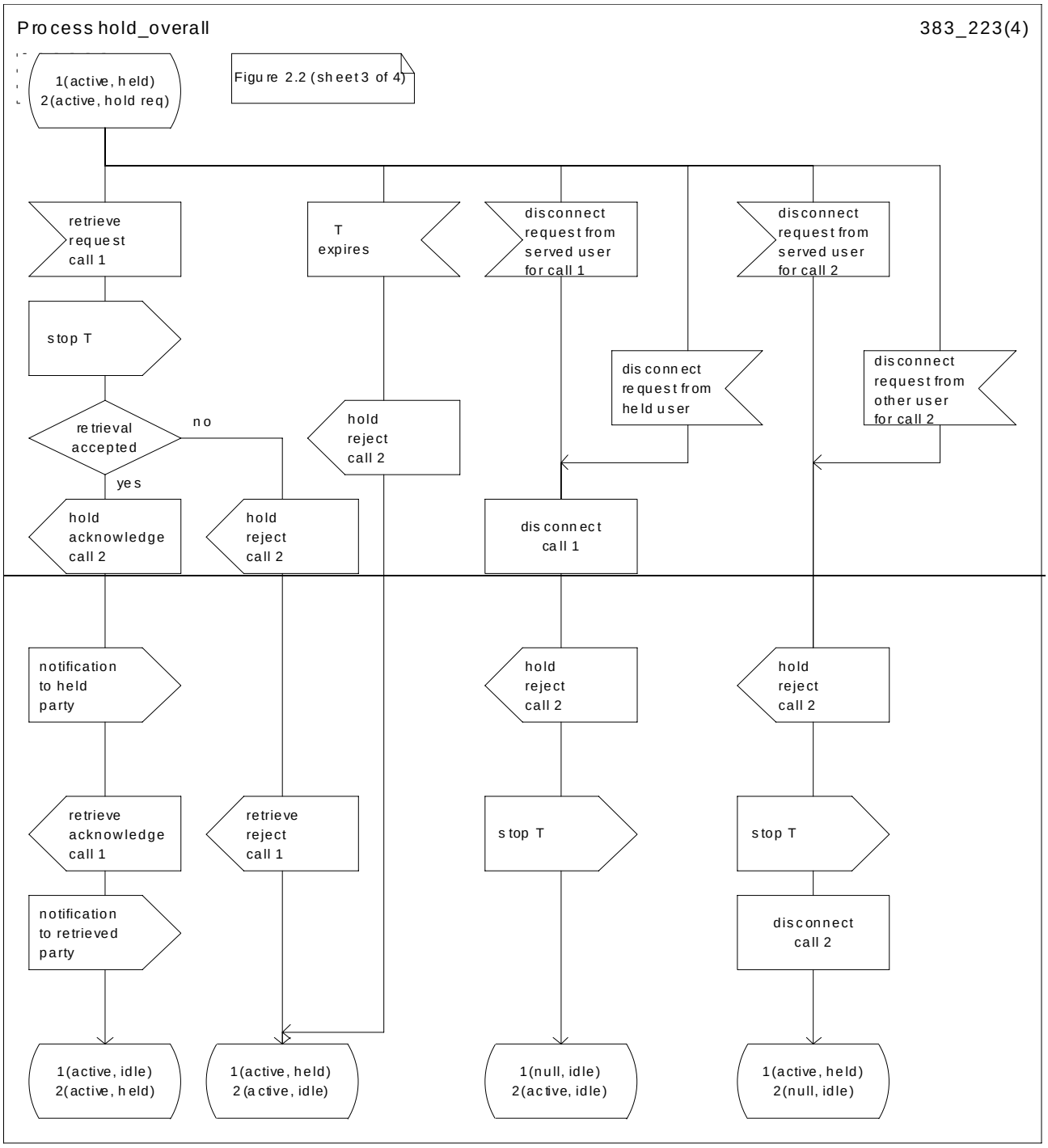
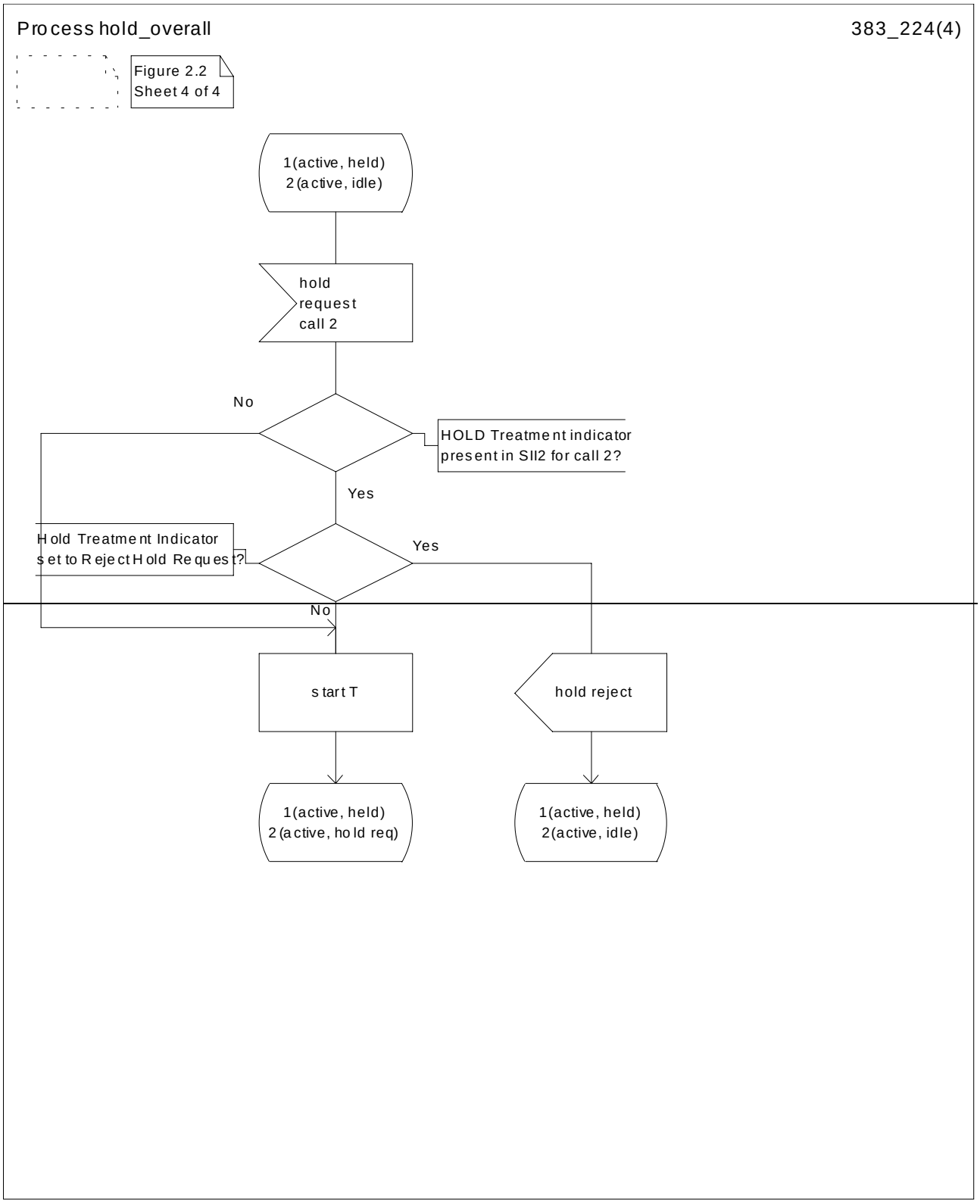


Figure x: Procedure Process_Retrieve_Request



~~Figure 2.2 (sheet 3 of 4): Overall SDL diagram of call hold~~



~~Figure 2.2 (sheet 4 of 4): Overall SDL diagram of call hold~~

******End of document ******

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000432
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.084	CR	002	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#09	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: N4 **Date:** 2000-06-26

Subject: SDL refresh

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

The SDL diagrams in this document have been replaced, without any semantic changes due to the following reasons:

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- Some of the diagrams were, if not impossible, very hard to print.
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Clauses affected: All figures in the document, containing an SDL diagram.

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:

ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

Functions and information flows

The following Mobile Additional Function has been identified for Multi Party service:

MAF026

Multi Party service related authorizations examination

The ability of a PLMN component to determine the authorizations relating to Multi Party service. See figure 2.1.

Location: VLR

The overall SDL-diagram of Multi Party service is shown in figure 1.2.

This overall SDL-diagram represents the network as a whole. The overall SDL-diagram shows the status of the service as perceived by the served mobile subscriber, as well as the status as perceived by any of the other parties. Beside this, the overall SDL-diagram shows the actions to be taken by the network and the information provided by the network to the users.

Within the authorization examinations diagram, the messages shown to and from the left are to and from the VLR.

Within the overall SDL diagram, messages to and from the served mobile subscriber are indicated to and from the left, whereas messages to and from remote parties are indicated to and from the right.

The information flow for Multi Party service is shown in figure 1.3.

In the information flow it is assumed that the served subscriber is a mobile subscriber and that the other parties are all fixed ISDN subscribers. For the purposes of the information flow diagrams it is assumed that there are only two remote parties. Where there are more than two remote parties, signals to any party connected to the MPTY bridge shall apply to all other parties connected to the MPTY bridge, except where a single remote party is to be selected for a private communication.

As a consequence of this assumption, after the MPTY is split (to establish a private communication) it only contains one remote party. However, the end state for disconnection of or by that remaining remote party is shown as A-B ACTIVE / MPTY HELD. This is to indicate that the disconnection by a single remote party will not necessarily cause the MPTY call to be released. This will only happen when that remote party is the only remaining party in the MPTY call.

Party A is the subscriber controlling the MPTY call (serviced mobile subscriber). Party B is the first remote party called. Party C is the second remote party called.

Remote parties are disconnected by the generic disconnect/release procedure. Any scenario requiring disconnection of remote parties shown in the SDL diagrams but not explicitly shown in the flow diagrams shall follow the procedure shown in the flow diagrams for similar scenarios.

Functions to be performed by the fixed ISDN (for example hold authorizations examination) are not shown in the information flow; only the functions to be performed by the PLMN are shown.

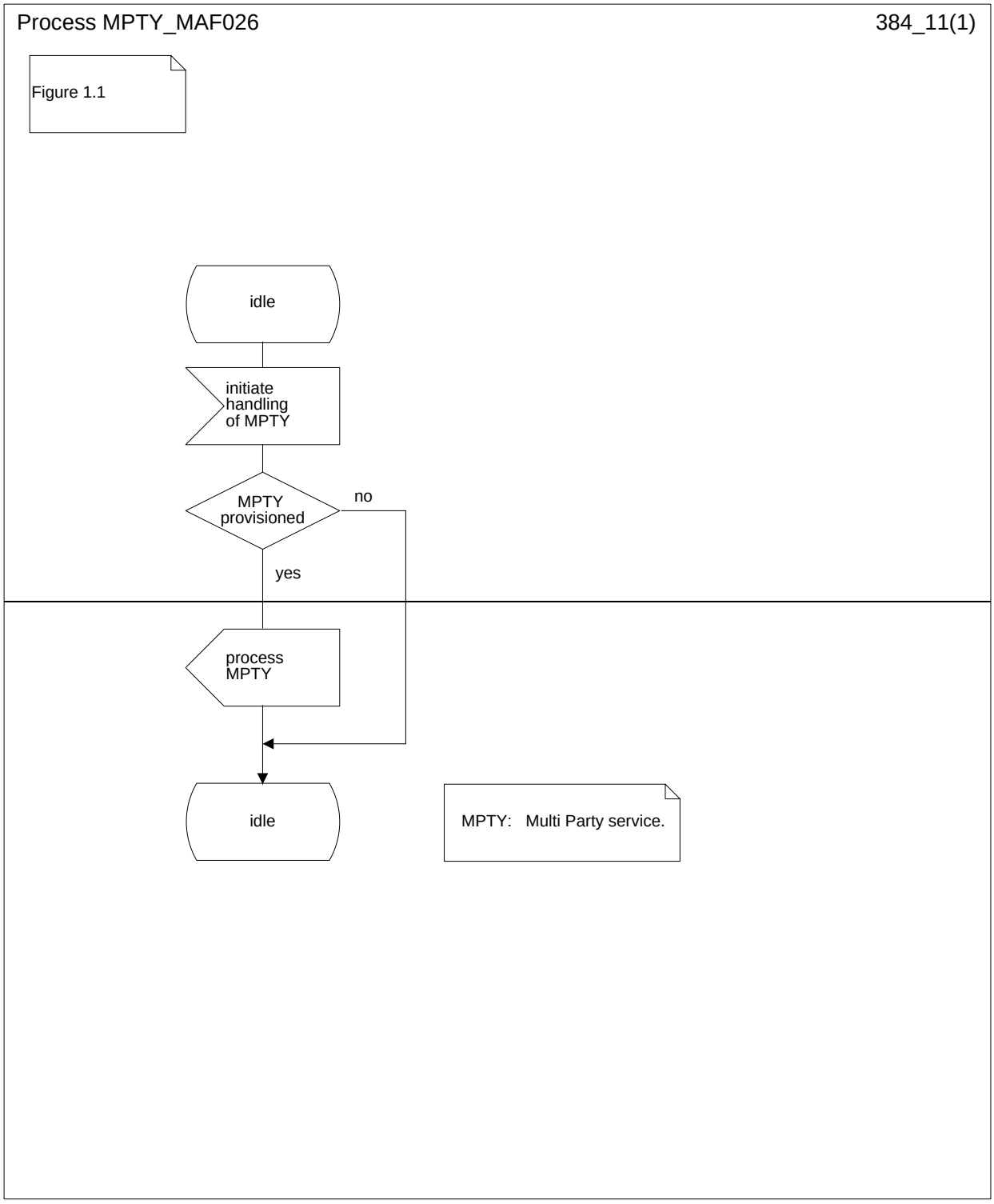
It is assumed that the Multi Party bridge is located in the MSC.

In the SDL-diagrams a two dimensional state in conjunction with call hold is used: (active,hold request).

- The first dimension is a normal basic call state "active".
- The second dimension is "hold request" (abbreviated hold req) meaning that a request has been made for the hold function.

To avoid having two calls on hold at the same time the reception of the retrieve request is supervised by timer T as defined in TS 23.083.

Note that while the Multi Party is on hold, the remote parties can continue to communicate with each other.


Process MPTY_MAF026
384_11(1)
Figure 1.1
idle
initiate handling of MPTY
MPTY provisioned
no
yes
process MPTY
idle
MPTY: Multi Party service.

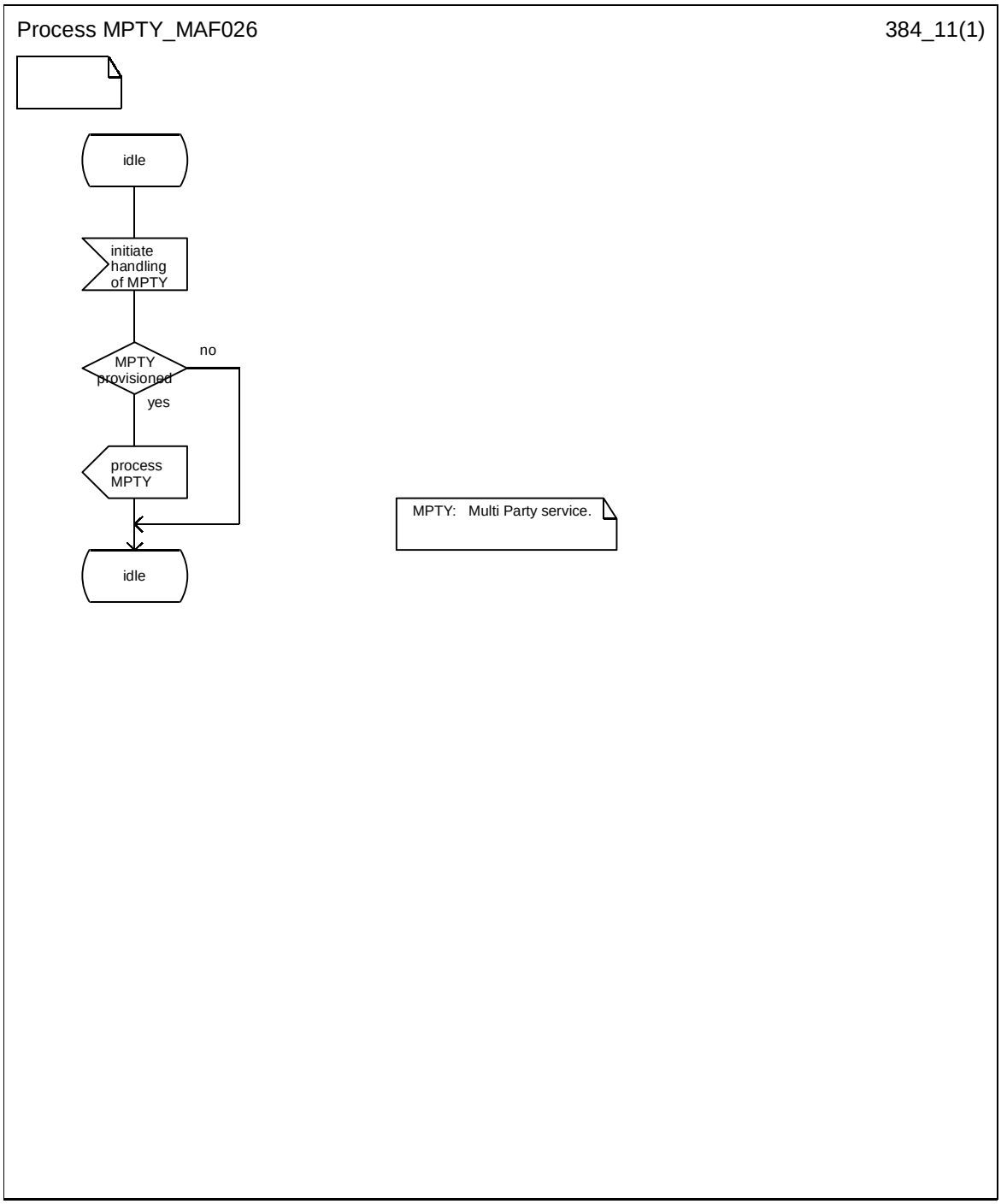
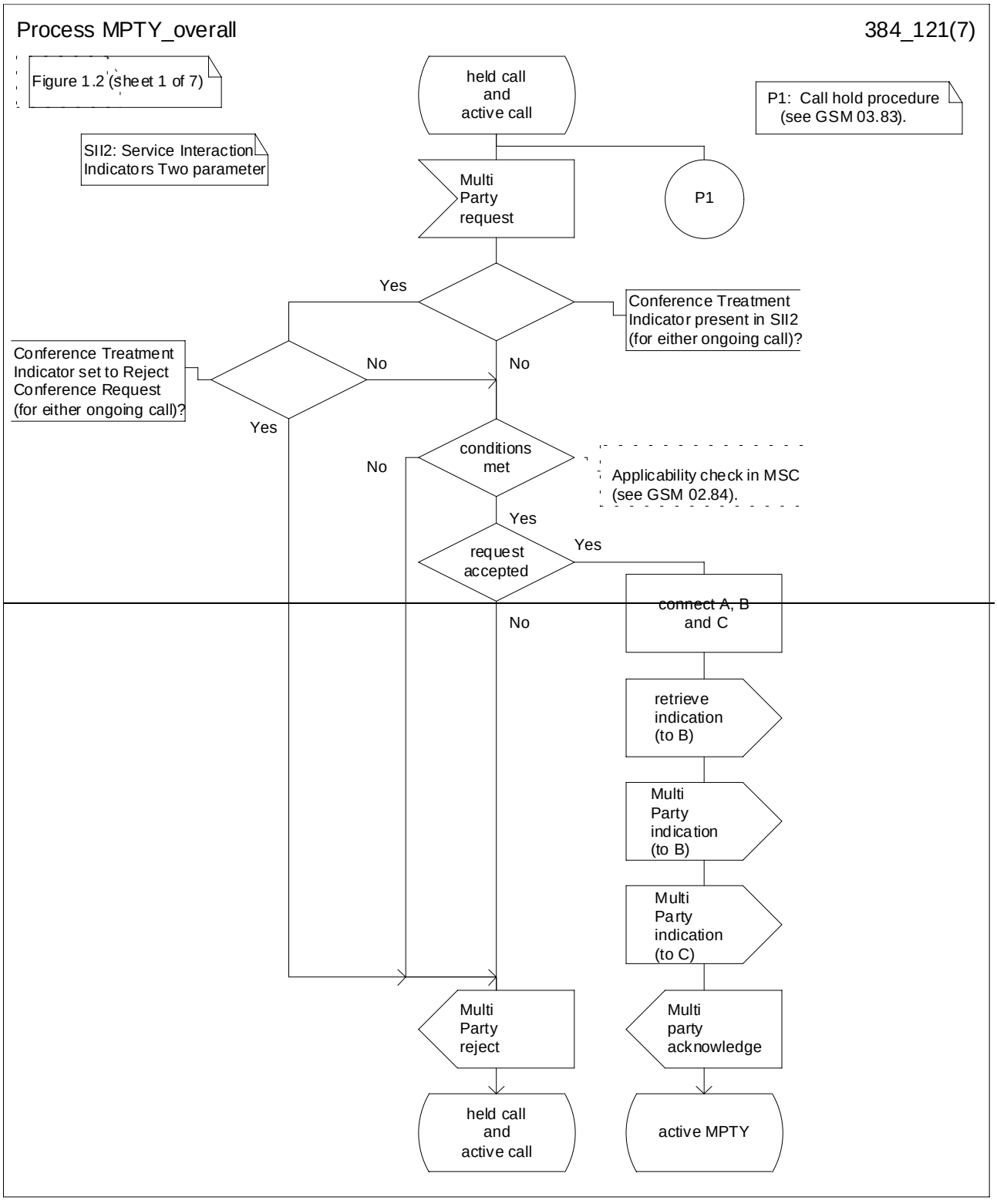


Figure 1.1: MAF026 Multi Party service related authorisations examination (VLR)


Process MPTY_overall
384_121(7)
Figure 1.2 (sheet 1 of 7)
SII2: Service Interaction Indicators Two parameter
held call and active call
P1: Call hold procedure (see GSM 03.83).
Multi Party request
P1
Yes
Conference Treatment Indicator present in SII2 (for either ongoing call)?
Conference Treatment Indicator set to Reject Conference Request (for either ongoing call)?
No
No
Yes
conditions met
No
Applicability check in MSC (see GSM 02.84).
Yes
request accepted
Yes
No
connect A, B and C
retrieve indication (to B)
Multi Party indication (to B)
Multi Party indication (to C)
Multi Party reject
Multi party acknowledge
held call and active call
active MPTY

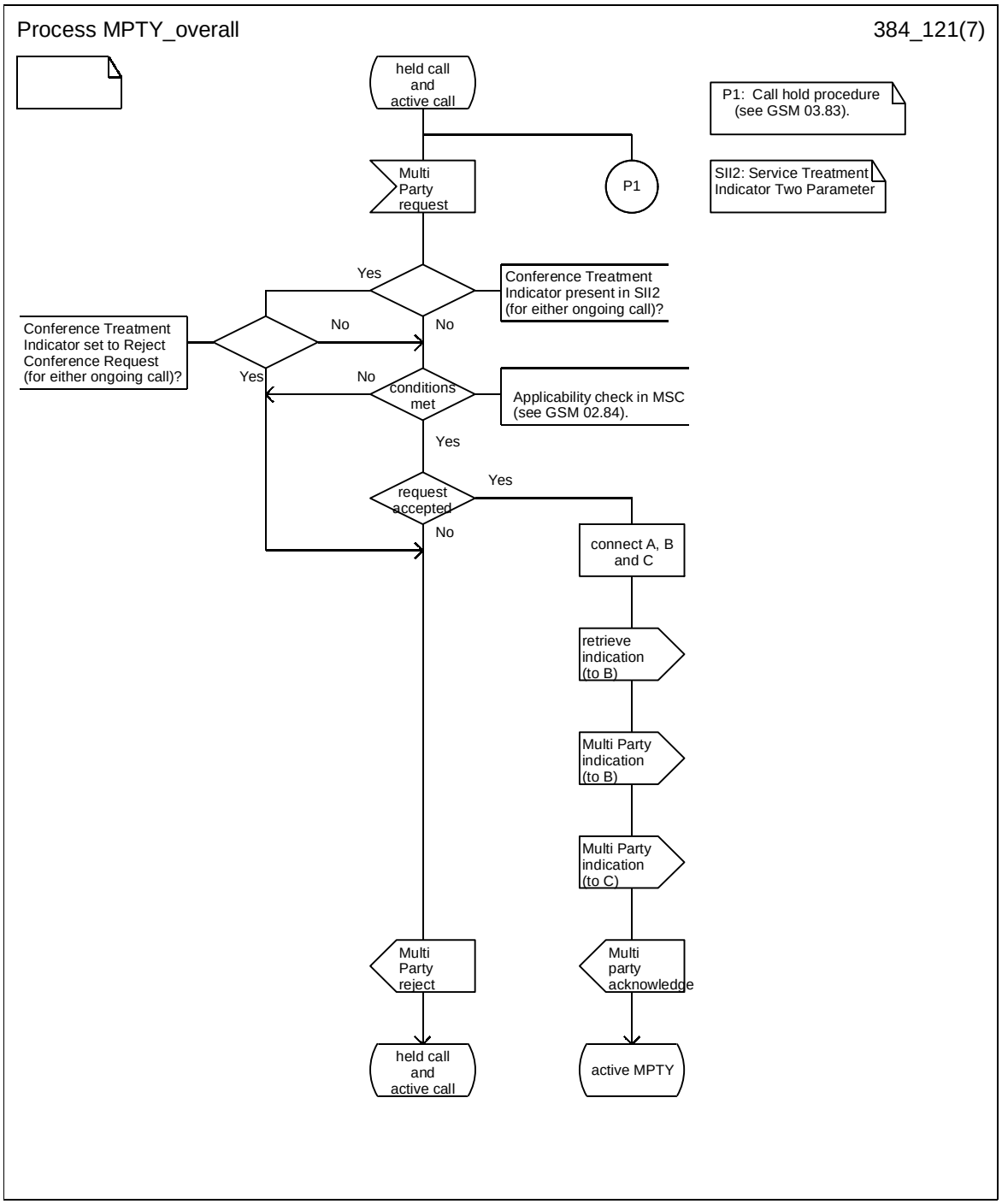
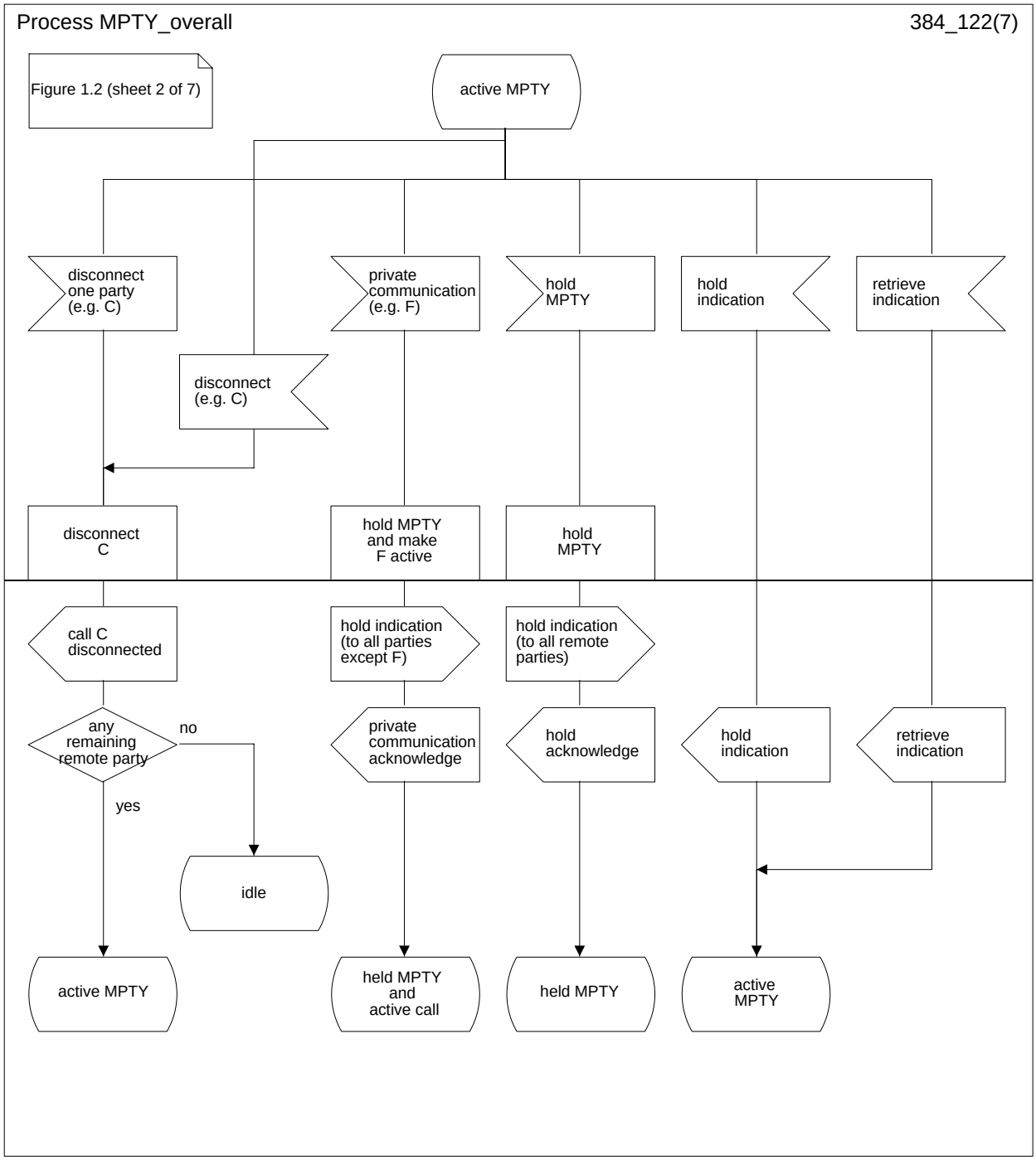


Figure 1.2 (sheet 1 of 7): Overall SDL diagram of Multi Party service


Process MPTY_overall
384_122(7)
Figure 1.2 (sheet 2 of 7)
active MPTY
disconnect one party (e.g. C)
private communication (e.g. F)
hold MPTY
hold indication
retrieve indication
disconnect (e.g. C)
disconnect C
hold MPTY and make F active
hold MPTY
call C disconnected
hold indication (to all parties except F)
hold indication (to all remote parties)
any remaining remote party
no
yes
private communication acknowledge
hold acknowledge
hold indication
retrieve indication
idle
active MPTY
held MPTY and active call
held MPTY
active MPTY

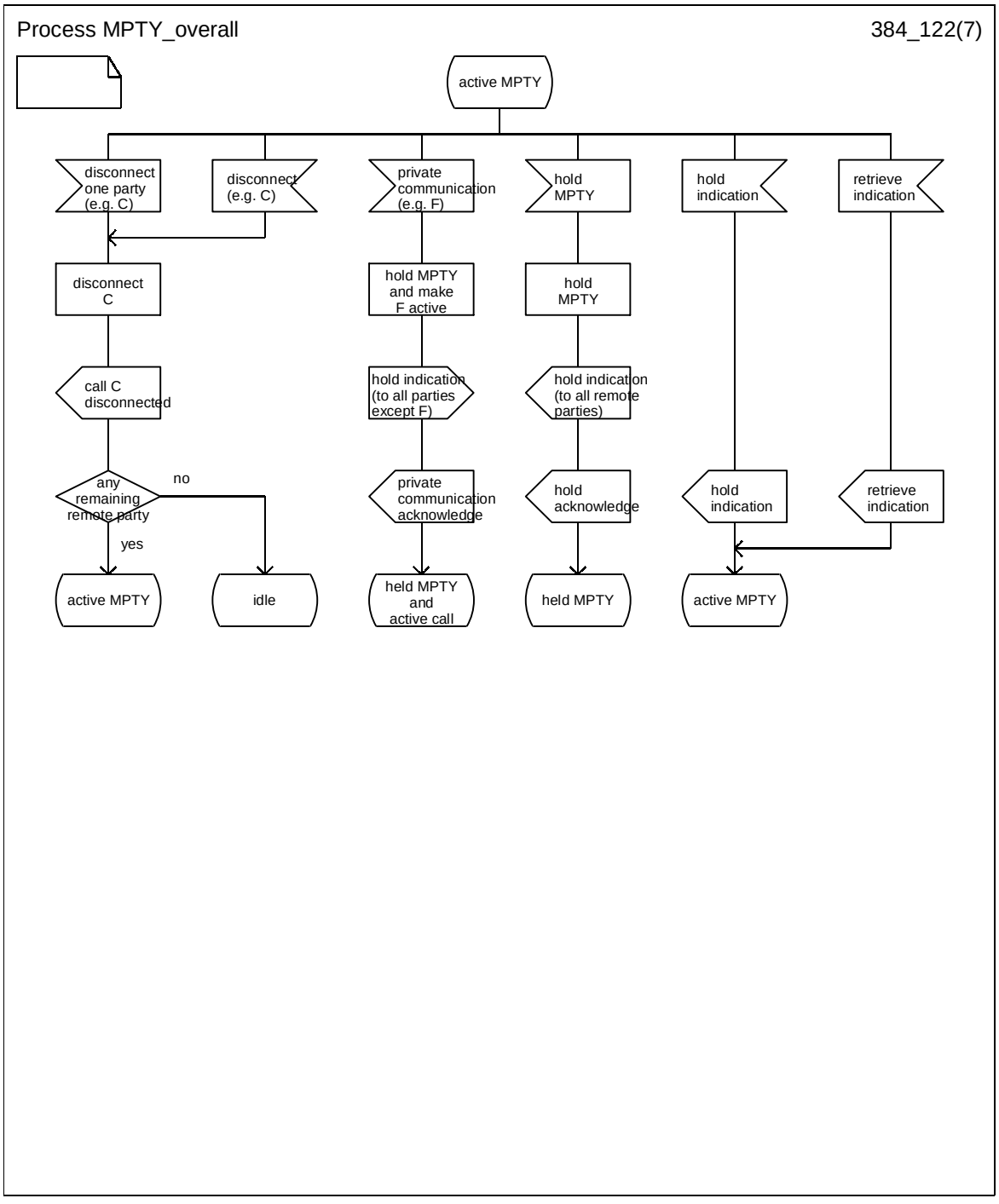
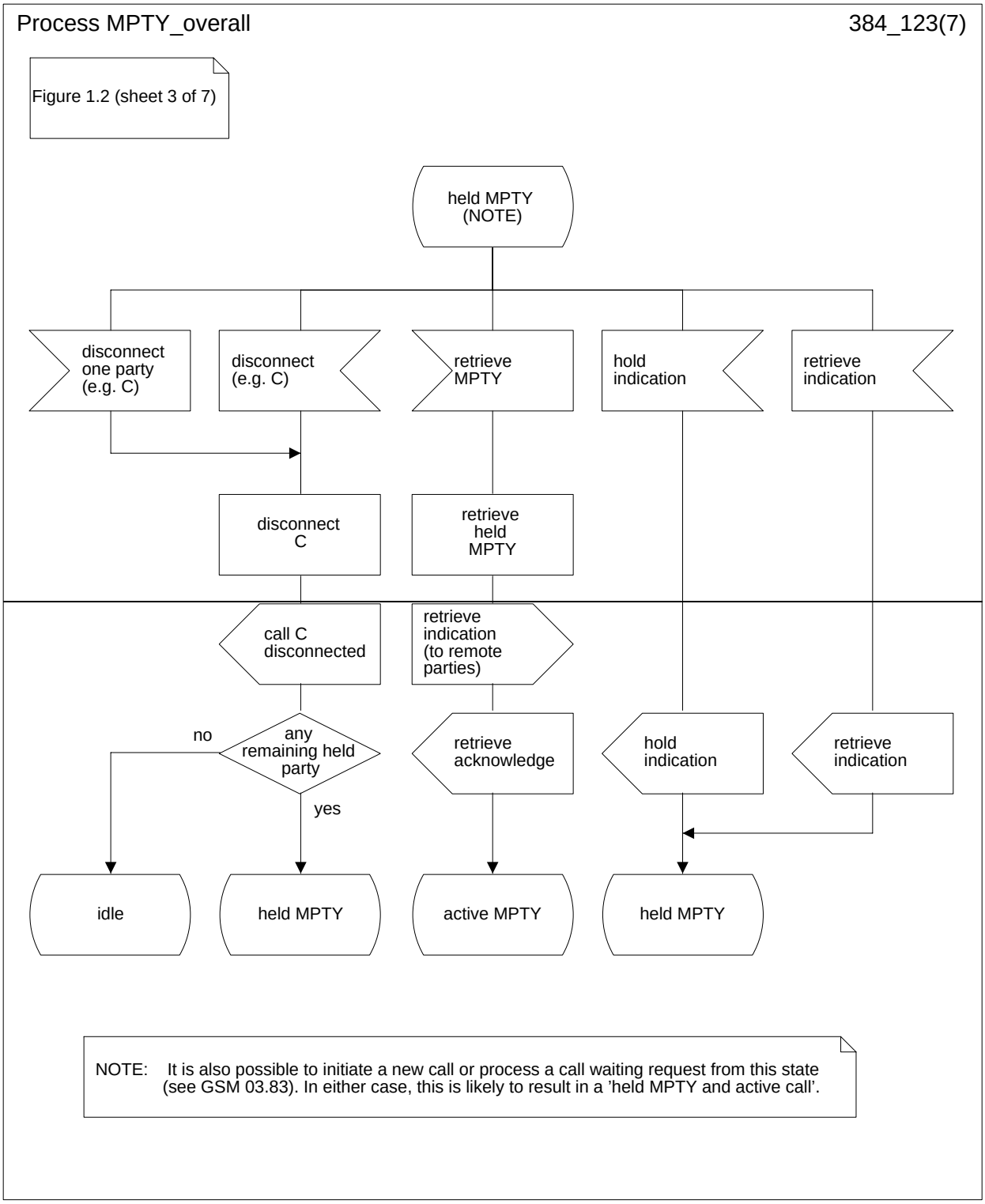


Figure 1.2 (sheet 2 of 7): Overall SDL diagram of Multi Party service


Process MPTY_overall
384_123(7)
Figure 1.2 (sheet 3 of 7)
held MPTY (NOTE)
disconnect one party (e.g. C)
disconnect (e.g. C)
retrieve MPTY
hold indication
retrieve indication
disconnect C
retrieve held MPTY
call C disconnected
retrieve indication (to remote parties)
no
any remaining held party
yes
retrieve acknowledge
hold indication
retrieve indication
idle
held MPTY
active MPTY
held MPTY
NOTE: It is also possible to initiate a new call or process a call waiting request from this state (see GSM 03.83). In either case, this is likely to result in a 'held MPTY and active call'.

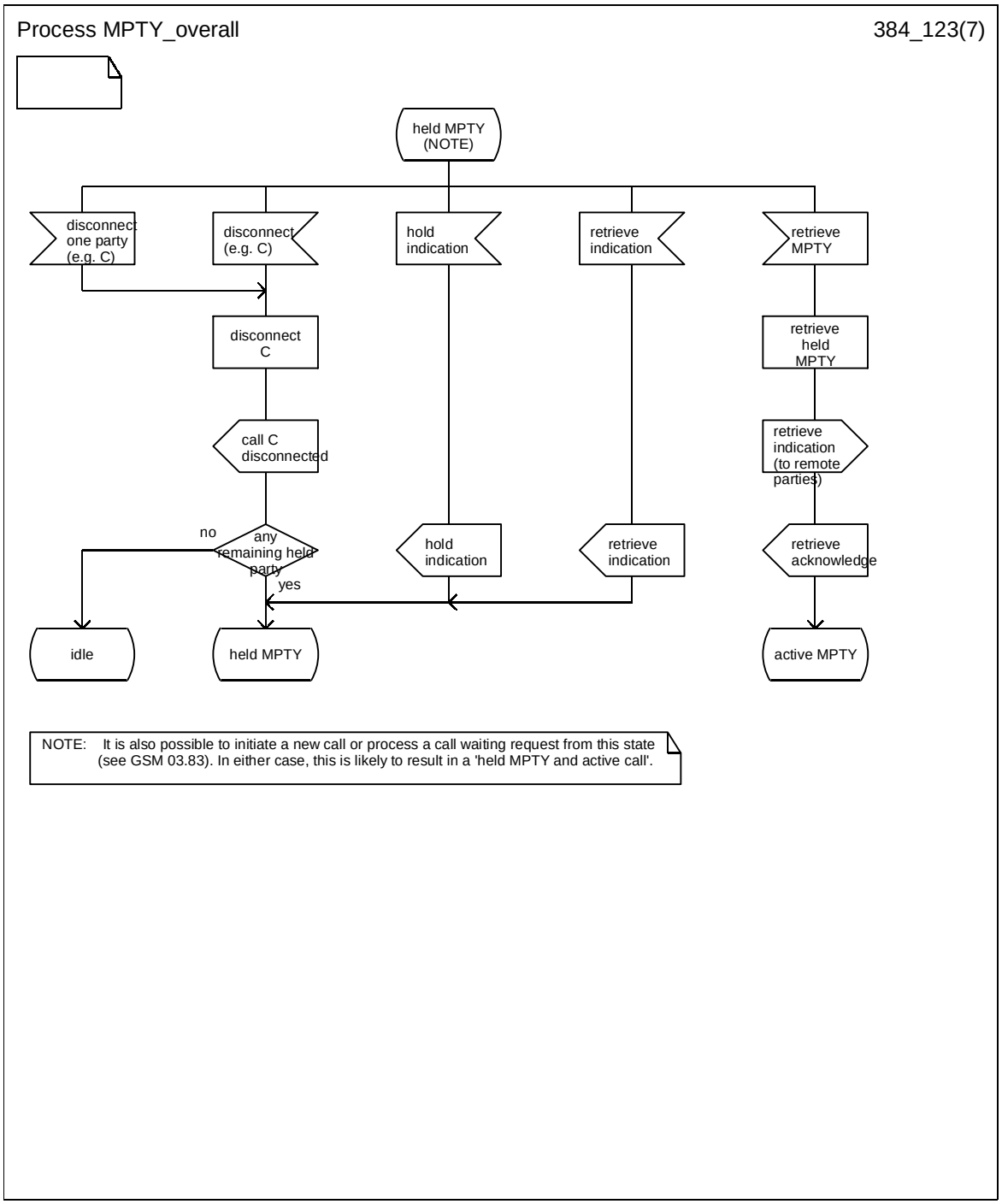
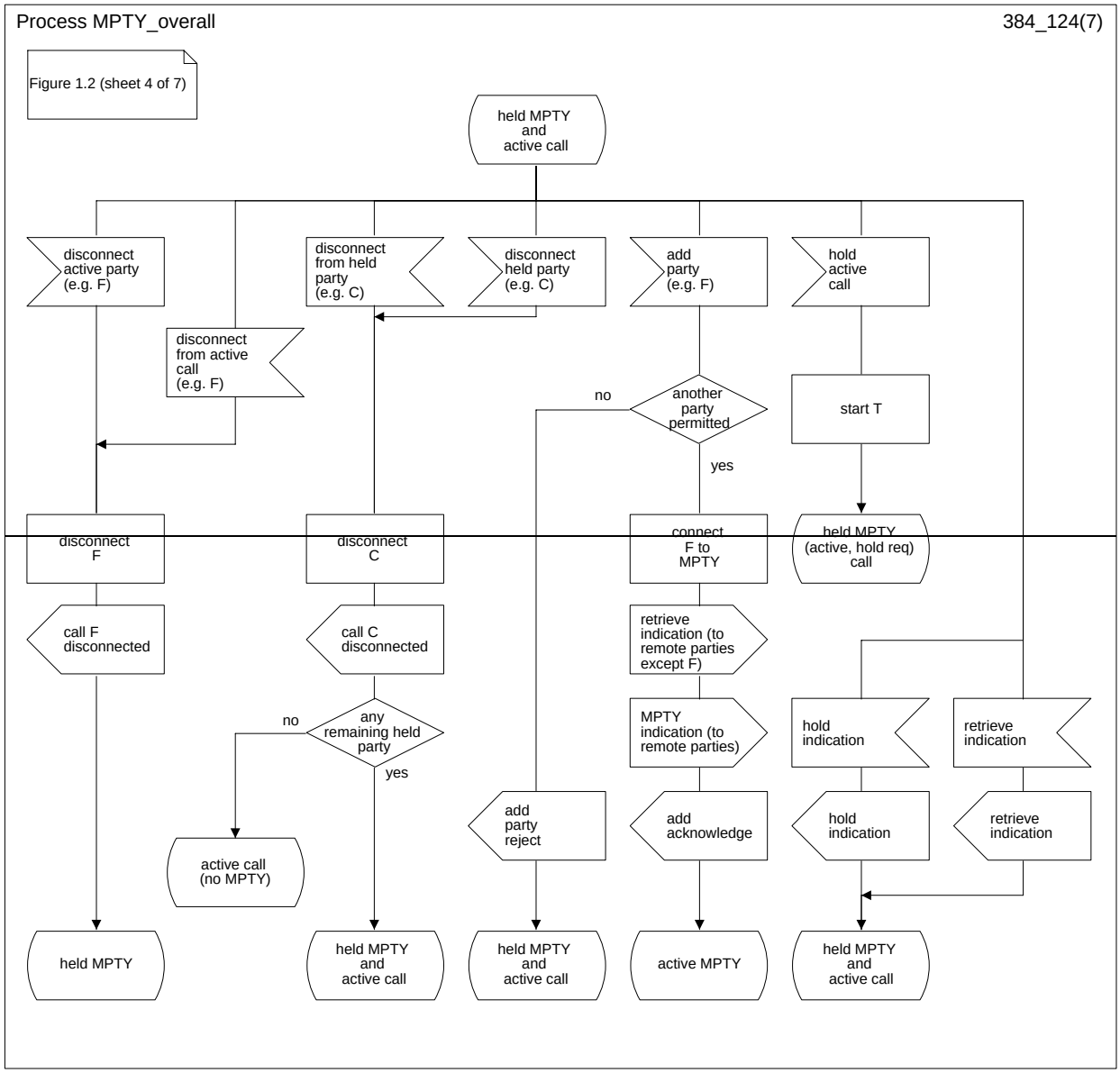


Figure 1.2 (sheet 3 of 7): Overall SDL diagram of Multi Party service


Process MPTY_overall
384_124(7)
Figure 1.2 (sheet 4 of 7)
held MPTY and active call
disconnect active party (e.g. F)
disconnect from held party (e.g. C)
disconnect held party (e.g. C)
add party (e.g. F)
hold active call
disconnect from active call (e.g. F)
no
another party permitted
start T
yes
disconnect F
disconnect C
connect F to MPTY
held MPTY (active, hold req) call
call F disconnected
call C disconnected
retrieve indication (to remote parties except F)
no
any remaining held party
MPTY indication (to remote parties)
hold indication
retrieve indication
yes
add party reject
add acknowledge
hold indication
retrieve indication
active call (no MPTY)
held MPTY
held MPTY and active call
held MPTY and active call
active MPTY
held MPTY and active call

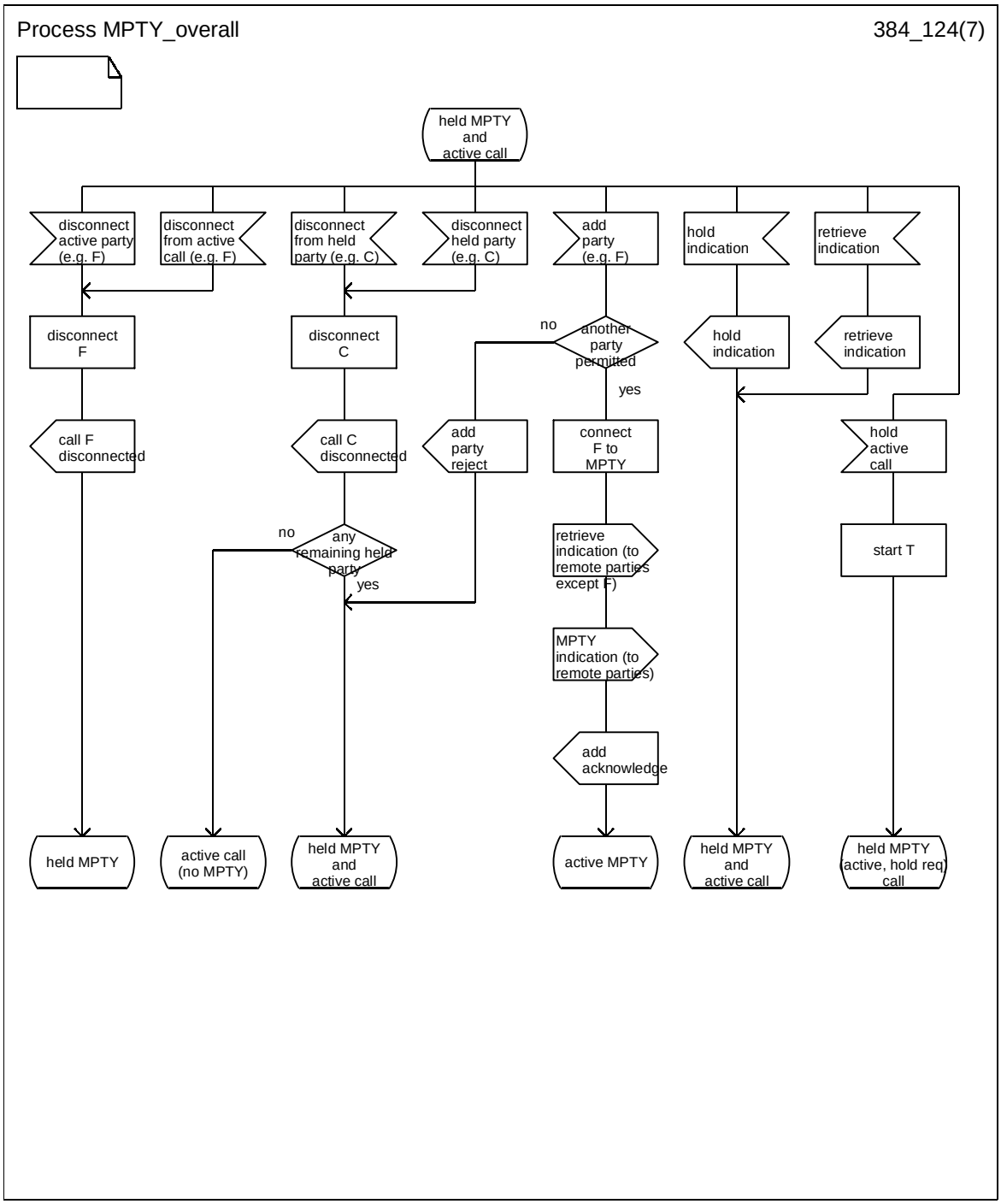
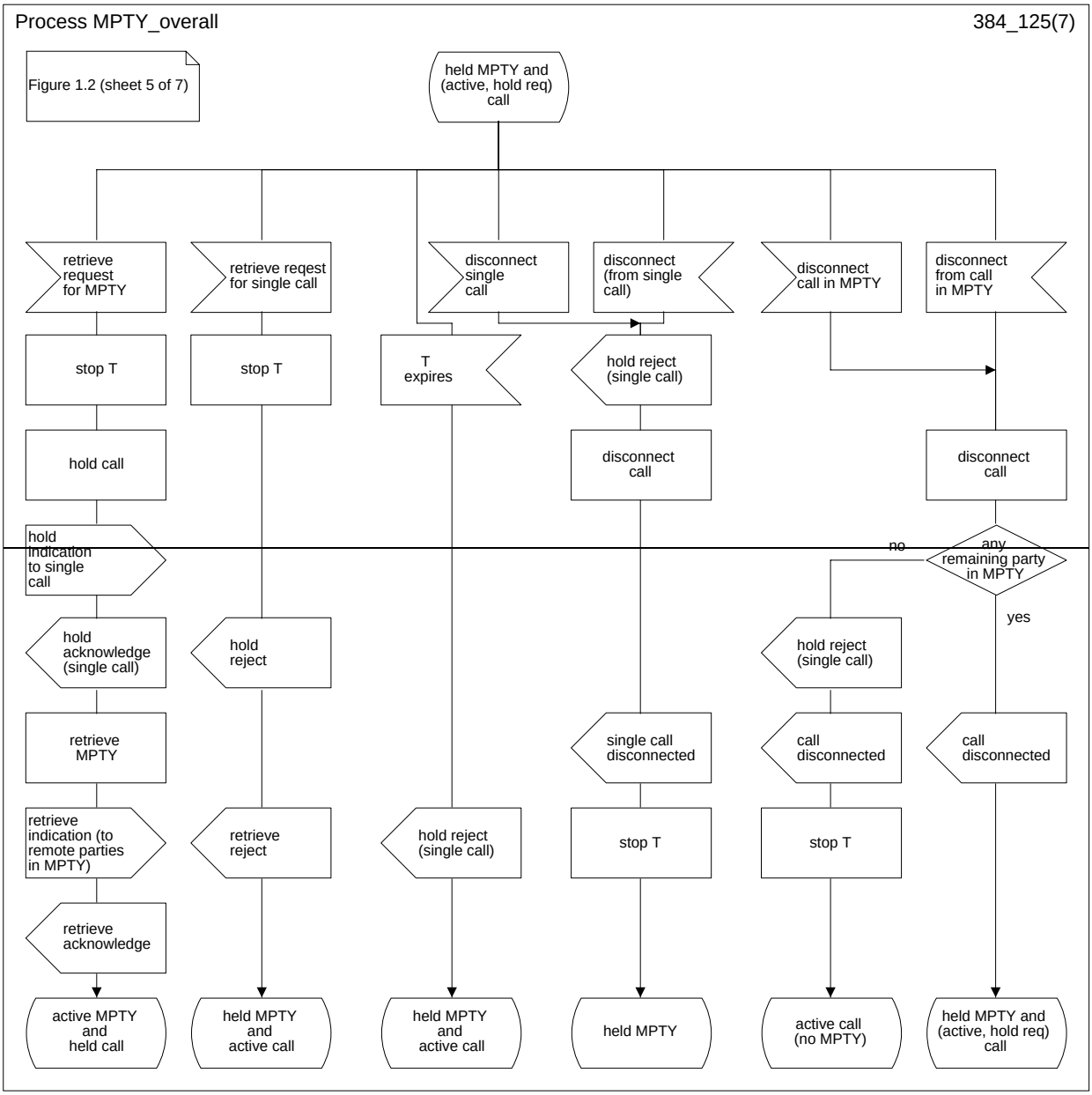


Figure 1.2 (sheet 4 of 7): Overall SDL diagram of Multi Party service


Process MPTY_overall
384_125(7)
Figure 1.2 (sheet 5 of 7)
held MPTY and (active, hold req) call
retrieve request for MPTY
retrieve reqest for single call
disconnect single call
disconnect (from single call)
disconnect call in MPTY
disconnect from call in MPTY
stop T
stop T
T expires
hold reject (single call)
hold call
disconnect call
disconnect call
hold indication to single call
no
any remaining party in MPTY
yes
hold acknowledge (single call)
hold reject
hold reject (single call)
retrieve MPTY
single call disconnected
call disconnected
call disconnected
retrieve indication (to remote parties in MPTY)
retrieve reject
hold reject (single call)
stop T
stop T
retrieve acknowledge
active MPTY and held call
held MPTY and active call
held MPTY and active call
held MPTY
active call (no MPTY)
held MPTY and (active, hold req) call

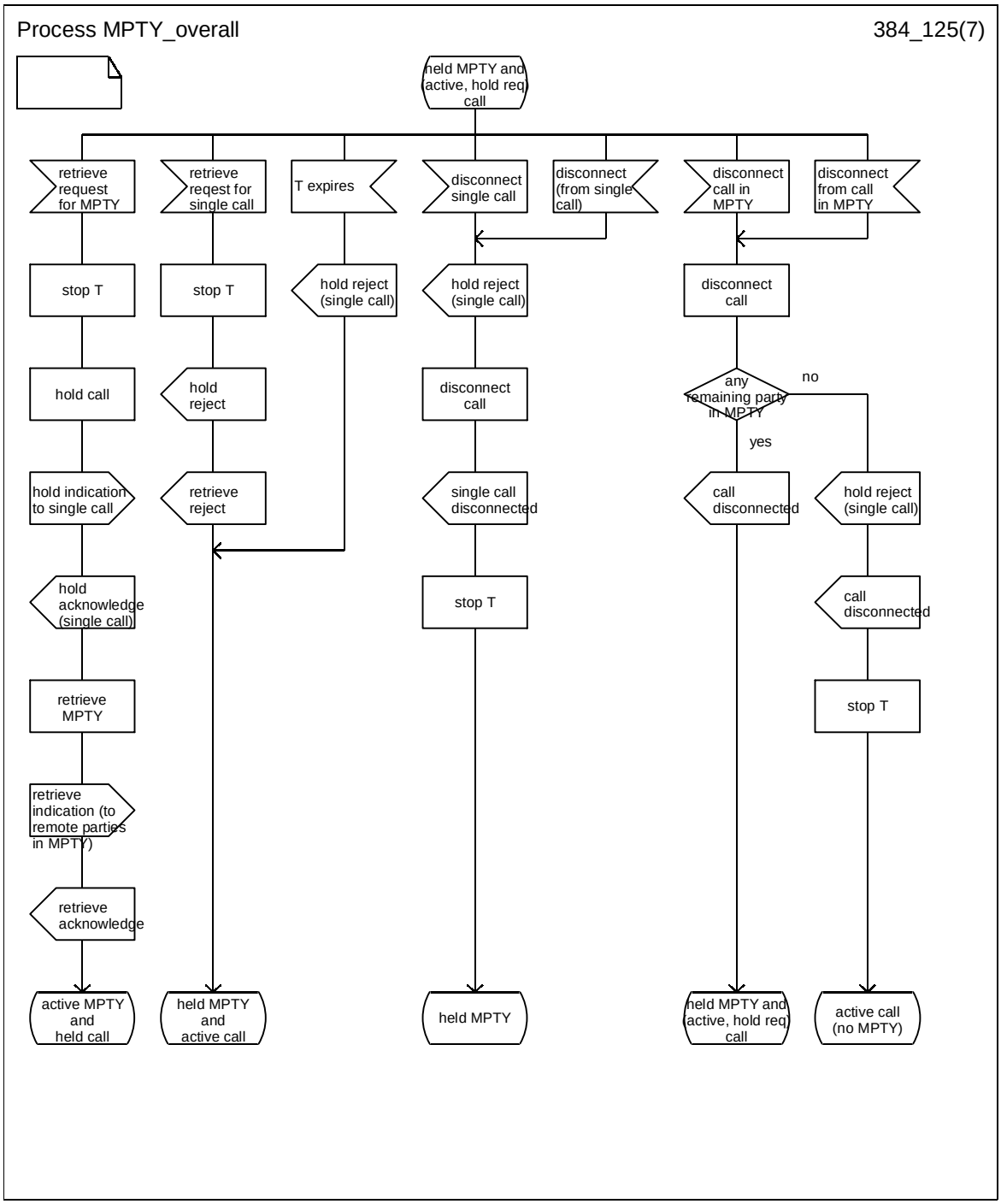
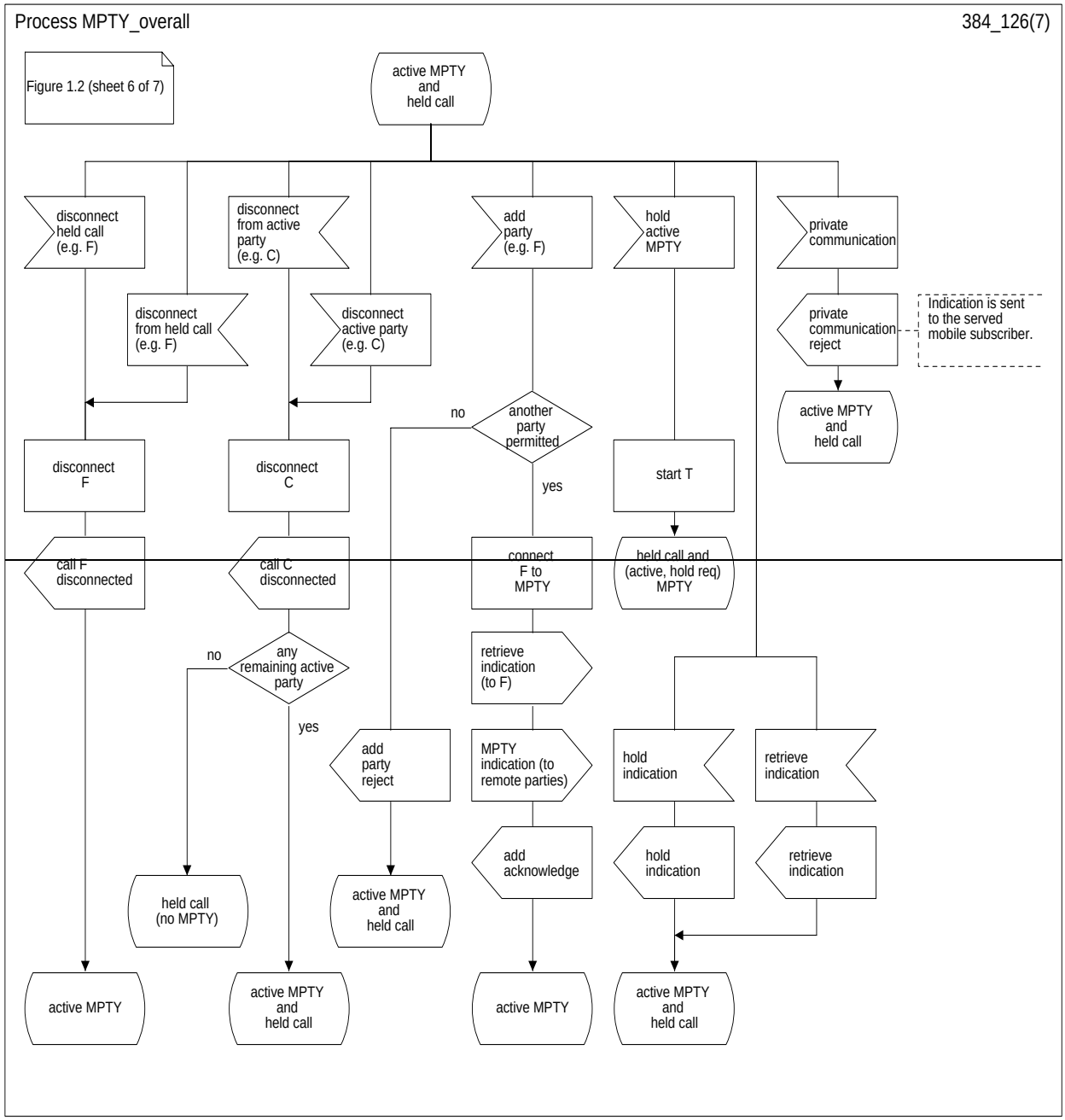


Figure 1.2 (sheet 5 of 7): Overall SDL diagram of Multi Party service


Process MPTY_overall
384_126(7)
Figure 1.2 (sheet 6 of 7)
active MPTY and held call
disconnect held call (e.g. F)
disconnect from active party (e.g. C)
add party (e.g. F)
hold active MPTY
private communication
disconnect from held call (e.g. F)
disconnect active party (e.g. C)
private communication reject
Indication is sent to the served mobile subscriber.
active MPTY and held call
no
another party permitted
yes
disconnect F
disconnect C
start T
call F disconnected
call C disconnected
connect F to MPTY
held call and (active, hold req) MPTY
no
any remaining active party
yes
retrieve indication (to F)
add party reject
MPTY indication (to remote parties)
hold indication
retrieve indication
add acknowledge
hold indication
retrieve indication
held call (no MPTY)
active MPTY and held call
active MPTY
active MPTY and held call
active MPTY
active MPTY and held call

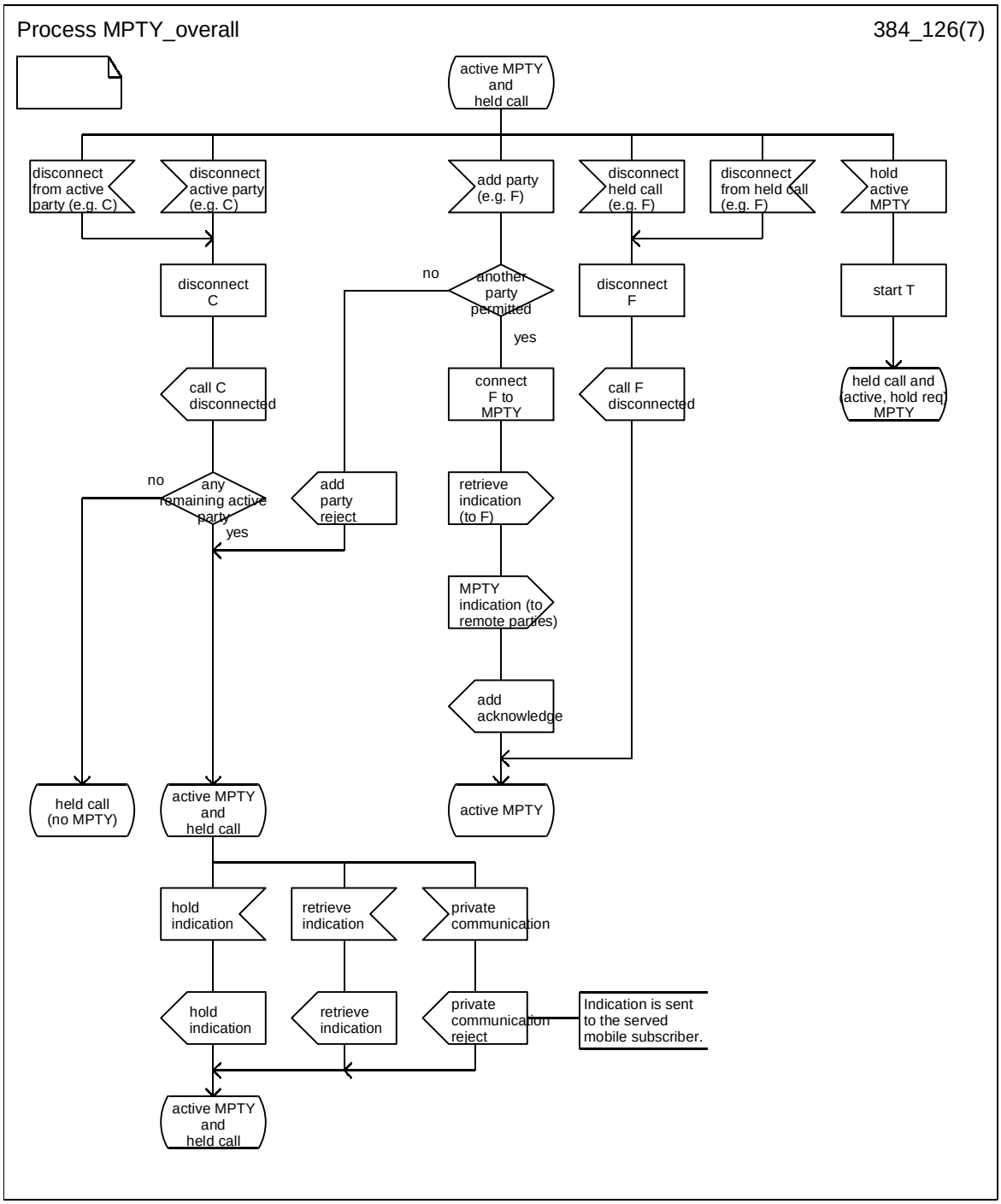
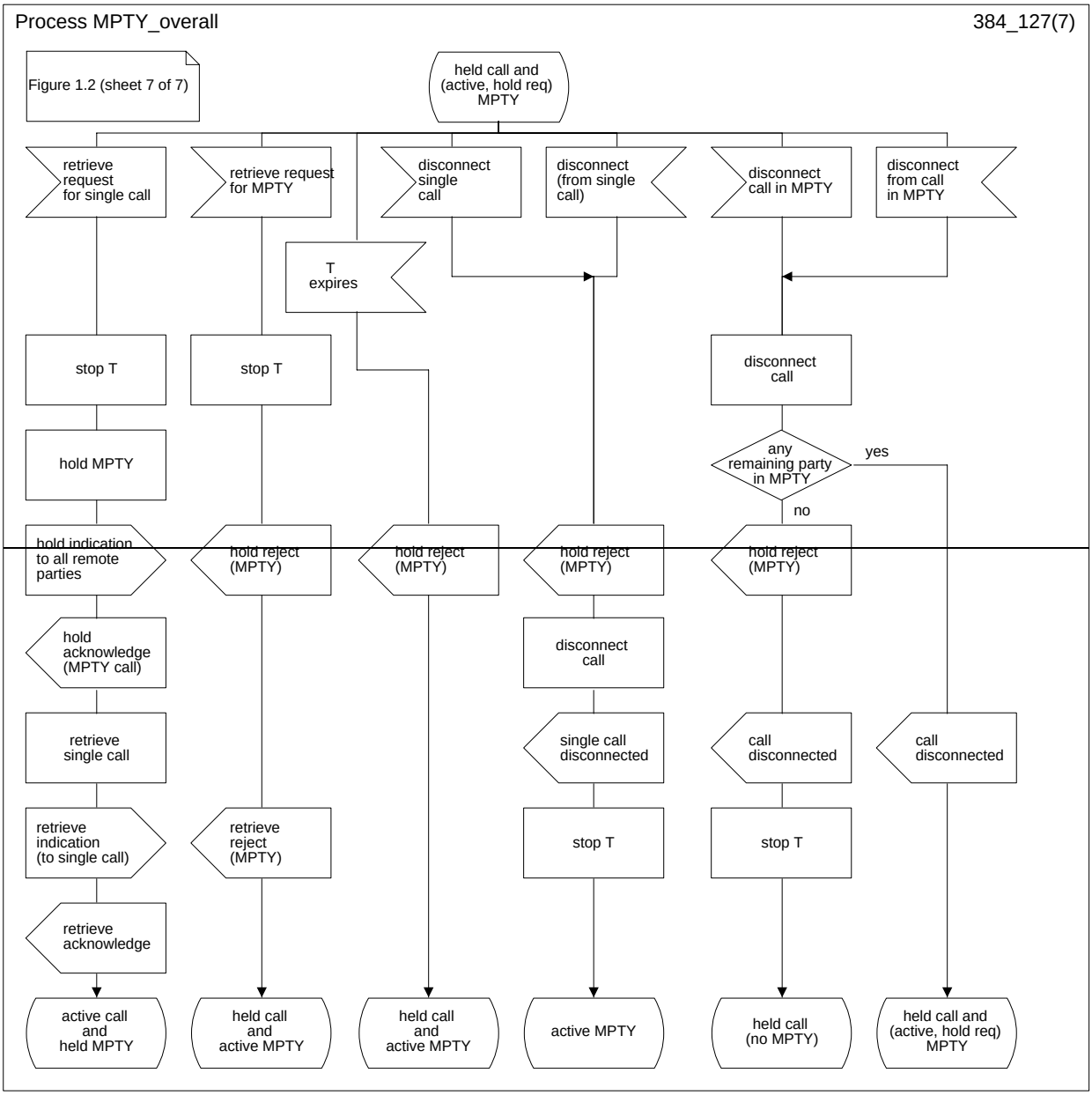


Figure 1.2 (sheet 6 of 7): Overall SDL diagram of Multi Party service


Process MPTY_overall
384_127(7)
Figure 1.2 (sheet 7 of 7)
held call and (active, hold req) MPTY
retrieve request for single call
retrieve request for MPTY
disconnect single call
disconnect (from single call)
disconnect call in MPTY
disconnect from call in MPTY
T expires
stop T
stop T
disconnect call
hold MPTY
any remaining party in MPTY
yes
no
hold indication to all remote parties
hold reject (MPTY)
hold reject (MPTY)
hold reject (MPTY)
hold reject (MPTY)
hold acknowledge (MPTY call)
disconnect call
retrieve single call
single call disconnected
call disconnected
call disconnected
retrieve indication (to single call)
retrieve reject (MPTY)
stop T
stop T
retrieve acknowledge
active call and held MPTY
held call and active MPTY
held call and active MPTY
active MPTY
held call (no MPTY)
held call and (active, hold req) MPTY

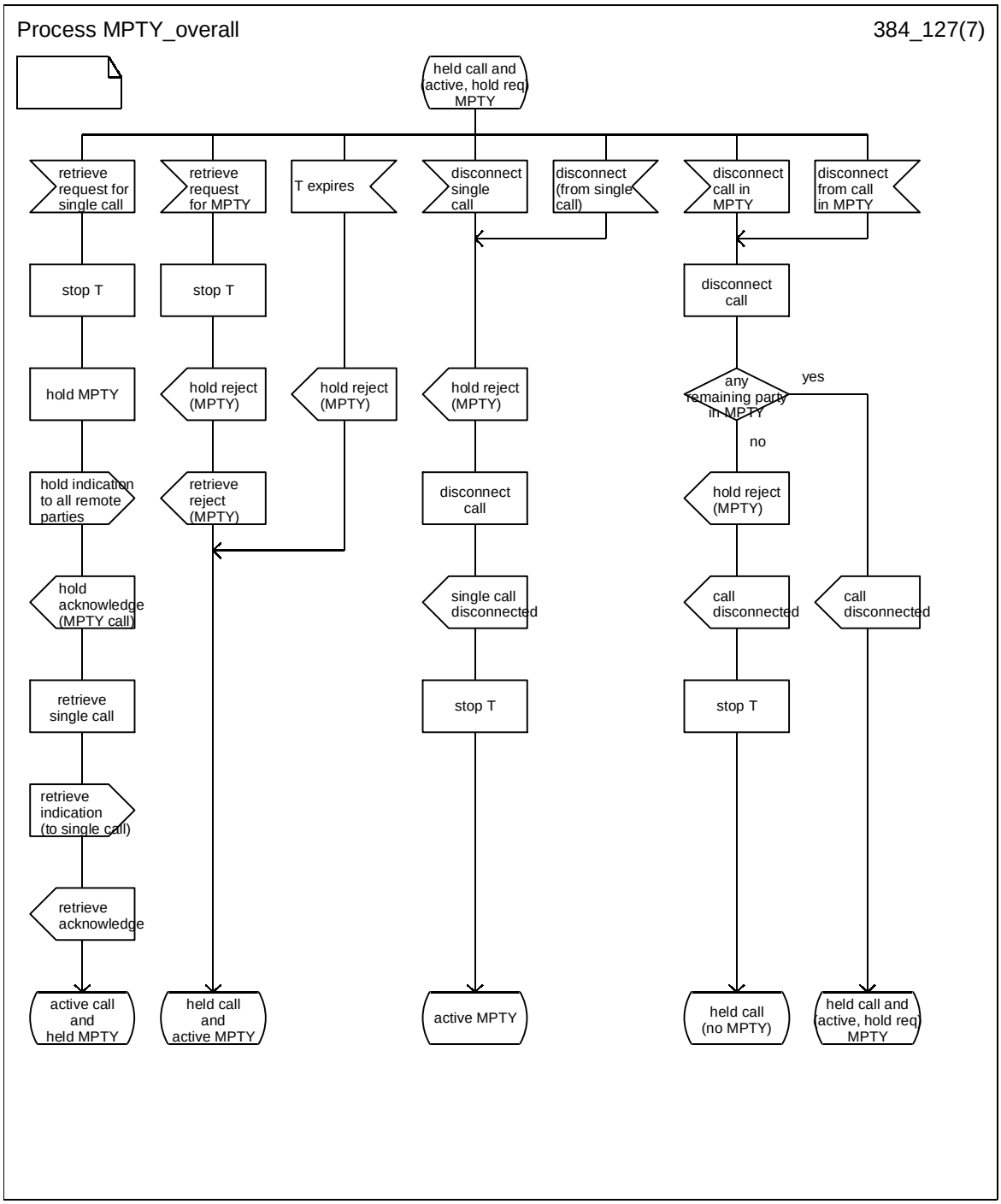


Figure 1.2 (sheet 7 of 7): Overall SDL diagram of Multi Party service

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000433
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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23.085	CR	001	Current Version:	3.0.1

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

For submission to:	CN#09	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: N4 **Date:** 2000-06-26

Subject: SDL refresh

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

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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:

ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

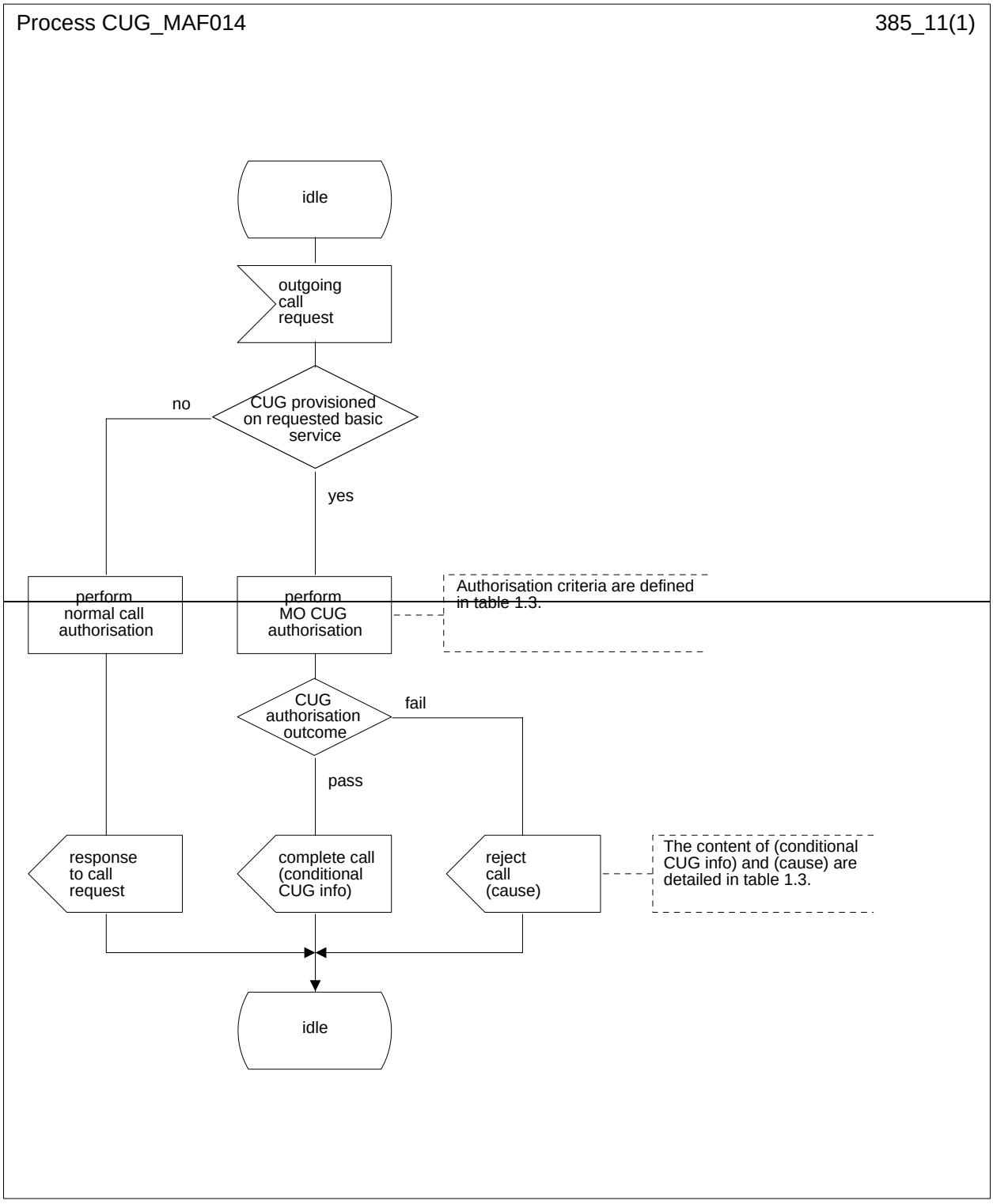
1.2.2 Information flows

The information flows for the CUG supplementary service are shown in figures 1.3 to 1.7.

List of figures:

- figure 1.3 Mobile Originated CUG calls;
- figure 1.4 Mobile Terminated CUG calls;
- figure 1.5 MT CUG call handling at the called party MSC/VLR;
- figure 1.6 Interworking with Non-ISDN/Non-GSM networks;
- figure 1.7 CUG interworking with Non-CUG GSM PLMN.

NOTE to figures 1.3 to 1.7:
"Conditional CUG Info" means that CUG information may or may not be present in the signalling message depending on the call case. These figures are intended to cover all call cases described in the CUG authorisation functions.


Process CUG_MAF014
385_11(1)
idle
outgoing call request
CUG provisioned on requested basic service
no
yes
perform normal call authorisation
perform MO CUG authorisation
Authorisation criteria are defined in table 1.3.
CUG authorisation outcome
fail
pass
response to call request
complete call (conditional CUG info)
reject call (cause)
The content of (conditional CUG info) and (cause) are detailed in table 1.3.
idle

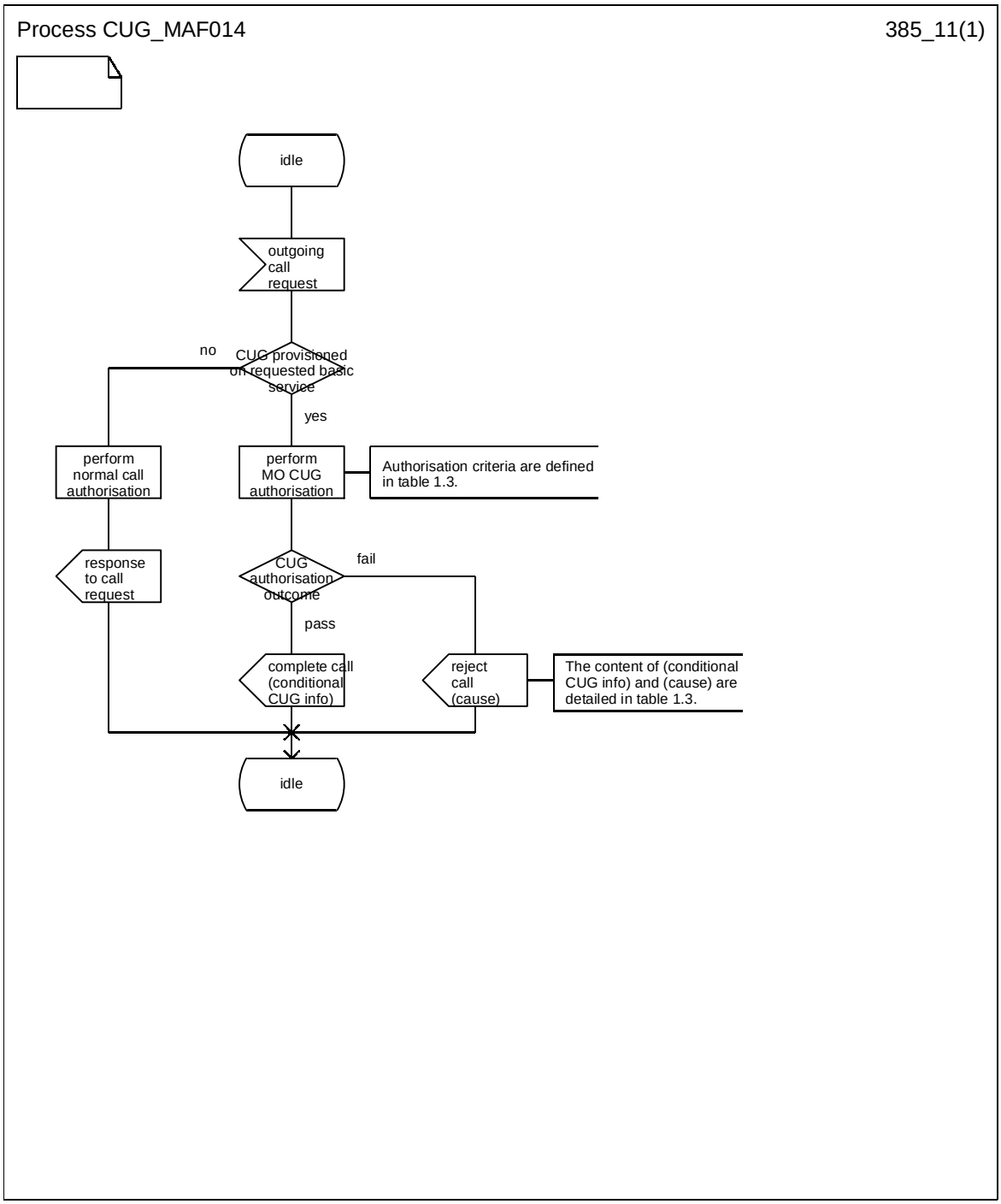
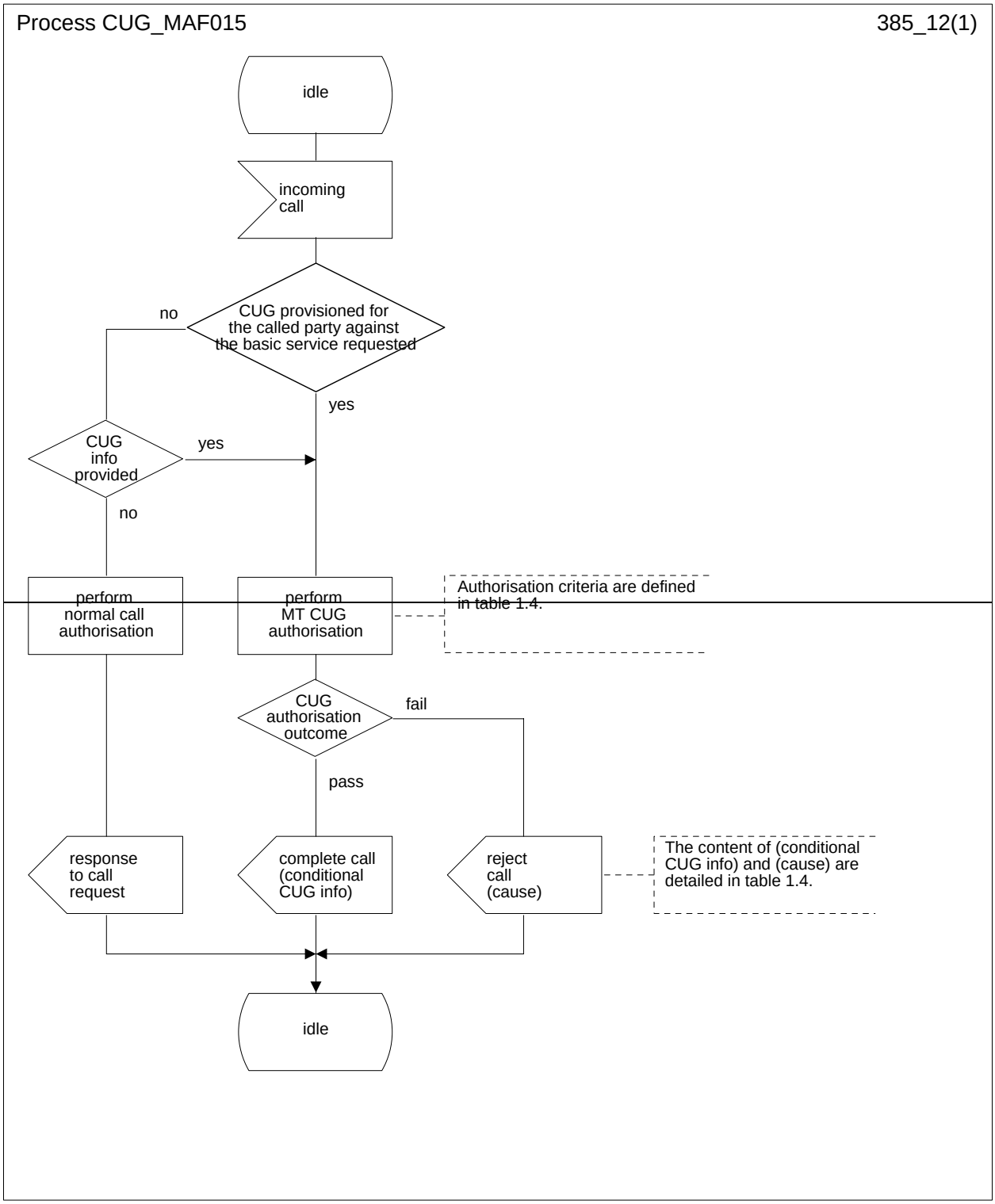


Figure 1.1: MAF014 Mobile Originated CUG call authorisation (VLR)


Process CUG_MAF015
385_12(1)
idle
incoming call
CUG provisioned for the called party against the basic service requested
no
yes
CUG info provided
yes
no
perform normal call authorisation
perform MT CUG authorisation
Authorisation criteria are defined in table 1.4.
CUG authorisation outcome
fail
pass
response to call request
complete call (conditional CUG info)
reject call (cause)
The content of (conditional CUG info) and (cause) are detailed in table 1.4.
idle

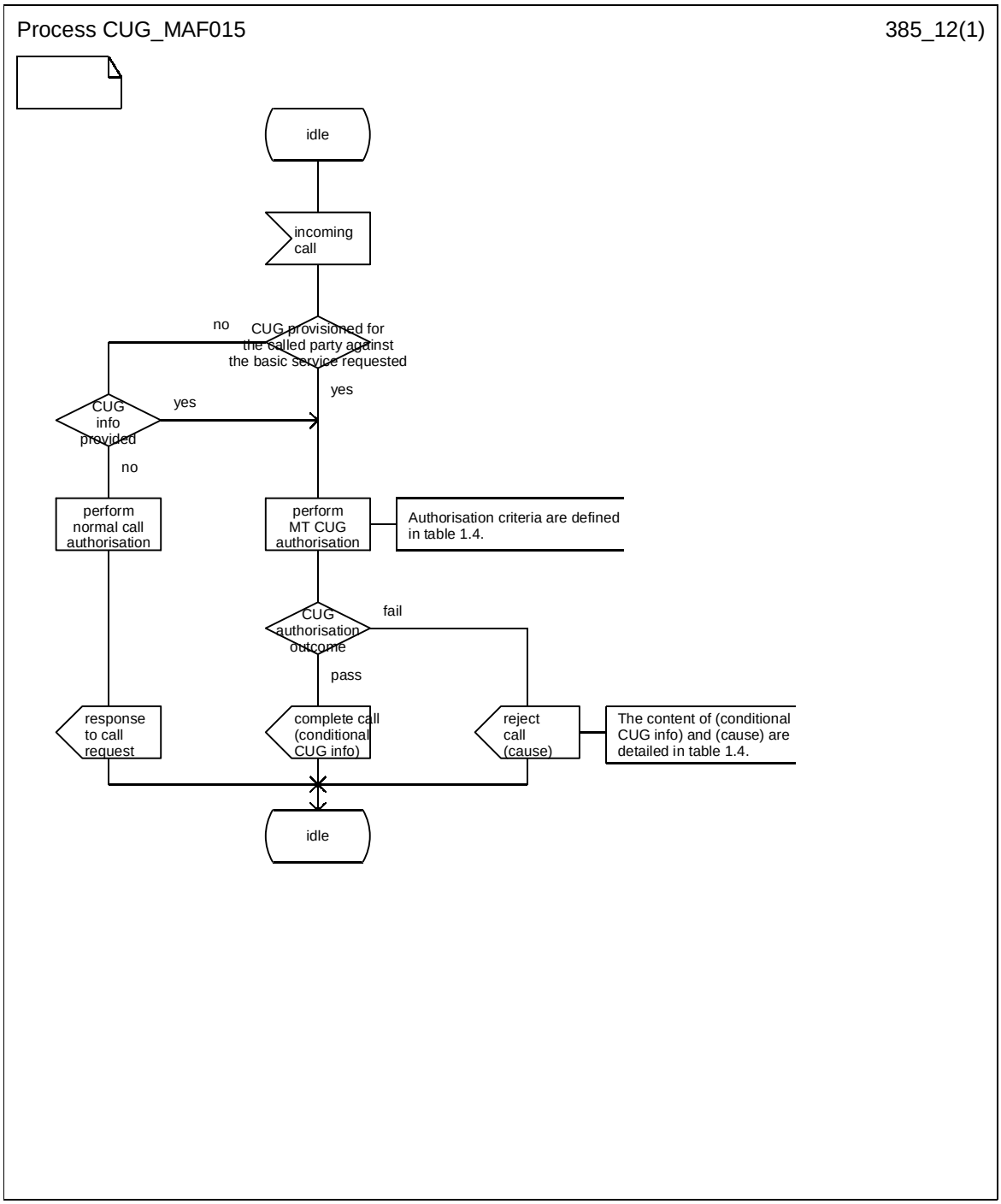


Figure 1.2: MAF015 Mobile Terminated CUG call authorisation (HLR)

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000434
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or for SMG, use the format P-99-xxx

CHANGE REQUEST

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23.086	CR	001	Current Version:	3.0.1

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

For submission to:	CN#09	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]

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Subject: SDL refresh

Work item: TEI

Category: *(only one category Shall be marked With an X)*

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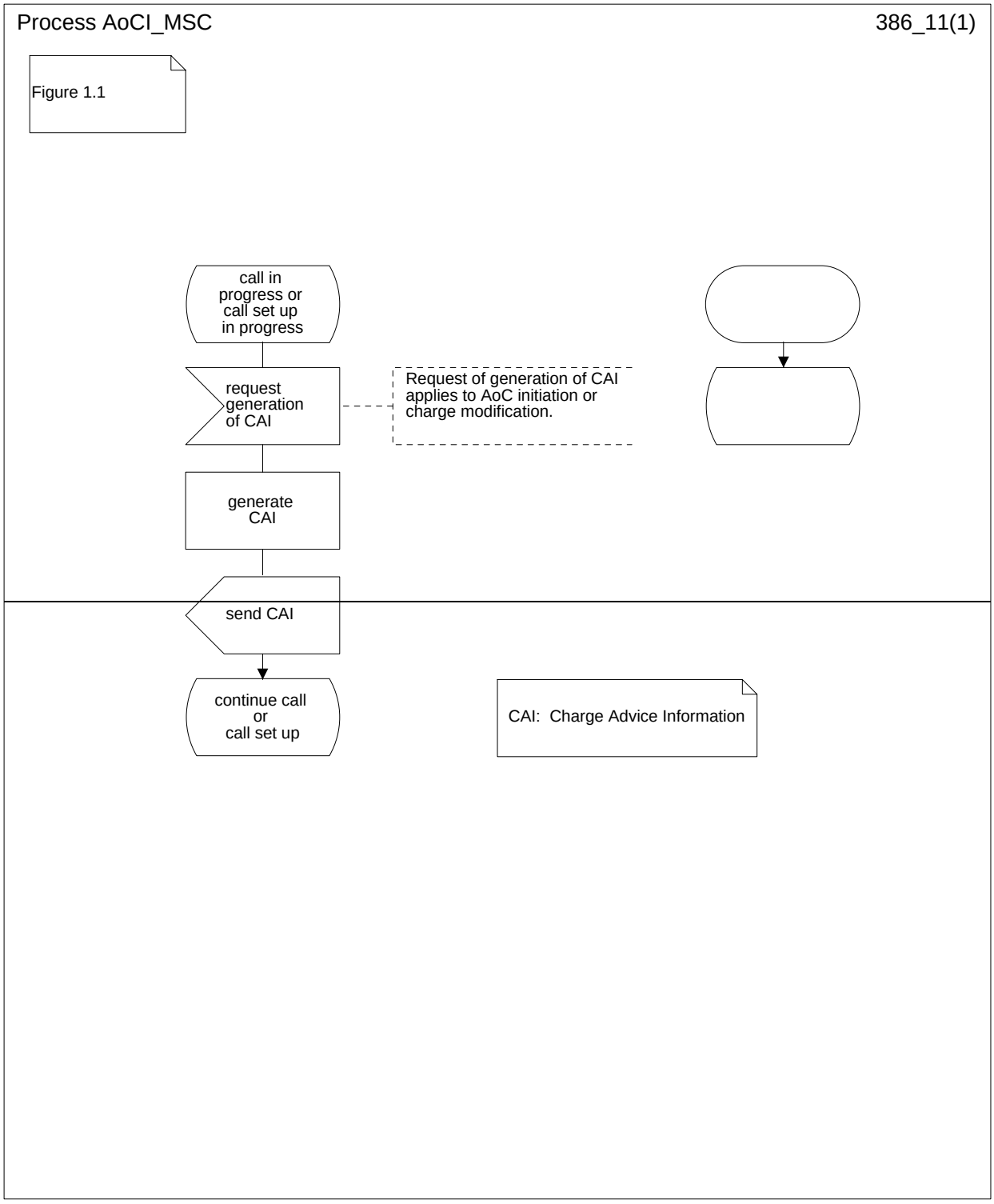
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

1.3 Advice of Charge (Information) information flow diagram

The Advice of Charge (Information) information flow diagrams are shown in figure 1.3.


Process AoCI_MSC
386_11(1)
Figure 1.1
call in progress or call set up in progress
request generation of CAI
Request of generation of CAI applies to AoC initiation or charge modification.
generate CAI
send CAI
continue call or call set up
CAI: Charge Advice Information

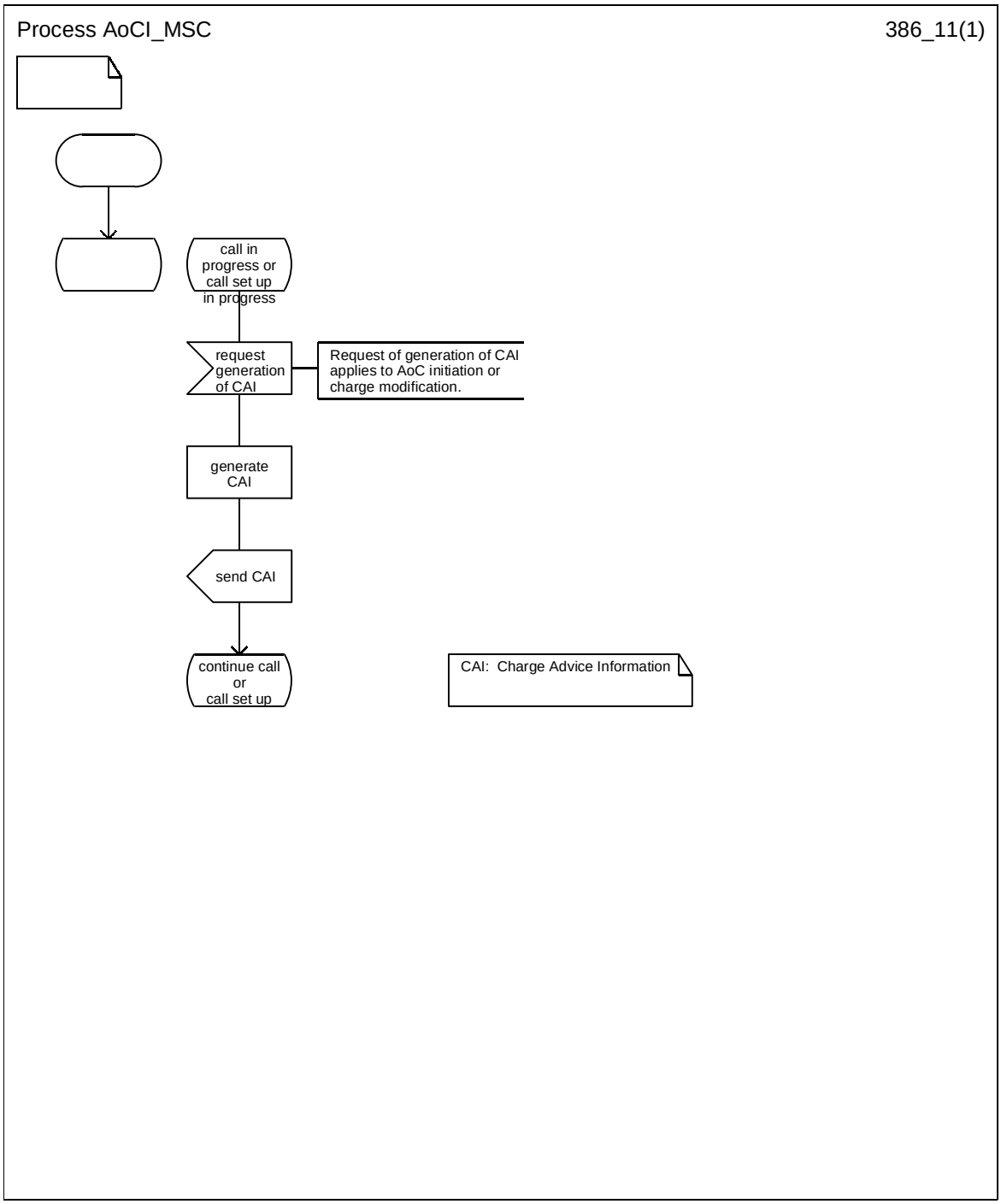
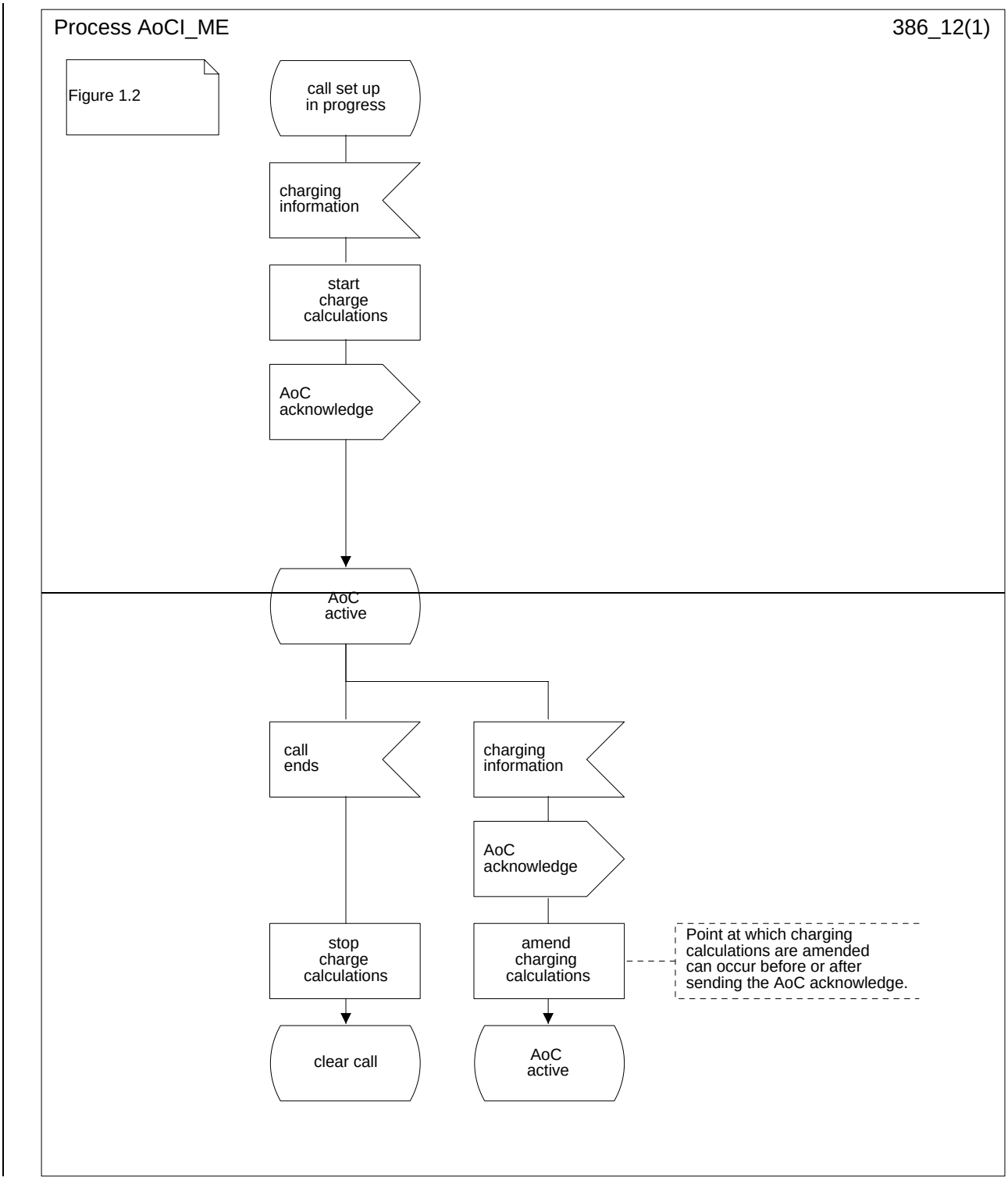


Figure 1.1: SDL diagram of advice of charge (information) in the MSC


Process AoCI_ME
386_12(1)
Figure 1.2
call set up in progress
charging information
start charge calculations
AoC acknowledge
AoC active
call ends
charging information
AoC acknowledge
stop charge calculations
amend charging calculations
Point at which charging calculations are amended can occur before or after sending the AoC acknowledge.
clear call
AoC active

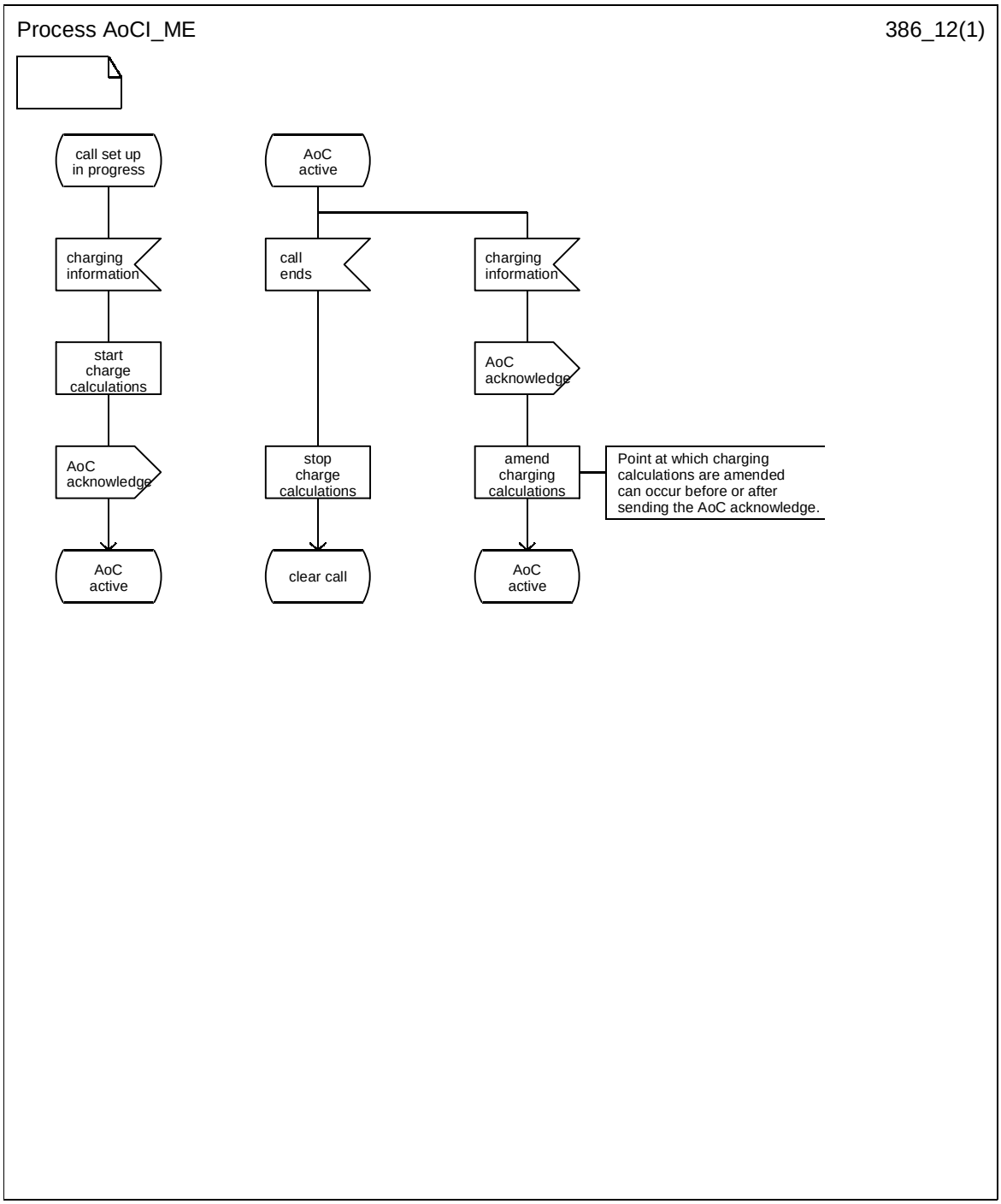


Figure 1.2: SDL diagram of advice of charge (information) in the mobile equipment

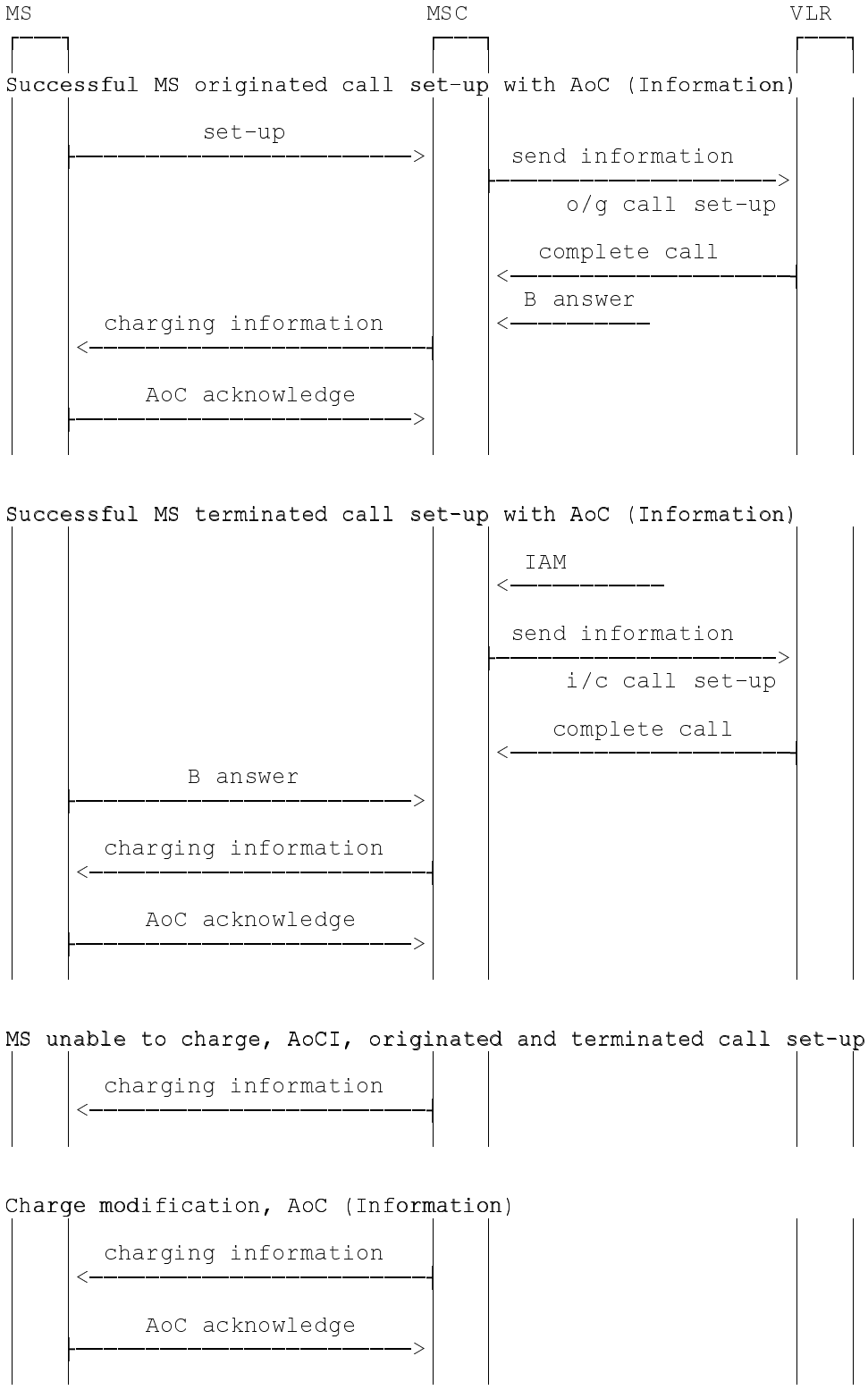


Figure 1.3: Information flow for Advice of Charge (Information)

1.4 Information stored in the HLR

AoCI may have the following logical states (refer to GSM 03.11 for an explanation of the notation):

Provisioning State	**Registration State**	**Activation State**	**HLR Induction State**
(Not Provisioned,	Not Applicable,	Not Active,	Not Induced)
(Provisioned,	Not Applicable,	Active and Operative,	Not Induced)

The HLR shall store the logical state of AoCI (which shall be one of the valid states listed above) on a per subscriber basis.

1.5 State transition model

The following figure shows the successful cases of transition between the applicable logic states of AoCI. The state changes are caused by actions of the service provider.

Note that error cases are not shown in the diagram as they normally do not cause a state change. Additionally, some successful requests may not cause a state change. Hence they are not shown in the diagram.

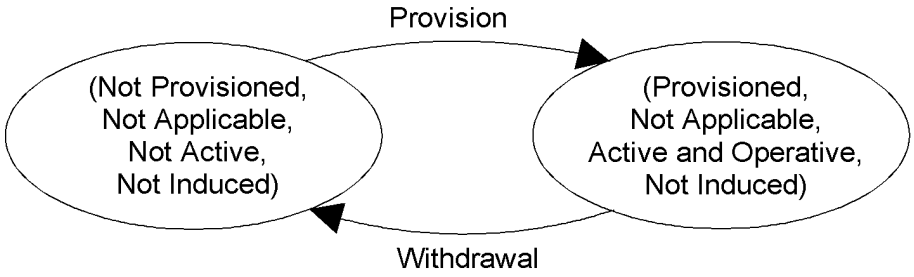


Figure 1.4: State transition model for AoCI

1.6 Transfer of Information from HLR to VLR

If the provisioning state for AoCI is "Provisioned" then when the served subscriber registers on a VLR the HLR shall send that VLR information about the logical state of AoCI.

If the logical state of AoCI is changed while a subscriber is registered on a VLR, then the HLR shall inform the VLR of the new logical state of AoCI.

1.7 Information stored in the VLR

For the supplementary service AoCI the VLR shall store the service state information received from the HLR.

1.8 Handover

Handover will have no impact on AoC control procedure.

2 Advice of Charge (Charging) (AoCC)

2.1 Advice of Charge (Charging) MSC SDL diagram

The SDL diagram for the Advice of Charge (Charging) supplementary service within the MSC is given in figure 2.1. At invocation of the Advice of Charge (Charging) supplementary service the network shall send the "Charging" MS the CAI. The network shall allow the call to proceed whilst waiting for an acknowledgement of the CAI. The waiting period is governed by Timer T(AoC). On expiry of T(AoC) the network shall initiate call clearing.

NOTE 1: AoC (Charging) is not applicable to emergency calls.

NOTE 2: The request of generation of CAI applies to AoC initiation or charge modification.

2.2 Advice of Charge (Charging) mobile equipment SDL diagram

The SDL diagram for the Advice of Charge (Charging) supplementary service within the mobile equipment is given in figure 2.2. The SDL indicates when charging calculations are started, amended and stopped, within the mobile equipment. The mobile equipment should start charging calculations as soon as possible after receiving the charging information. Charging calculations should be emended by the mobile equipment in accordance with GSM 02.24.

NOTE: The point at which charging calculations are amended can occur before or after sending the AoC Acknowledge.

Charging calculations are stopped when the call ends for any reason.

The reception of the CAI shall be acknowledged only if the MS supports the AoCC functionality specified in GSM 02.24 and GSM 02.86.

For mobile originated calls, the MS shall prevent a call set-up attempt if the ACM value is equal to or greater than ACMmax.

For mobile terminated calls, a call set-up attempt shall be allowed even if the ACM value is equal to or greater than ACMmax. In this case, when the MS detects that this is a chargeable call and that the ACM value is equal to or greater than ACMmax then the call shall be released.

During an active call, when the MS detects that ACM is equal to or greater than ACMmax then the MS shall release the call.

2.3 Advice of Charge (Charging) information flow diagram

The Advice of Charge (Charging) information flow diagrams are shown in figure 2.3.

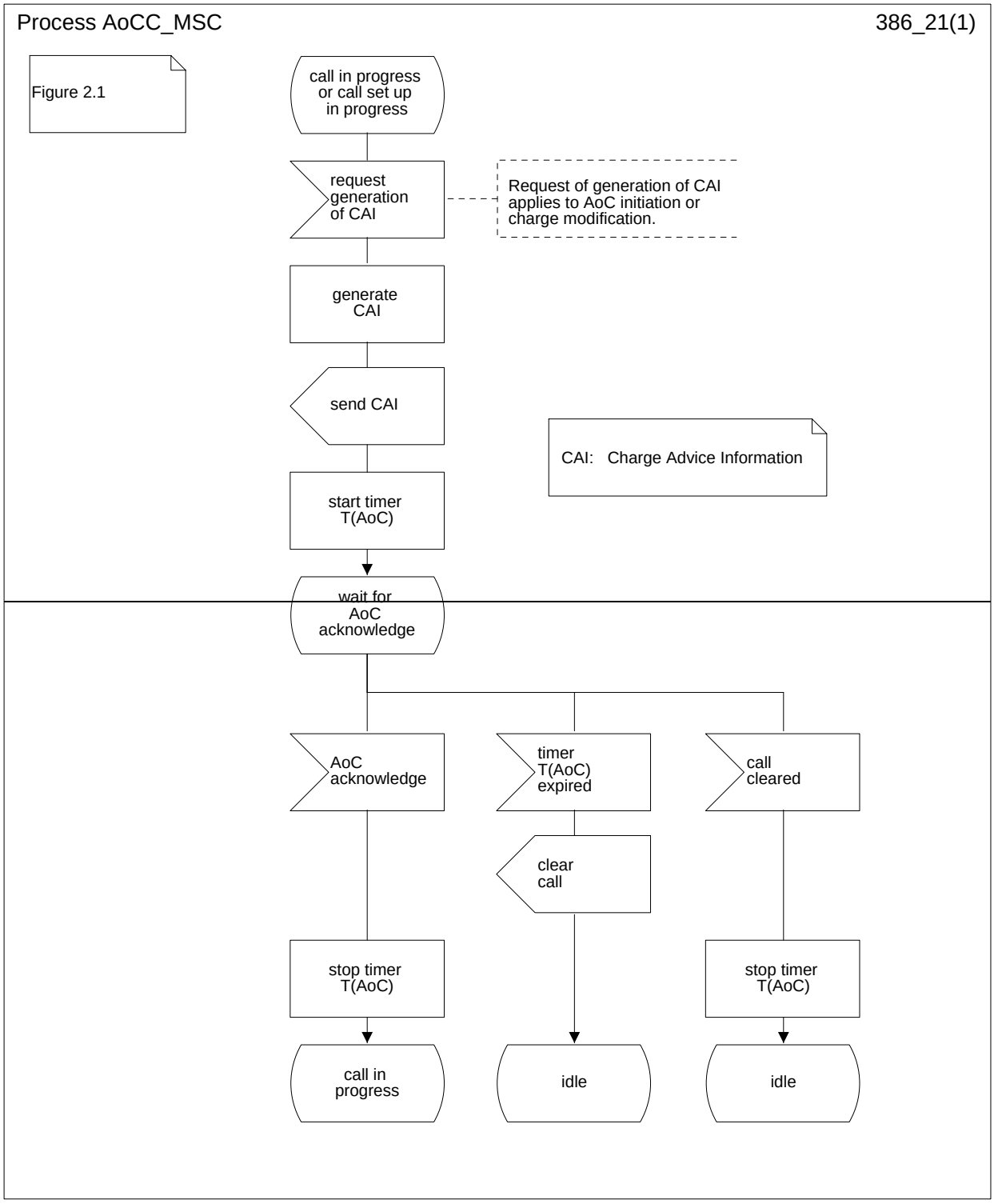
2.4 AoCC subscriber roaming requirements

When an AoCC subscriber first roams into an MSC area not supporting AoCC, or the subscription is given to him while he is roaming in an MSC area not supporting AoCC the following applies:

The HLR shall indicate to the VLR that roaming is restricted in this MSC area due to unsupported feature, and it prevents further mobile terminated traffic. In this case the MS is not reachable.

When entering an AoCC supporting area the AoCC related roaming restriction shall be removed in the HLR.

When AoCC is withdrawn the AoCC related roaming restriction shall be removed in the HLR and VLR. This is independent from roaming restrictions due to other reasons.


Process AoCC_MSC
386_21(1)
Figure 2.1
call in progress or call set up in progress
request generation of CAI
Request of generation of CAI applies to AoC initiation or charge modification.
generate CAI
send CAI
CAI: Charge Advice Information
start timer T(AoC)
wait for AoC acknowledge
AoC acknowledge
timer T(AoC) expired
call cleared
clear call
stop timer T(AoC)
stop timer T(AoC)
call in progress
idle
idle

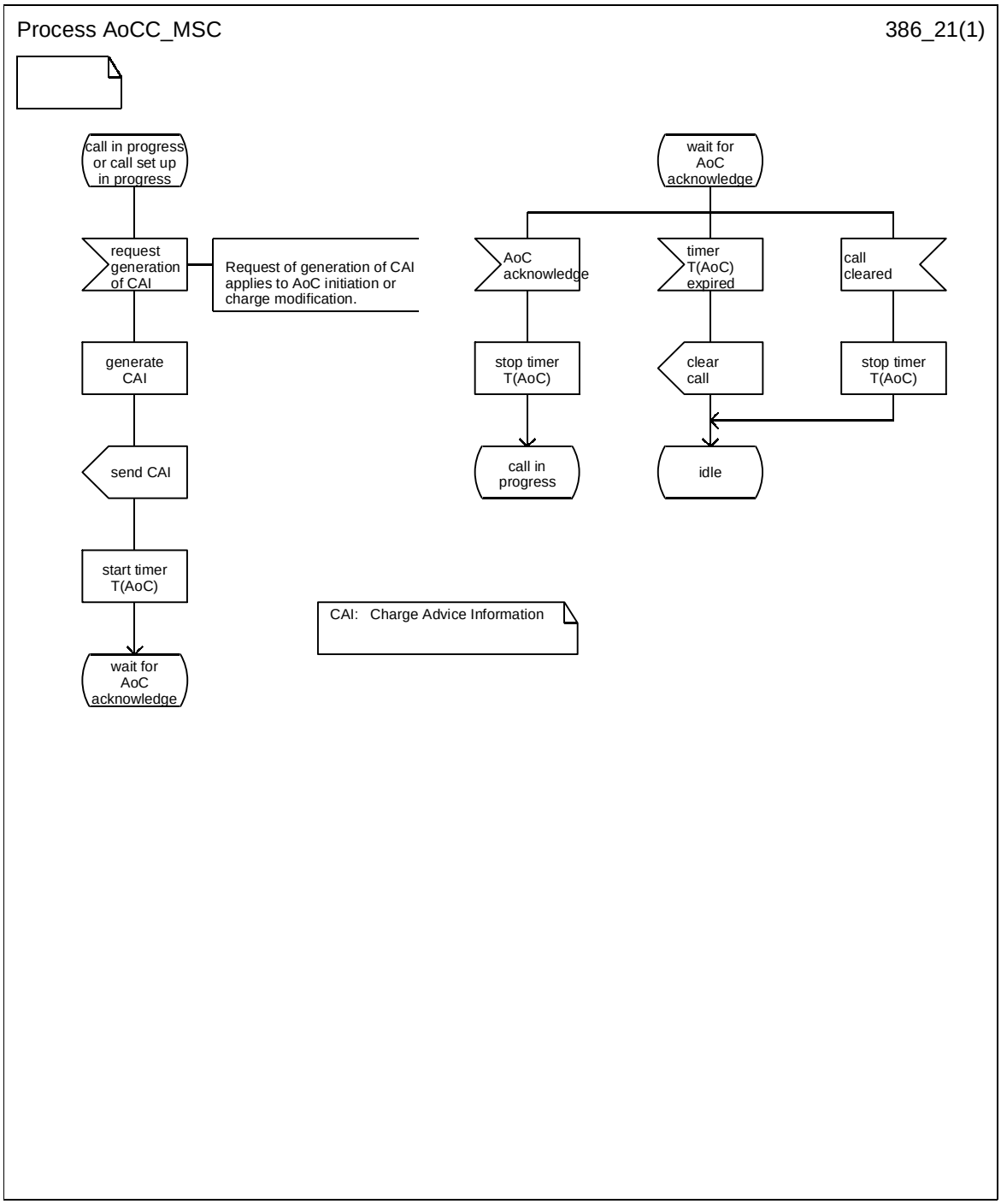
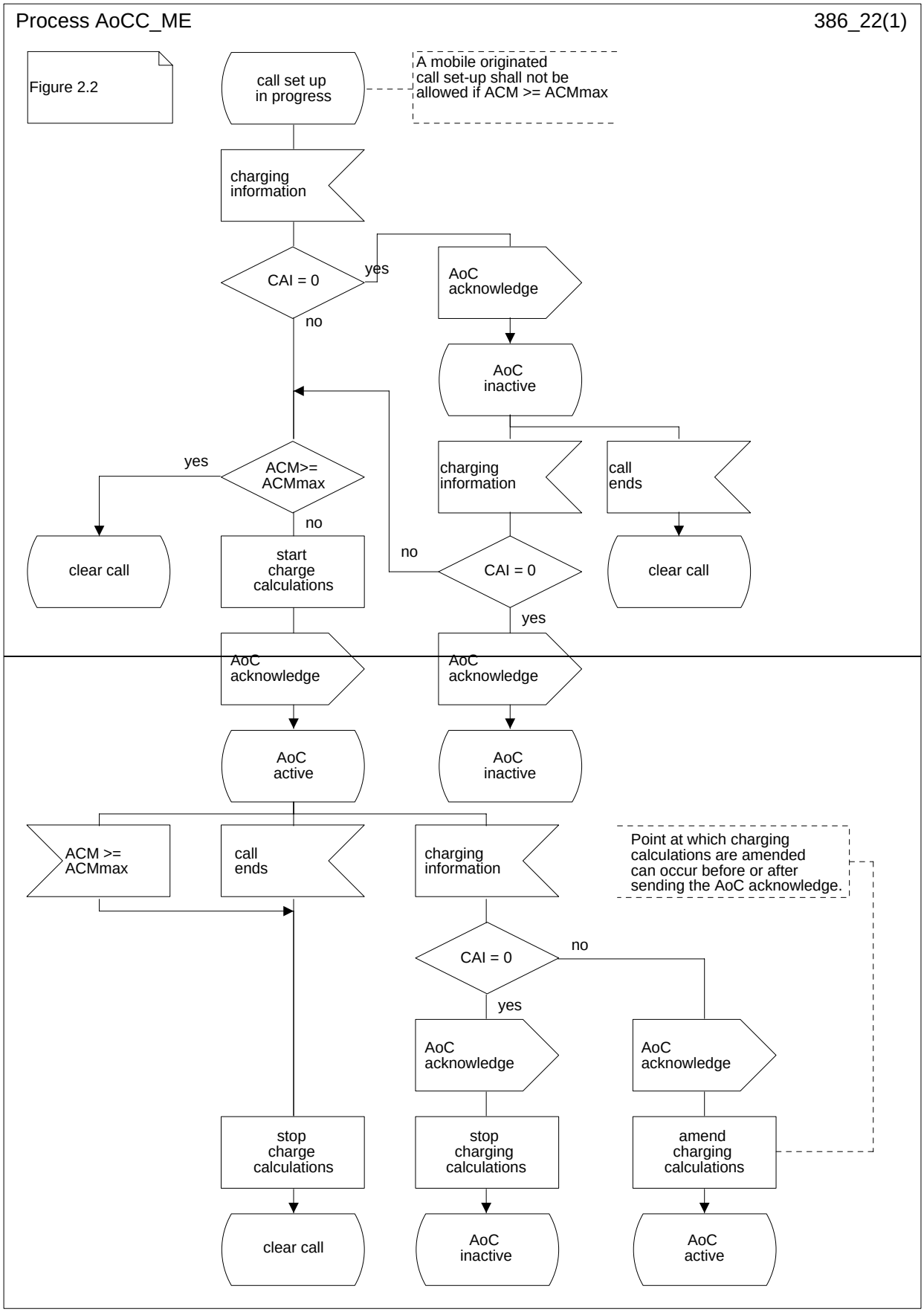


Figure 2.1: SDL diagram of advice of charge (charging) in the MSC


Process AoCC_ME
386_22(1)
Figure 2.2
call set up in progress
A mobile originated call set-up shall not be allowed if ACM >= ACMmax
charging information
CAI = 0
yes
no
AoC acknowledge
AoC inactive
ACM>= ACMmax
yes
no
charging information
call ends
clear call
start charge calculations
CAI = 0
no
clear call
yes
AoC acknowledge
AoC acknowledge
AoC active
AoC inactive
ACM >= ACMmax
call ends
charging information
Point at which charging calculations are amended can occur before or after sending the AoC acknowledge.
CAI = 0
no
yes
AoC acknowledge
AoC acknowledge
stop charge calculations
stop charging calculations
amend charging calculations
clear call
AoC inactive
AoC active

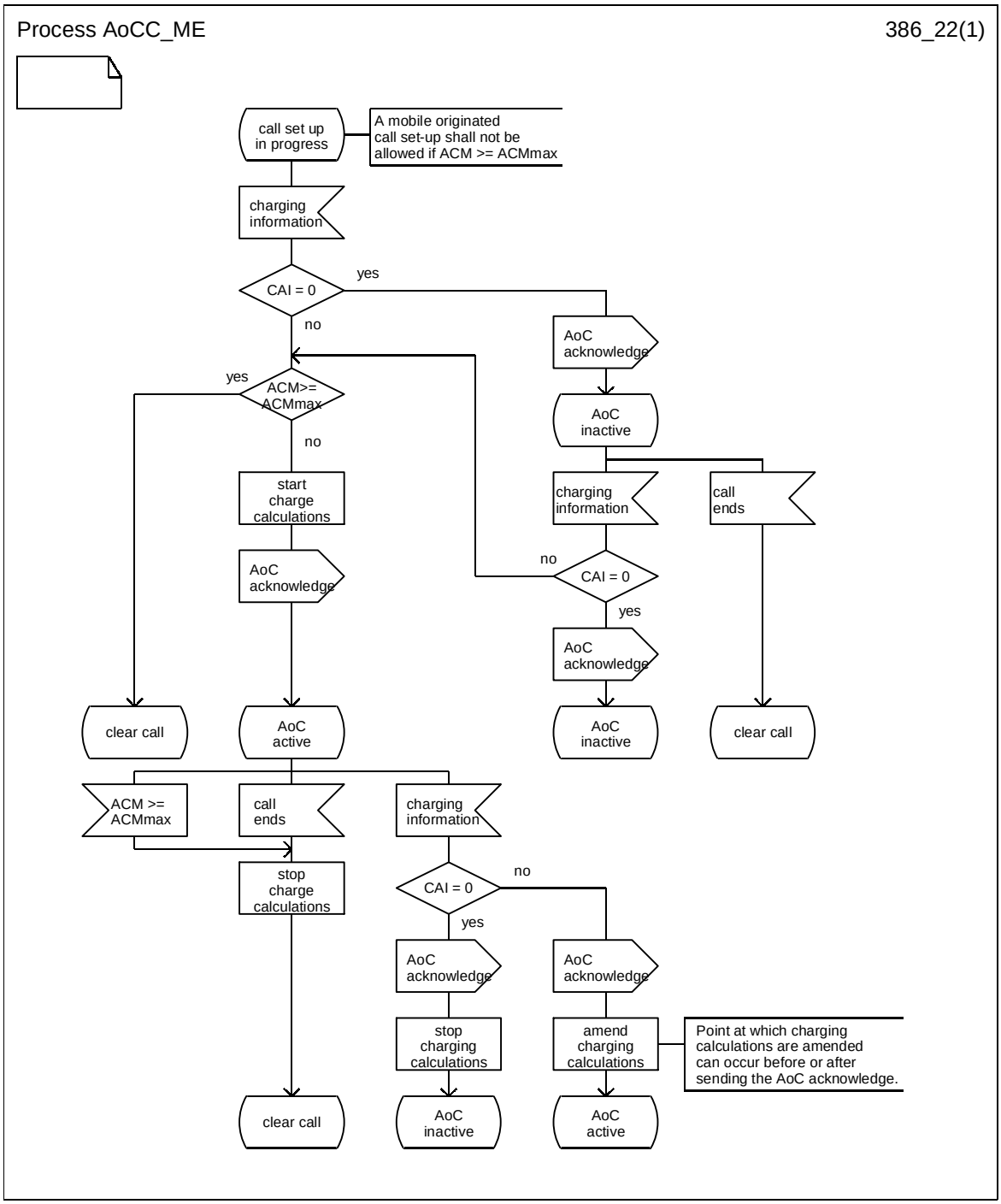


Figure 2.2: SDL diagram of advice of charge (charging) in the mobile equipment

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000435
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.087	CR	001	Current Version:	3.0.1

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

For submission to:	CN#09	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: N4 **Date:** 2000-06-26

Subject: SDL refresh

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

The SDL diagrams in this document have been replaced, without any semantic changes due to the following reasons:

- In the previous version, the diagrams contained nothing but garbage when viewed on-screen.
- Some of the diagrams were, if not impossible, very hard to print.
- A binary version of the SDL diagrams, suitable for standard tools, is needed to assure a qualitative handling of the diagrams in the future. Telelogic Tau SDL Suite (formerly known as SDT) versions of the diagrams have been created and made available, providing a new fresh base for future changes. For obvious reasons, the binary version, to be regarded as the source, should be mirrored in the document. Therefore, the diagrams replacing the previous versions are printouts of the binary versions.

Clauses affected: All figures in the document, containing an SDL diagram.

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:

ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

5.2.1.2 Information flows

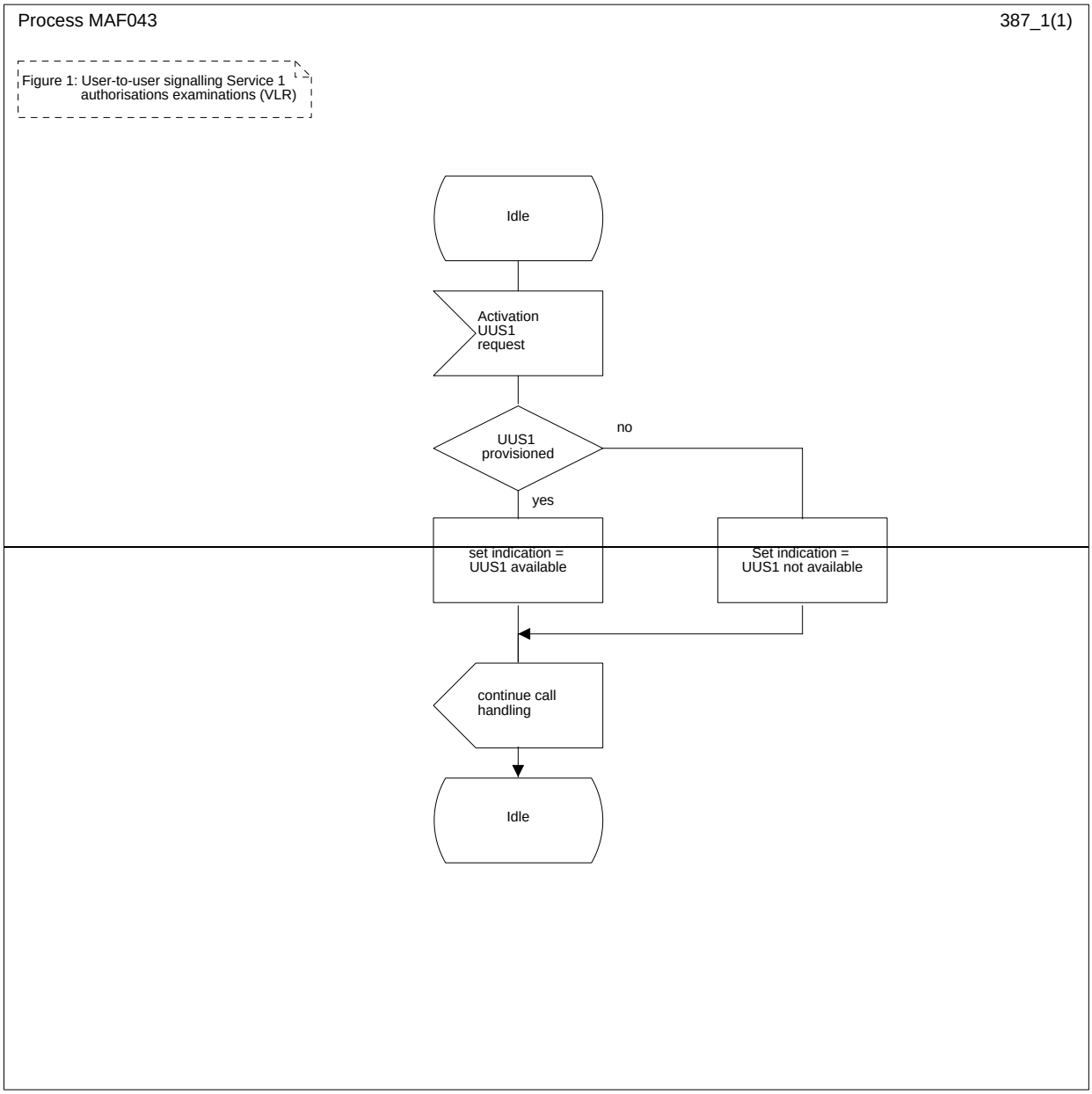
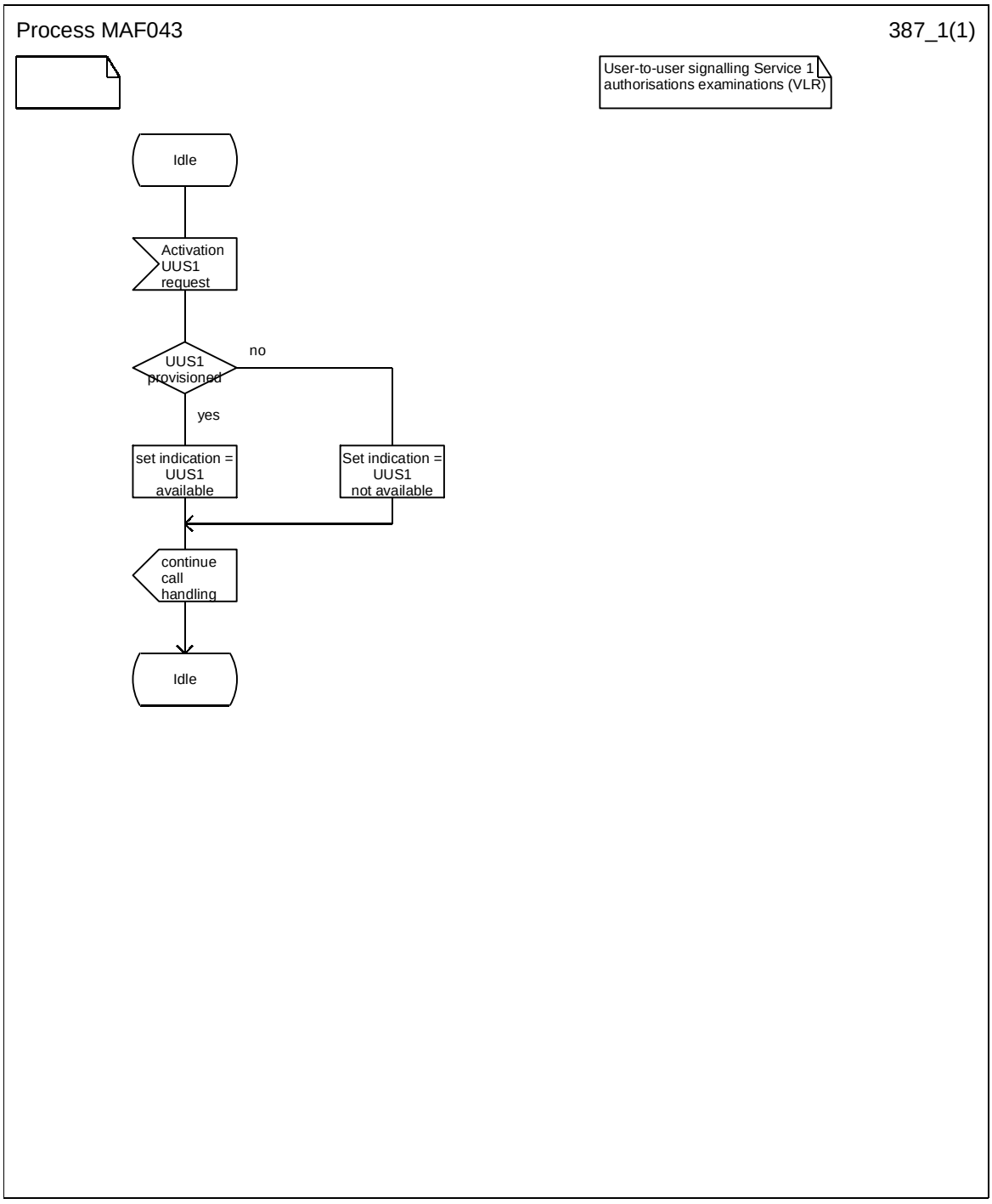


Figure 1: User-to-user signalling Service 1 authorisations examinations (VLR)



5.2.1.2.1 Implicit activation

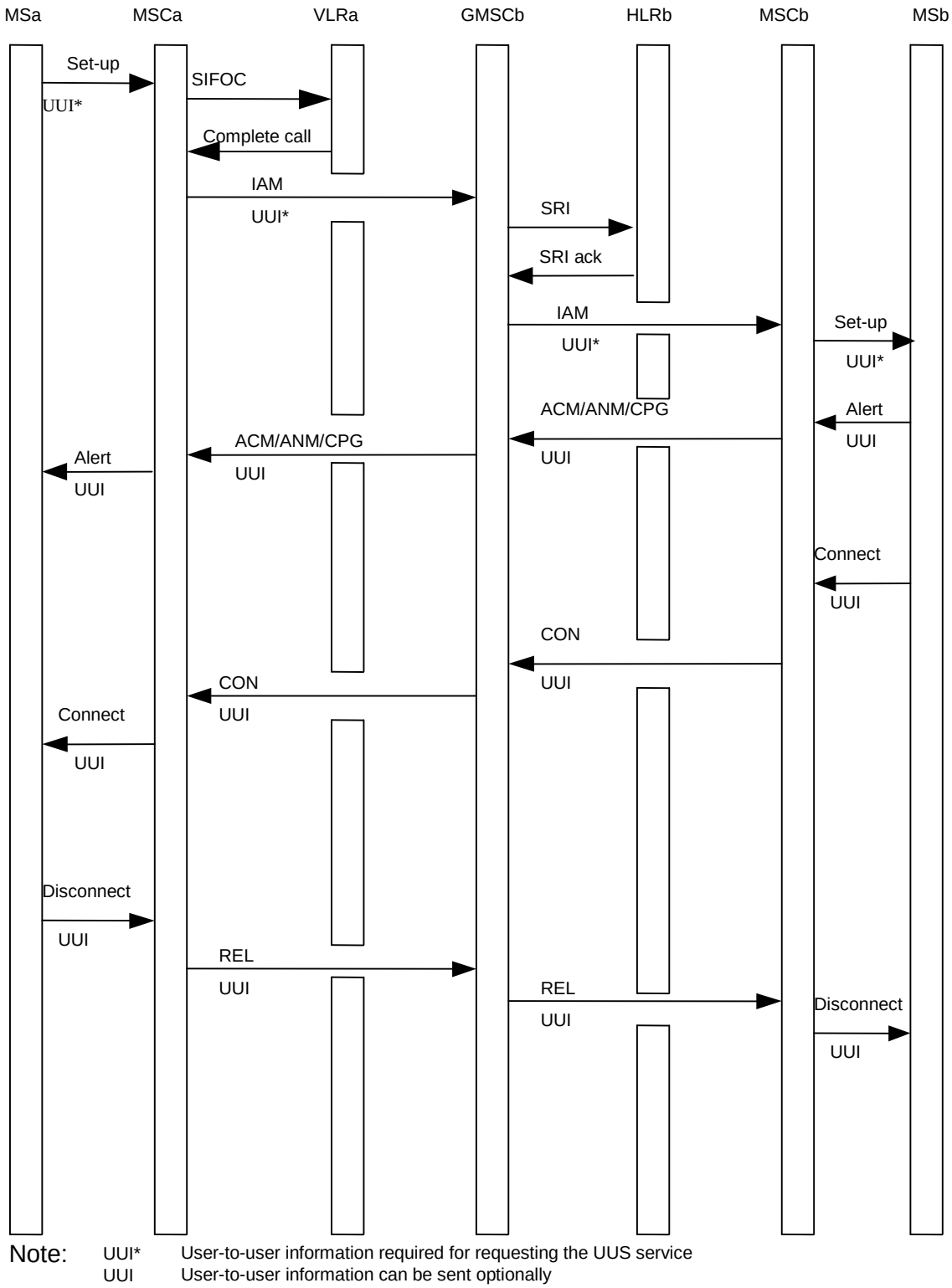
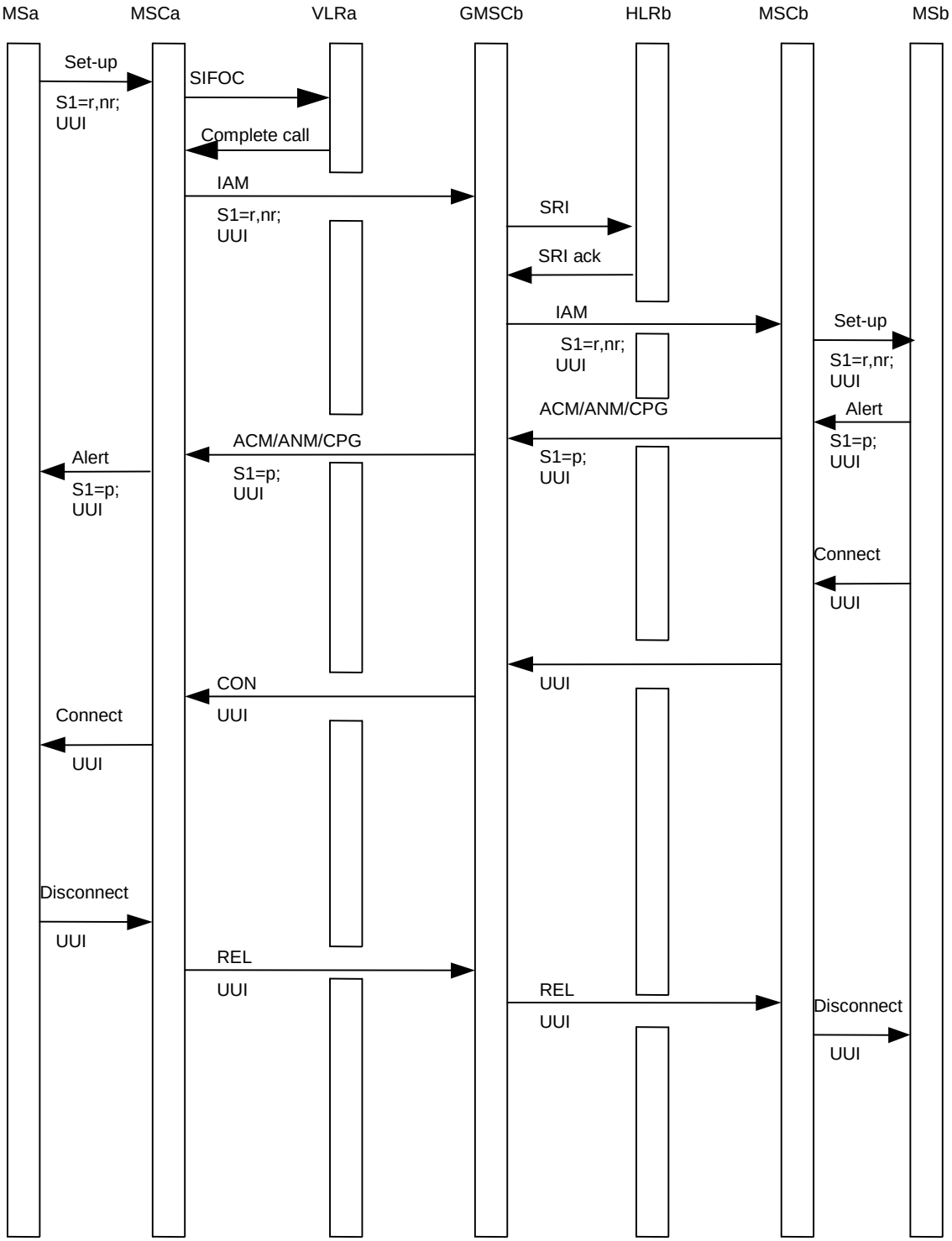


Figure 5.2.1.2.1.1: Information flow for UUS1 implicit request (mobile to mobile call)

5.2.1.2.2 Explicit activation



Note:

S1	UUS Service 1
UUI	User-to-user information can be sent optionally
r,nr	requested, not required
p	provided

Figure 5.2.1.2.2.1: Information flow for UUS 1 explicit request (mobile to mobile call)

5.2.2 Service 2 (UUS2)

5.2.2.1 Flow control

Up to two UUI messages can be sent in each direction. If either party tries to send more than two UUI messages, they are discarded.

5.2.2.2 Information flows

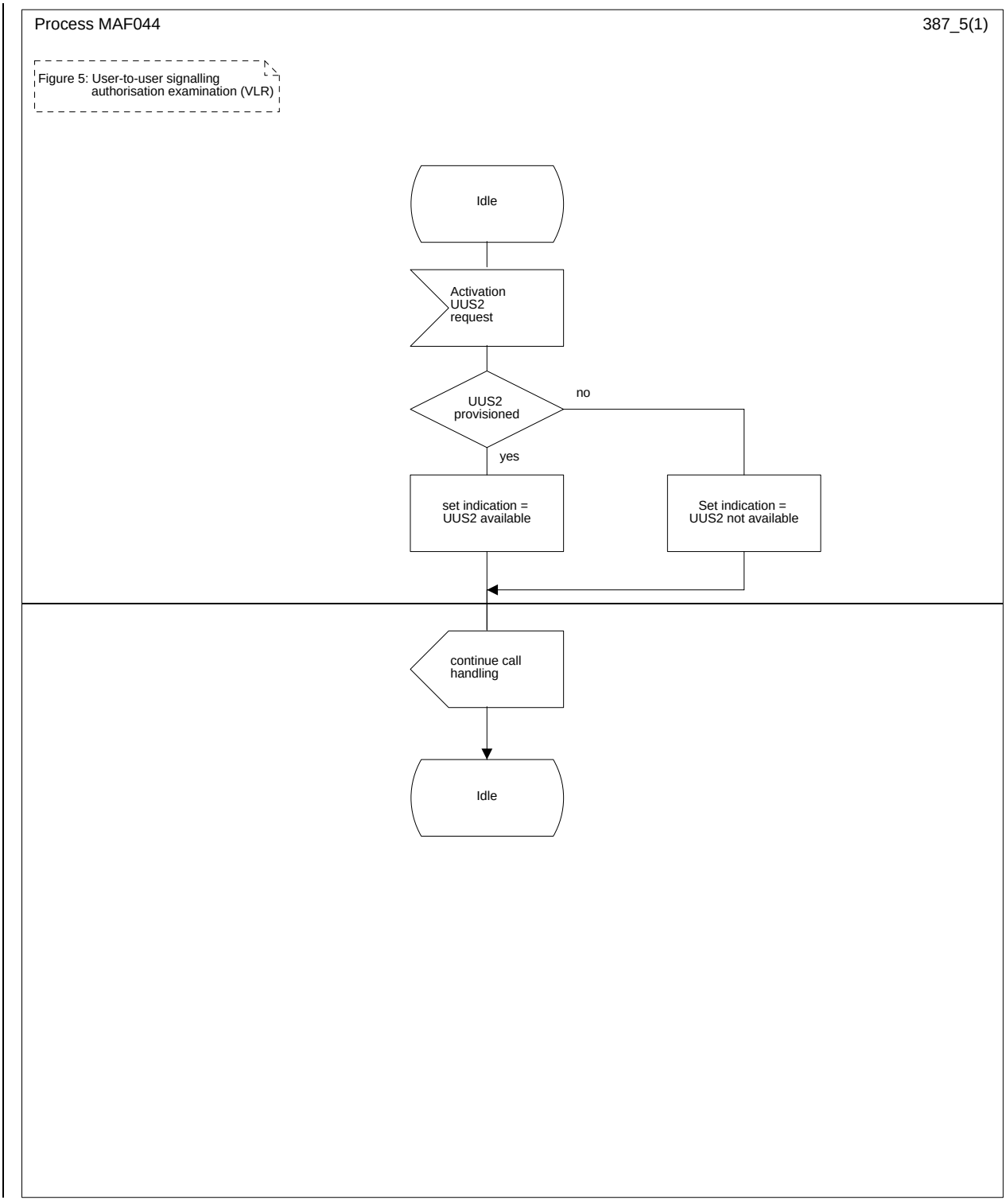
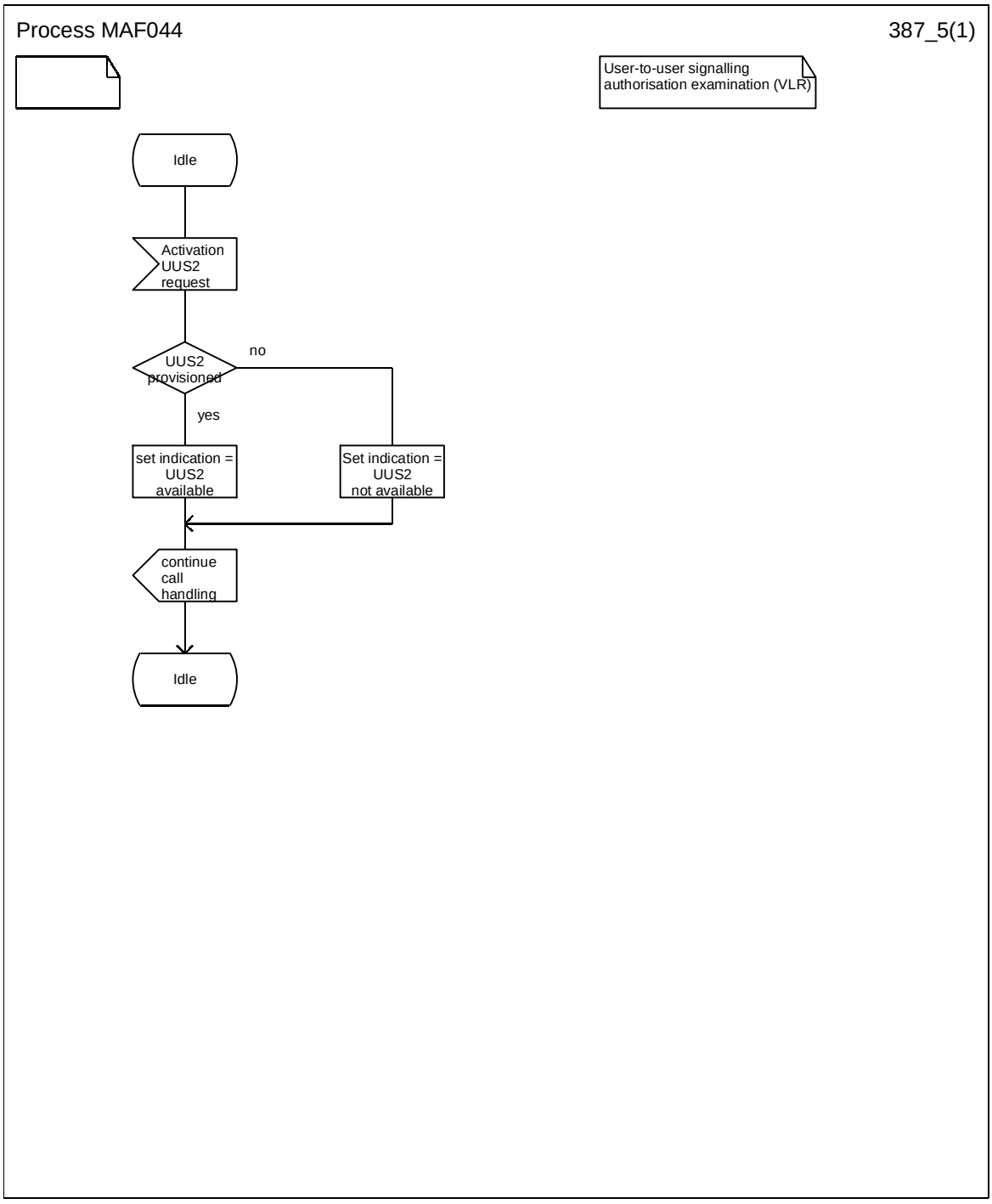
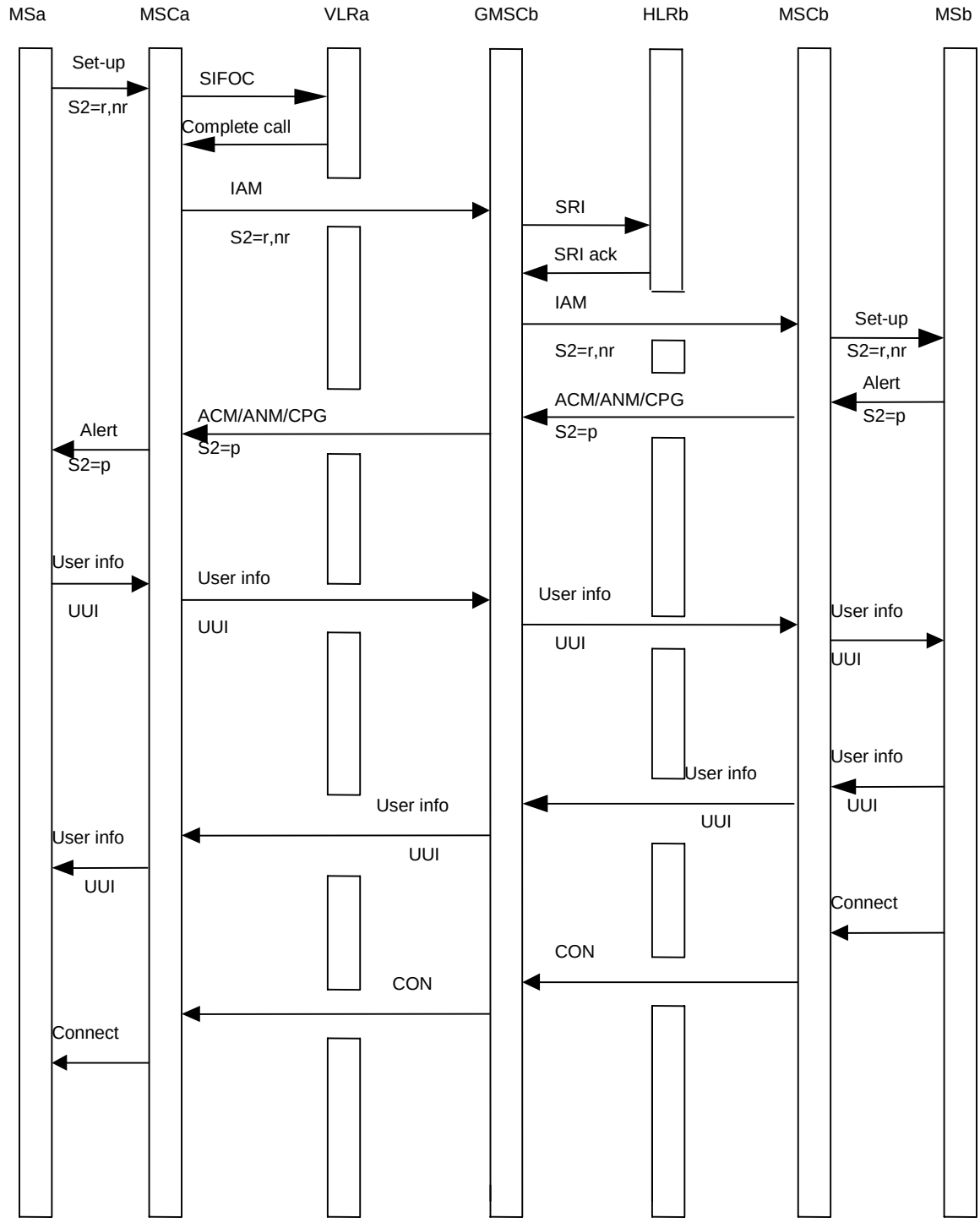


Figure 5: User-to-user signalling authorisation examination (VLR)


Process MAF044
387_5(1)
User-to-user signalling authorisation examination (VLR)
Idle
Activation UUS2 request
UUS2 provisioned
no
yes
set indication = UUS2 available
Set indication = UUS2 not available
continue call handling
Idle



Note:

	S2	UUS Service 2
	UUI	User-to-user information
	r,nr	requested, not required
	p	provided

Figure 5.2.2.2.1: Information flow for UUS2 explicit request (mobile to mobile call)

5.2.3 Service 3 (UUS3)

5.2.3.1 Flow control

Network flow control mechanisms shall exist after the connection has been established in order to restrict the amount of UUI sent in each direction. A burst capability of sending N messages shall immediately be available to each user, where N initially equals the value of the burst parameter X. The value of N shall be decremented by one for every message sent by the user and incremented by Y at regular intervals of T2-UUS3 (see table 5.1). The value of N shall be limited to a maximum of X.

The value of the burst parameter X shall be 16.

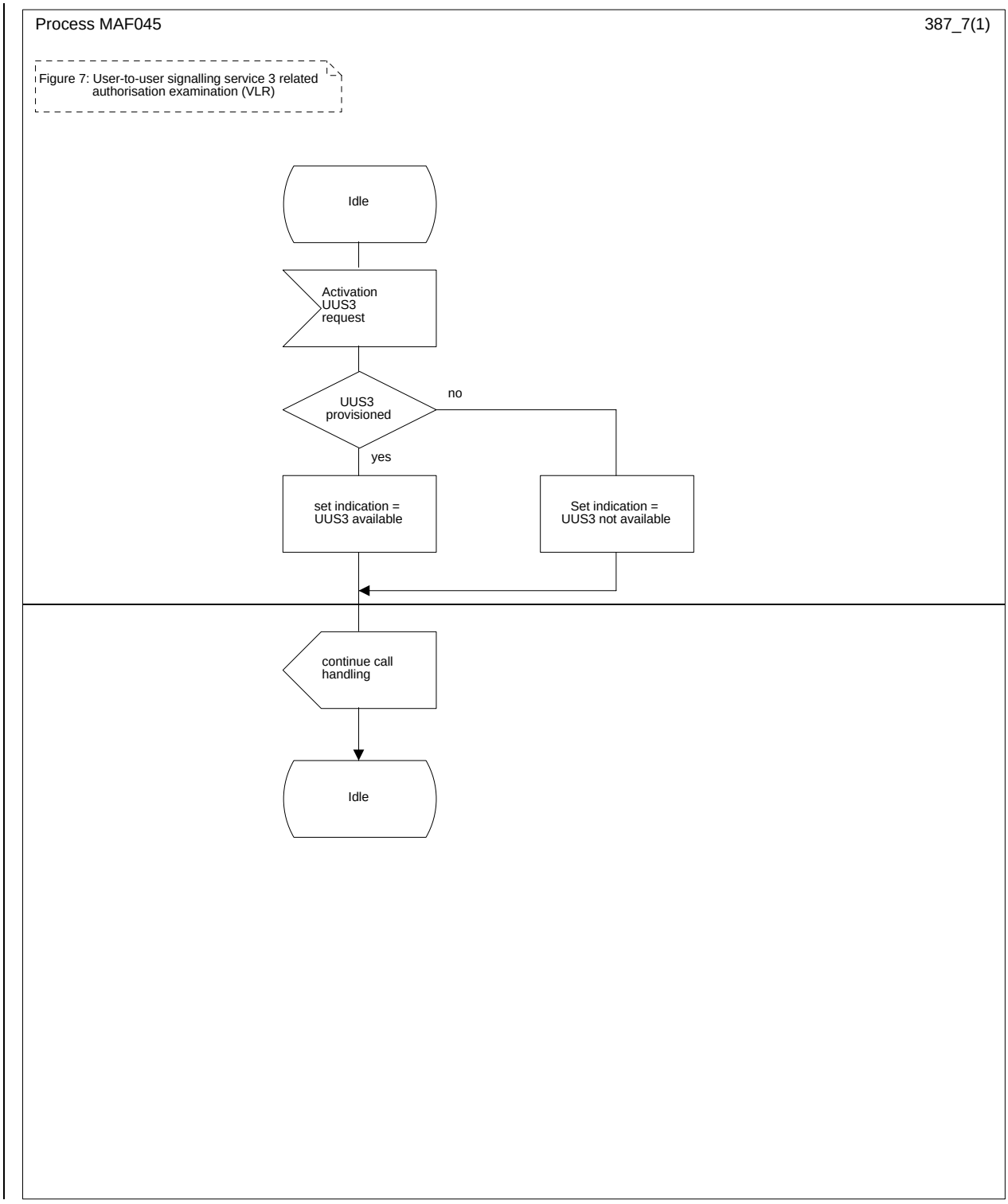
The value of the replenishment parameter Y shall be 8.

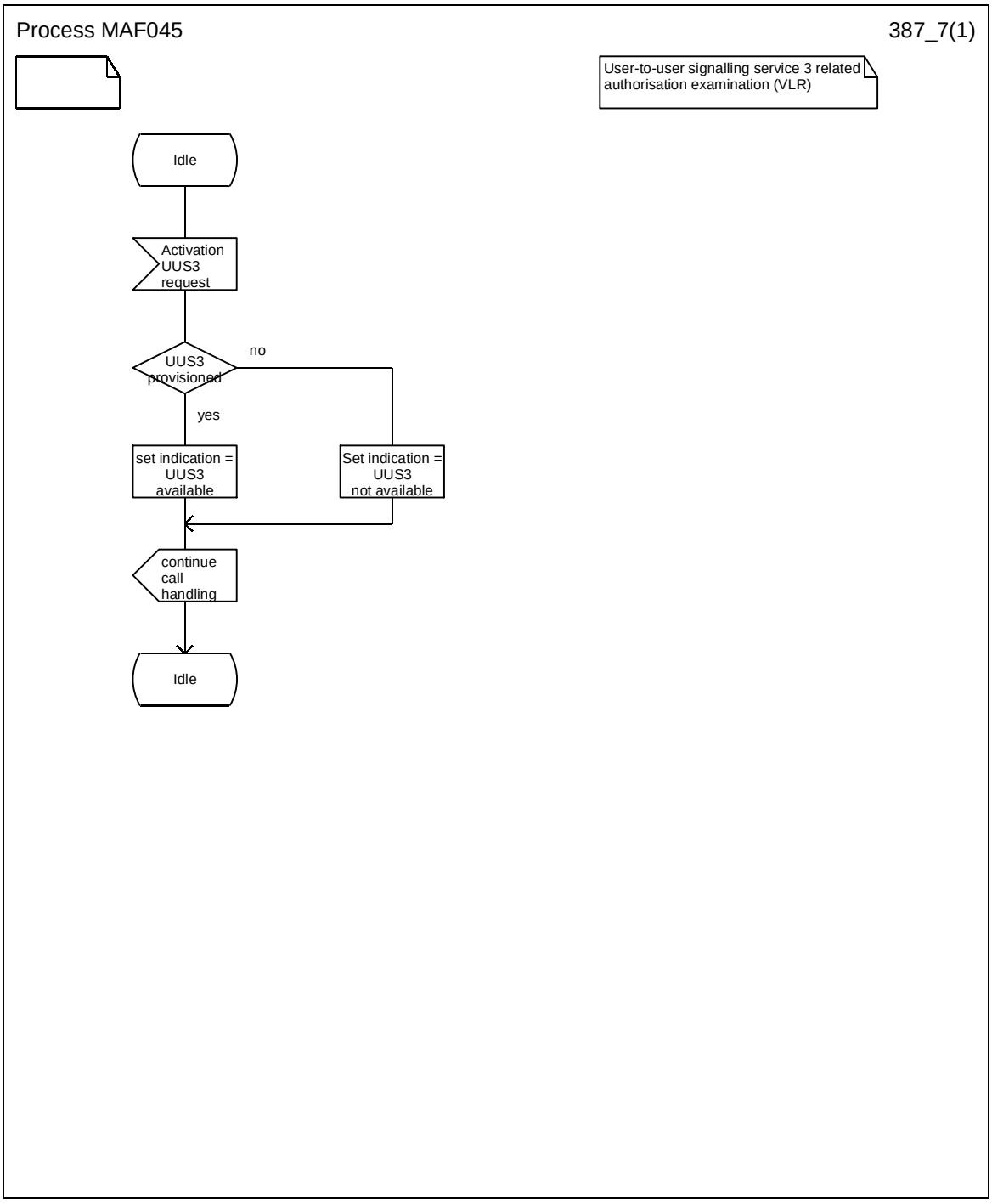
Network flow control shall be performed only by the sending user's network.

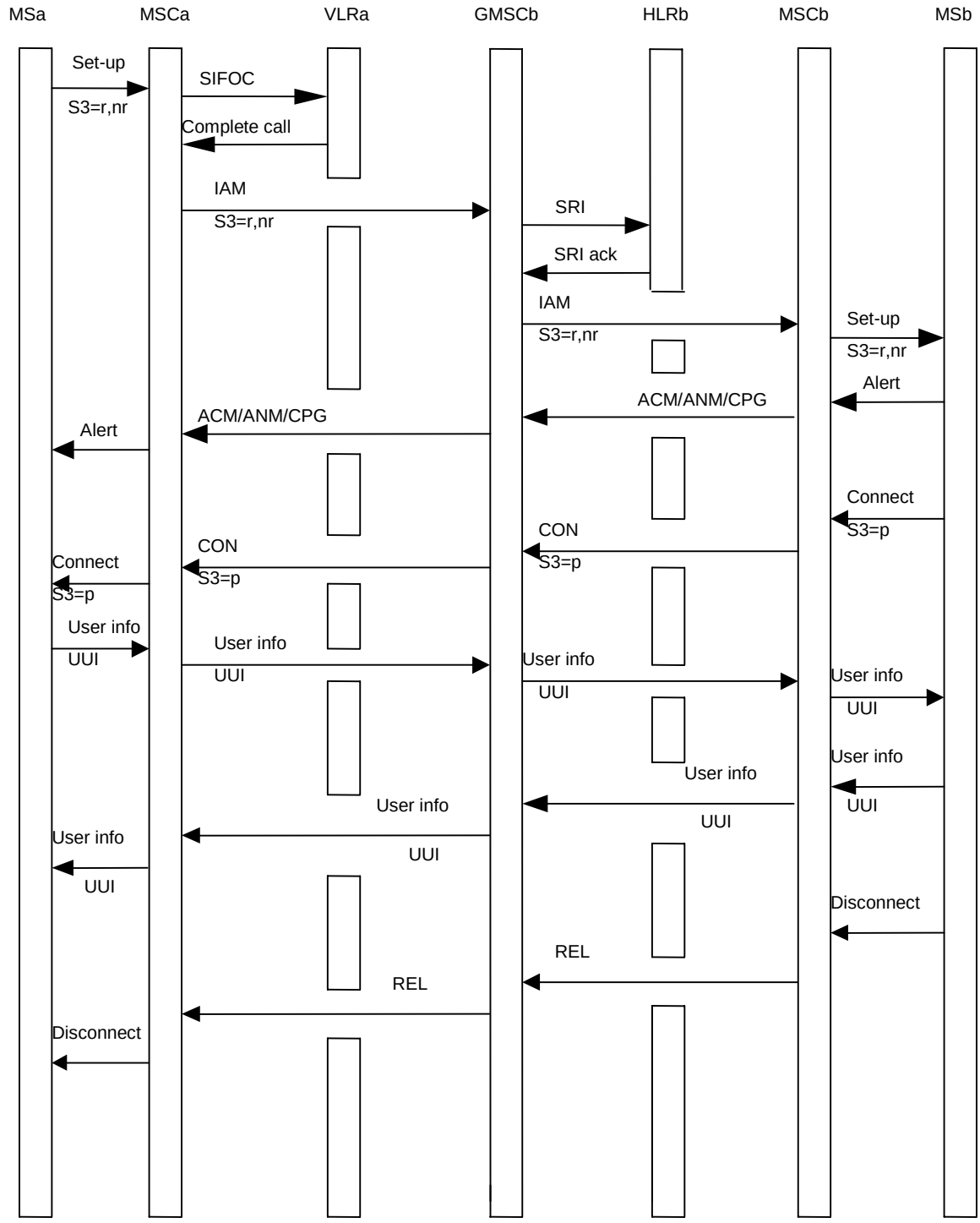
If the MSC receives UUI messages from the MS at a rate which exceeds the flow control limit, it shall discard the UUI messages that cannot be handled and respond to the first discarded UUI message with a congestion control message.

When the flow control restrictions are removed, an indication that further UUI messages can be accepted shall be given. See the Processes Serving_MSC_Handle_UUS_In_Active_Call and Remote_ MSC_Handle_UUS_In_Active_Call.

5.2.3.2 Information flows


Process MAF045
387_7(1)
Figure 7: User-to-user signalling service 3 related authorisation examination (VLR)
Idle
Activation UUS3 request
UUS3 provisioned
no
yes
set indication = UUS3 available
Set indication = UUS3 not available
continue call handling
Idle

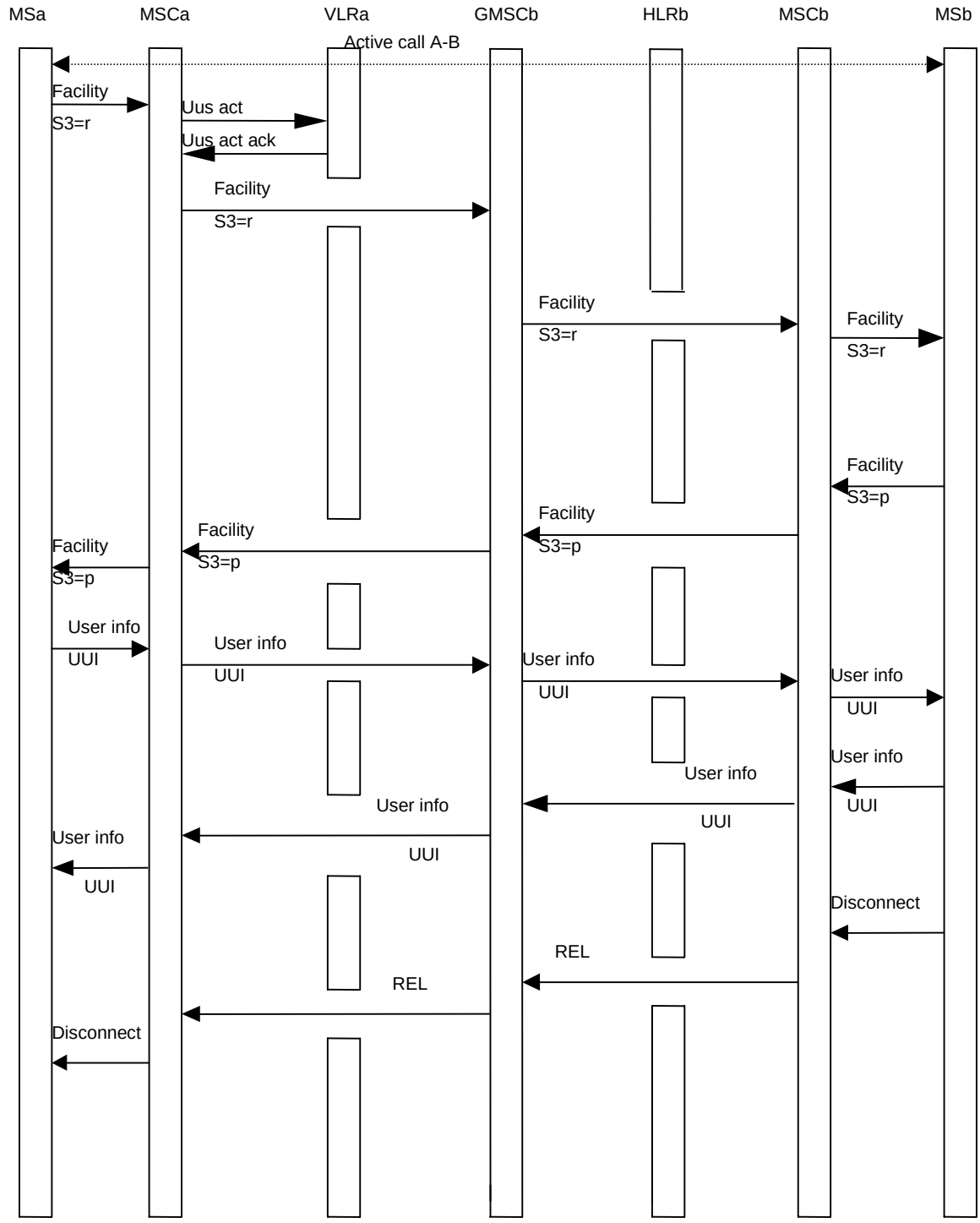

Process MAF045
387_7(1)
User-to-user signalling service 3 related authorisation examination (VLR)
Idle
Activation UUS3 request
UUS3 provisioned
no
yes
set indication = UUS3 available
Set indication = UUS3 not available
continue call handling
Idle



Note:

	S3	UUS Service 3
	UUI	User-to-user information
	r,nr	requested, not required
	p	provided

Figure 5.2.3.2.1: Information flow for UUS3 explicit request during call establishment (mobile to mobile call)



Note: S3 UUS Service 3
UUI User-to-user information
r requested
p provided

Figure 5.2.3.2.2: Information flow for UUS3 explicit request during active call (mobile to mobile call)

5.3 Messages and their contents

This subclause contains the detailed description of the information flows used by UUS.

Each Information Element, IE is marked as (M) Mandatory, (C) Conditional, or (O) Optional. A mandatory information element shall always be present. A conditional information element shall be present if certain conditions are fulfilled; if those conditions are not fulfilled it shall be absent. An optional information element may be present or absent, at the discretion of the application at the sending entity. This categorisation is a functional classification, i.e. stage 2 information and not a stage 3 classification to be used for the protocol.

The stage 2 and stage 3 message and information element names are not necessarily identical.

5.3.1 Information elements used in the messages

The following UUS specific constructed information elements are used in the messages.

Table 5.3.1.1: UUS specific information elements

Parent Information Element	Child Information Element name	Information element Required	Information element description
UUS options	UUS1	C	The information element is present if UUS1 service is requested; otherwise it shall be absent. It may contain the following values: - Required - Not Required
	UUS2	C	The information element is present if UUS2 service is requested; otherwise it shall be absent. It may contain the following values: - Required - Not Required
	UUS3	C	The information element is present if UUS3 service is requested; otherwise it shall be absent. It may contain the following values: - Required - Not Required
UUS provision	UUS1	C	If UUS1 services is requested and provisioned the information element is present, otherwise it shall be absent.
	UUS2	C	If UUS2 services is requested and provisioned the information element is present, otherwise it shall be absent.
	UUS3	C	If UUS3 services is requested and provisioned the information element is present, otherwise it shall be absent.

5.3.2 Messages between MS and MSC

Call control messages (Setup, Alert, Connect, Disconnect, Release and Release Complete, refer to GSM 04.08) may carry UUS service activation request and response. They can carry also UUI for UUS1.

Facility message, refer to GSM 04.08, can carry UUS service 3 activation request and response.

Dedicated User-To-User message, refer to GSM 04.08, carries UUI for UUS service 2 and 3.

These messages are used both in serving and remote networks.

5.3.3 Messages between MSC and VLR (B interface)

These messages are used in the serving network.

Table 5.3.3.1: Messages between MSC and VLR

Message	Message sender	Information element name	Information element Required	Information element description
Send Info For Outgoing Call	MSC	- UUS options	- C	Refer to GSM 03.18. In addition: The information element is present if MS A requested UUS service; otherwise it shall be absent. The structure of UUS options is defined in table 5.3.1.1
Send Info For Outgoing Call negative response	VLR	- UUS reject	- C	Refer to GSM 03.18 In addition: The information element is present, if required UUS service was requested by MS A and service is not provided, otherwise it shall be absent.
Complete Call	VLR	- UUS provision	- C	Refer to GSM 03.18 In addition: The information element is present if MS A requested UUS service(s); otherwise it shall be absent. The structure of UUS Provision is defined in table 5.3.1.1
Send Info For UUS3	MSC	-	-	The message is sent when UUS3 service is requested during active call. NOTE: This message is used in serving and remote MSCs.
Send Info For UUS3 Ack	VLR	UUS provision	C	The information element is present if UUS3 service is provisioned; otherwise it shall be absent

5.3.4 Messages between MSC – MSC (E interface)

These messages are used in the remote network when UUS is supported in remote MSC in conjunction of SOR, refer to GSM 03.79.

Table 5.3.4.1: Messages between MSC – MSC

Message	Message sender	Information element name	Information element Required	Information element description
Resume Call Handling	MSCB	-	-	Refer to GSM 03.79. In addition:
		UUS1 Service request	C	The information element is present if UUS1 Service was requested in the original call and remote MSC supports UUS service; otherwise it shall be absent.
		UUS2 Service request	C	The information element is present if UUS2 Service was requested in the original call and remote MSC supports UUS service; otherwise it shall be absent
		UUS3 Service request	C	The information element is present if UUS3 Service was requested in the original call and remote MSC supports UUS service; otherwise it shall be absent.
		UUS1 UUI	C	The information element is present if UUS1 UUI was present in the original call and remote MSC supports UUS service; otherwise it shall be absent.
		UUS CF interaction	C	The information element is present if the remote subscriber has accepted UUS1 service request and call forwarding or call deflection has been activated after that; otherwise it shall be absent.

6 Interaction with other supplementary services

GSM 02.87 specifies interaction of UUS with other supplementary services. Additional details are provided in this clause.

6.1 Call forwarding unconditional (CFU)

No impact.

6.2 Call forwarding on mobile subscriber busy (CFB)

No impact, if CFB is invoked due to a NDUB condition or due to UDUB before an alerting message was received from the mobile station.

If CFB is invoked due to a UDUB indication from the B forwarding subscriber the same interaction as for CFNRy shall apply.

6.3 Call forwarding on no reply (CFNRy)

If UUS Service 1 is implicitly requested for a call to a subscriber who has Call Forwarding on no reply active and operative, the forwarding MSC shall store the UUI. If CFNRy is invoked, the stored UUI shall be forwarded with the call.

If UUS Service 1 is explicitly requested as not required for a call to a subscriber who has Call Forwarding on no reply active and operative, the forwarding MSC shall store UUS 1 service request and UUI, if any. If the forwarding user accepts the UUS1 supplementary service request in the Alerting message, the CFNRy supplementary service can be invoked and the stored UUS1 service request and UUI, if any, shall be forwarded with the call. If the forwarding user rejects the UUS1 supplementary service request or does not include a response related to it in the Alerting message, then the CFNRy supplementary service can be invoked but the UUS1 service request and UUI, if any, shall not be forwarded with the call.

If UUS Service 1 is explicitly requested as required for a call to a subscriber who has Call Forwarding on no reply active and operative and the no reply condition timer expires, the remote MSC shall release the call towards the calling subscriber.

If Call Forwarding on no reply is invoked for a call for which UUS Service 2 was requested as not required, UUS Service 2 shall not be requested for the forwarding leg, i.e. UUS 2 is no longer available for the call.

Call Forwarding on no reply shall not be invoked if UUS Service 2 was requested required for the initial mobile terminated call.

If UUS Service 3 is requested for a call to a subscriber who has Call Forwarding on no reply active and operative, the forwarding MSC shall store the UUS3 request. If CFNRy is invoked the UUS3 request shall be forwarded with the call.

For further details refer to procedures UUS_ICH_Check_Forwarding and UUS_MSC_Clear_UUS.

6.4 Call forwarding on mobile subscriber not reachable (CFNRc)

No impact.

6.5 Call waiting (CW)

No impact.

6.6 Call hold (HOLD)

No impact.

6.7 Completion of calls to busy subscribers (CCBS)

Requests for the activation of the UUS supplementary service contained in the original call request shall be maintained along with other call information used for the CCBS supplementary service.

The network shall also store any UUI containing in the original call request and use this stored UUI in the CCBS call.

6.8 Explicit call transfer (ECT)

When calls are transferred as a result of invocation of explicit call transfer supplementary service, the UUS supplementary service activated on either of the calls prior to the invocation of the explicit call transfer supplementary service shall be cancelled by the network.

No specific notification shall be sent to the users on the resulting call when the UUS supplementary service is no longer activated.

The users on the resulting call can request service 3 again, if required.

6.9 Multi party service (MPTY)

No impact.

6.10 Advice of charge (AoC)

No impact.

6.11 Barring of outgoing calls (BAOC)

No impact.

6.12 Barring of outgoing international calls (BOIC)

No impact.

6.13 Barring of outgoing international calls except those directed to the home PLMN country (BOIC-exHC)

No impact.

6.14 Barring of incoming calls (BAIC)

No impact.

6.15 Barring of incoming calls when roaming outside the home PLMN country (BIC-Roam)

No impact.

6.16 Call deflection (CD)

If Call Deflection is invoked before alerting there is no impact.

If Call Deflection is invoked after alerting the same interactions as for Call forwarding on no reply shall apply.

7 Interaction with other network features

7.1 Customised Applications for Mobile network Enhanced Logic (CAMEL)

No impact.

7.2 Support for Optimal Routeing(SOR)

The invocation of Optimal Routeing in case of late call forwarding shall have no impact on the interactions of UUS with the call forwarding supplementary services as defined in clause 6.

The UUS request, UUI and UUS CF interaction indicator, if any, shall be added to the Resume Call Handling message in remote MSC when SOR late call forwarding is applied. For details refer to the procedure UUS_ICH_Handle_LCF in SDLs and the procedure Handle_ORLCF_VMSC (see GSM 03.79).

The UUS request and UUI, if any, shall be copied from the Resume Call Handling message to the IAM in GMSC when SOR late call forwarding is applied. For details refer to the procedure UUS_GMSC_Check_Forwarding in SDLs and the procedure OR_Handle_RCH (see GSM 03.79).

If UUS CF interaction indicator was present in Resume Call Handling message, the presence of UUS1 Service acceptance and UUI, if any, shall be modified during call setup time. For further details refer to the procedure MT_CF_MSC (see GSM 03.18) and UUS_MSC_Clear_UUS.

8 Interworking with other networks

8.1 Interworking with GSM PLMN/ISDN network supporting only a maximum User-user information element length of 35 octets

If interworking occurs with a network supporting only a maximum of User-user information element length of 35 octets, no notification shall be given to the calling user or called user sending the user information.

8.2 Interworking with non-ISDN network

In the case of interworking with non-ISDN network or with a non-ISDN called user, a progress indicator information element indicating #1 "call is not end-to-end ISDN; further progress information may be available in-band" or #2 "destination address is non-ISDN", respectively, is sent to the calling user as part of basic call.

This progress information shall serve as indication that the requested service cannot be guaranteed.

9 Network entity functions

9.1 Originating network processes

9.1.1 Procedures in MSC

Figure 9.1.1.1 Procedure UUS_OCH_Check_Setup

This procedure is called when Setup is received from A-subscriber. It sets requested UUS service options into SIFOC message.

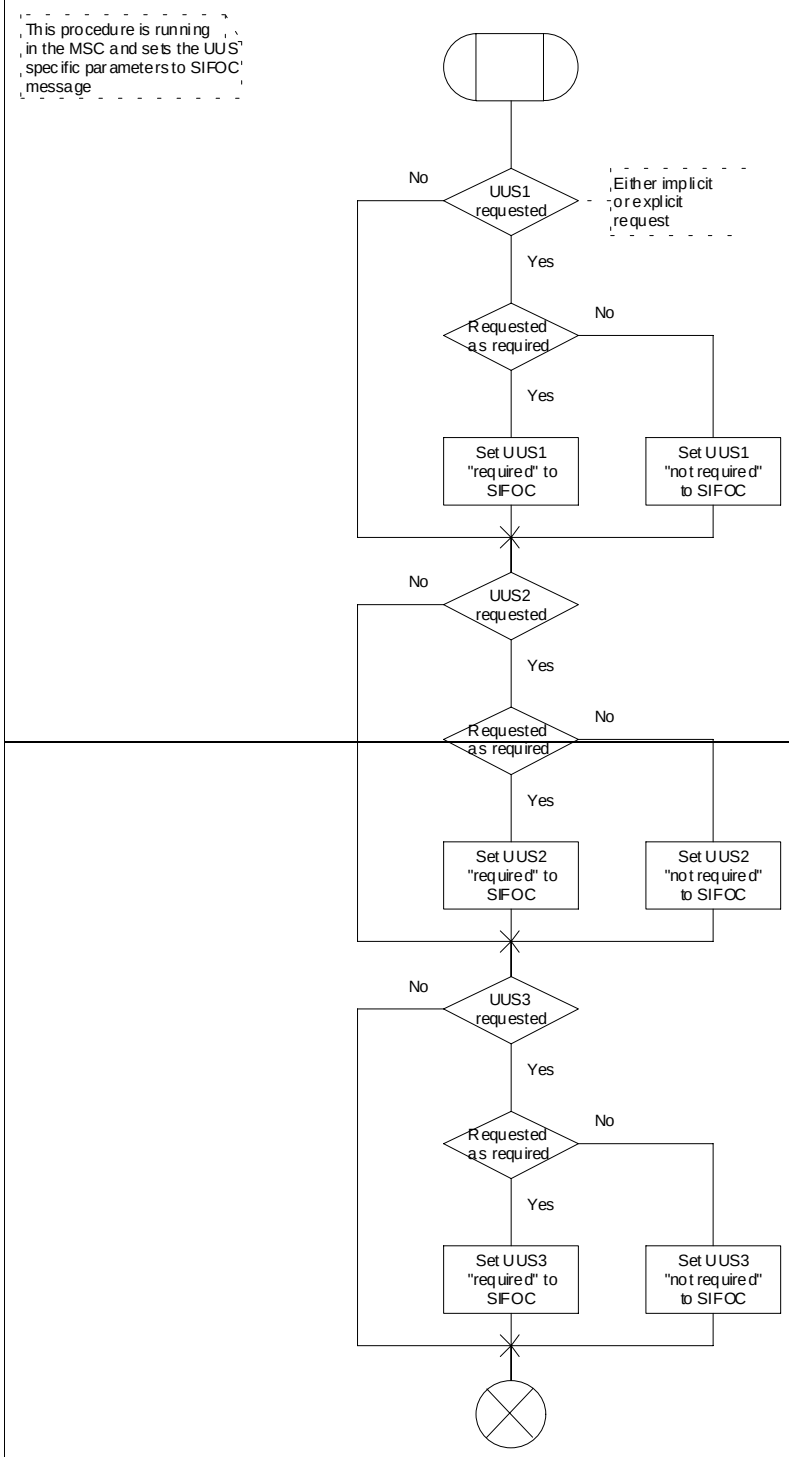
Figure 9.1.1.2 Procedure UUS_OCH_Set_Info_In_IAM

Requested UUS service options and possible UUS1 data is copied in IAM. The procedure is controlled by the Complete Call message parameters from the VLR.

Figure 9.1.1.3 Procedure UUS_OCH_Set_Alert_And_Connect_Param

In this procedure UUS related parameters are checked and set into the Alerting/Connect message that is sent to A-subscriber. If any of the UUS services is requested as required and positive service acknowledgement is not received from the remote end, the check will fail and the call will be cleared.

Procedure UUS_OCH_Check_Setup 1(1)



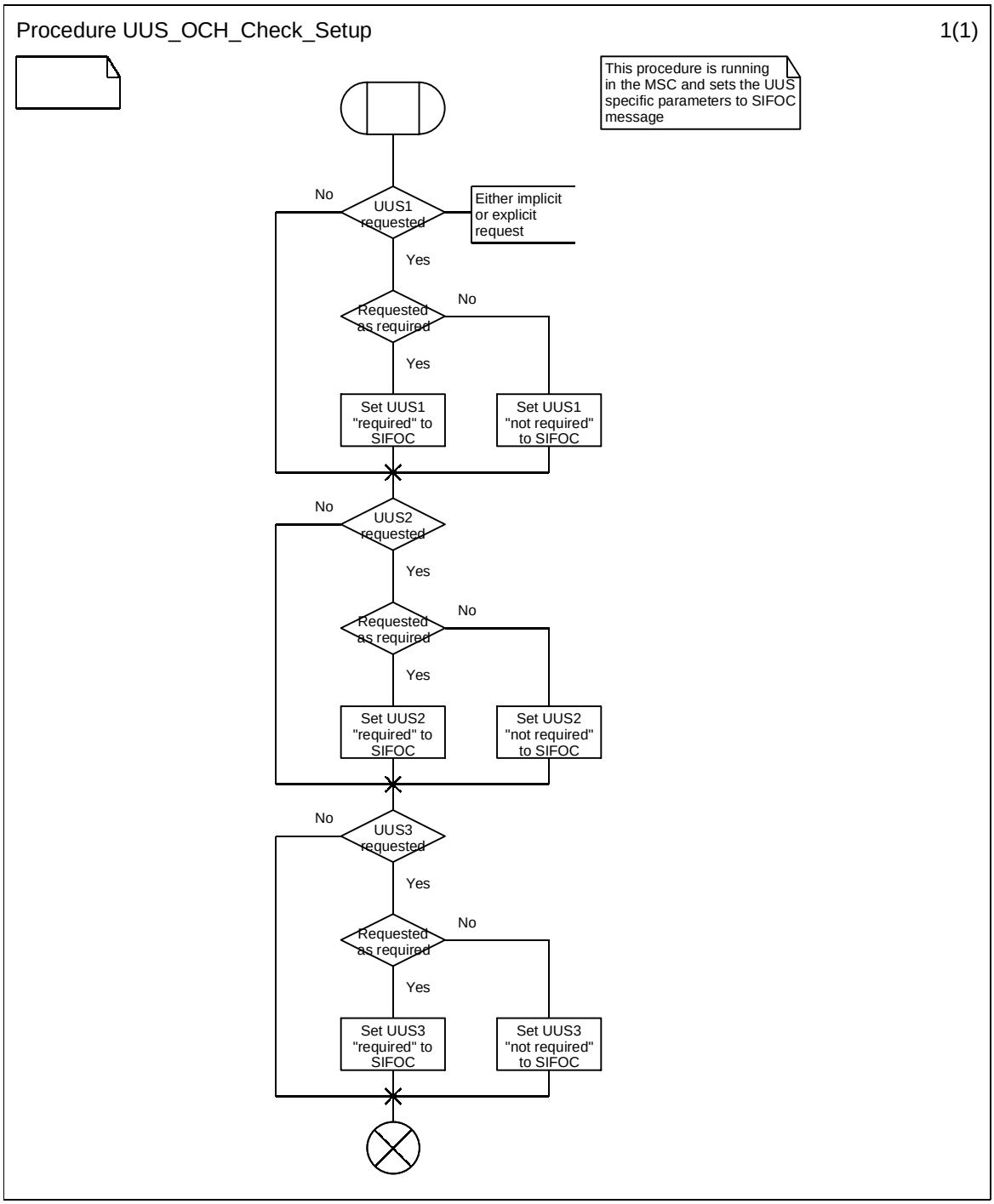
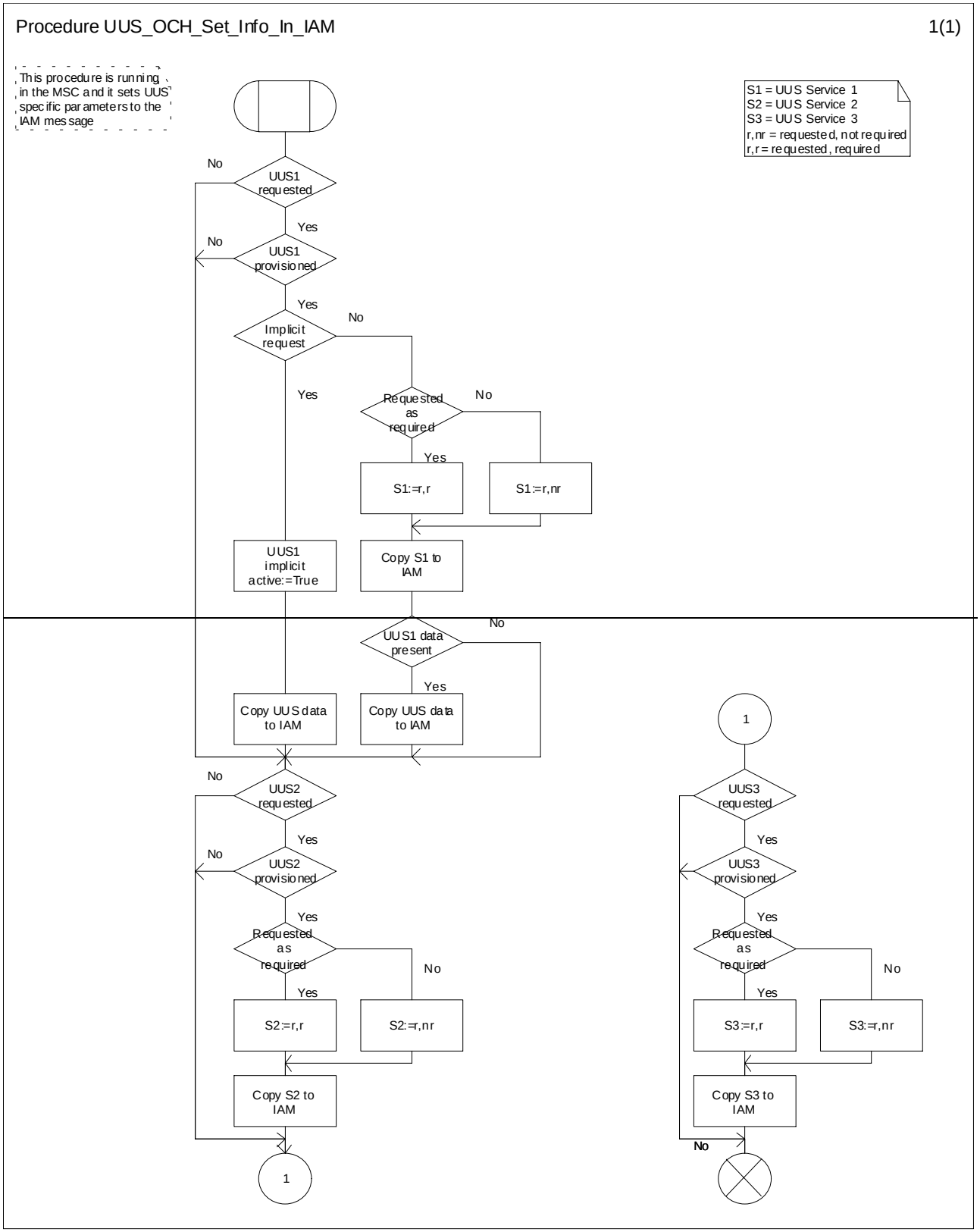


Figure 9.1.1.1: Procedure UUS_OCH_Check_Setup


Procedure UUS_OCH_Set_Info_In_IAM
1(1)
This procedure is running in the MSC and it sets UUS specific parameters to the IAM message
S1 = UUS Service 1
S2 = UUS Service 2
S3 = UUS Service 3
r,nr = requested, not required
r,r = requested, required
UUS1 requested
UUS1 provisioned
Implicit request
Requested as required
S1:=r,r
S1:=r,nr
UUS1 implicit active:=True
Copy S1 to IAM
UUS1 data present
Copy UUS data to IAM
Copy UUS data to IAM
UUS2 requested
UUS2 provisioned
Requested as required
S2:=r,r
S2:=r,nr
Copy S2 to IAM
1
1
UUS3 requested
UUS3 provisioned
Requested as required
S3:=r,r
S3:=r,nr
Copy S3 to IAM
No
Yes

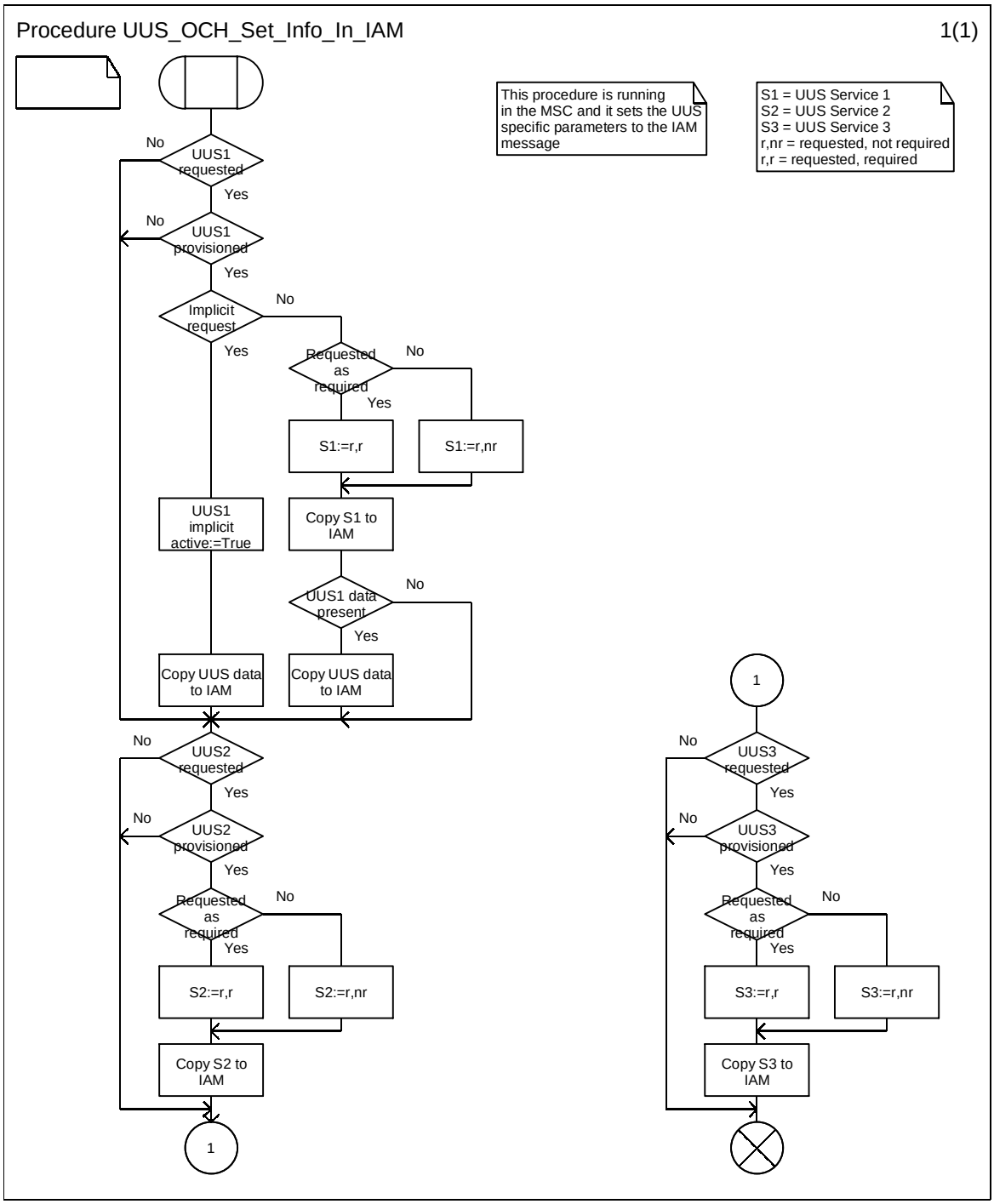
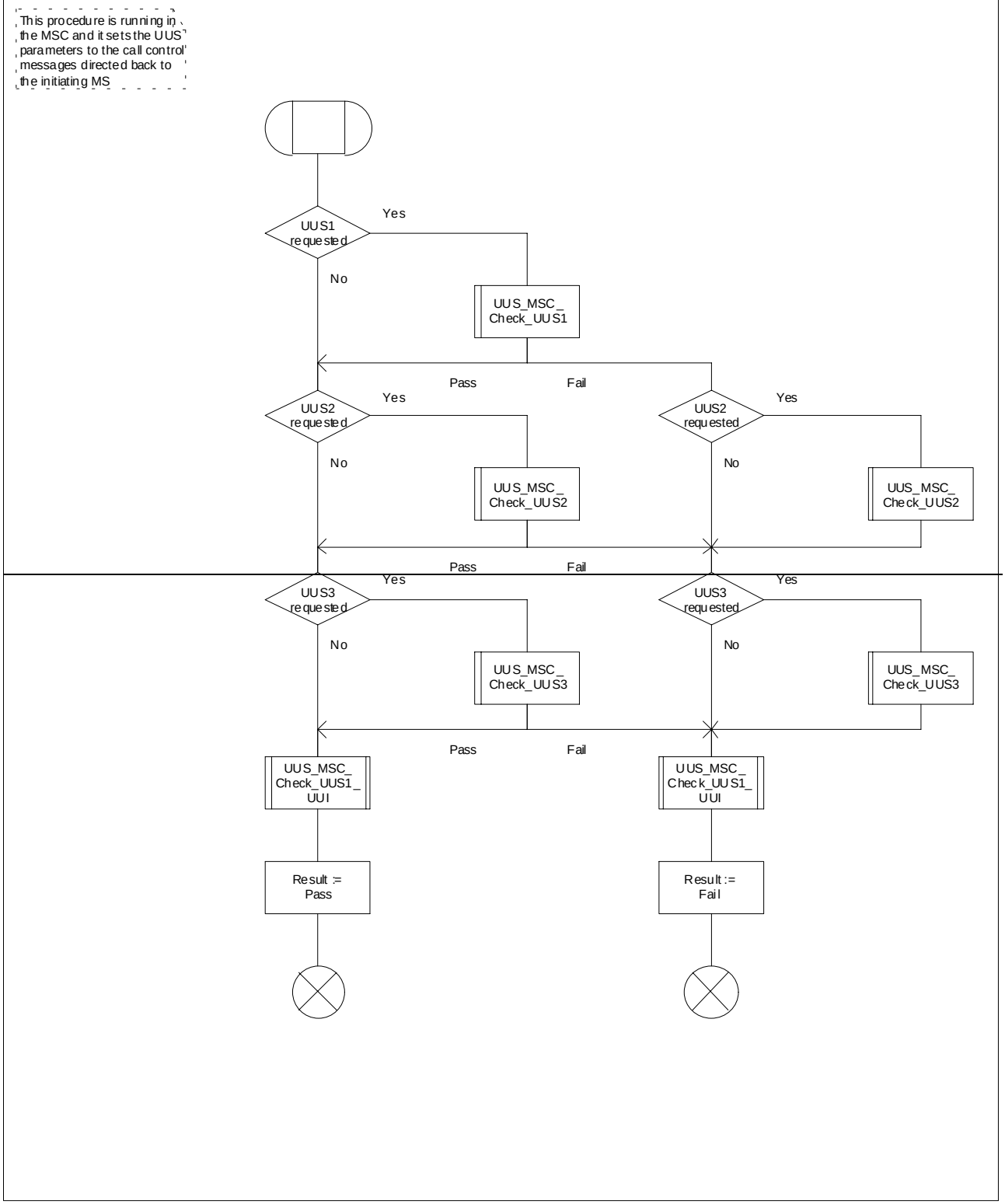


Figure 9.1.1.2: Procedure UUS_OCH_Set_Info_In_IAM

Procedure UUS_OCH_Set_Alert_And_Connect_Param 1(1)



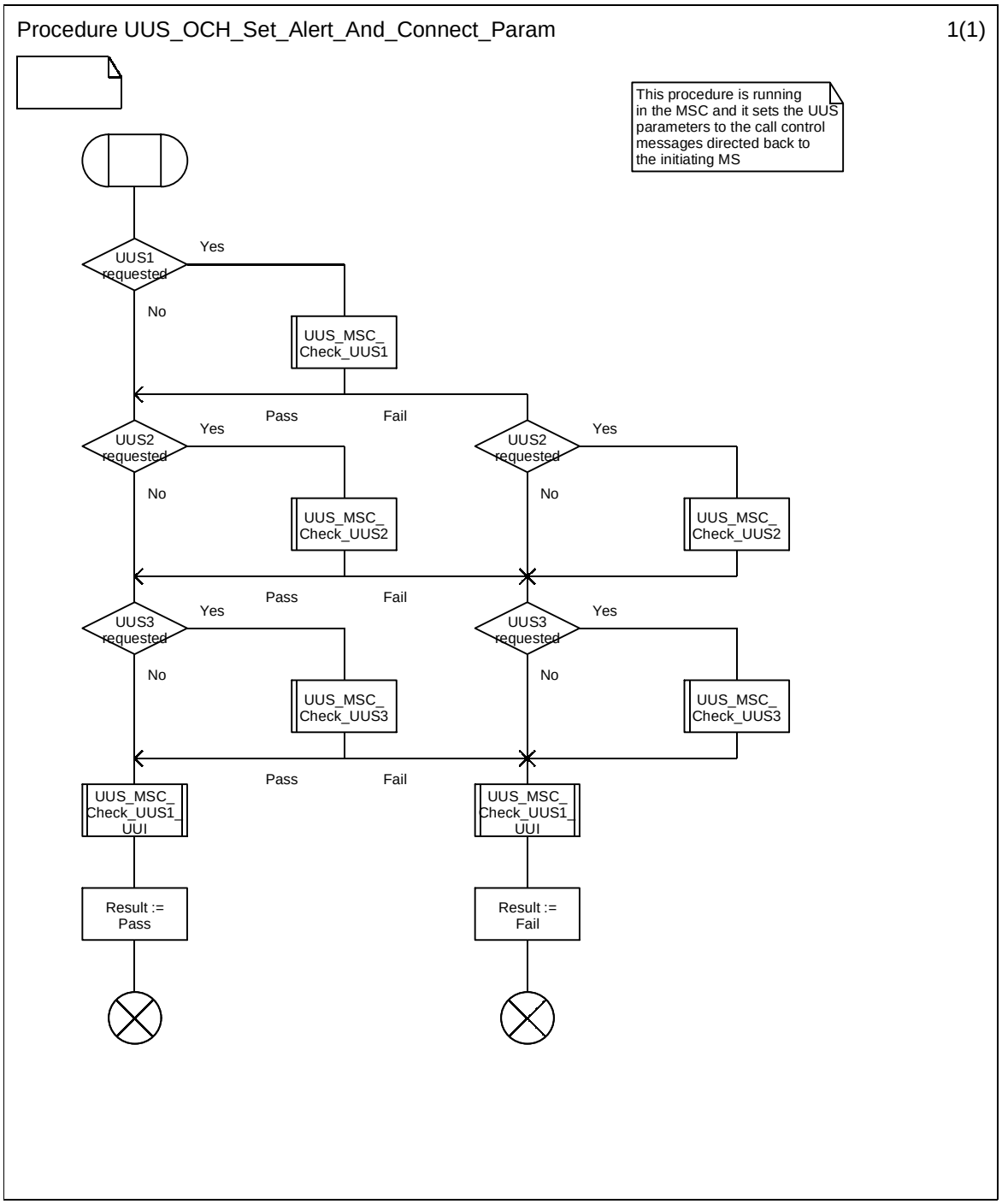
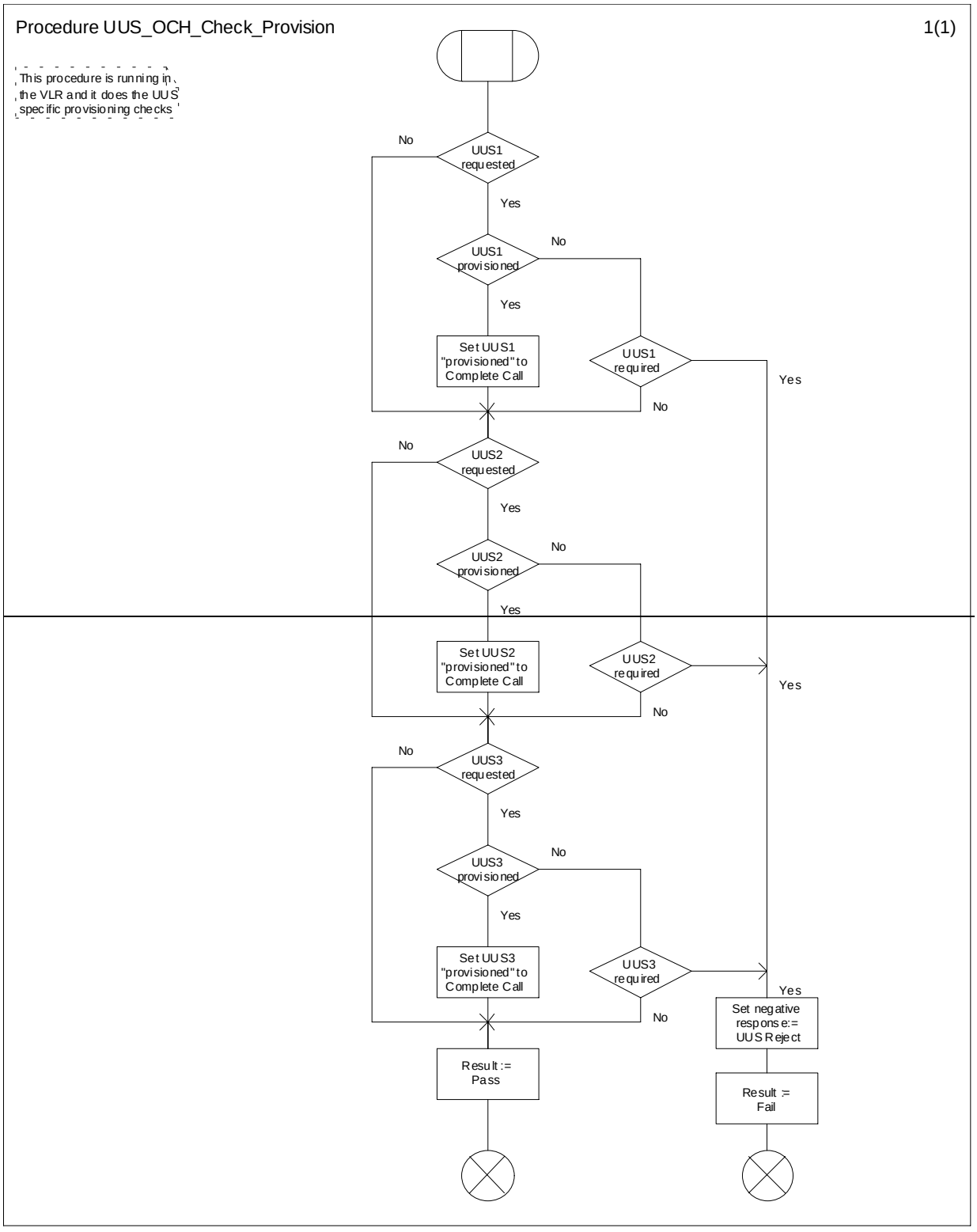


Figure 9.1.1.3: Procedure UUS_OCH_Set_Alert_And_Connect_Param

9.1.2 Procedures in VLR

Figure 9.1.2.1 Procedure UUS_OCH_Check_Provision.

This procedure is called in the VLR during subscription checks for an outgoing call. It sets requested UUS service provision information in Complete call message. If any of the UUS services is requested as required and the service is not provided to the subscription, the check will fail and the call will be cleared.


Procedure UUS_OCH_Check_Provision
1(1)
This procedure is running in the VLR and it does the UUS specific provisioning checks
UUS1 requested
No
Yes
UUS1 provisioned
No
Yes
Set UUS1 "provisioned" to Complete Call
UUS1 required
Yes
No
UUS2 requested
No
Yes
UUS2 provisioned
No
Yes
Set UUS2 "provisioned" to Complete Call
UUS2 required
Yes
No
UUS3 requested
No
Yes
UUS3 provisioned
No
Yes
Set UUS3 "provisioned" to Complete Call
UUS3 required
Yes
No
Set negative response:= UUS Reject
Result := Pass
Result := Fail

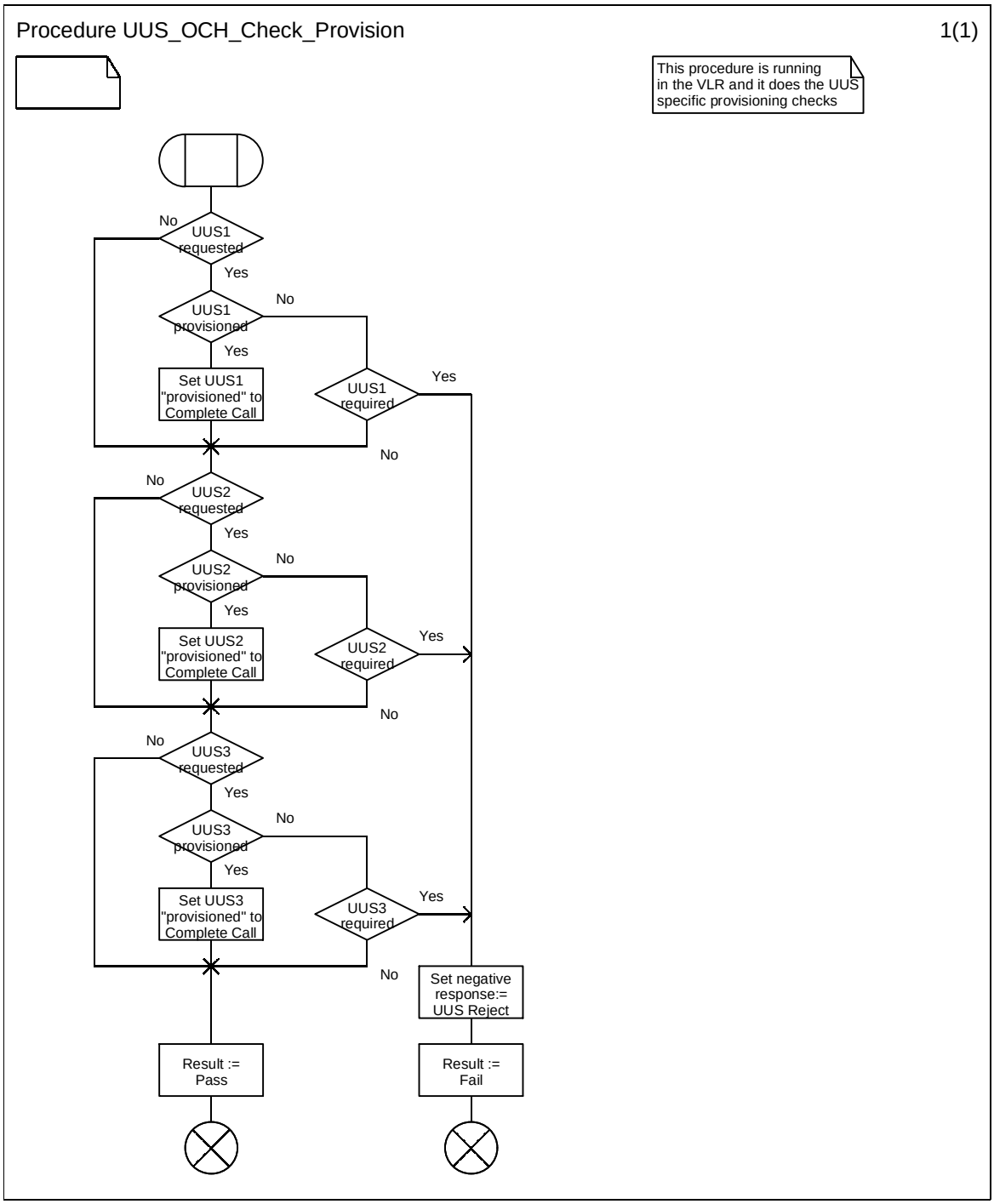


Figure 9.1.2.1: Procedure UUS_OCH_Check_Provision

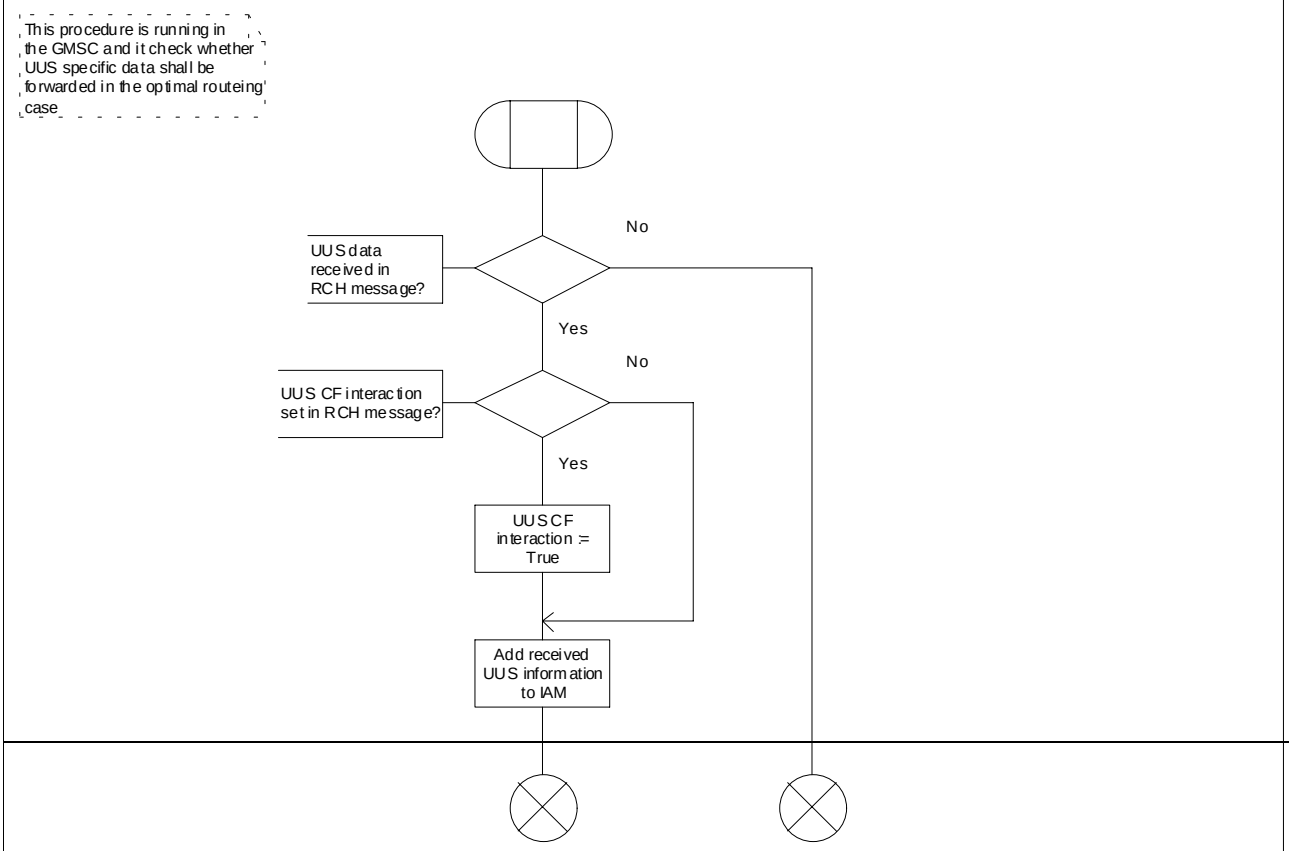
9.2 Terminating network processes

9.2.1 Procedures in GMSC

Figure 9.2.1.1 Procedure UUS_GMSC_Check_Forwarding.

This procedure is called when Resume Call Handling message is received from the remote MSC. If the message contains UUS related information, that is copied to the subsequent IAM message.

Procedure UUS_GMSC_Check_Forwarding 1(1)



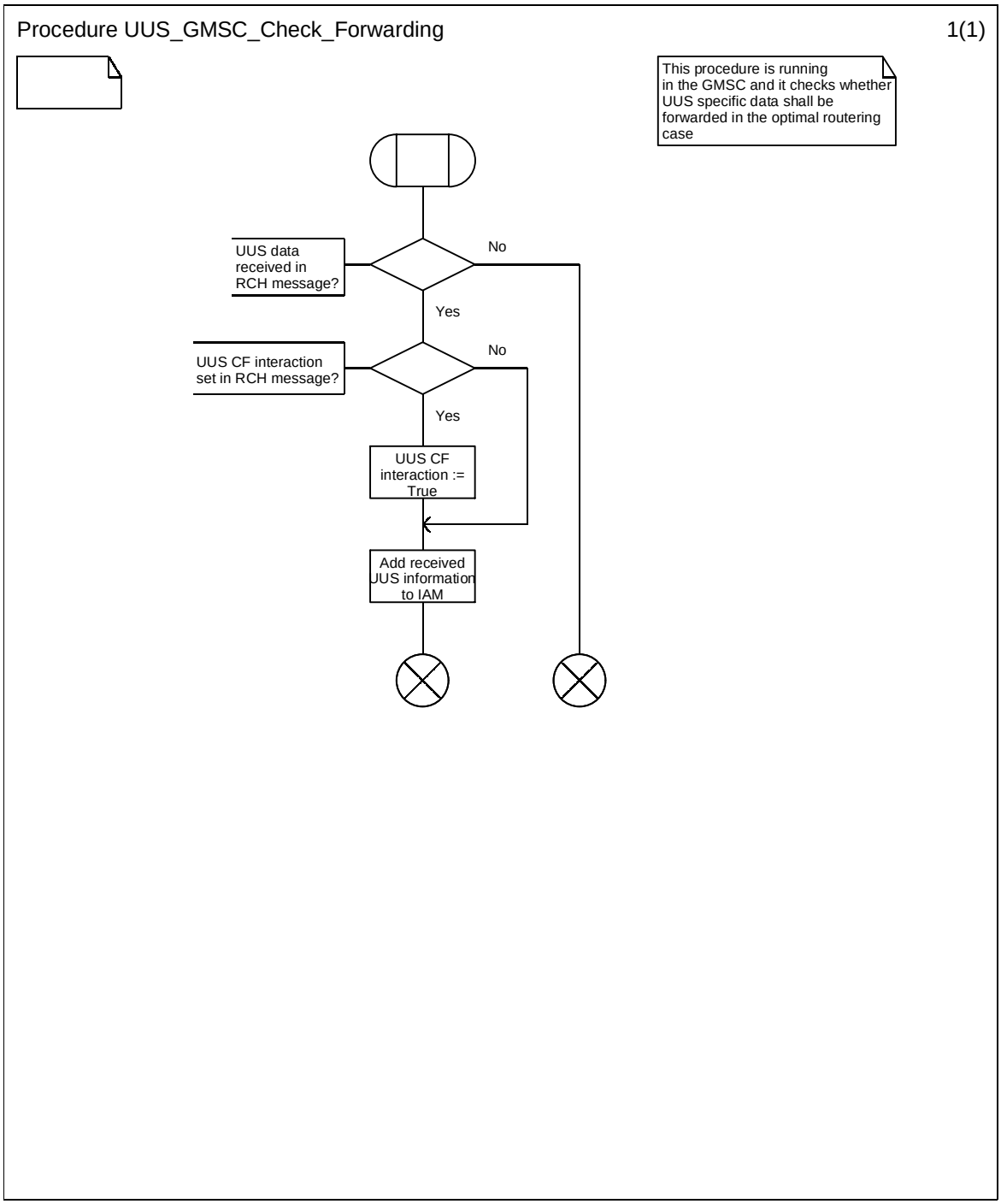


Figure 9.2.1.1: Procedure UUS_GMSC_Check_Forwarding

9.2.2 Procedures in MSC

Figure 9.2.2.1 Procedure UUS_ICH_Check_Support.

This procedure is called after Alerting/Connect message is received from B-subscriber. It checks whether UUS service is possible and if not whether the call setup can be continued.

Figure 9.2.2.2 Procedure UUS_ICH_Check_Forwarding.

This procedure is called when no reply is received from B-subscriber. It checks whether call forwarding is allowed from UUS service point of view.

Figure 9.2.2.3 Procedure UUS_ICH_Handle_LCF.

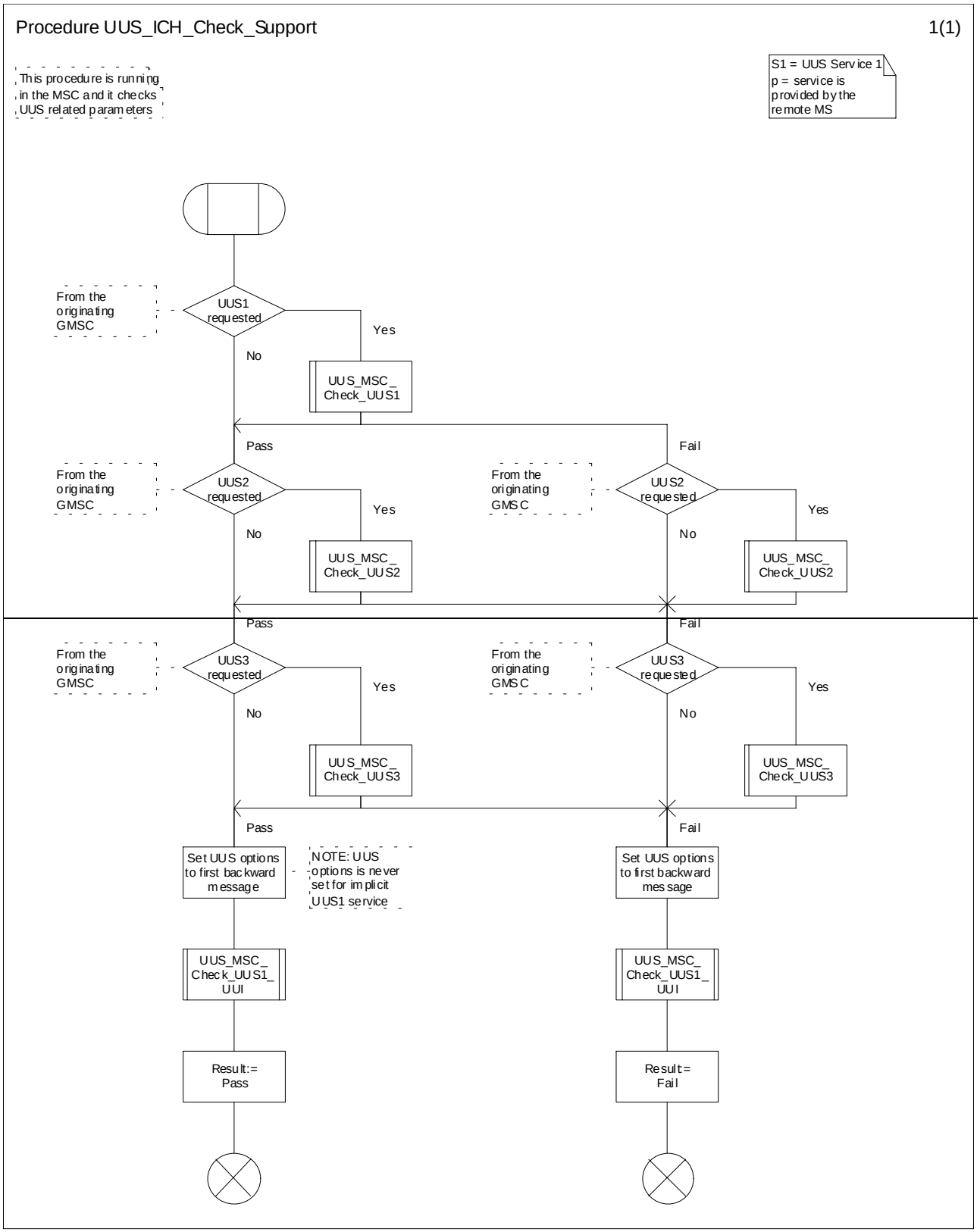
This procedure is used to add UUS information to Resume Call Handling message when Optimal Routeing late call forwarding is supported.

Figure 9.2.2.4 Procedure UUS_ICH_Set_Info_In_IAM.

This procedure is used to add UUS specific information to forwarded call IAM message.

Figure 9.2.2.5 Procedure UUS_ICH_UUS1_Implicit_Active.

This procedure is used to set UUS1 implicit service active at the remote MSC when only UUI for service 1 is received.


Procedure UUS_ICH_Check_Support
1(1)
This procedure is running in the MSC and it checks UUS related parameters
S1 = UUS Service 1
p = service is provided by the remote MS
From the originating GMSC
UUS1 requested
Yes
No
UUS_MSC_ Check_UUS1
Pass
Fail
From the originating GMSC
UUS2 requested
Yes
No
UUS_MSC_ Check_UUS2
From the originating GMSC
UUS2 requested
Yes
No
UUS_MSC_ Check_UUS2
Pass
Fail
From the originating GMSC
UUS3 requested
Yes
No
UUS_MSC_ Check_UUS3
From the originating GMSC
UUS3 requested
Yes
No
UUS_MSC_ Check_UUS3
Pass
Fail
Set UUS options to first backward message
NOTE: UUS options is never set for implicit UUS1 service
UUS_MSC_ Check_UUS1_ UUI
Result:= Pass
Set UUS options to first backward message
UUS_MSC_ Check_UUS1_ UUI
Result= Fail

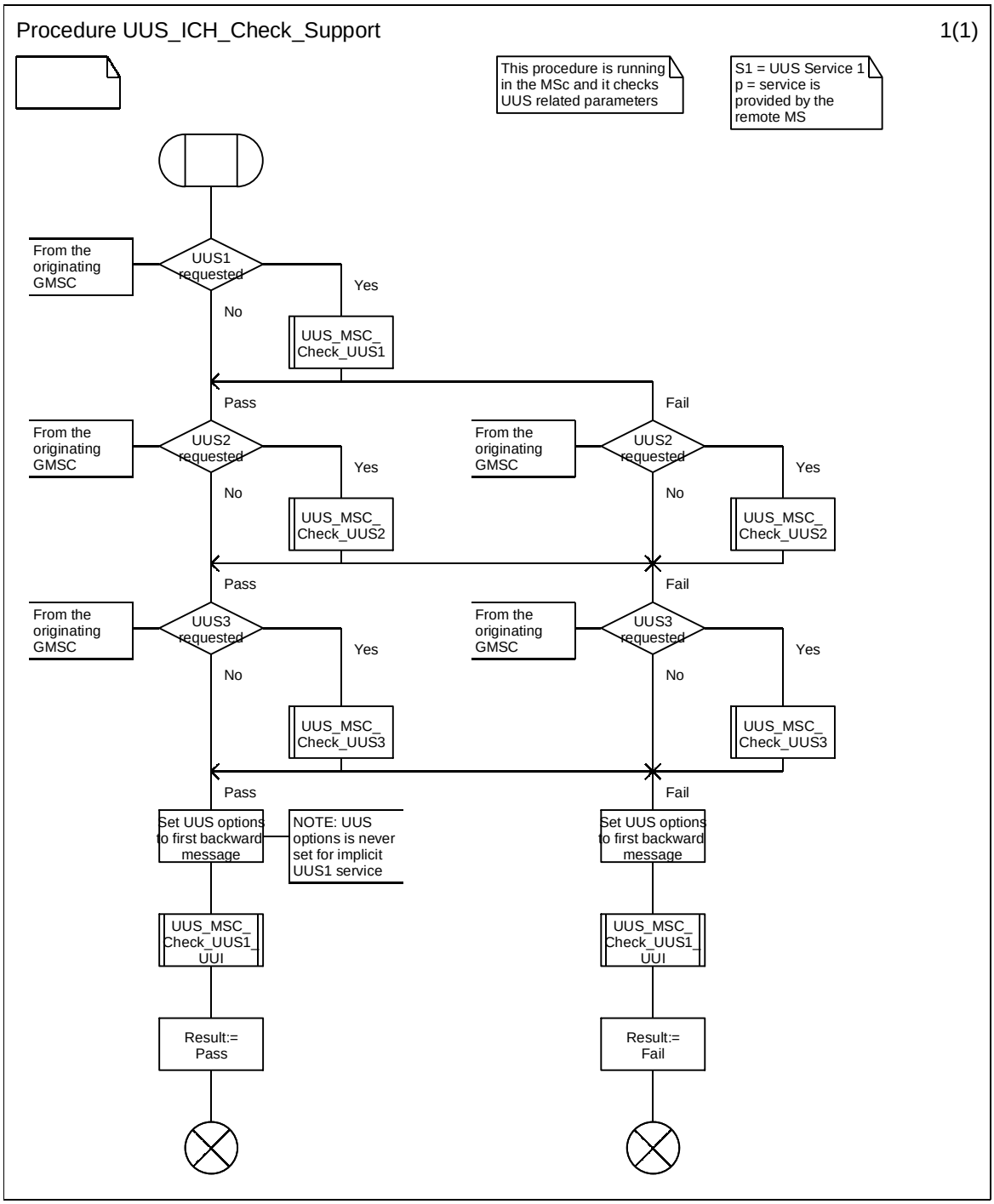
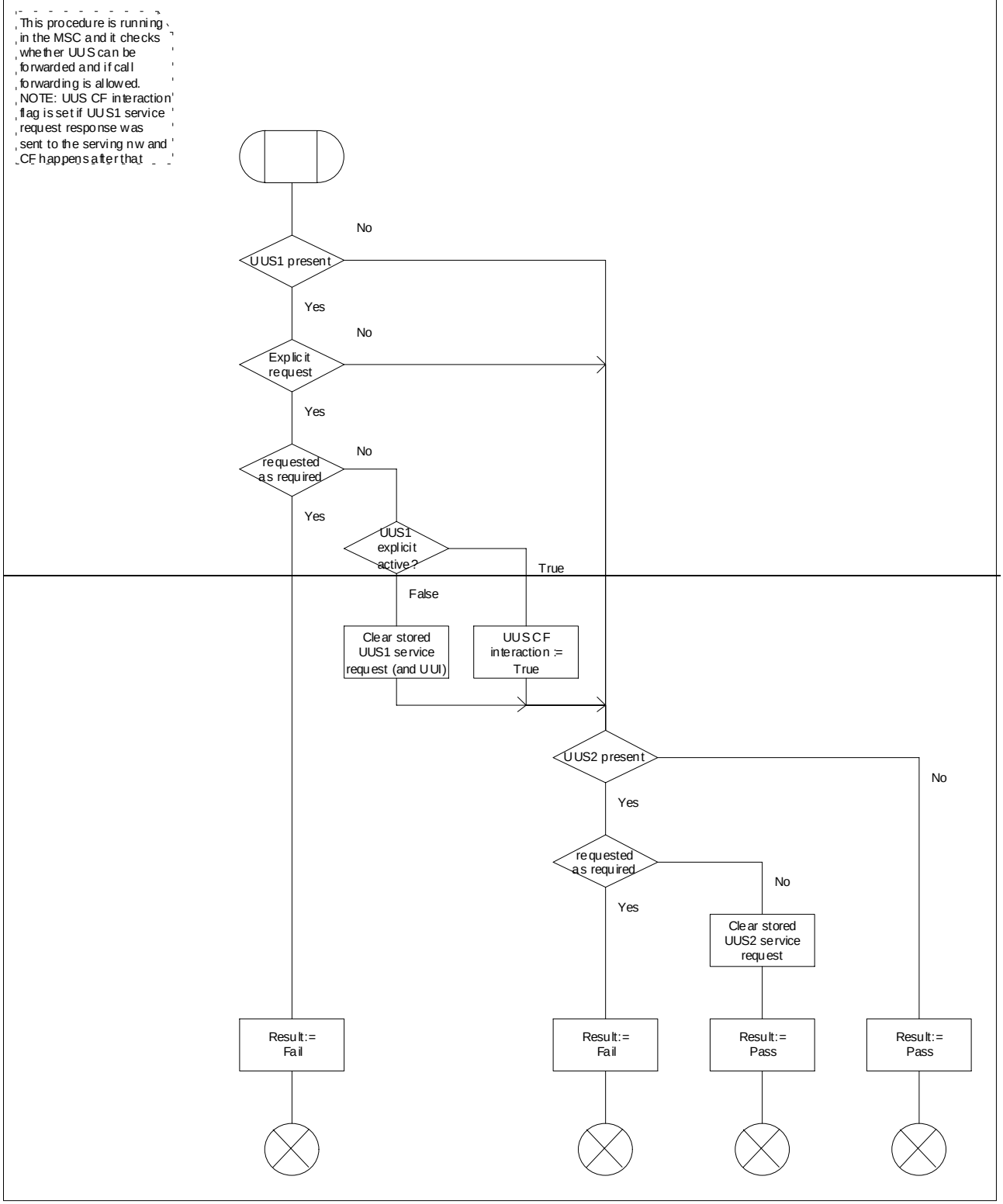


Figure 9.2.2.1: Procedure UUS_ICH_Check_Support

Procedure UUS_ICH_Check_Forwarding 1(1)



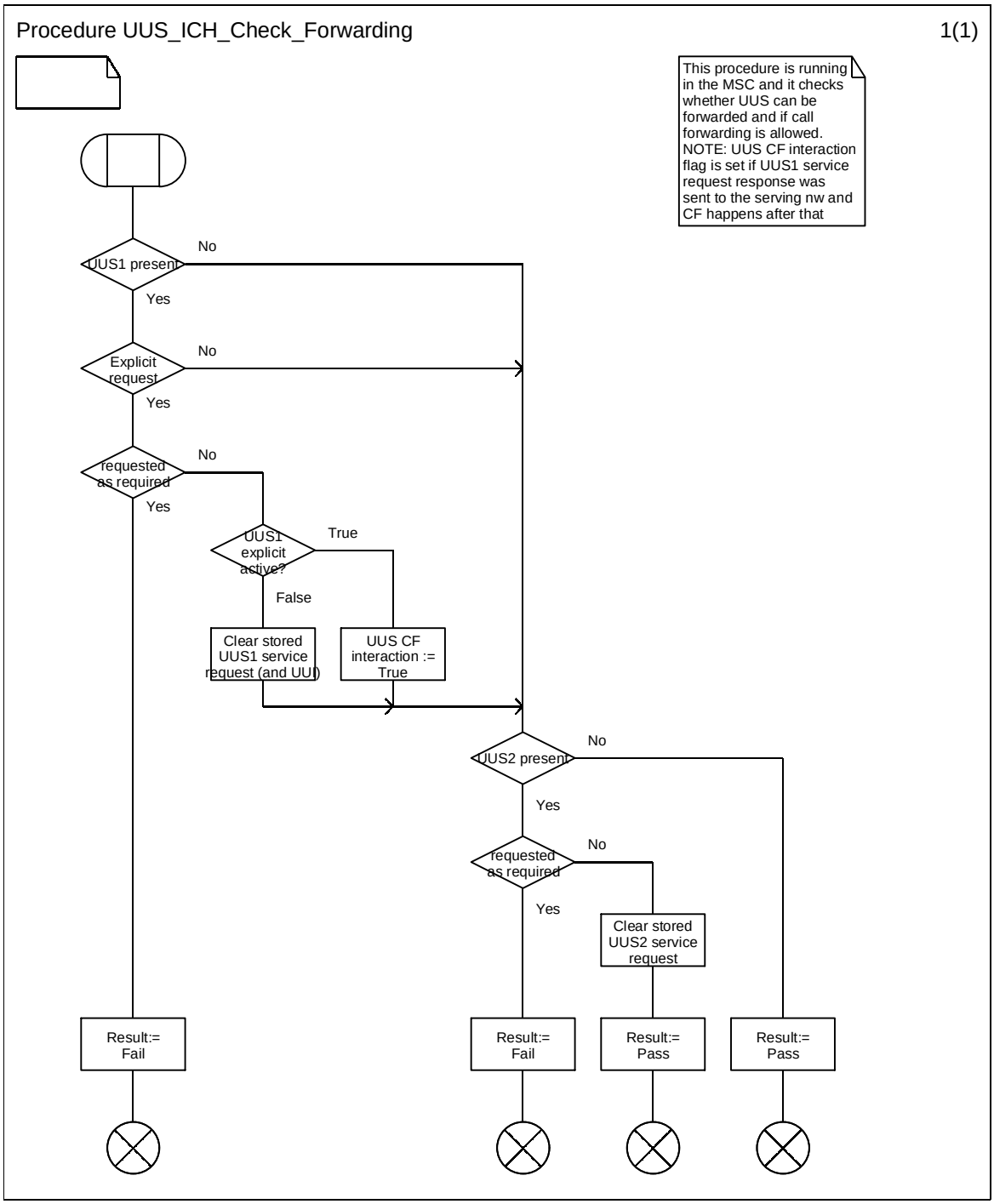
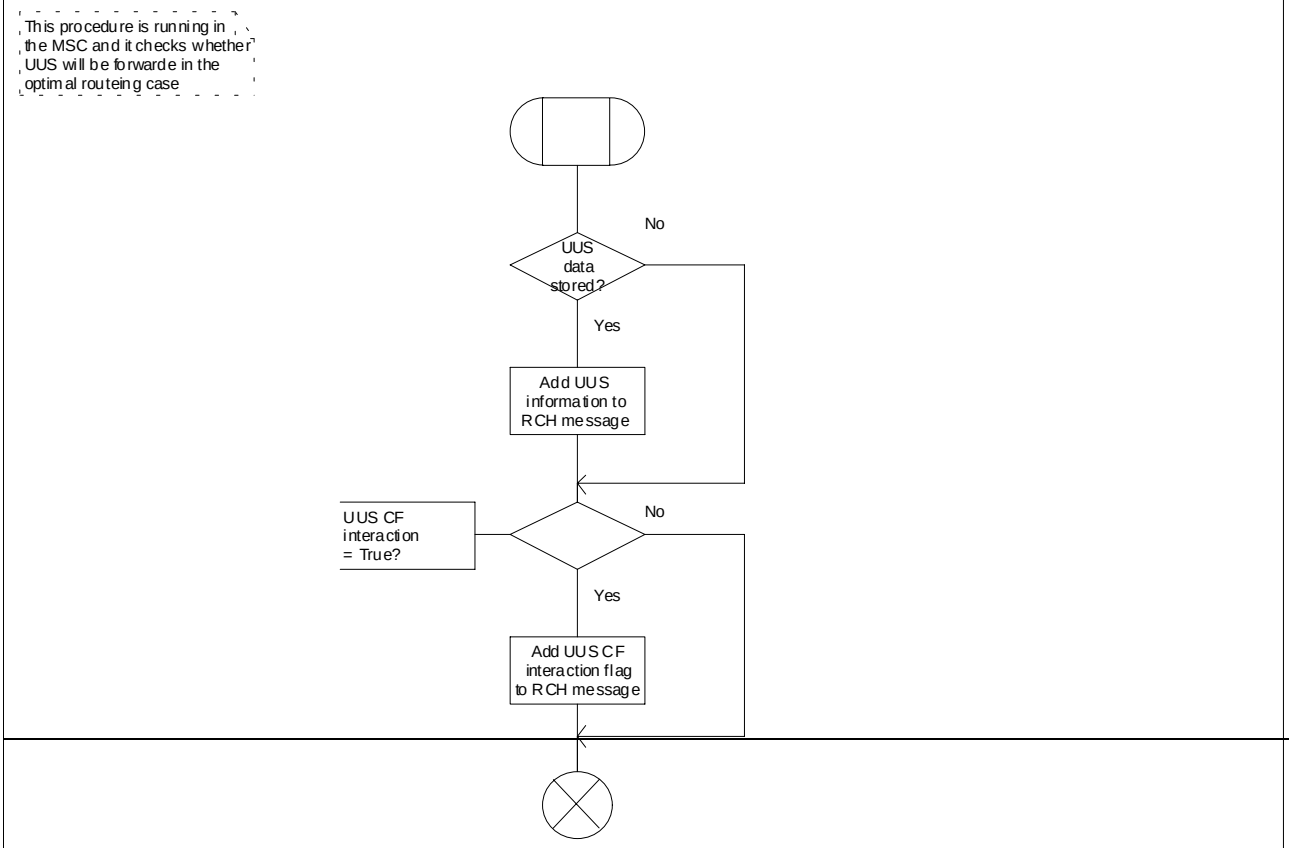


Figure 9.2.2.2: Procedure UUS_ICH_Check_Forwarding

Procedure UUS_ICH_Handle_LCF 1(1)



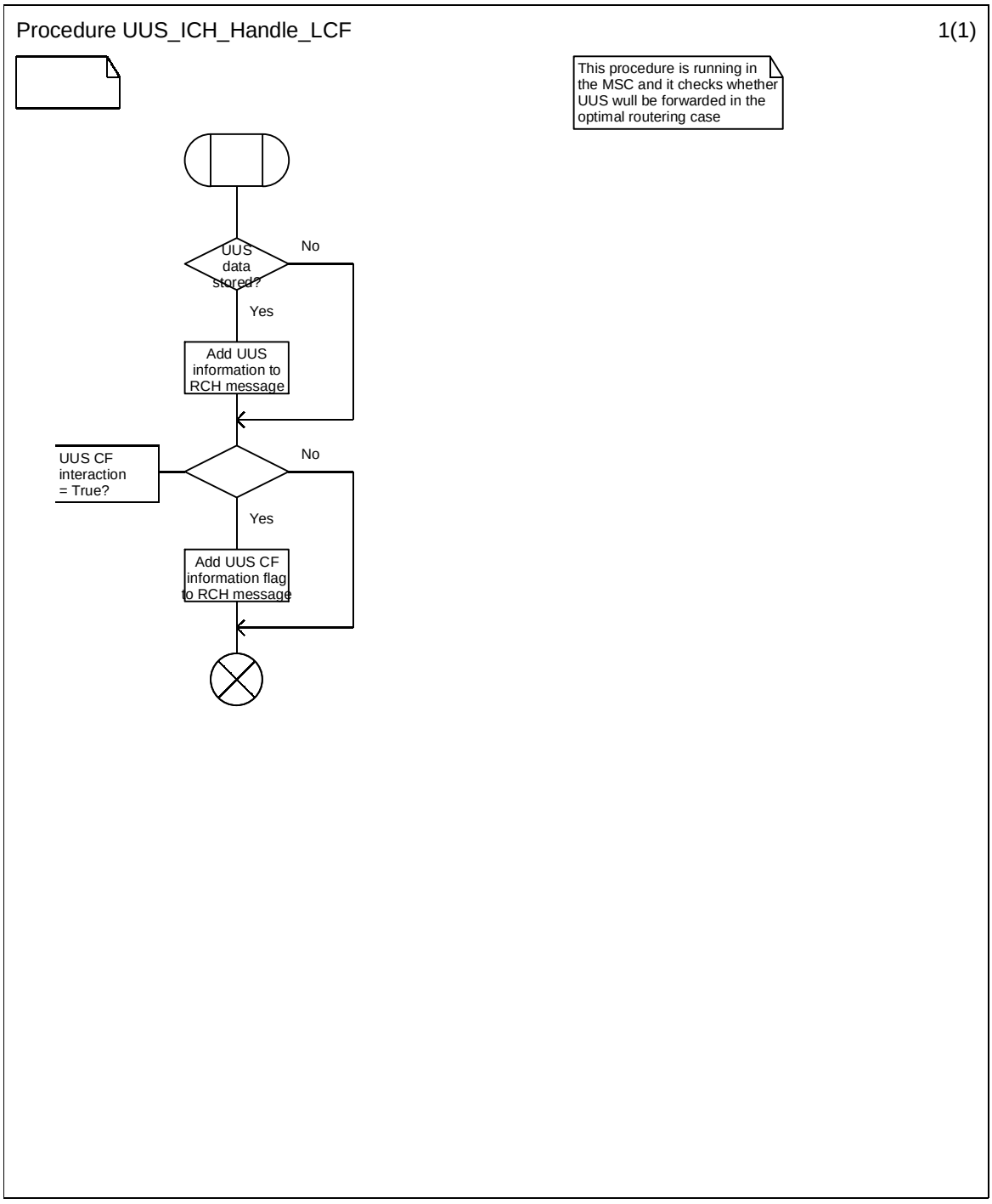
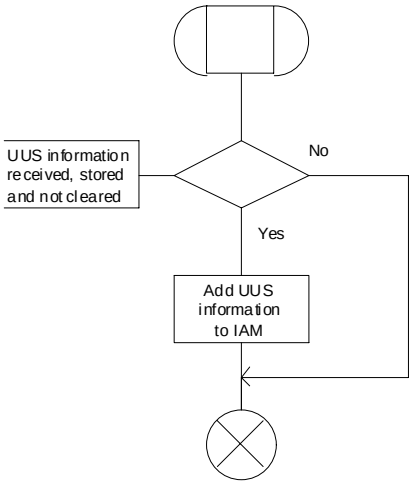


Figure 9.2.2.3: Procedure UUS_ICH_Handle_LCF

Procedure UUS_ICH_Set_Info_In_IAM 1(1)

This procedure is running in the MSC and it checks whether UUS will be added to the IAM message in the call forwarding case



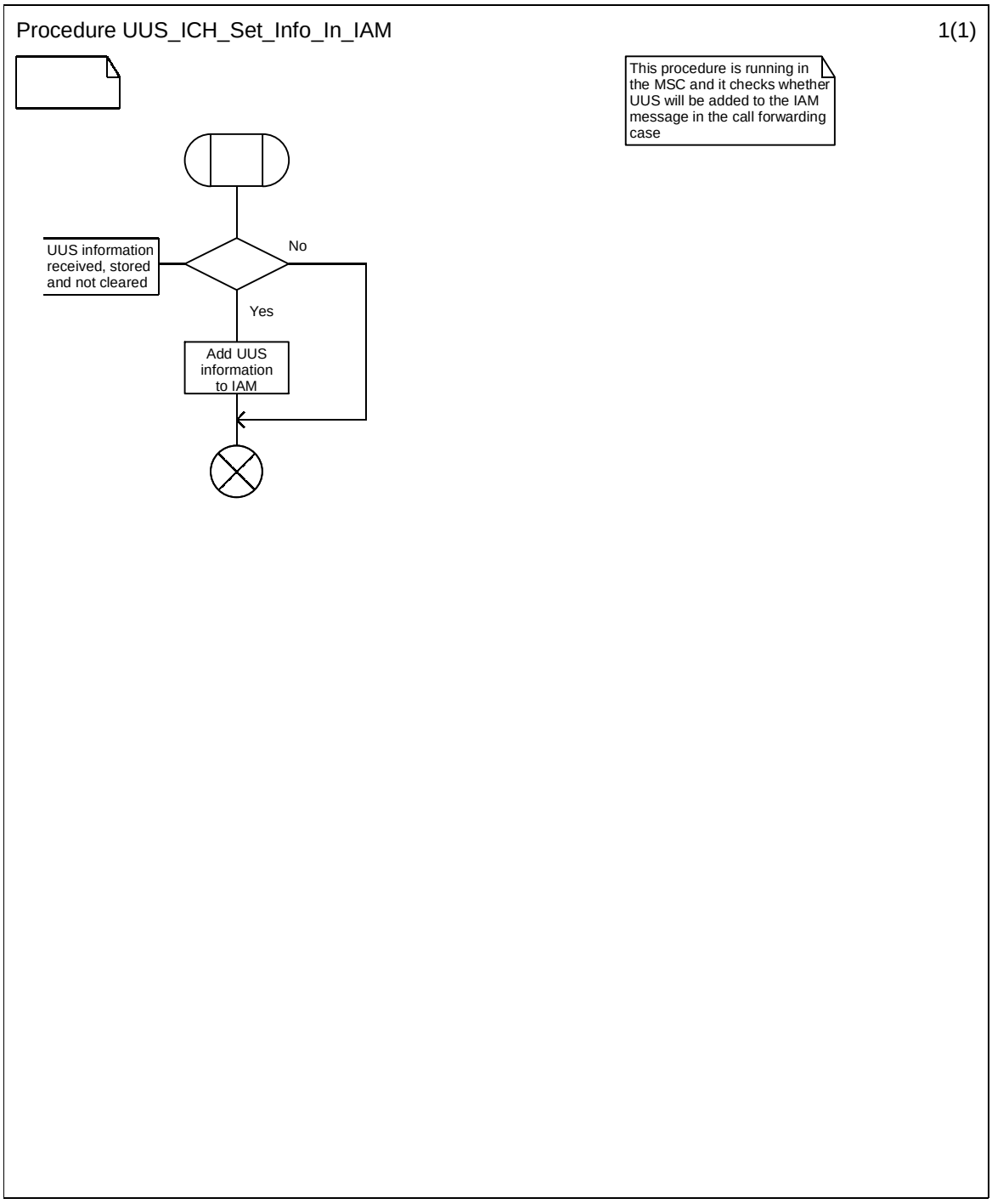
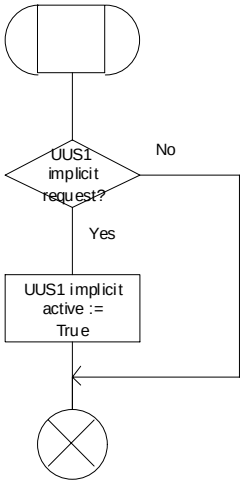


Figure 9.2.2.4: Procedure UUS_ICH_Set_Info_In_IAM

Procedure UUS_ICH_UUS1_Implicit_Active 1(1)

This procedure is running in the MSC and it sets the implicit UUS1 active when UUI is send



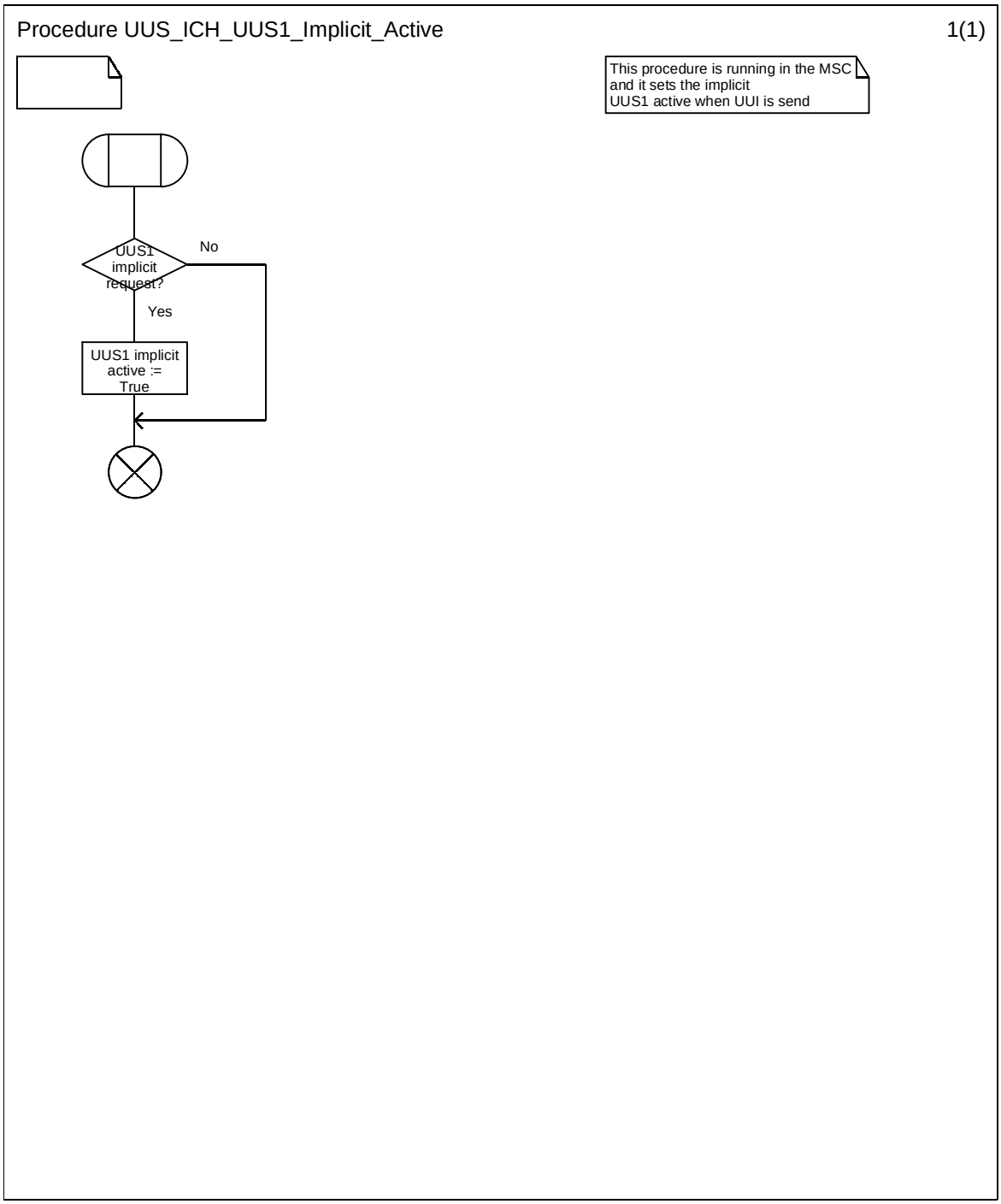


Figure 9.2.2.5: Procedure UUS_ICH_UUS1_Implicit_Active

9.3 Procedures common in serving and remote networks

Figure 9.3.1 Procedure UUS_MSC_Check_UUS1_UUI.

This procedure is used to check whether it is allowed to pass UUI for UUS1 from MS to network or vice versa.

Figure 9.3.2 Procedure UUS_MSC_Check_UUS2_UUI_to_MS.

This procedure is used to check whether it is allowed to pass User-To-User messages for UUS2 from network to MS.

Figure 9.3.3 Procedure UUS_MSC_Check_UUS2_UUI_to_NW.

This procedure is used to check whether it is allowed to pass User-To-User messages for UUS2 from MS to network.

Figure 9.3.4 Procedure UUS_MSC_Check_UUS3_UUI_to_MS.

This procedure is used to check whether it is allowed to pass User-To-User messages for UUS3 from network to MS.

Figure 9.3.5 Procedure UUS_MSC_Check_UUS3_UUI_to_NW.

This procedure is used to check whether it is allowed to pass User-To-User messages for UUS3 from MS to network.

Figure 9.3.6 Procedure UUS_MSC_Clear_UUS.

This procedure is used to handle the call forwarding interaction with UUS when call control messages are received from the forwarded-to NW.

Figure 9.3.7 Macrodefinition UUS_MSC_Check_UUS1.

Macro used in procedures UUS_OCH_Set_Alert_And_Connect_Param and UUS_ICH_Check_Support. It checks whether UUS service 1 is supported.

Figure 9.3.8 Macrodefinition UUS_MSC_Check_UUS2.

Macro used in procedures UUS_OCH_Set_Alert_And_Connect_Param and UUS_ICH_Check_Support. It checks whether UUS service 2 is supported.

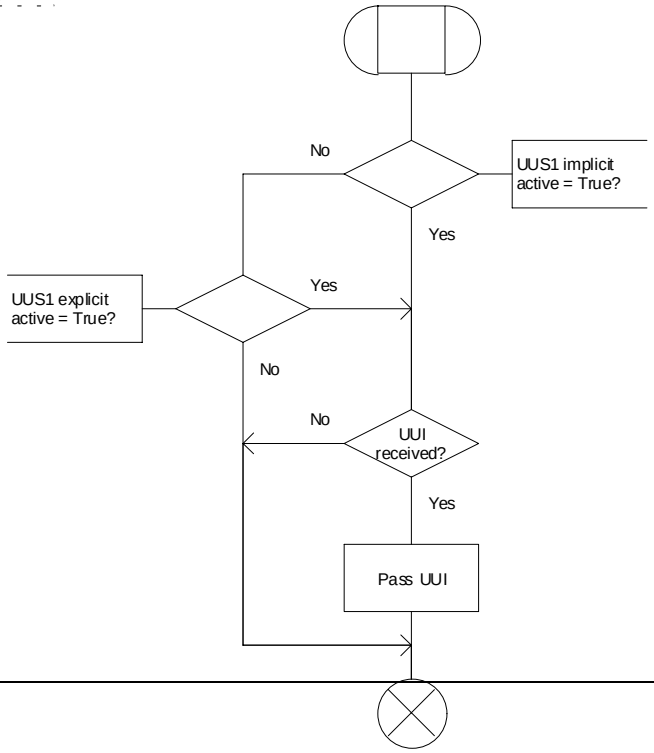
Figure 9.3.9 Macrodefinition UUS_MSC_Check_UUS3.

Macro used in procedures UUS_OCH_Set_Alert_And_Connect_Param and UUS_ICH_Check_Support. It checks whether UUS service 3 is supported.

Procedure UUS_MSC_Check_UUS1_UUI 1(1)

This procedure is running in the MSC and it checks whether UUI can be passed over.

Signals to/from the left are to/from the BSS; signals to/from the right are to/from the destination exchange unless otherwise marked.



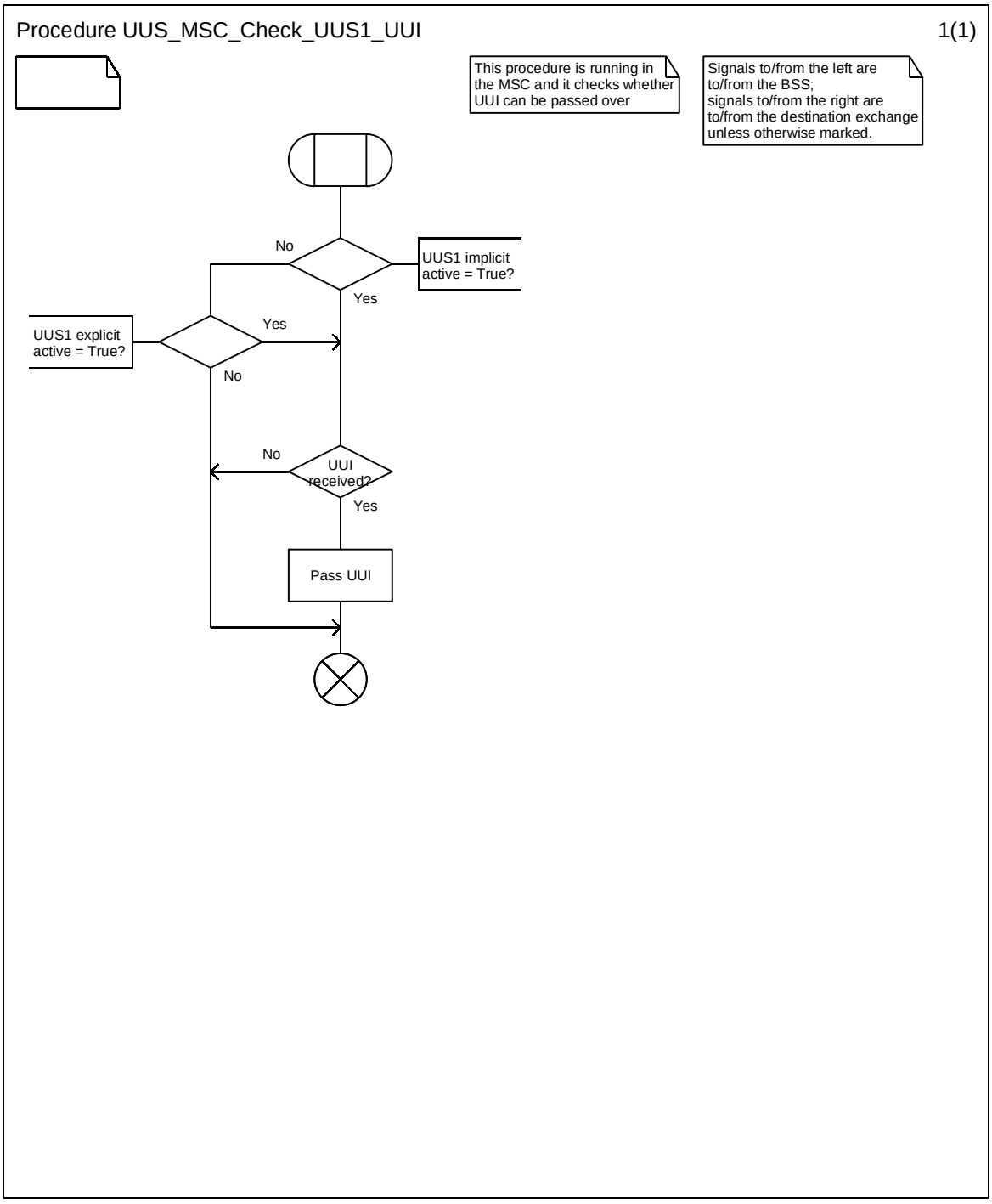
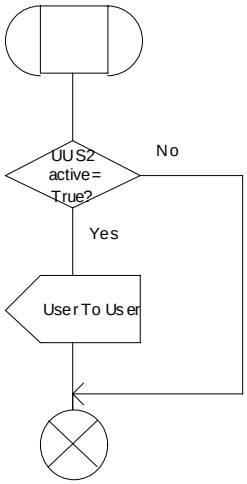


Figure 9.3.1: Procedure UUS_MSC_Check_UUS1_UUI

Procedure UUS_MSC_Check_UUS2_UUI_to_MS 1(1)

This procedure is running in the MSC and it checks whether UUI can be passed over

Signals to/from the left are to/from the BSS; signals to/from the right are to/from the destination exchange unless otherwise marked.



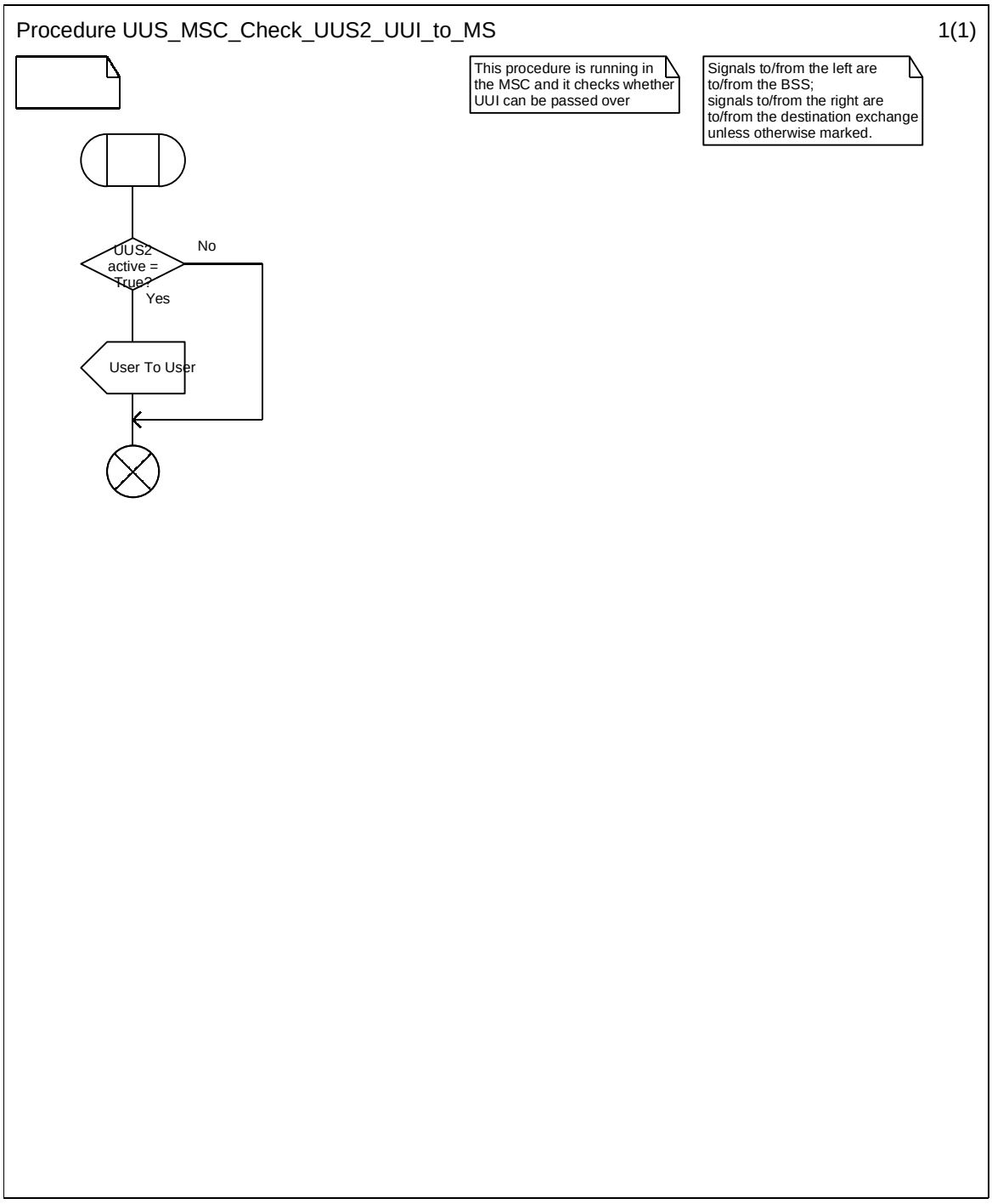
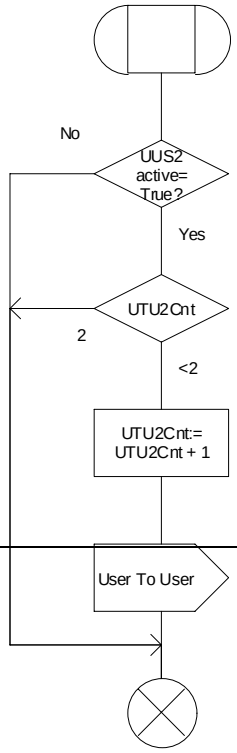


Figure 9.3.2: Procedure UUS_MSC_Check_UUS2_UUI_to_MS

Procedure UUS_MSC_Check_UUS2_UUI_to_NW 1(1)

This procedure is running in the MSC and it checks whether UUI can be passed over. In addition it handles UUS2 flow control

Signals to/from the left are to/from the BSS; signals to/from the right are to/from the destination exchange unless otherwise marked.



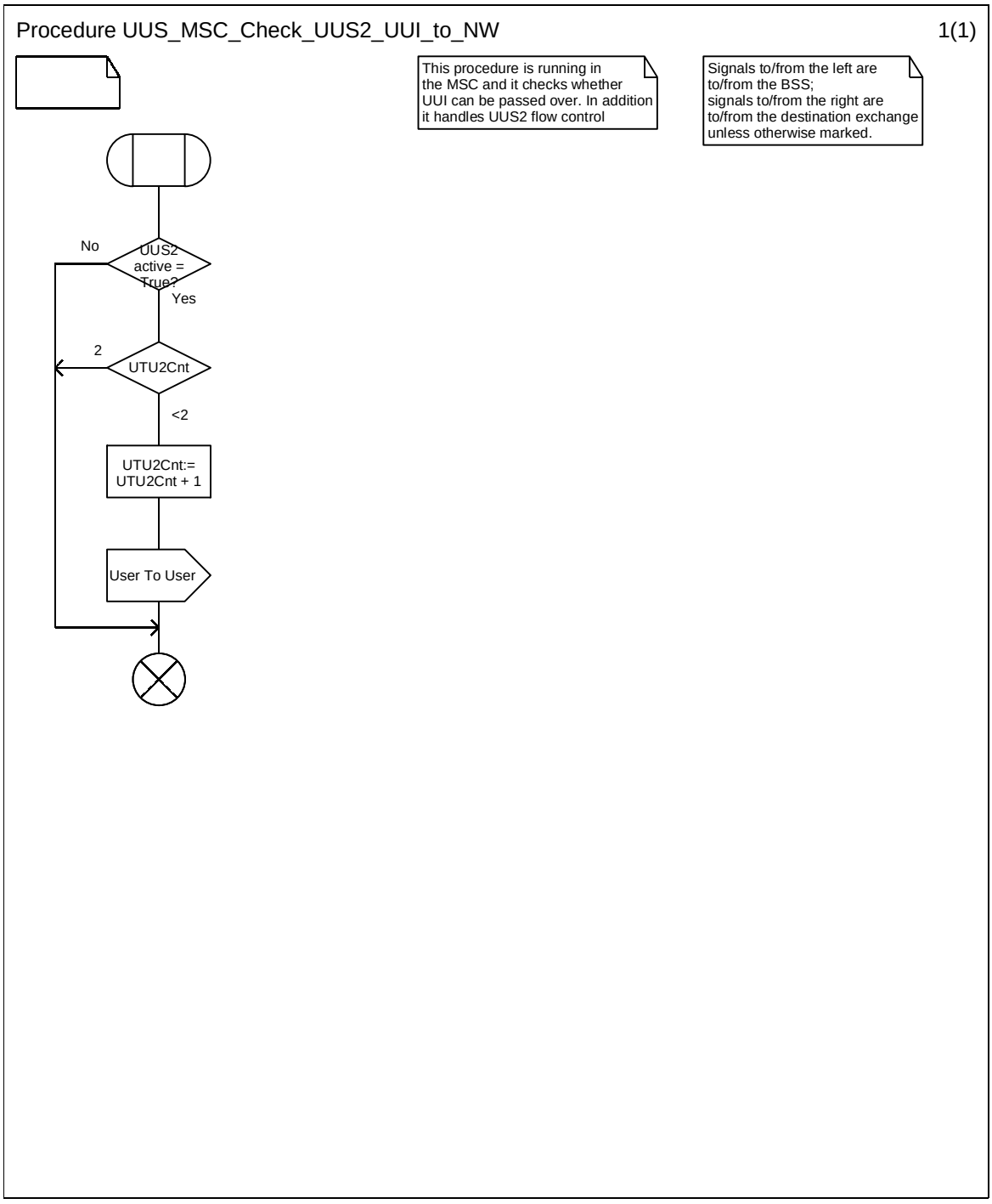
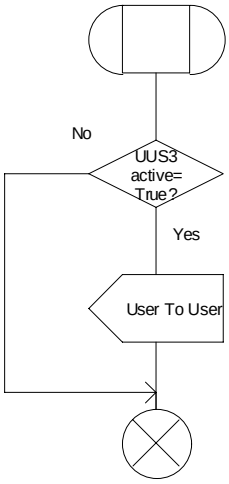


Figure 9.3.3: Procedure UUS_MSC_Check_UUS2_UUI_to_NW

Procedure UUS_MSC_Check_UUS3_UUI_to_MS 1(1)

This procedure is running in the MSC and it checks whether UUI can be passed over.

Signals to/from the left are to/from the BSS; signals to/from the right are to/from the destination exchange unless otherwise marked.



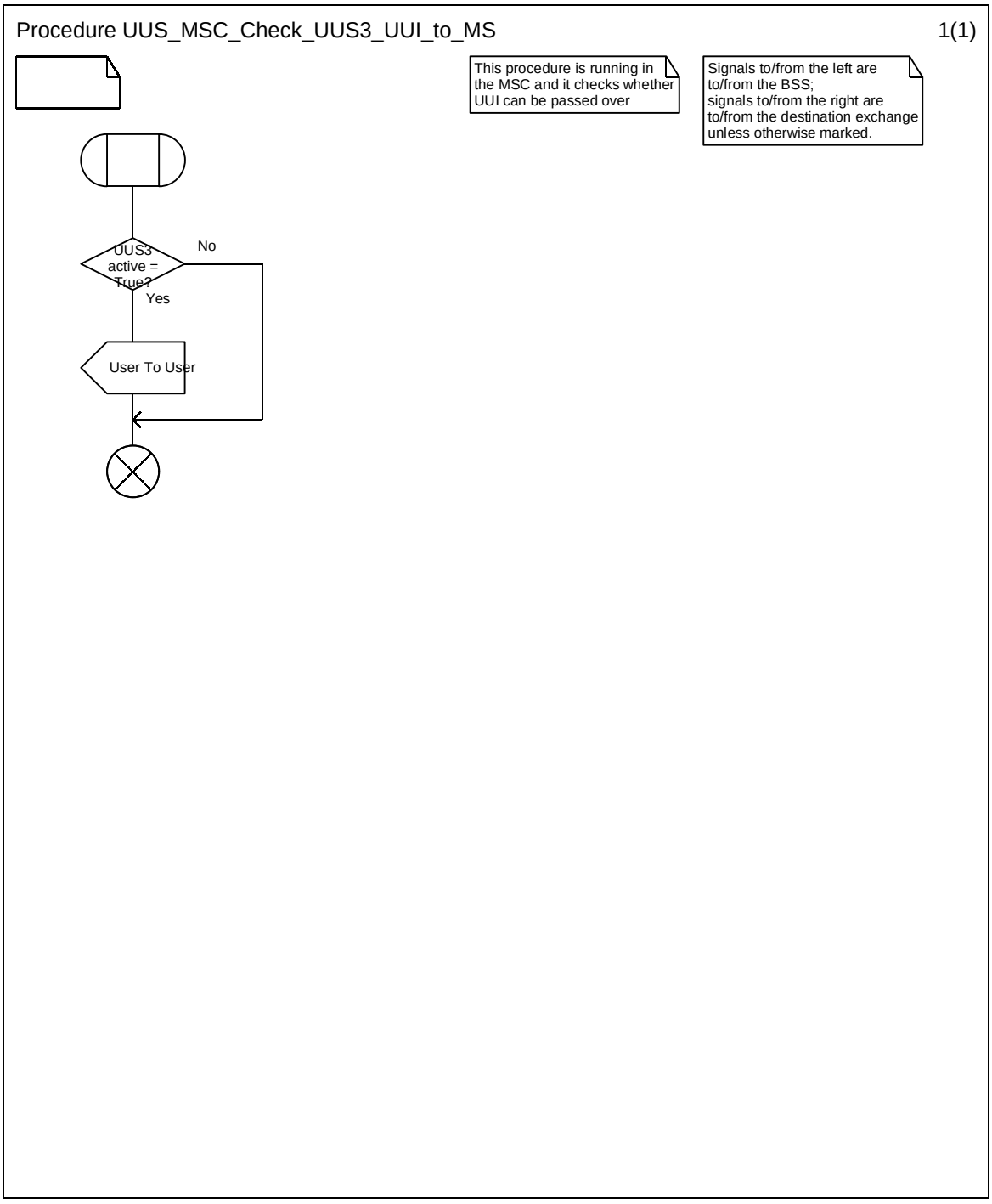
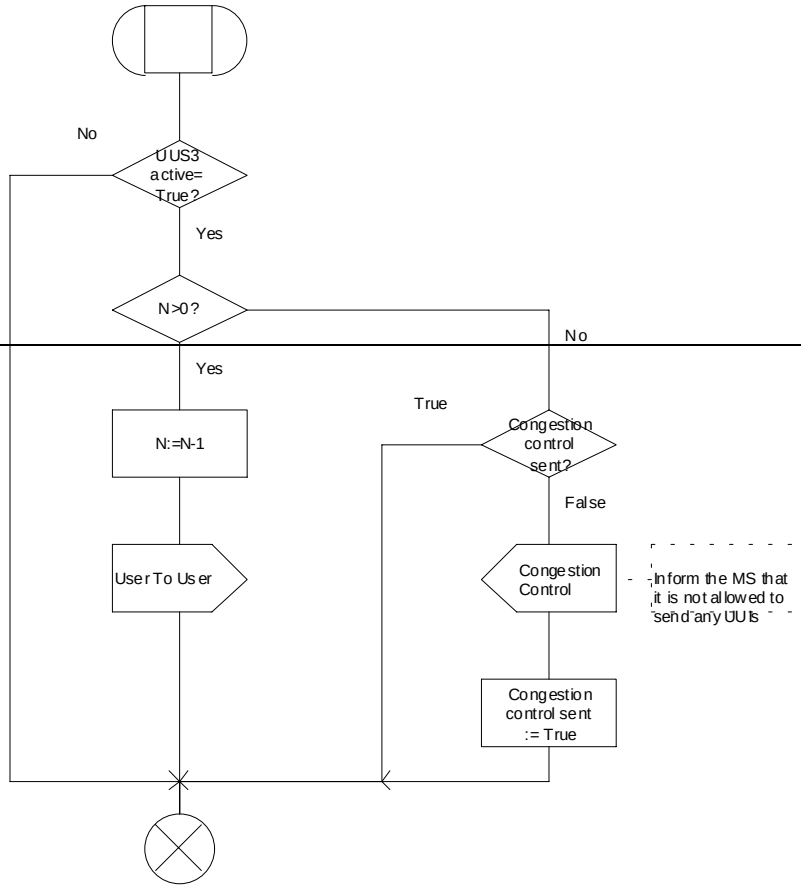


Figure 9.3.4: Procedure UUS_MSC_Check_UUS3_UUI_to_MS

Procedure UUS_MSC_Check_UUS3_UUI_to_NW 1(1)

This procedure is running in the MSC and it checks whether UUI can be passed over. In addition it handles UUS3 flow control

Signals to/from the left are to/from the BSS; signals to/from the right are to/from the destination exchange unless otherwise marked.



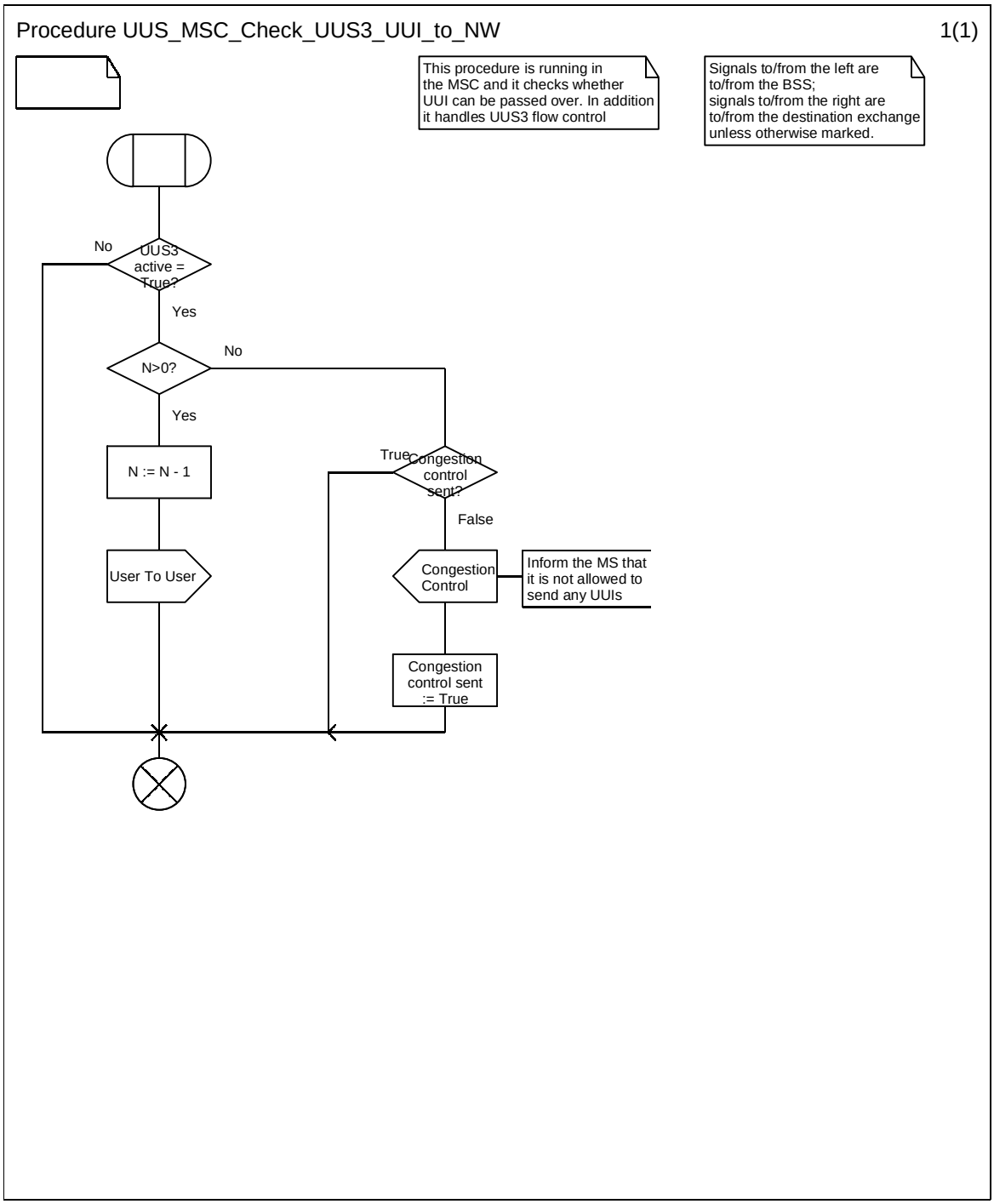
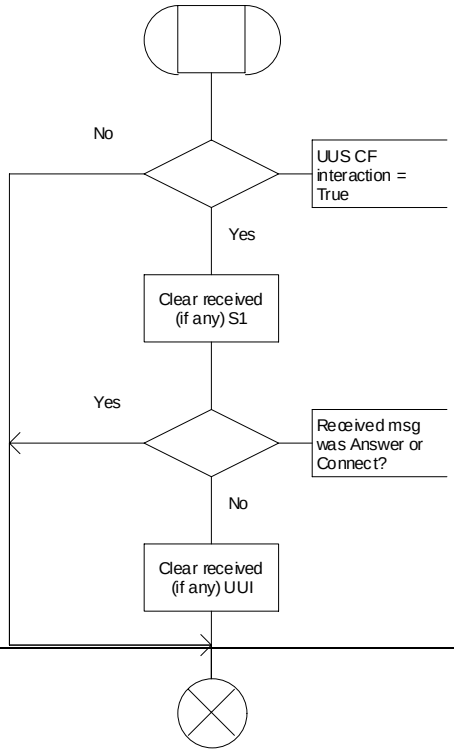


Figure 9.3.5: Procedure UUS_MSC_Check_UUS3_UUI_to_NW

Procedure UUS_MSC_Clear_UUS 1(1)

This procedure is running in the MSC and it handles CFNRy and UUS interaction when the MSC is receiving call control messages from forwarded-to NW.

S1 = UUS1 Service response



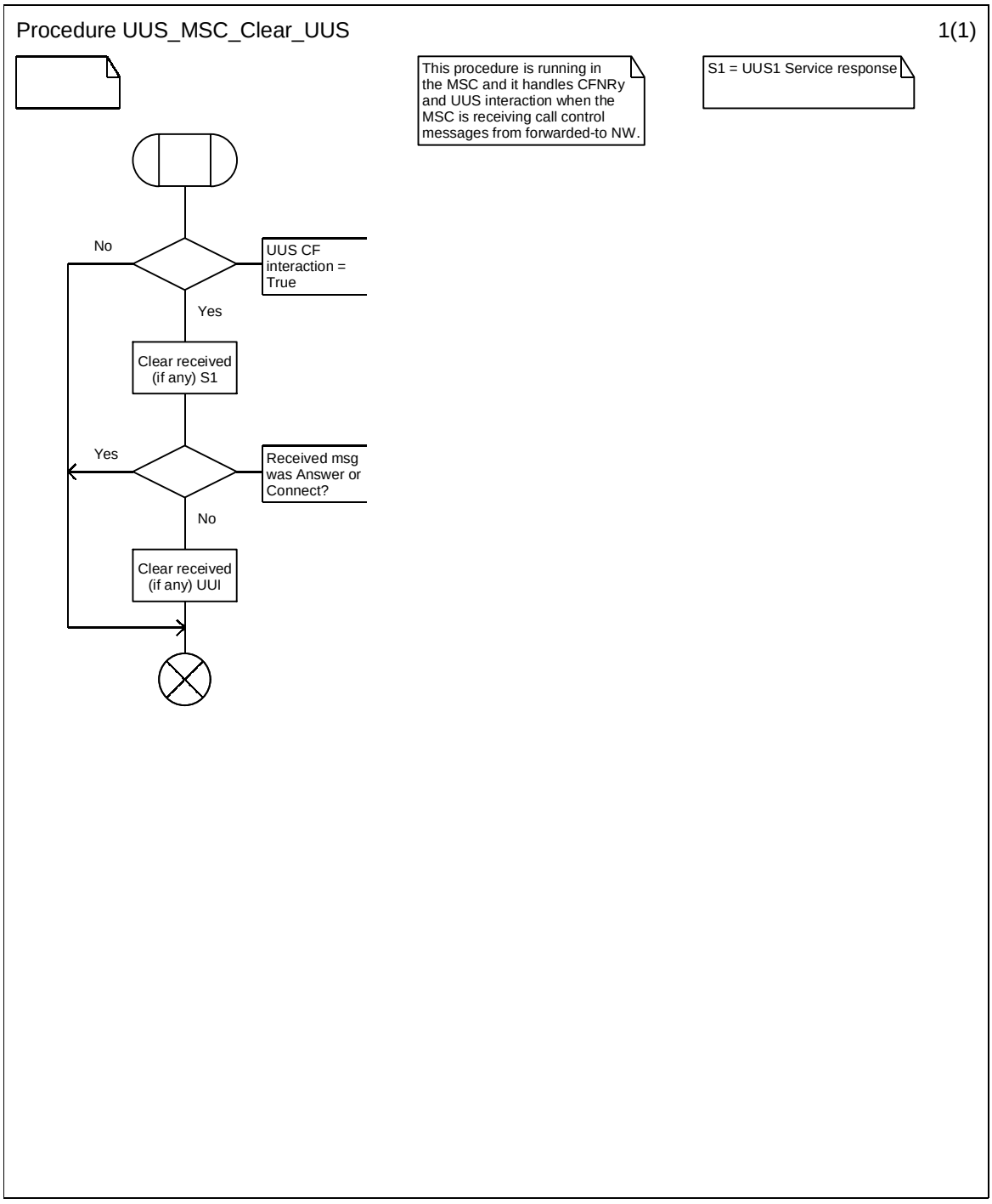
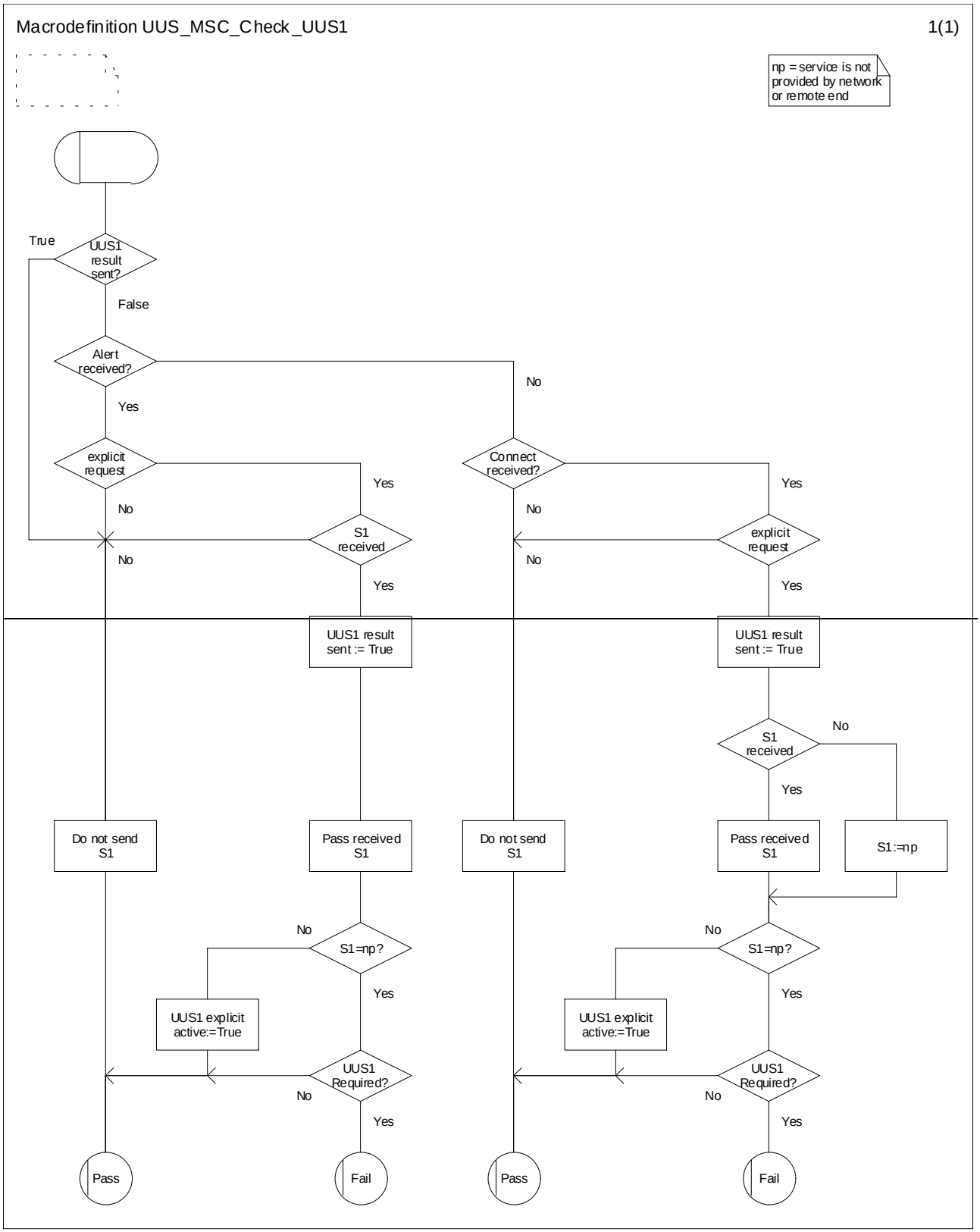


Figure 9.3.6: Procedure UUS_MSC_Clear_UUS


Macrodefinition UUS_MSC_Check_UUS1
1(1)
np = service is not provided by network or remote end
True
UUS1 result sent?
False
Alert received?
No
Yes
explicit request
Yes
No
S1 received
No
Yes
Connect received?
Yes
No
explicit request
No
Yes
UUS1 result sent := True
UUS1 result sent := True
S1 received
No
Yes
Do not send S1
Pass received S1
Do not send S1
Pass received S1
S1:=np
No
S1=np?
Yes
UUS1 explicit active:=True
UUS1 Required?
No
Yes
No
S1=np?
Yes
UUS1 explicit active:=True
UUS1 Required?
No
Yes
Pass
Fail
Pass
Fail

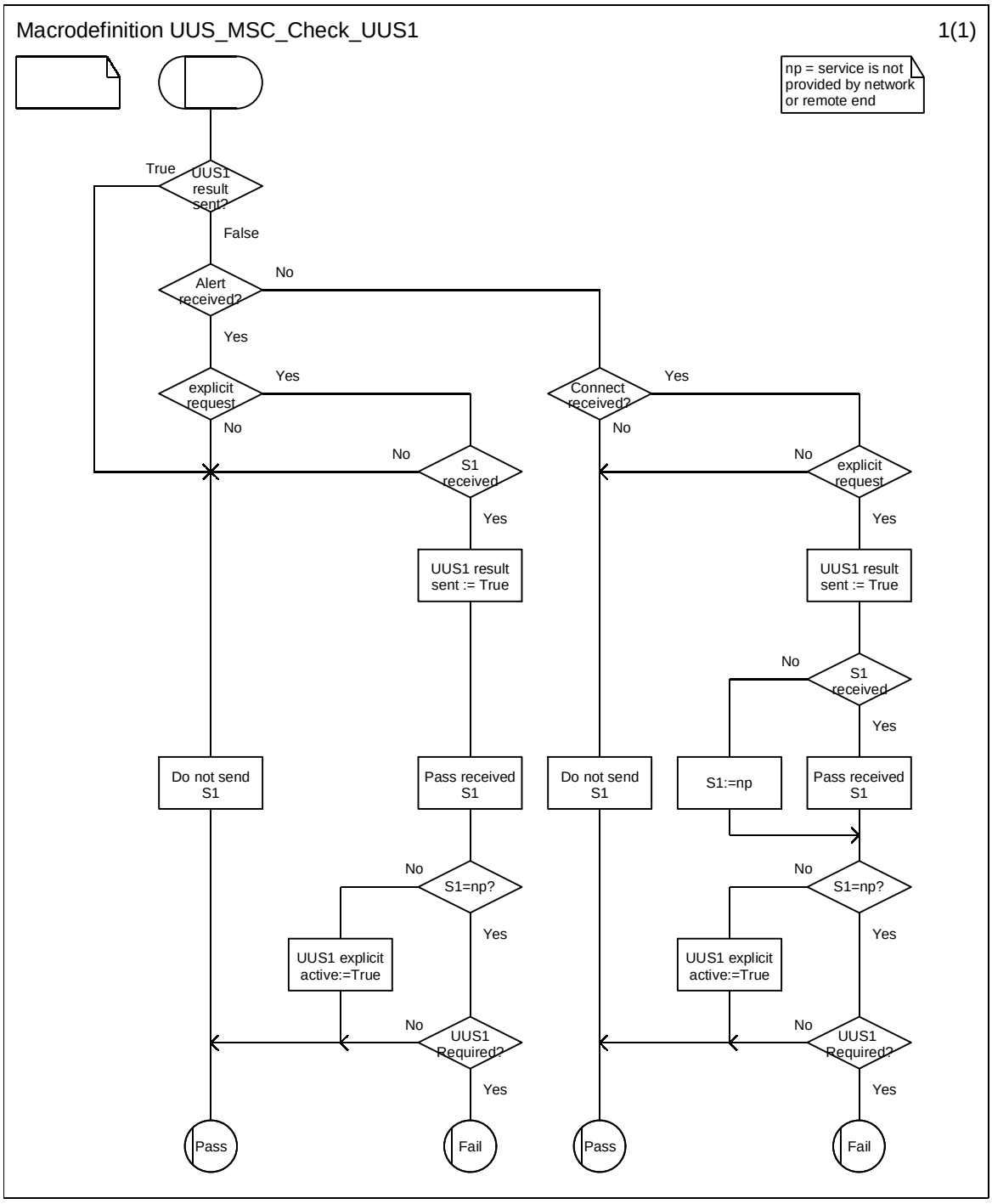
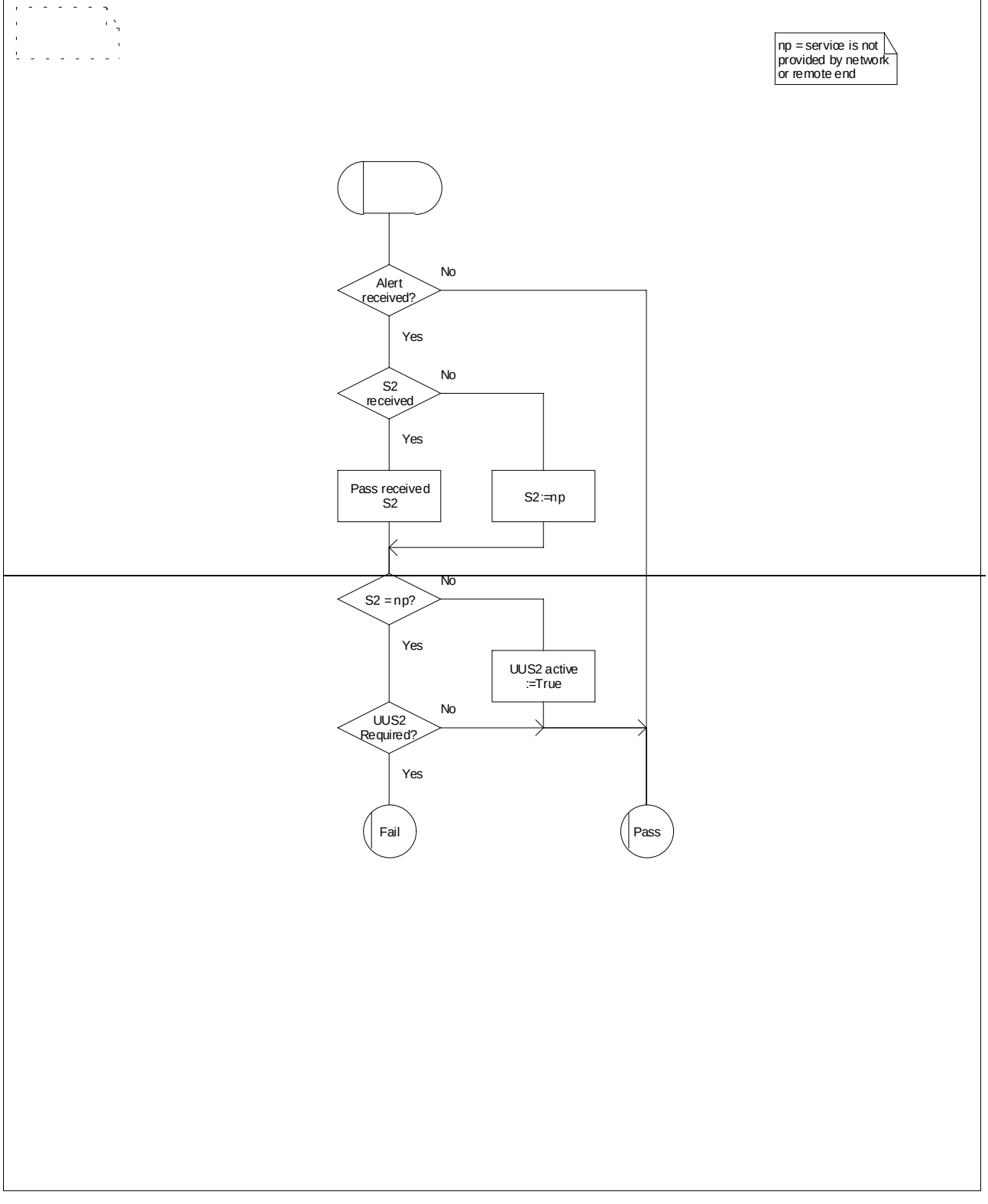


Figure 9.3.7: Macrodefinition UUS_MSC_Check_UUS1

Macrodefinition UUS_MSC_Check_UUS2 1(1)



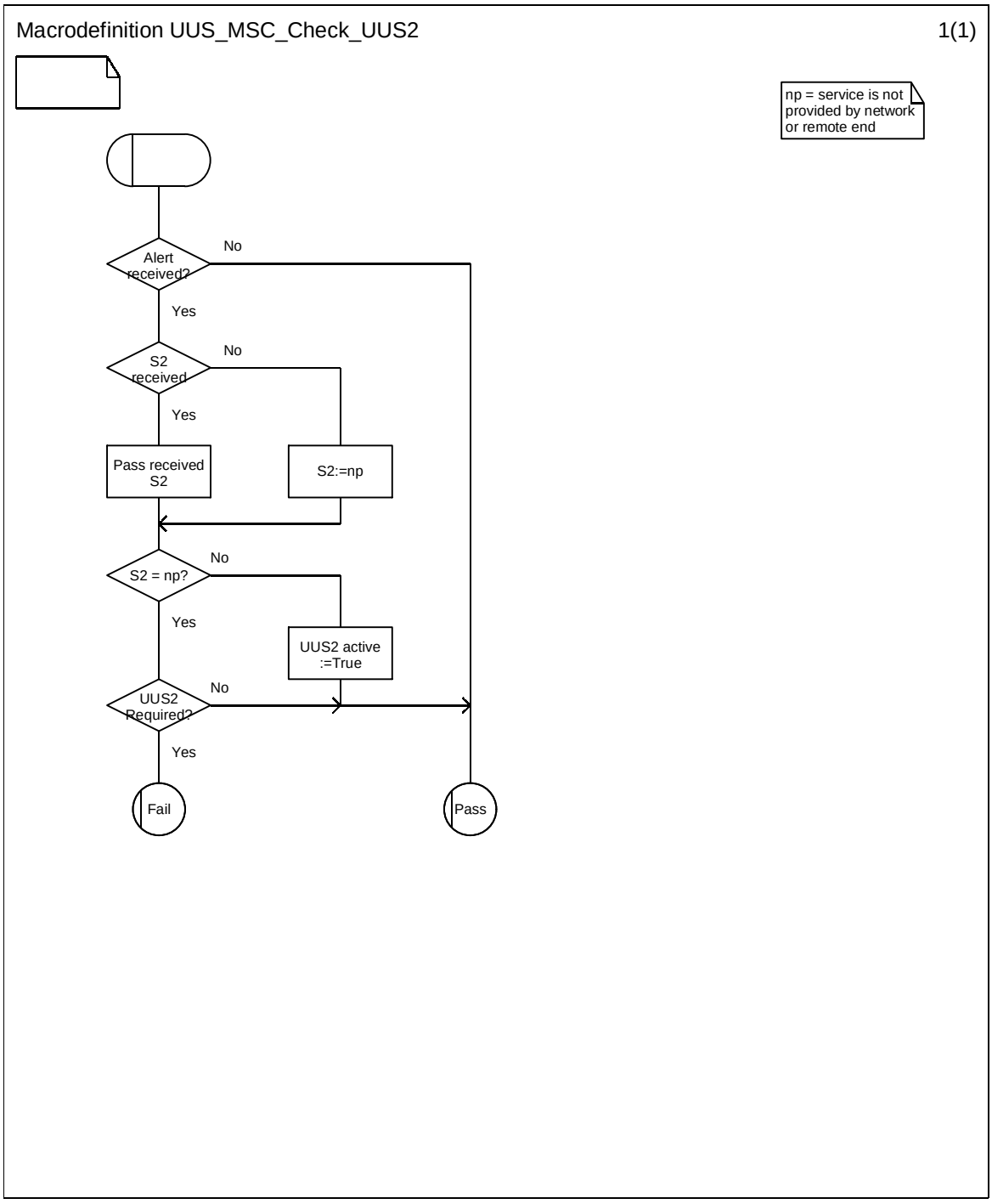
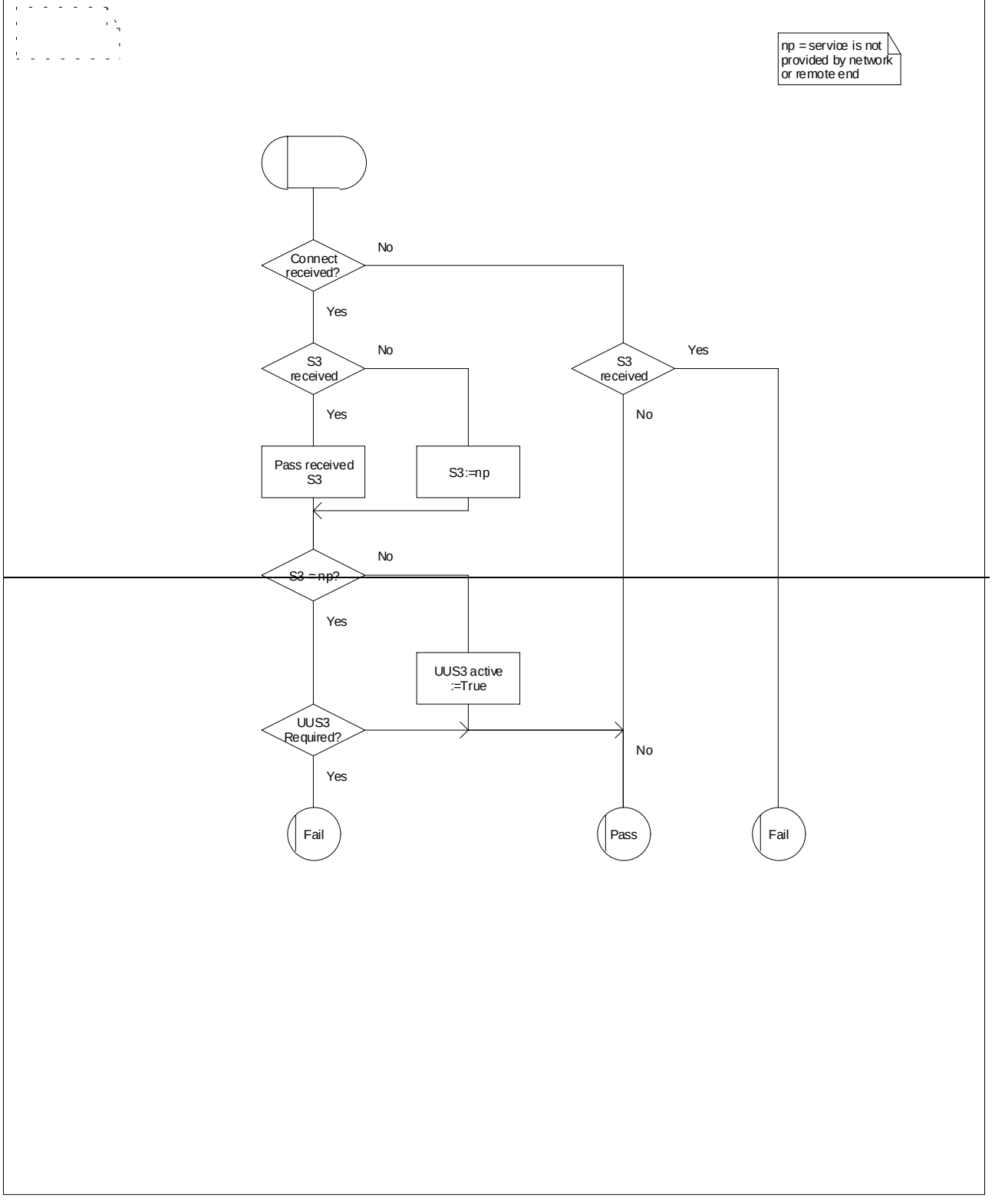


Figure 9.3.8: Macrodefinition UUS_MSC_Check_UUS2

Macrodefinition UUS_MSC_Check_UUS3 1(1)



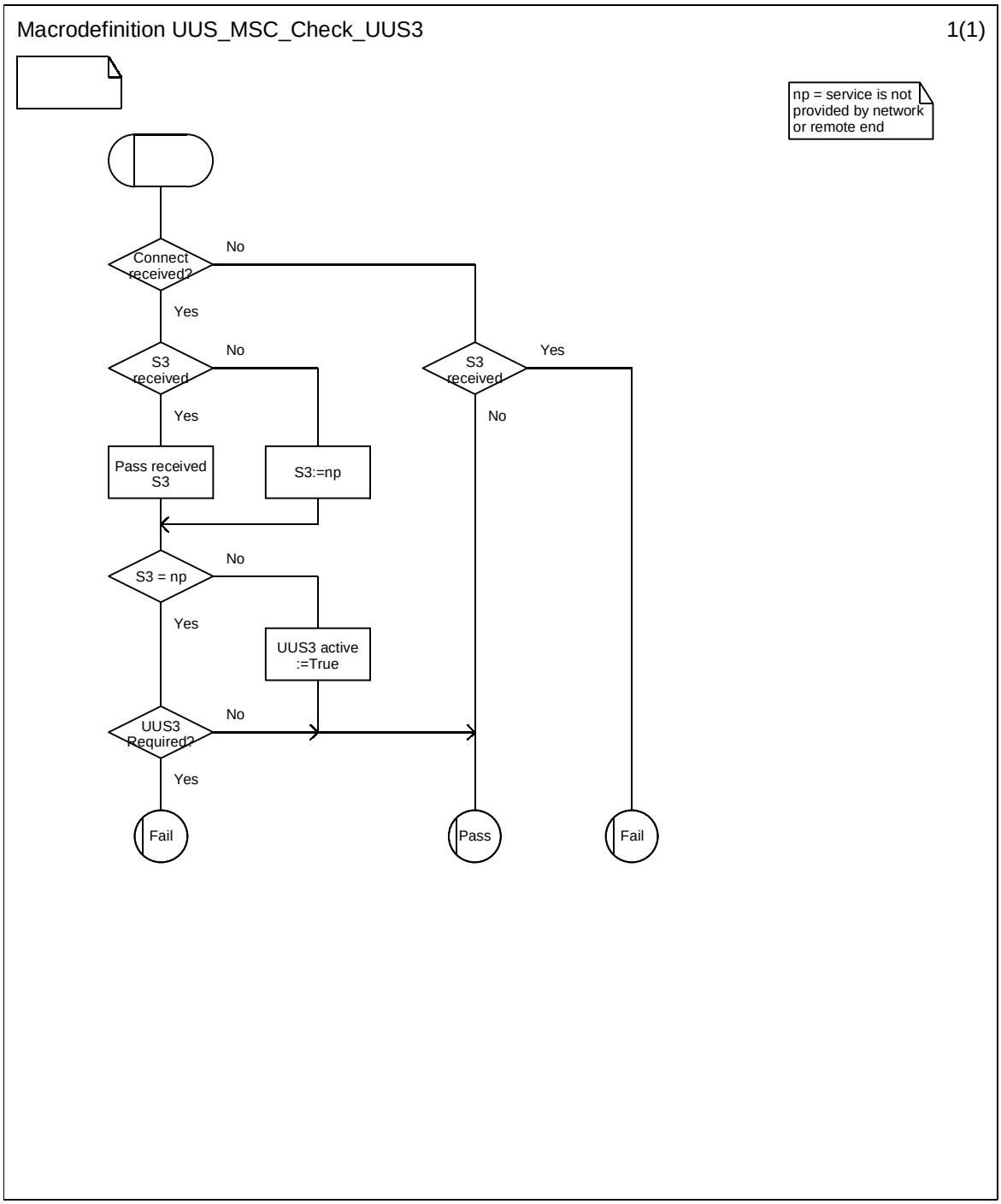


Figure 9.3.9: Macrodefinition UUS_MSC_Check_UUS3

9.4 Processes used during Active Call

There are different processes running for UUS3 during active call in serving and remote network. However, this differentiation does not implicitly mean that call originator’s network is serving network. The differentiation is based on which party initiates the UUS3 service. Thus, serving network process shall be used on initiator's side and remote network process on the opposite end.

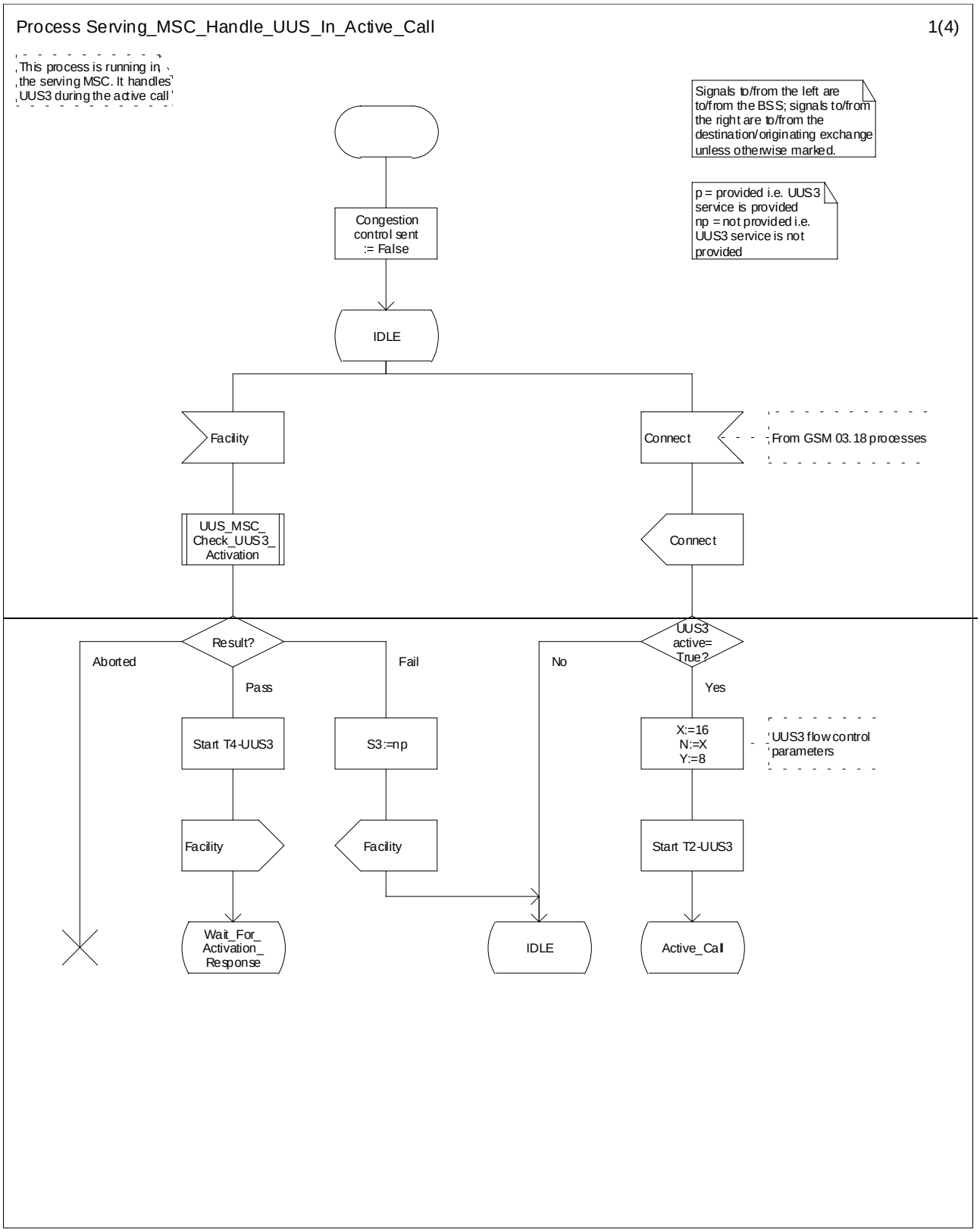
9.4.1 Process and procedures in serving MSC

Figure 9.4.1.1 Process Serving_MSC_Handle_UUS_In_Active_Call

This process is used to check UUS3 activation during active call, handle UUS3 flow control and interaction with ECT supplementary service. The process starts during the call setup and checks the content of the Connect message in order to start the UUS3 flow control correctly. If the UUS3 is not activated the process stays in the Idle state and waits UUS3 activation request from the MS.

Figure 9.4.1.2 Procedure UUS_MSC_Check_UUS3_Activation

This procedure is used to handle the dialogue towards the serving VLR when provisioning check is done.


Process Serving_MSC_Handle_UUS_In_Active_Call
1(4)
This process is running in the serving MSC. It handles UUS3 during the active call
Signals to/from the left are to/from the BSS; signals to/from the right are to/from the destination/originating exchange unless otherwise marked.
p = provided i.e. UUS3 service is provided
np = not provided i.e. UUS3 service is not provided
Congestion control sent := False
IDLE
Facility
Connect
From GSM 03.18 processes
UUS_MSC_ Check_UUS3_ Activation
Connect
Result?
Aborted
Pass
Fail
UUS3 active= True?
No
Yes
Start T4-UUS3
S3:=np
X:=16
N:=X
Y:=8
UUS3 flow control parameters
Facility
Facility
Start T2-UUS3
Wait_For_ Activation_ Response
IDLE
Active_Call

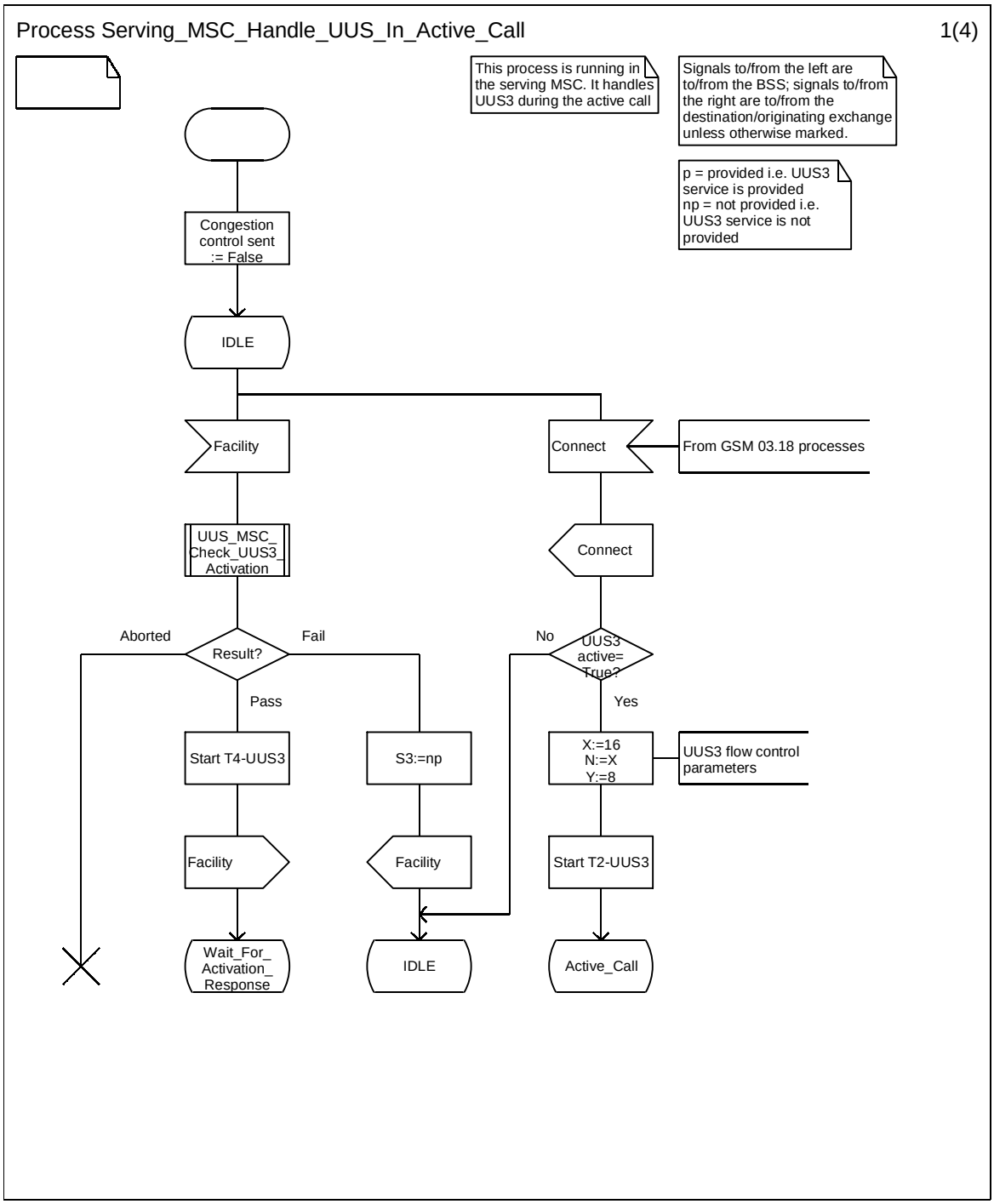
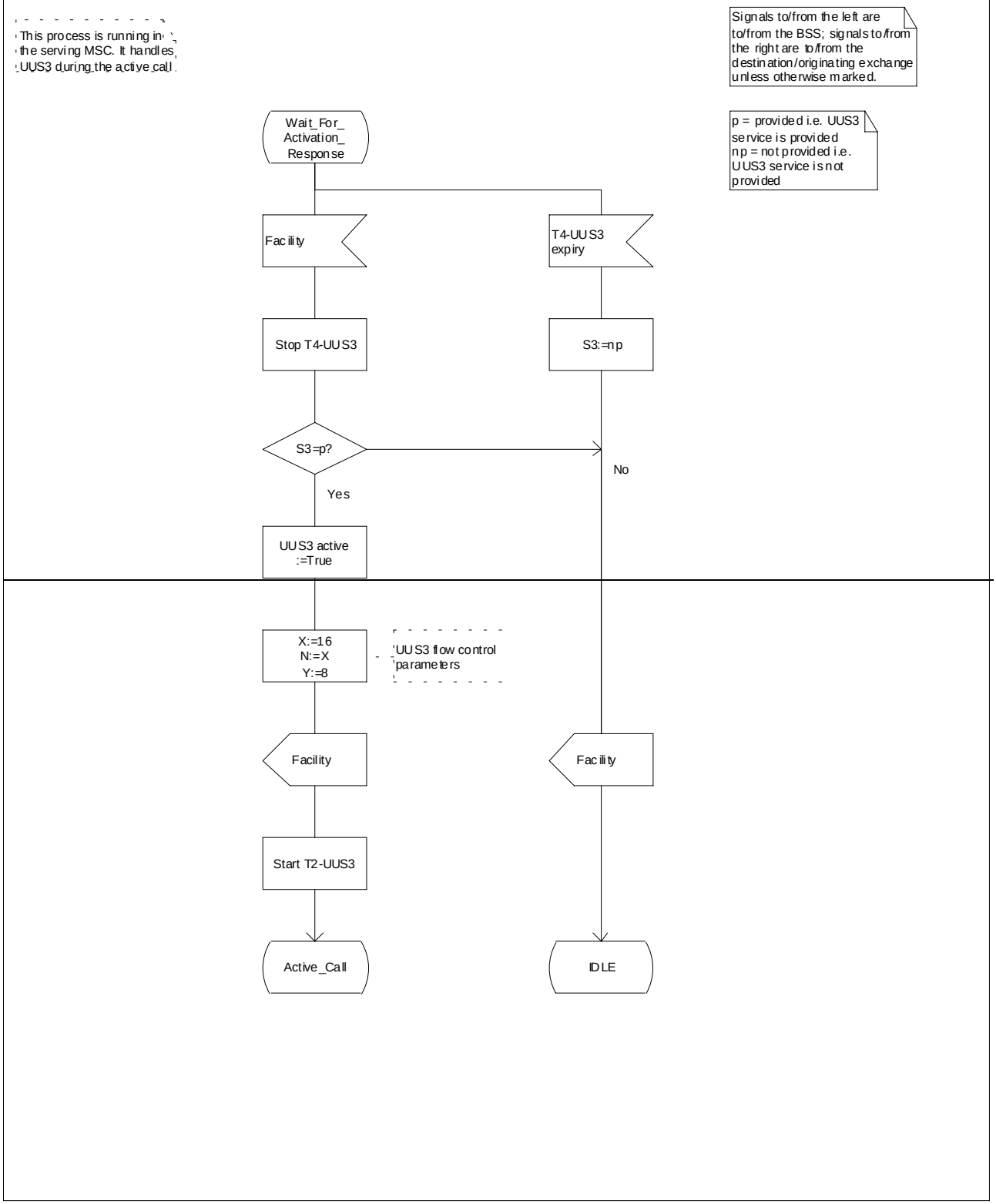


Figure 9.4.1.1: Process Serving_MSC_Handle_UUS_In_Active_Call (sheet 1)

Process Serving_MSC_Handle_UUS_In_Active_Call 2(4)



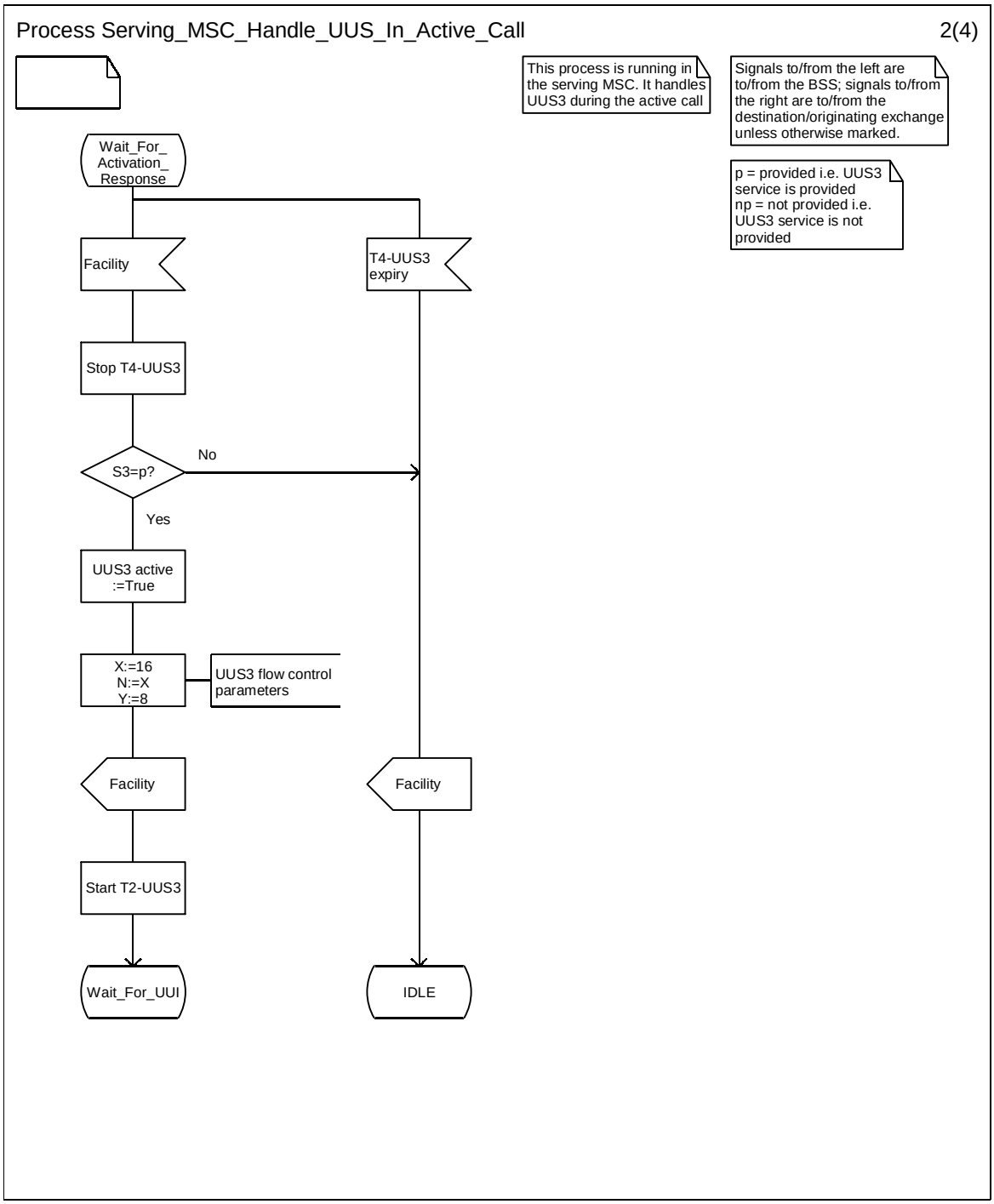
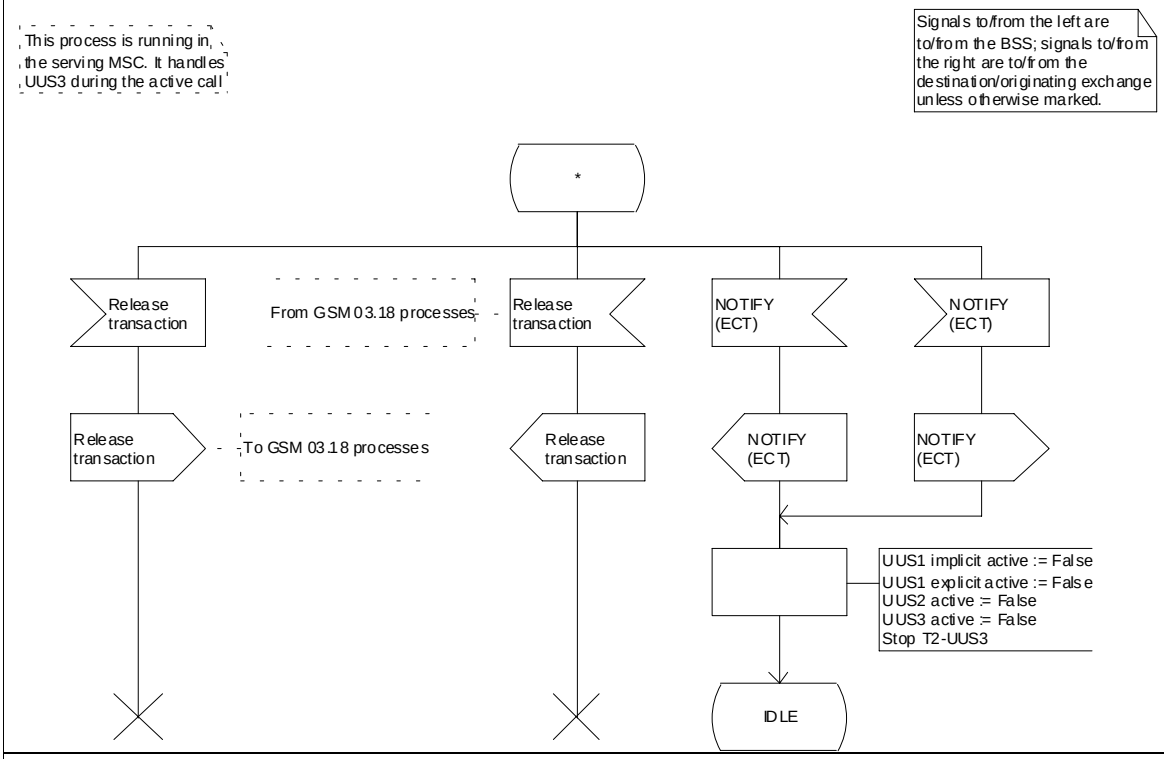


Figure 9.4.1.1: Process Serving_MSC_Handle_UUS_In_Active_Call (sheet 2)

Process Serving_MSC_Handle_UUS_In_Active_Call 3(4)



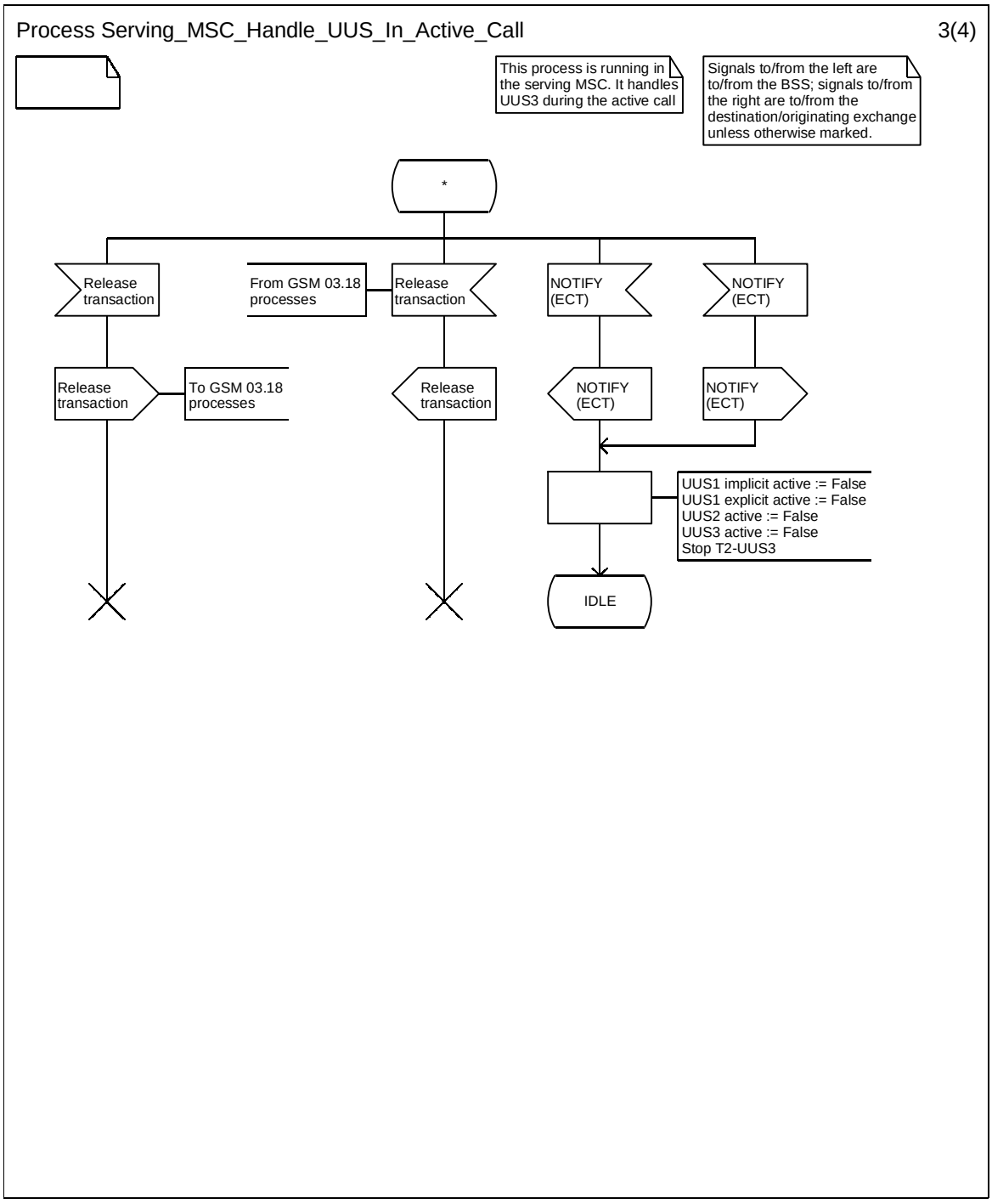
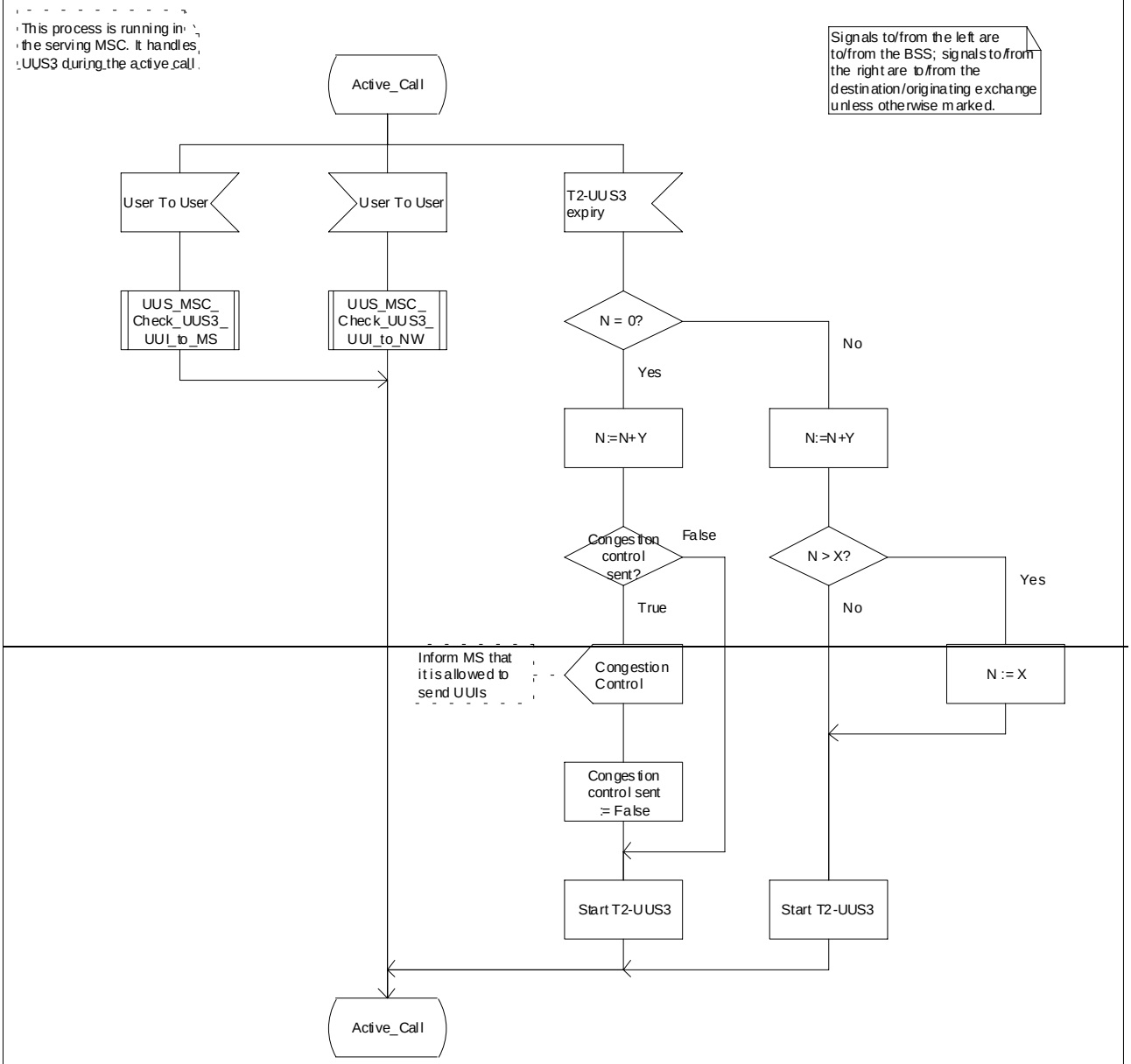


Figure 9.4.1.1: Process Serving_MSC_Handle_UUS_In_Active_Call (sheet 3)

Process Serving_MSC_Handle_UUS_In_Active_Call 4(4)



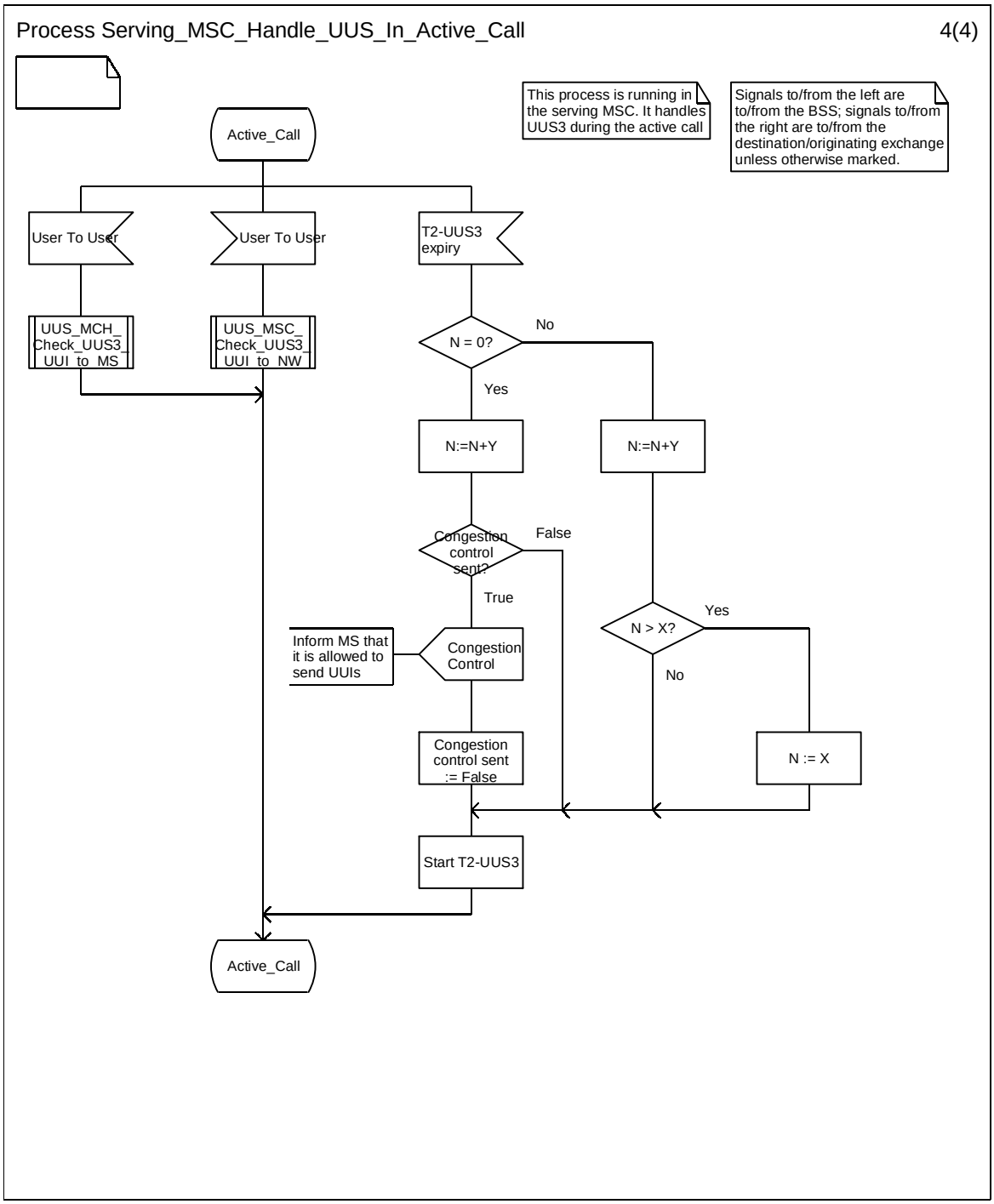
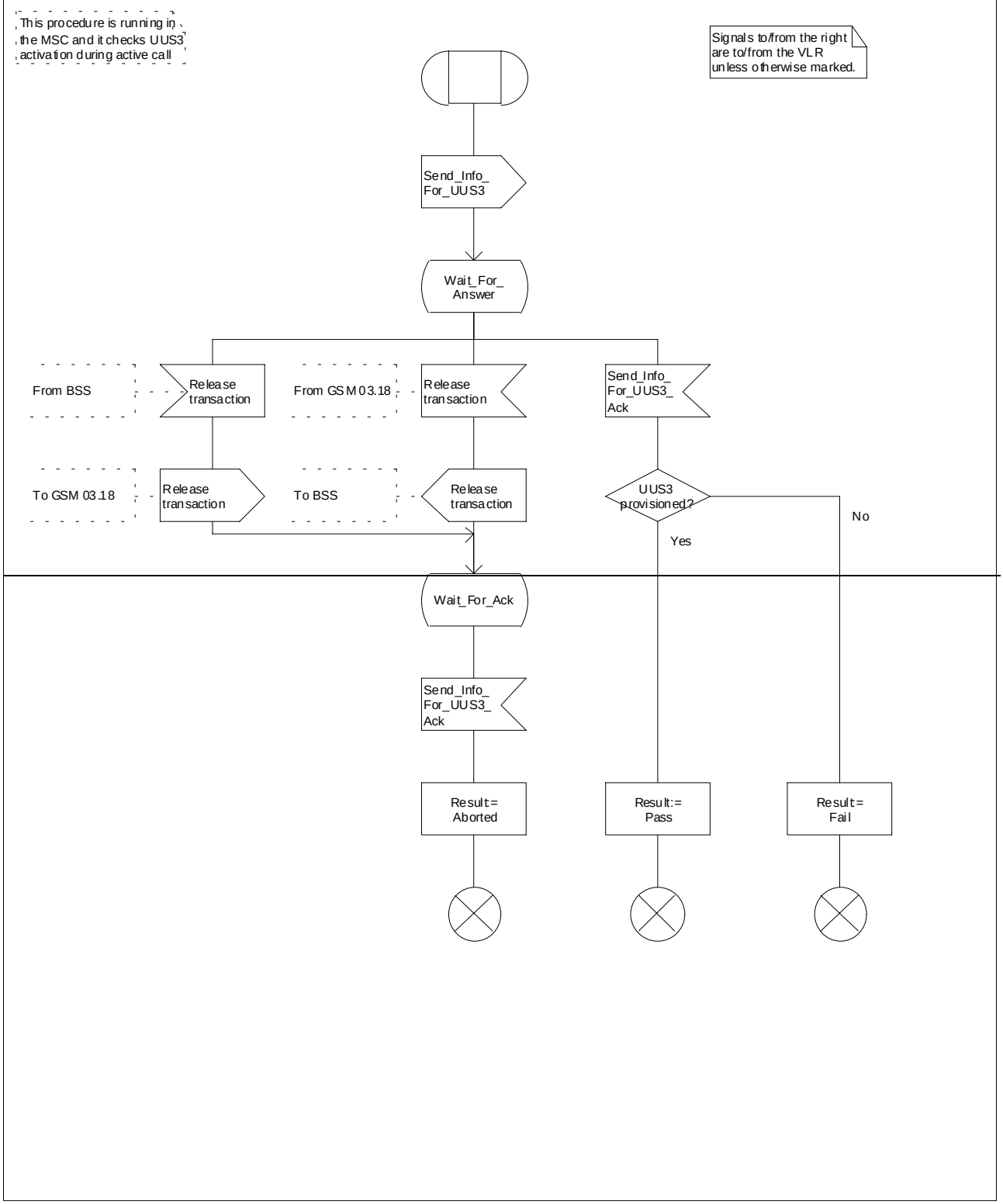


Figure 9.4.1.1: Process Serving_MSC_Handle_UUS_In_Active_Call (sheet 4)

Procedure UUS_MSC_Check_UUS3_Activation 1(1)



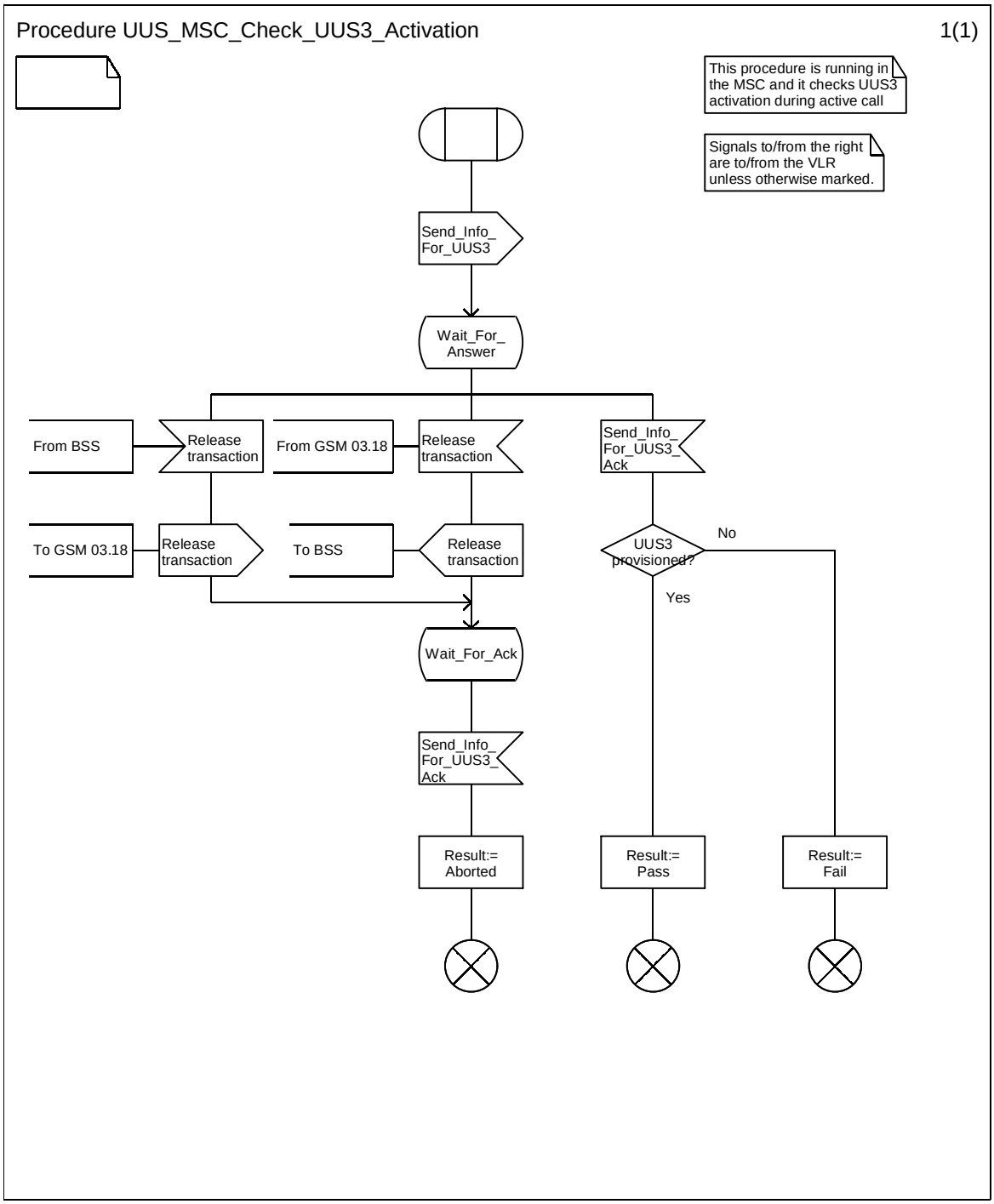
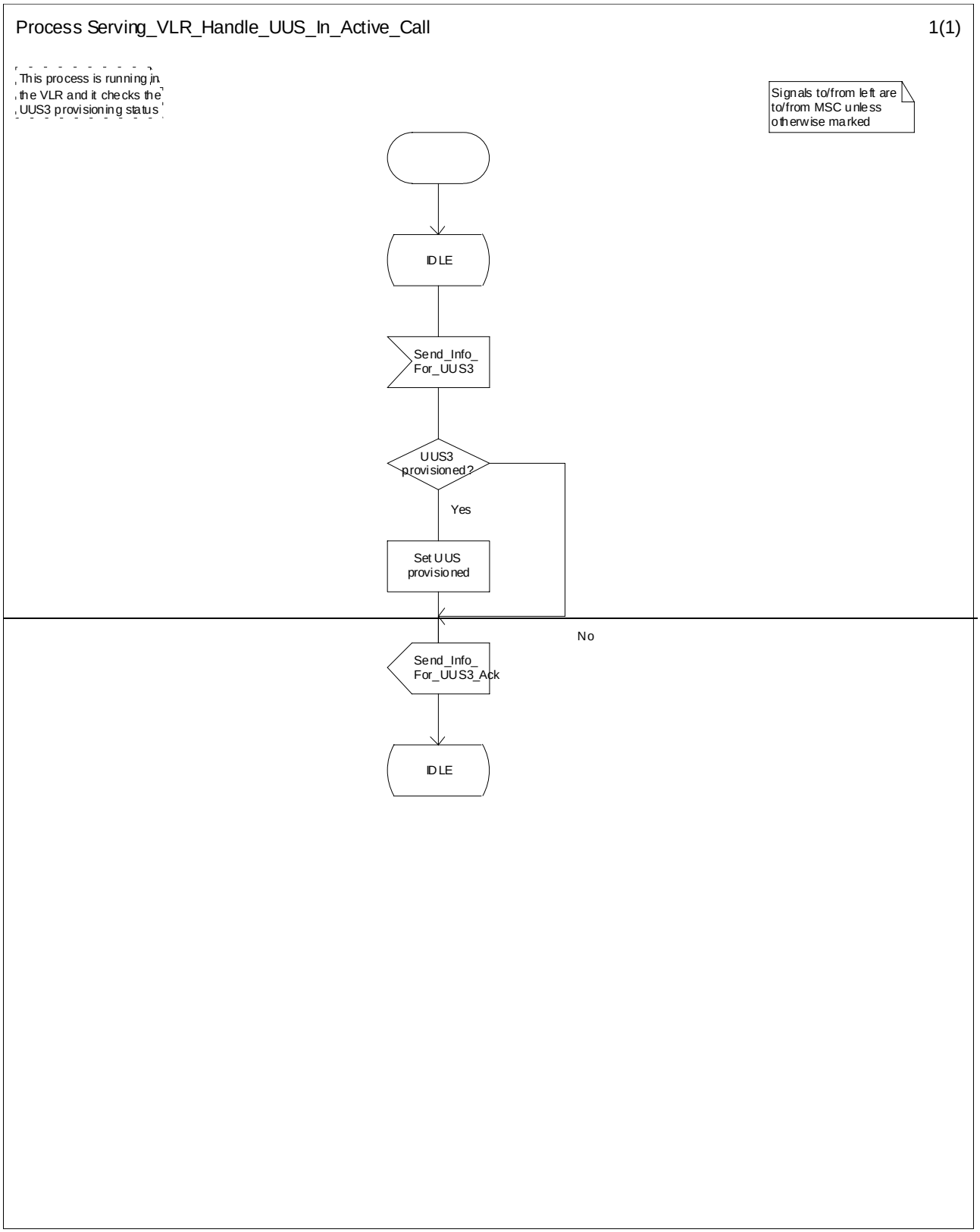


Figure 9.4.1.2: Procedure UUS_MSC_Check_UUS3_Activation

9.4.2 Process and procedures in serving VLR

Figure 9.4.2.1 Process Serving_VLR_Handle_UUS_In_Active_Call

This process is running in the serving VLR. If the UUS3 activation request comes during the active call, this process is used to check whether the service is provisioned to the subscriber.


Process Serving_VLR_Handle_UUS_In_Active_Call
1(1)
This process is running in the VLR and it checks the UUS3 provisioning status
Signals to/from left are to/from MSC unless otherwise marked
IDLE
Send_Info_For_UUS3
UUS3 provisioned?
Yes
No
Set UUS provisioned
Send_Info_For_UUS3_Ack
IDLE

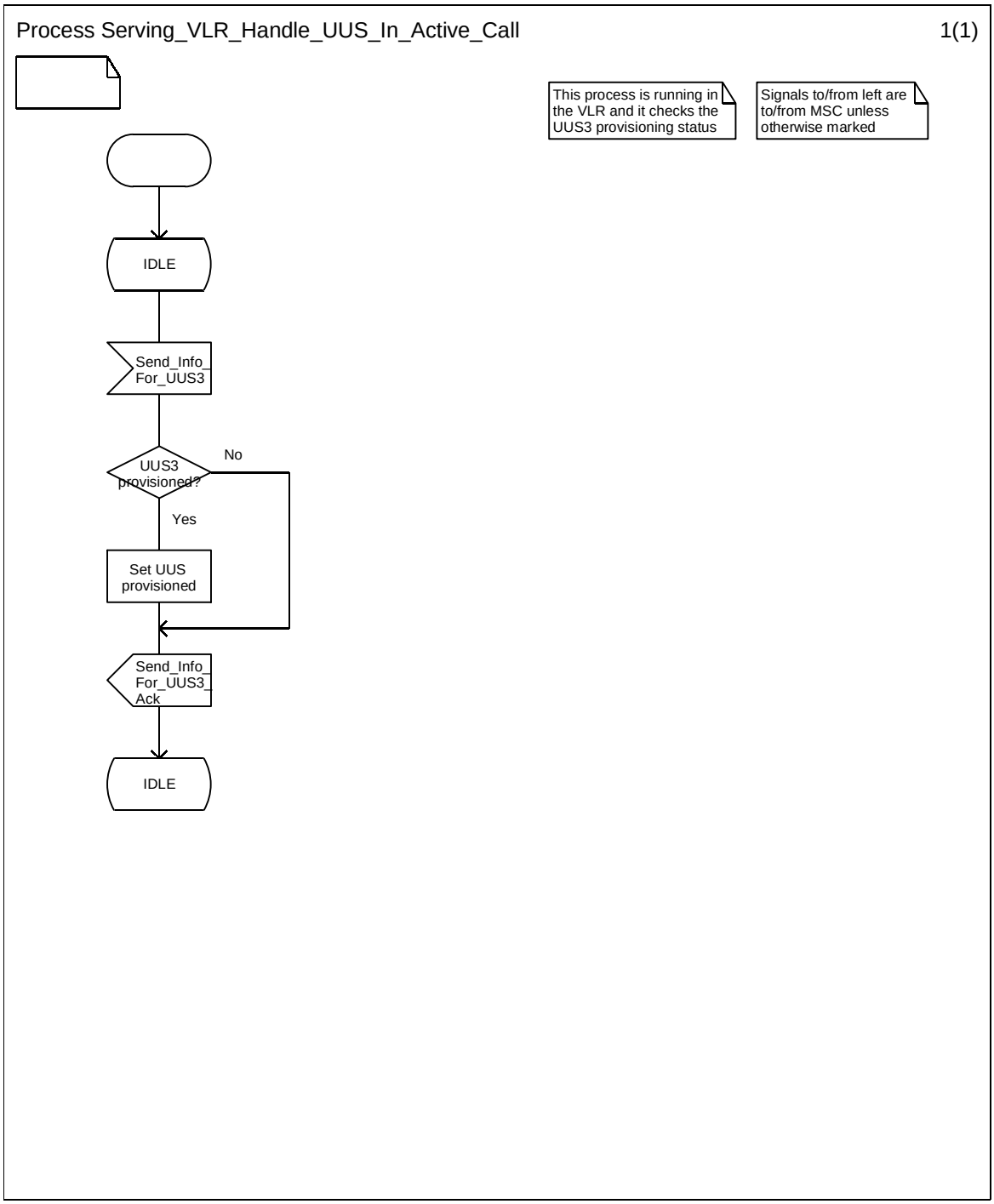
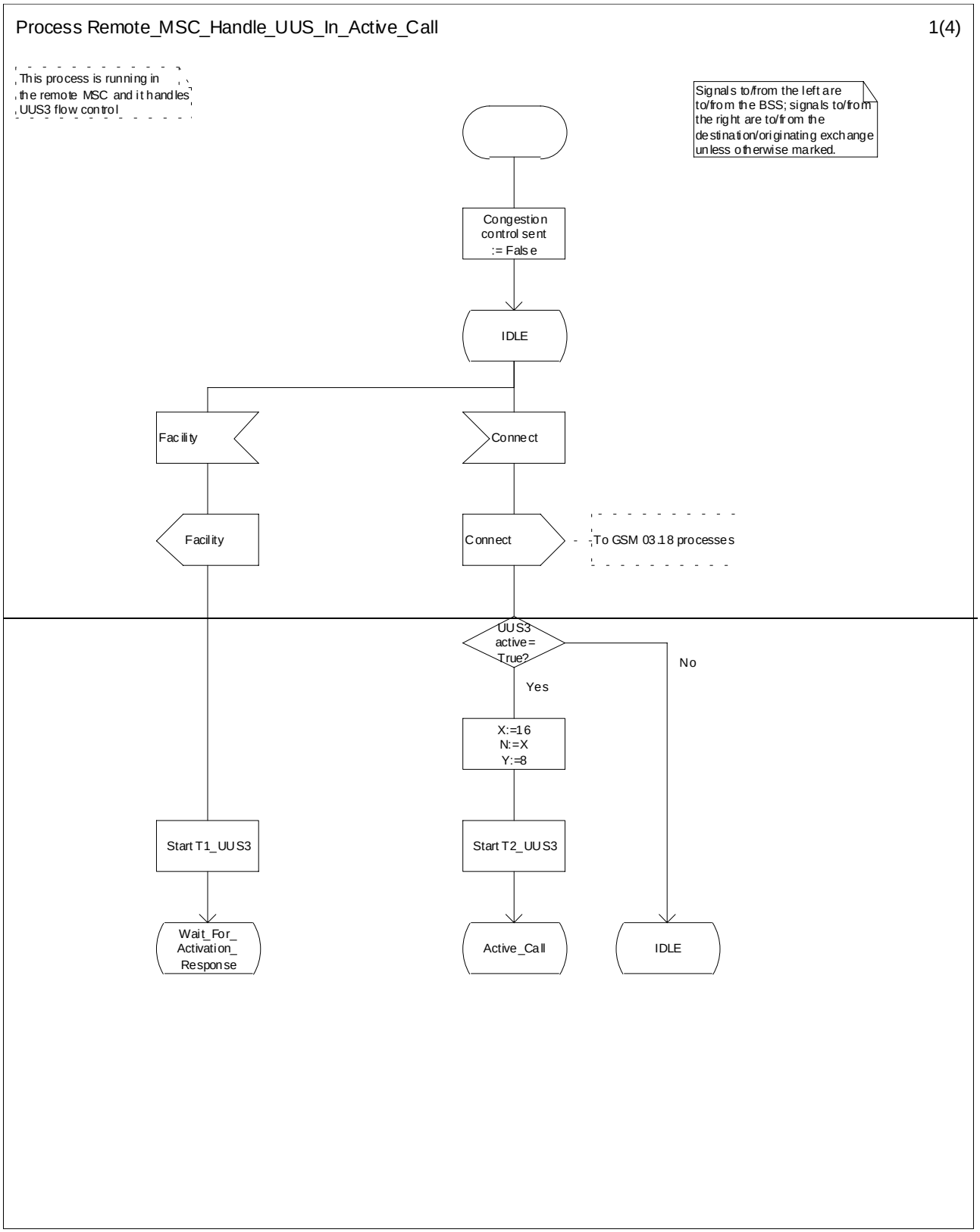


Figure 9.4.2.1: Process Serving_VLR_Handle_UUS_In_Active_Call

9.4.3 Process and procedures in remote MSC

Figure 9.4.3.1 Process Remote_MSC_Handle_UUS_In_Active_Call

This process is running in the remote MSC. It is used for checking whether UUS3 UUI's can be passed on and control the flow control for UUS3. The process starts during the call setup and checks the content of the Connect message in order to start the UUS3 flow control correctly. If the UUS3 is not activated the process stays in the Idle state and waits UUS3 activation request from the NW.


Process Remote_MSC_Handle_UUS_In_Active_Call
1(4)
This process is running in the remote MSC and it handles UUS3 flow control
Signals to/from the left are to/from the BSS; signals to/from the right are to/from the destination/originating exchange unless otherwise marked.
Congestion control sent := False
IDLE
Facility
Connect
Facility
Connect
To GSM 03.18 processes
UUS3 active = True?
No
Yes
X:=16
N:=X
Y:=8
Start T1_UUS3
Start T2_UUS3
Wait_For_ Activation_ Response
Active_Call
IDLE

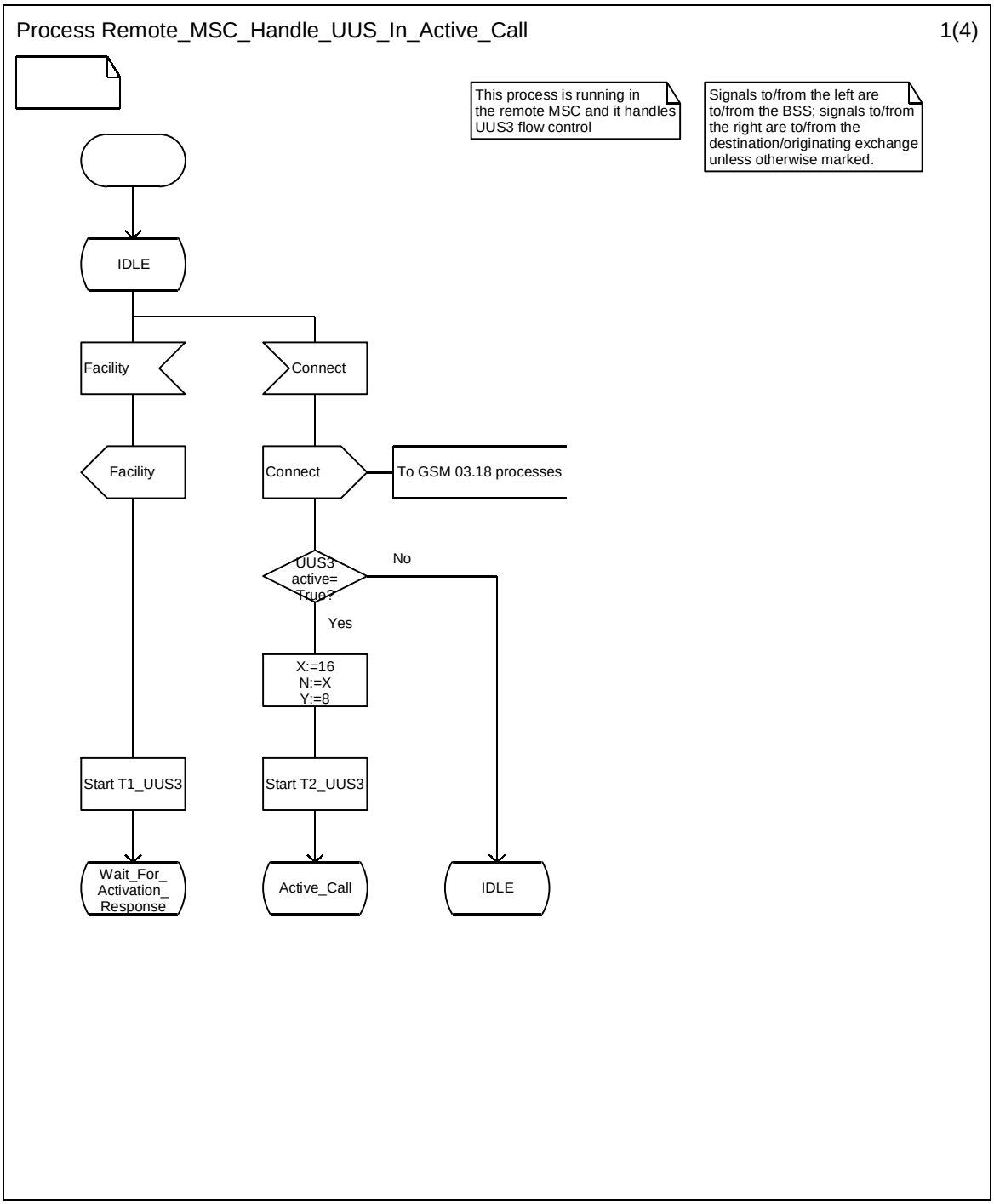
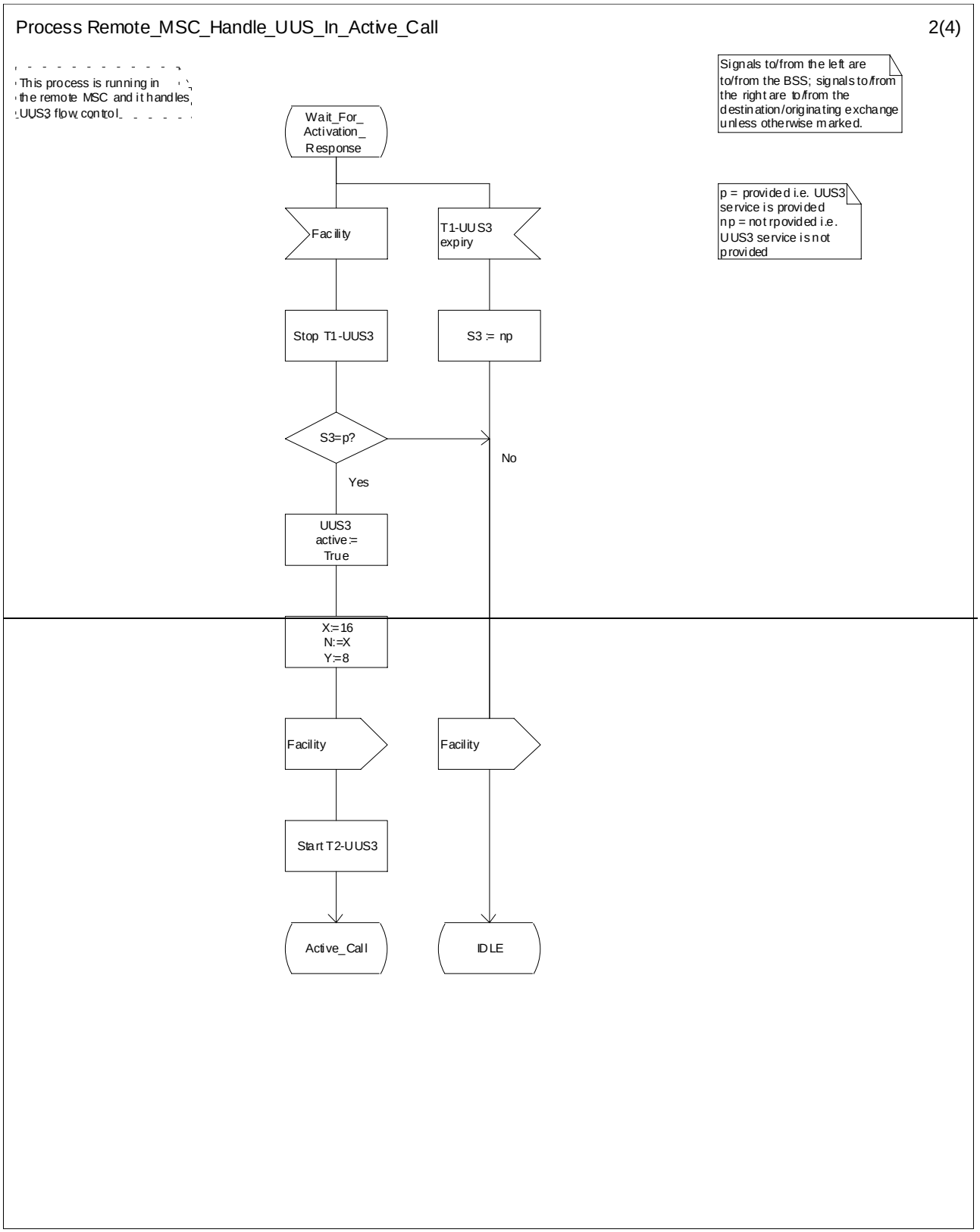


Figure 9.4.3.1: Process Remote_MSC_Handle_UUS_In_Active_Call (sheet 1)


Process Remote_MSC_Handle_UUS_In_Active_Call
2(4)
This process is running in the remote MSC and it handles UUS3 flow control
Signals to/from the left are to/from the BSS; signals to/from the right are to/from the destination/originating exchange unless otherwise marked.
p = provided i.e. UUS3 service is provided
np = not rpovided i.e. UUS3 service is not provided
Wait_For_ Activation_ Response
Facility
T1-UUS3 expiry
Stop T1-UUS3
S3 := np
S3=p?
No
Yes
UUS3 active := True
X:=16
N:=X
Y:=8
Facility
Facility
Start T2-UUS3
Active_Call
IDLE

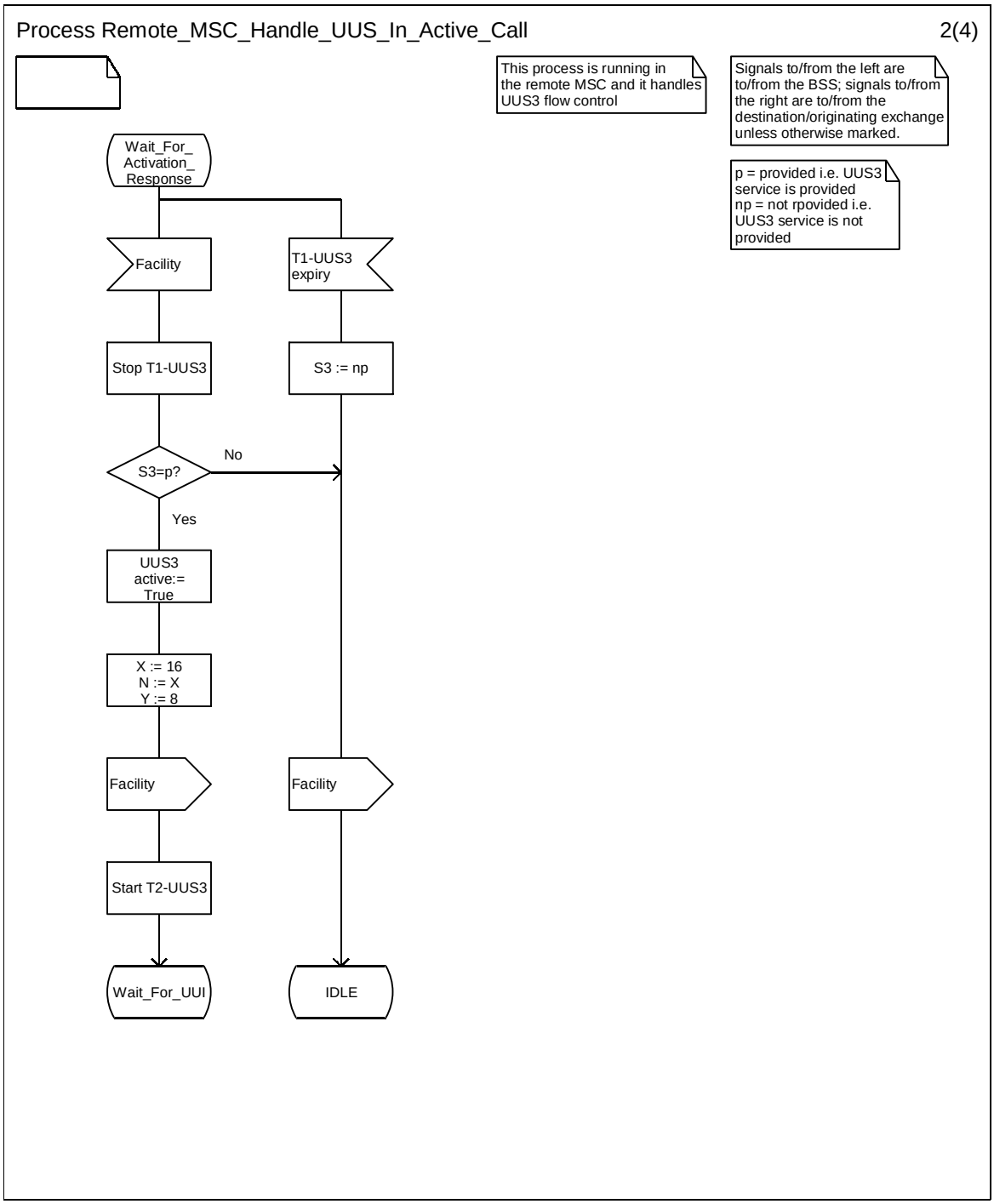
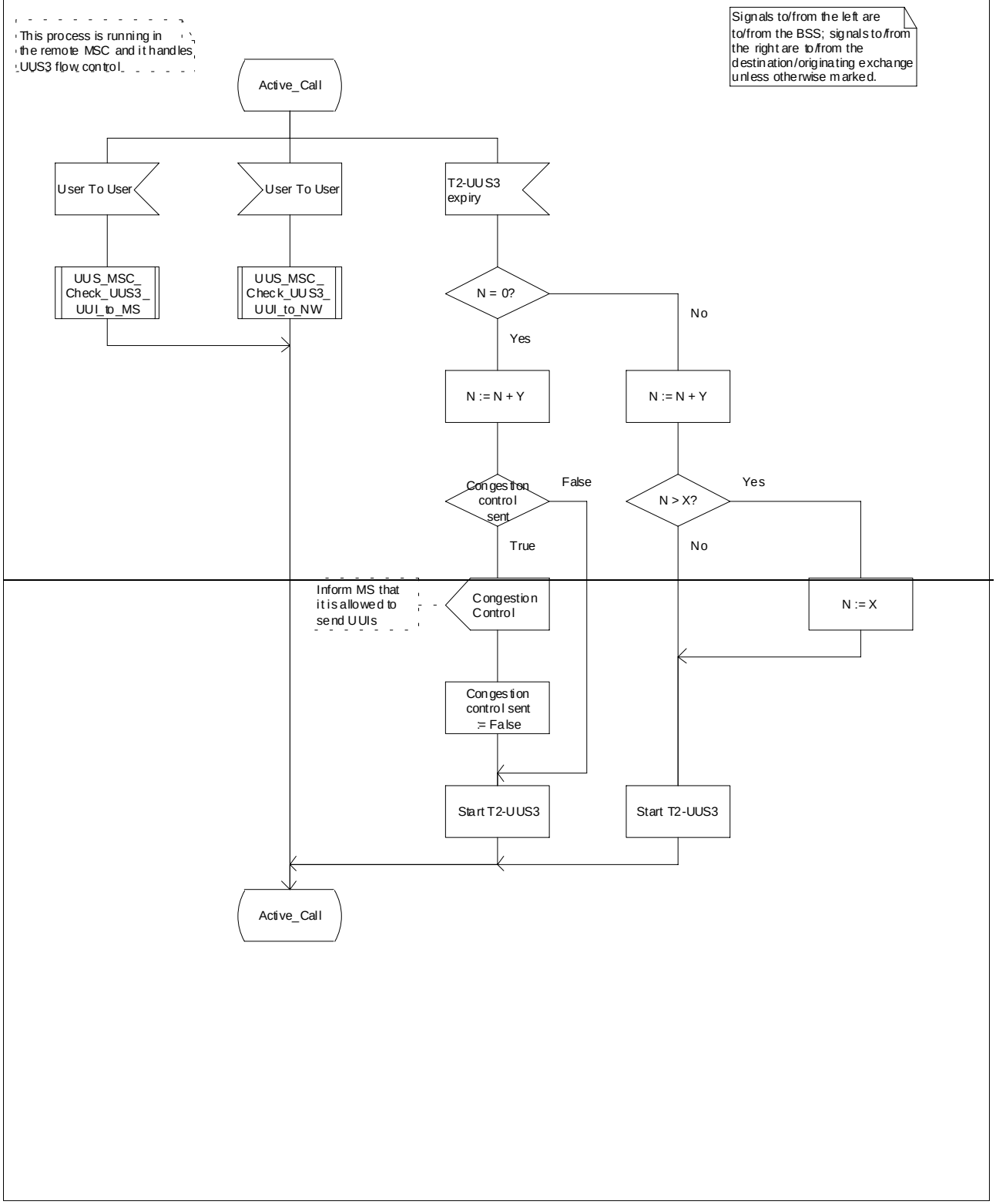


Figure 9.4.3.1: Process Remote_MSC_Handle_UUS_In_Active_Call (sheet 2)

Process Remote_MSC_Handle_UUS_In_Active_Call 3(4)



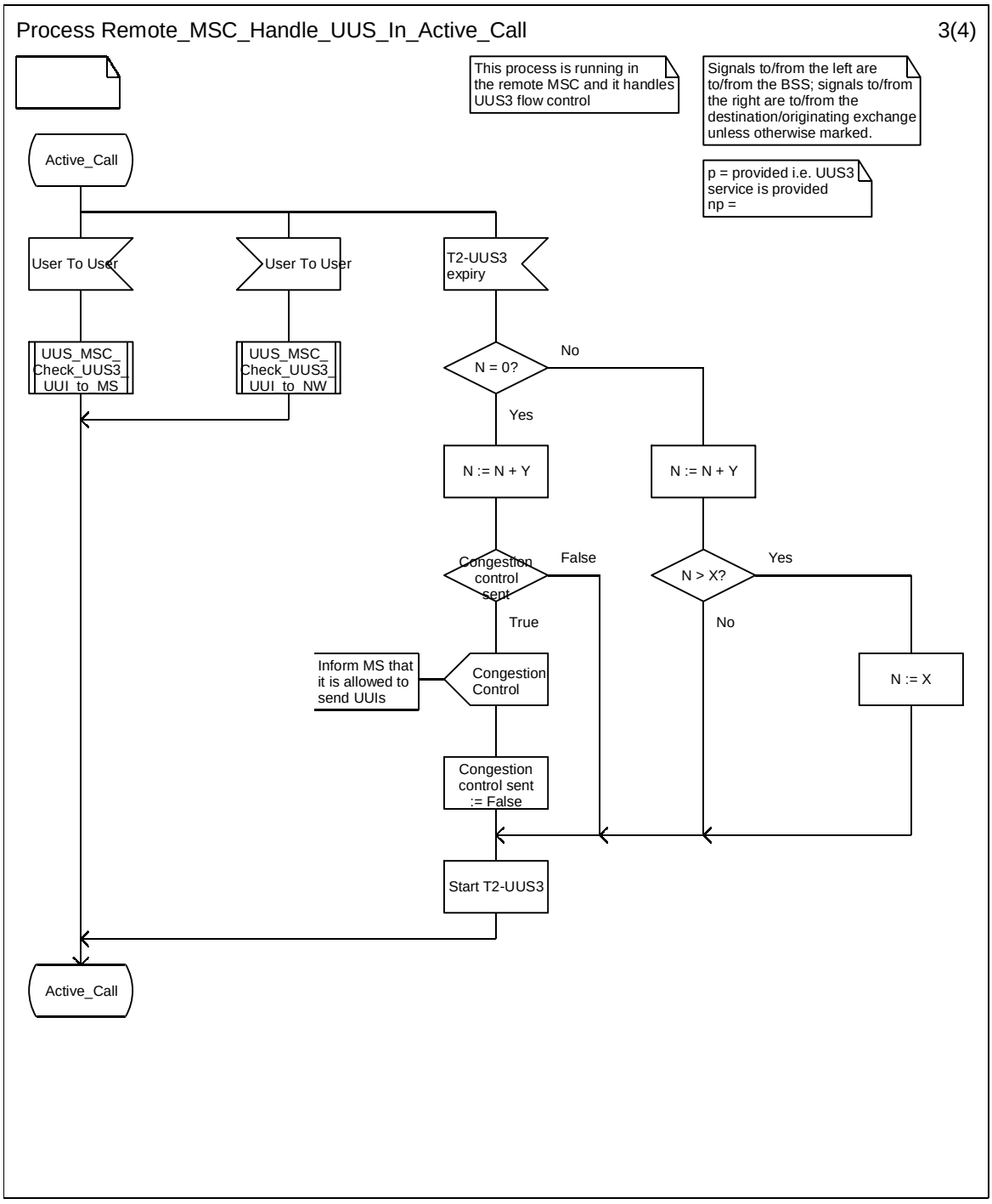
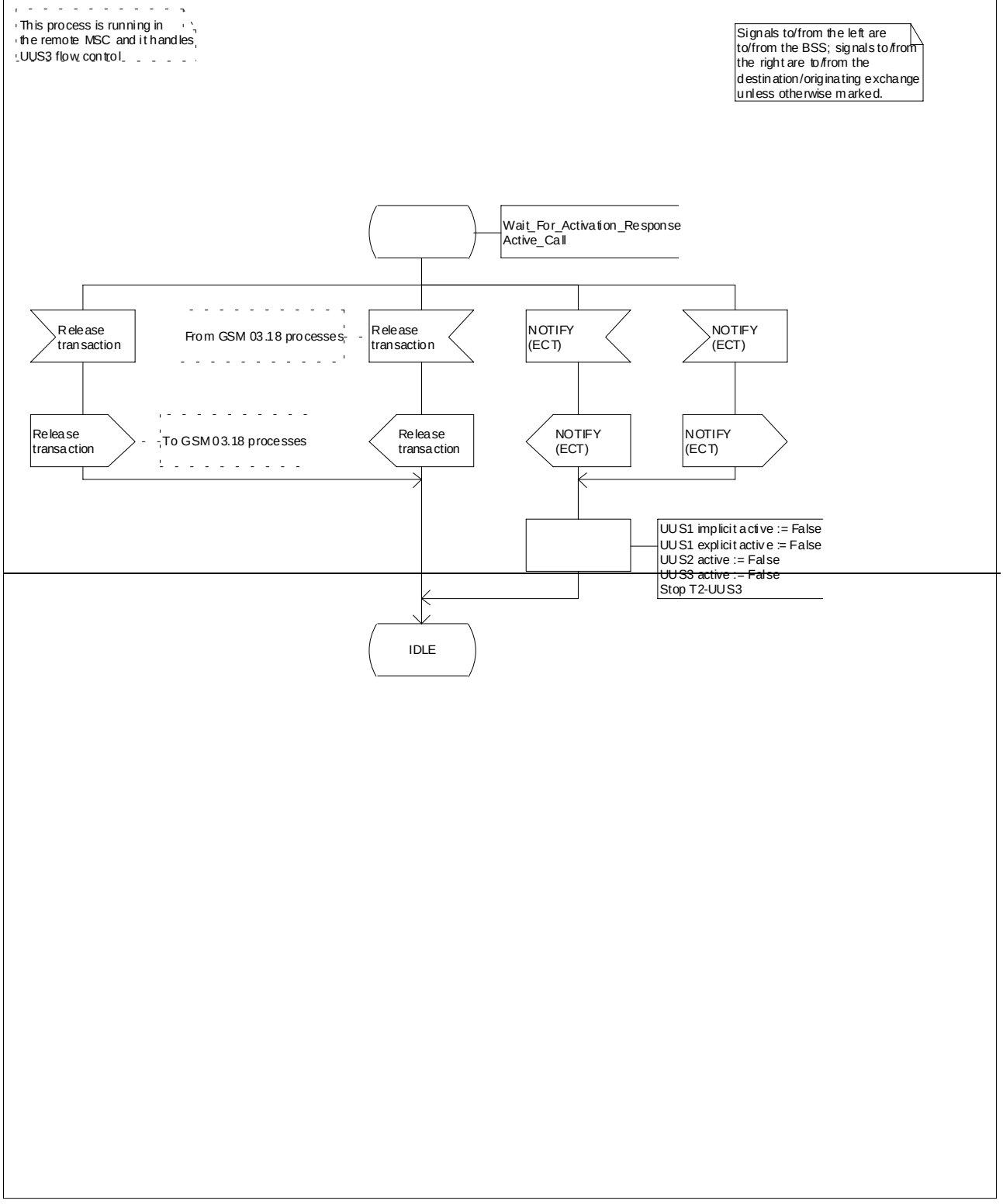


Figure 9.4.3.1: Process Remote_MSC_Handle_UUS_In_Active_Call (sheet 3)

Process Remote_MSC_Handle_UUS_In_Active_Call 4(4)



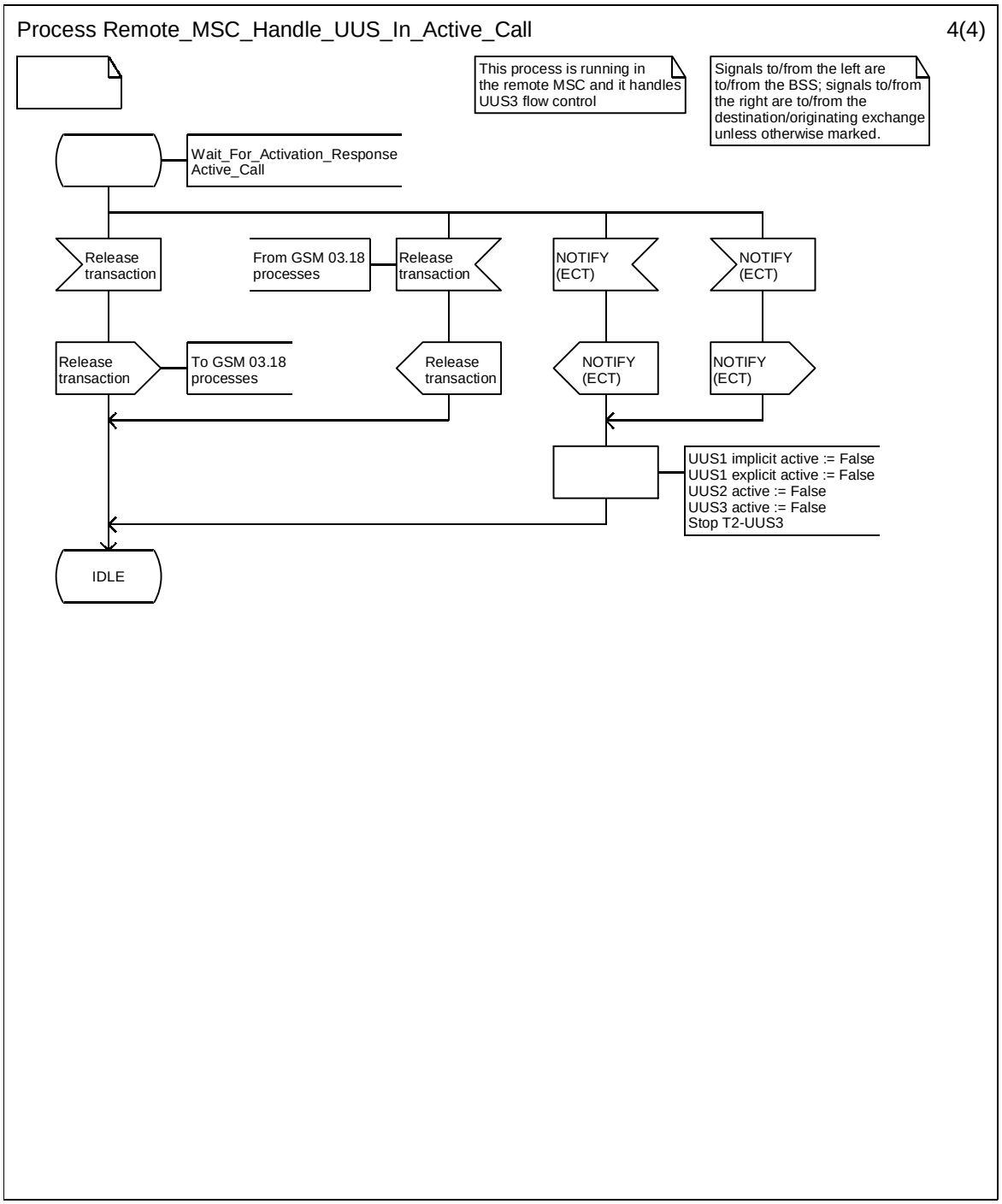


Figure 9.4.3.1: Process Remote_MSC_Handle_UUS_In_Active_Call (sheet 4)

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000436
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.088	CR	002	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#09	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: N4 **Date:** 2000-06-26

Subject: SDL refresh

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

The SDL diagrams in this document have been replaced, without any semantic changes due to the following reasons:

- In the previous version, the diagrams contained nothing but garbage when viewed on-screen.
- Some of the diagrams were, if not impossible, very hard to print.
- A binary version of the SDL diagrams, suitable for standard tools, is needed to assure a qualitative handling of the diagrams in the future. Telelogic Tau SDL Suite (formerly known as SDT) versions of the diagrams have been created and made available, providing a new fresh base for future changes. For obvious reasons, the binary version, to be regarded as the source, should be mirrored in the document. Therefore, the diagrams replacing the previous versions are printouts of the binary versions.

Clauses affected: All figures in the document, containing an SDL diagram.

Other specs Affected:

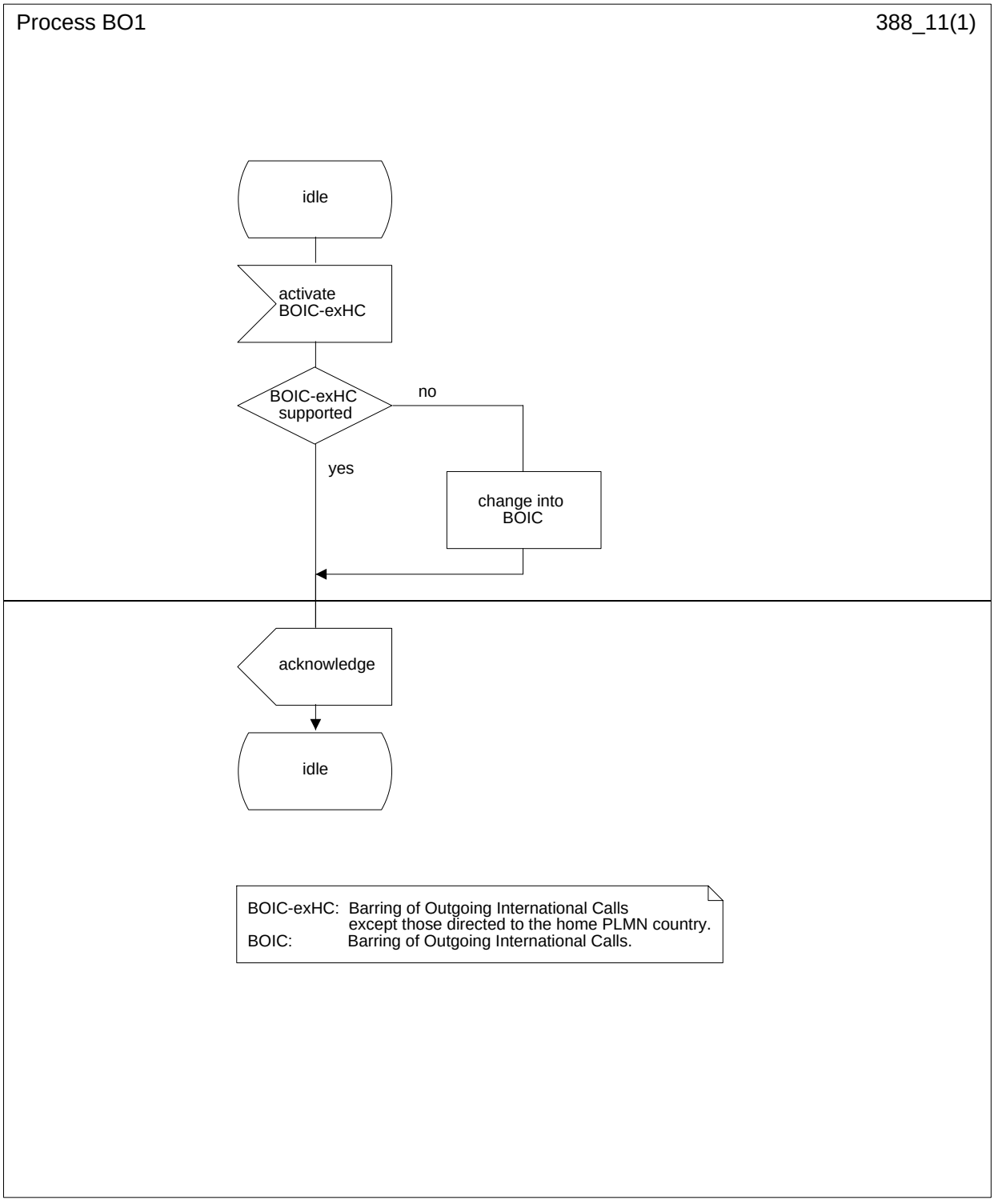
Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments: ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

6.1.2.3 Interactions with call forwarding supplementary services

For interactions with call forwarding supplementary services see 3G TS 22.082.

The SDL diagram in figure 6.3 shows the function to be performed in the HLR in order to deal with the interactions with call forwarding supplementary services.


Process BO1
388_11(1)
idle
activate
BOIC-exHC
BOIC-exHC
supported
no
yes
change into
BOIC
acknowledge
idle
BOIC-exHC: Barring of Outgoing International Calls
except those directed to the home PLMN country.
BOIC: Barring of Outgoing International Calls.

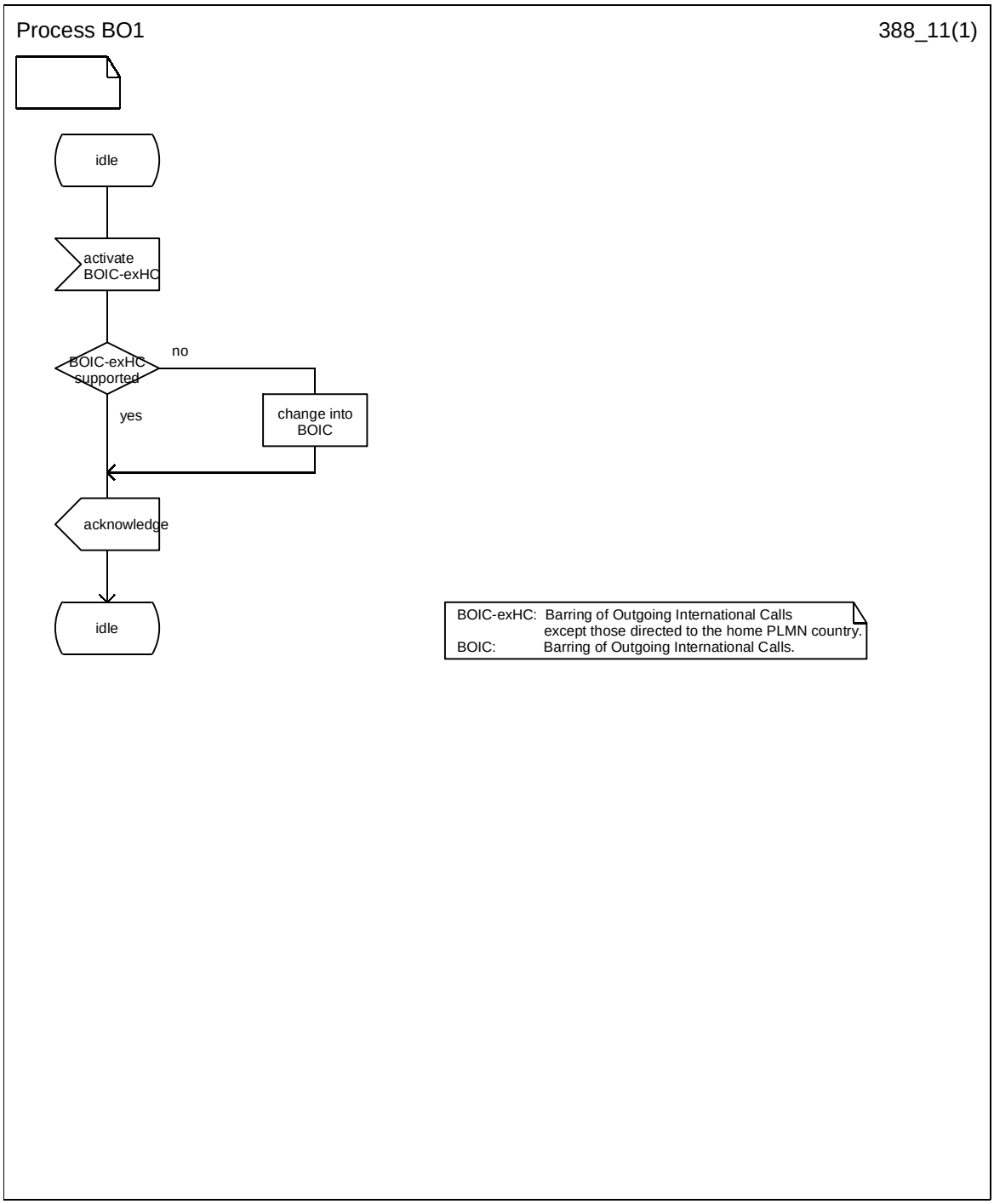
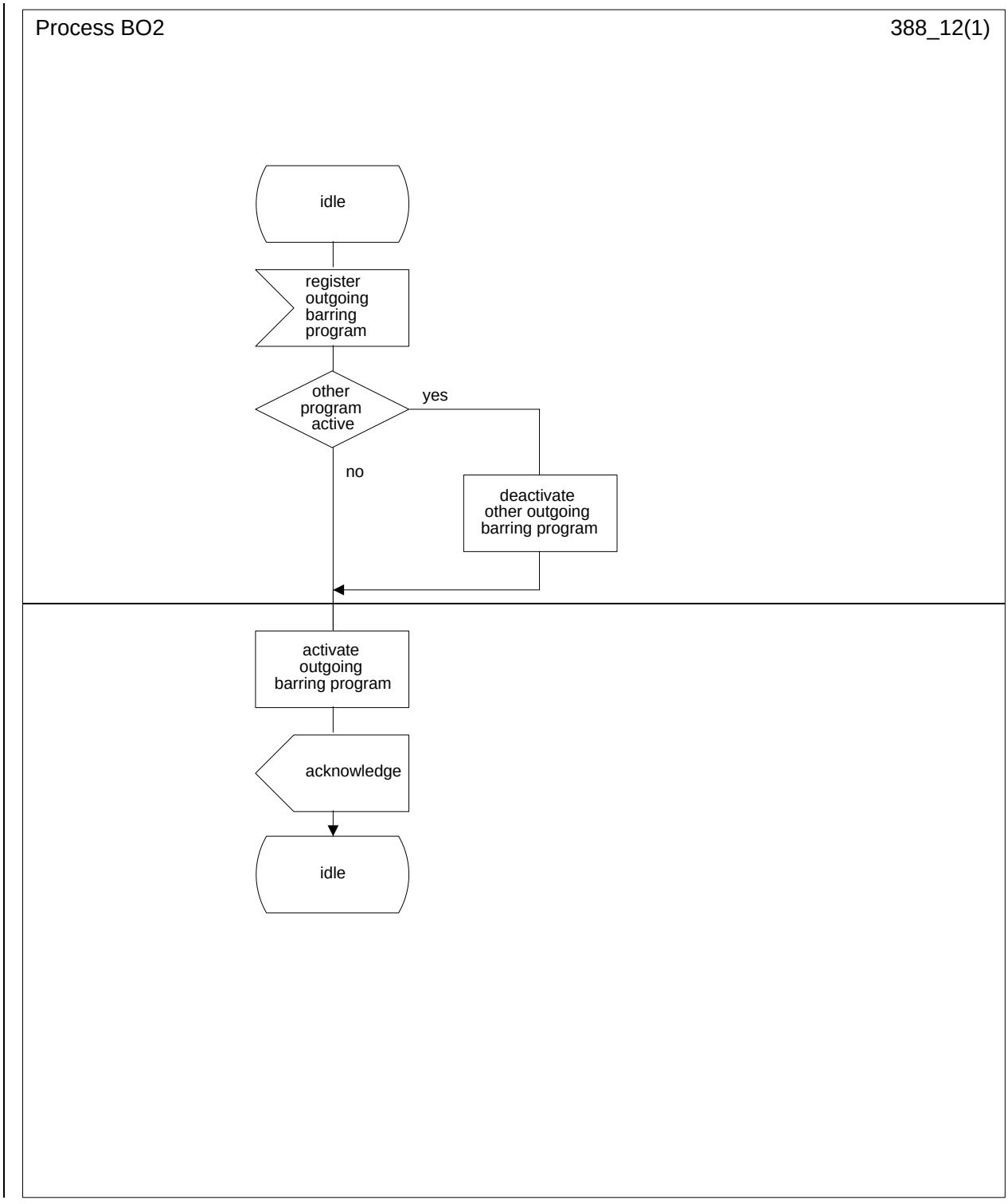


Figure 6.1: BO1 Possible change of barring of outgoing international calls except those directed to the home PLMN country into barring of outgoing international calls


Process BO2
388_12(1)
idle
register outgoing barring program
other program active
yes
no
deactivate other outgoing barring program
activate outgoing barring program
acknowledge
idle

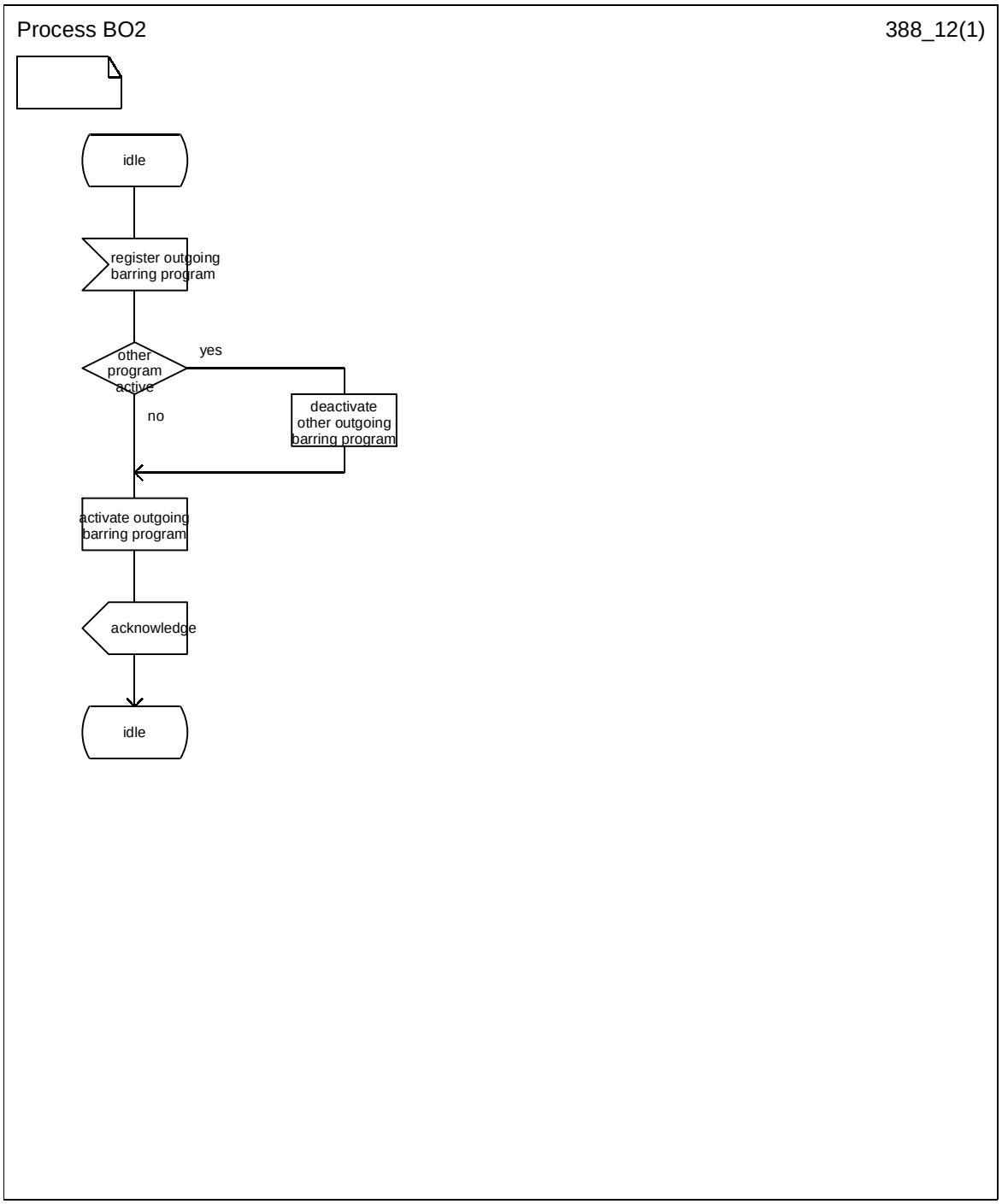
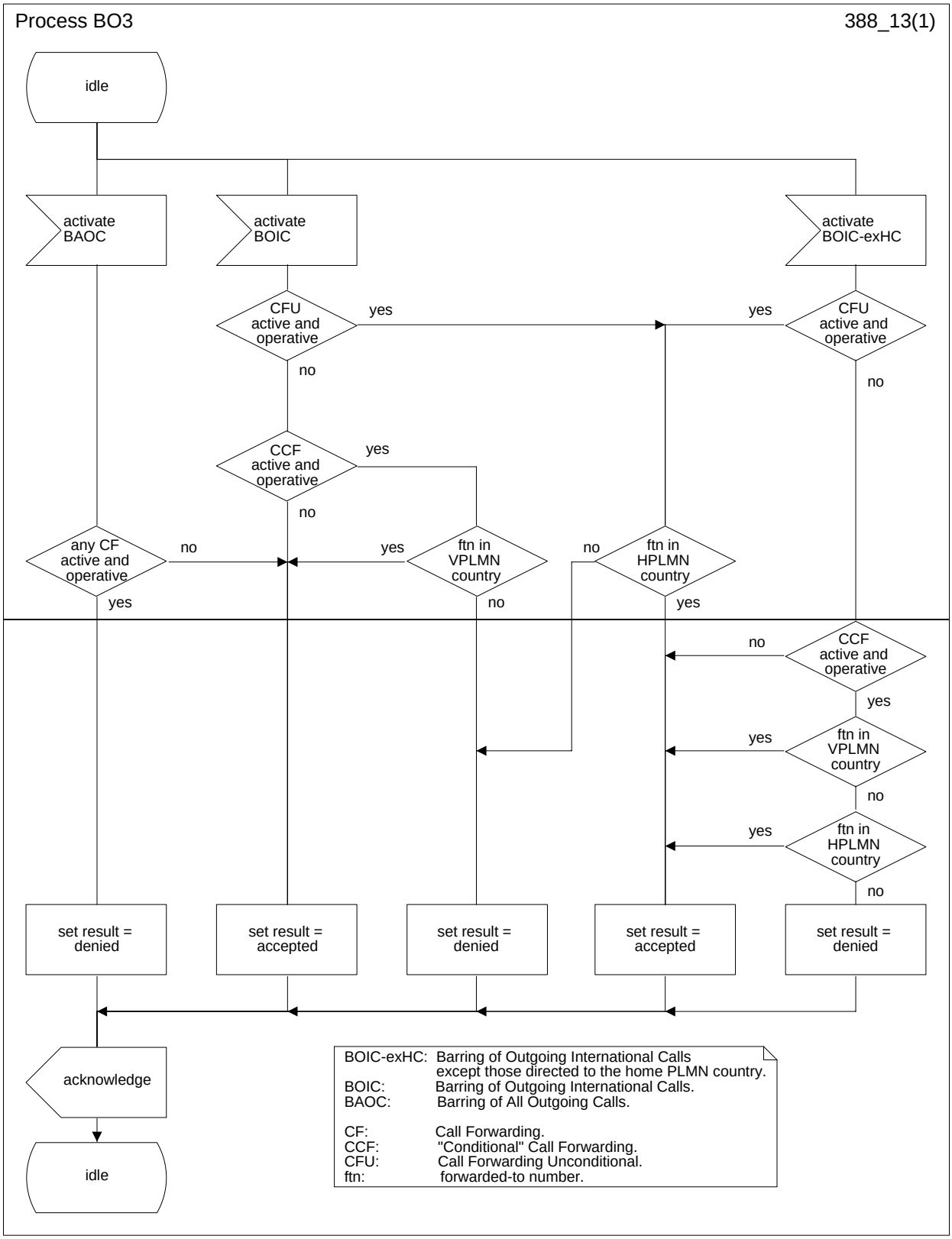


Figure 6.2: BO2 Interaction between call barring programs


Process BO3
388_13(1)
idle
activate BAOC
activate BOIC
activate BOIC-exHC
CFU active and operative
yes
no
CCF active and operative
any CF active and operative
ftn in VPLMN country
ftn in HPLMN country
set result = denied
set result = accepted
acknowledge
BOIC-exHC: Barring of Outgoing International Calls except those directed to the home PLMN country.
BOIC: Barring of Outgoing International Calls.
BAOC: Barring of All Outgoing Calls.
CF: Call Forwarding.
CCF: "Conditional" Call Forwarding.
CFU: Call Forwarding Unconditional.
ftn: forwarded-to number.

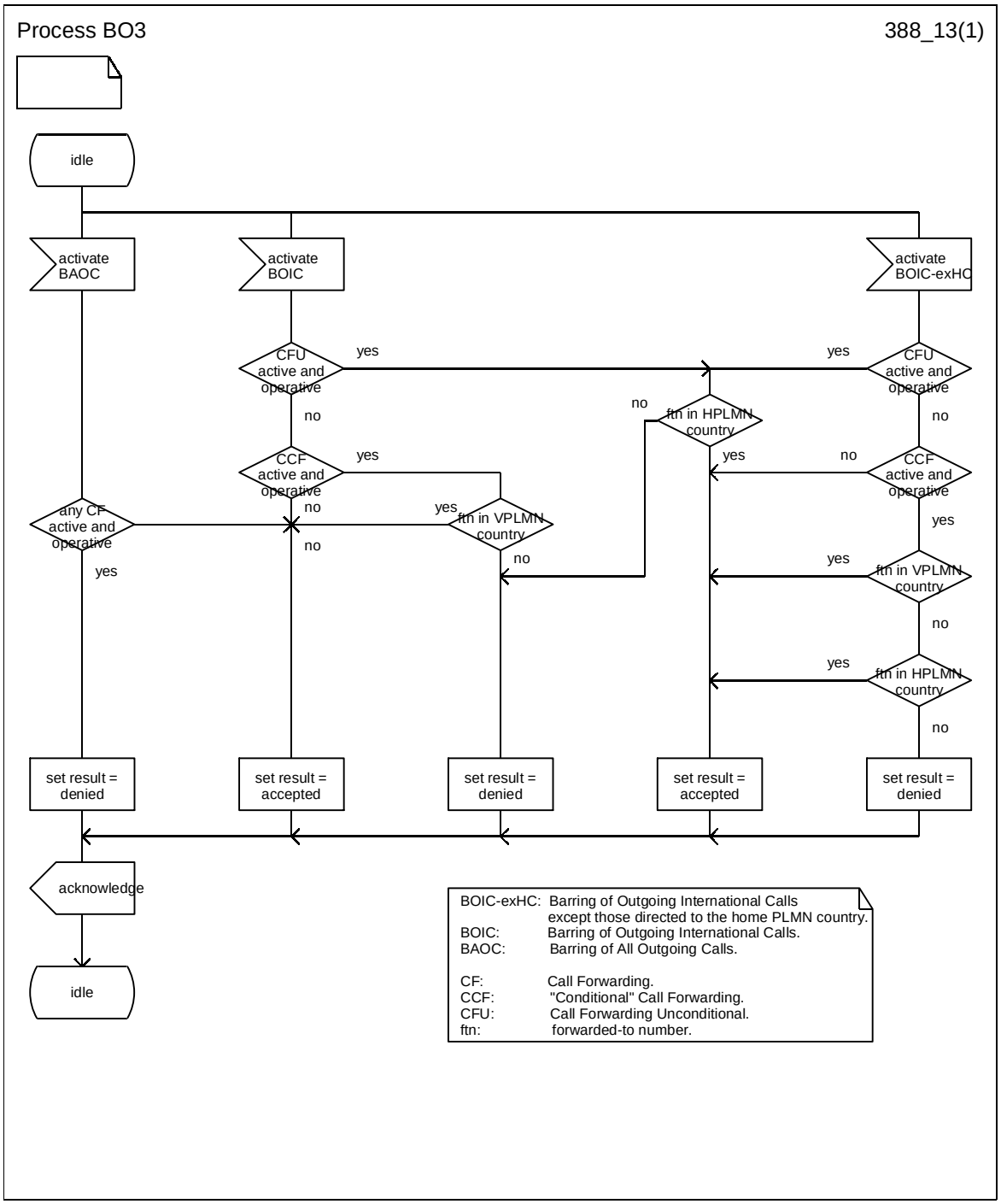
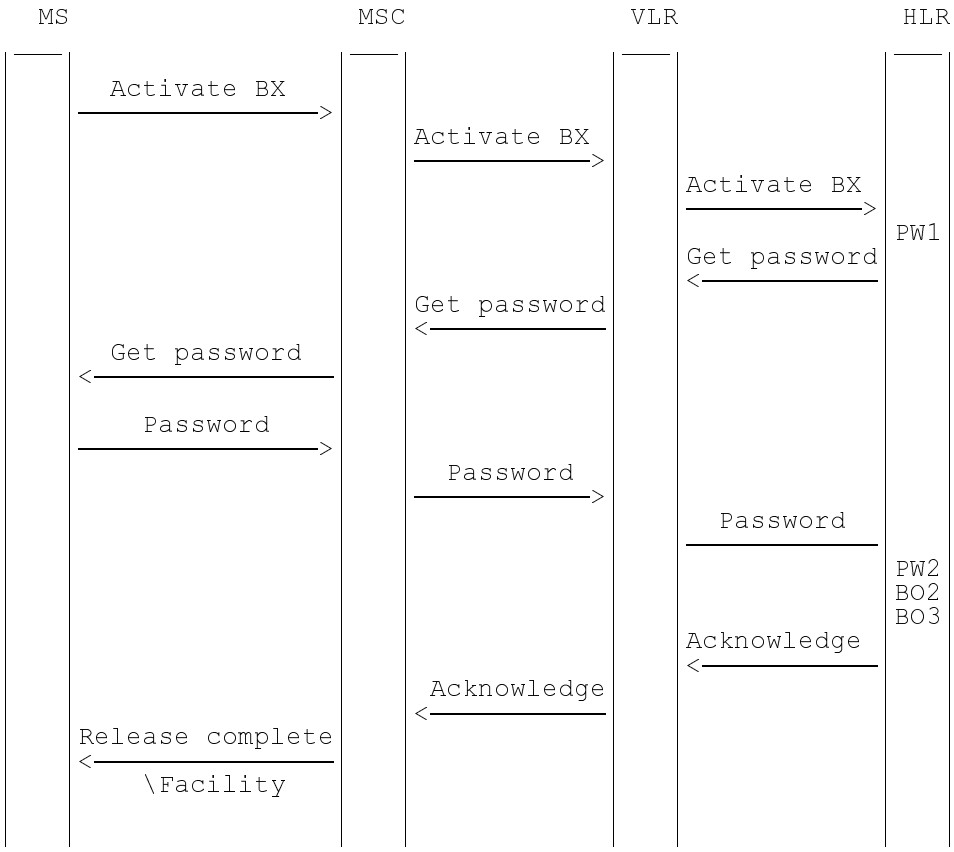


Figure 6.3: BO3 Interaction between call forwarding supplementary services and barring of outgoing calls programs



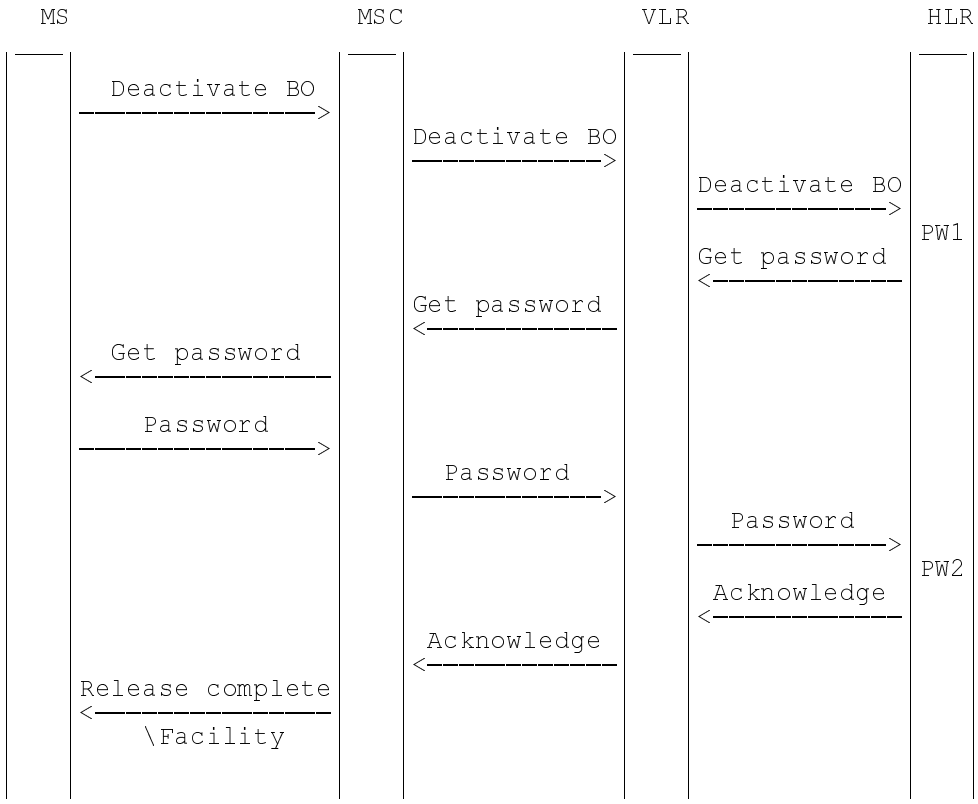
NOTE: BX indicates any of the barring programs. PW1 and PW2 indicate password handling programs, see 3G TS 23.011.

Figure 6.4: Activation of barring of outgoing calls

6.1.3 Deactivation

The procedure for activation, described in subclause 1.1.2.1, is valid also correspondingly for deactivation with the addition that a barring supplementary service, i.e. the Outgoing barring service, or All barring services can be signalled.

The information flow for deactivation of barring of outgoing calls is shown in figure 6.5. For more details see 3G TS 23.011.



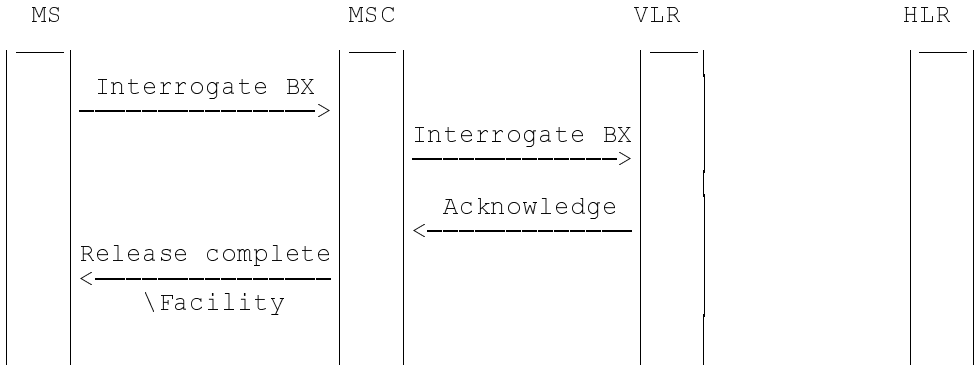
NOTE: BO indicates the general code for barring of outgoing calls. PW1 and PW2 indicate password handling programs, see 3G TS 23.011.

Figure 6.5: Deactivation of barring of outgoing calls

6.1.4 Interrogation

The interrogation procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return a list of all basic services to which the given barring program is active.

The information flow for interrogation of barring of outgoing calls is shown in figure 6.6.



NOTE: BX indicates any of the barring programs.

Figure 6.6: Interrogation of barring of outgoing calls

6.2 Functions and information flows

The following Mobile Additional Functions have been identified:

MAF017

Barring of all outgoing calls related authorizations examination.

The ability of a PLMN component to determine the authorizations relating to barring of all outgoing calls. See figure 6.7.

Location: VLR

MAF018

Barring of outgoing international calls related authorizations examination.

The ability of a PLMN component to determine the authorizations relating to barring of outgoing international calls. See figure 6.8.

Location: VLR

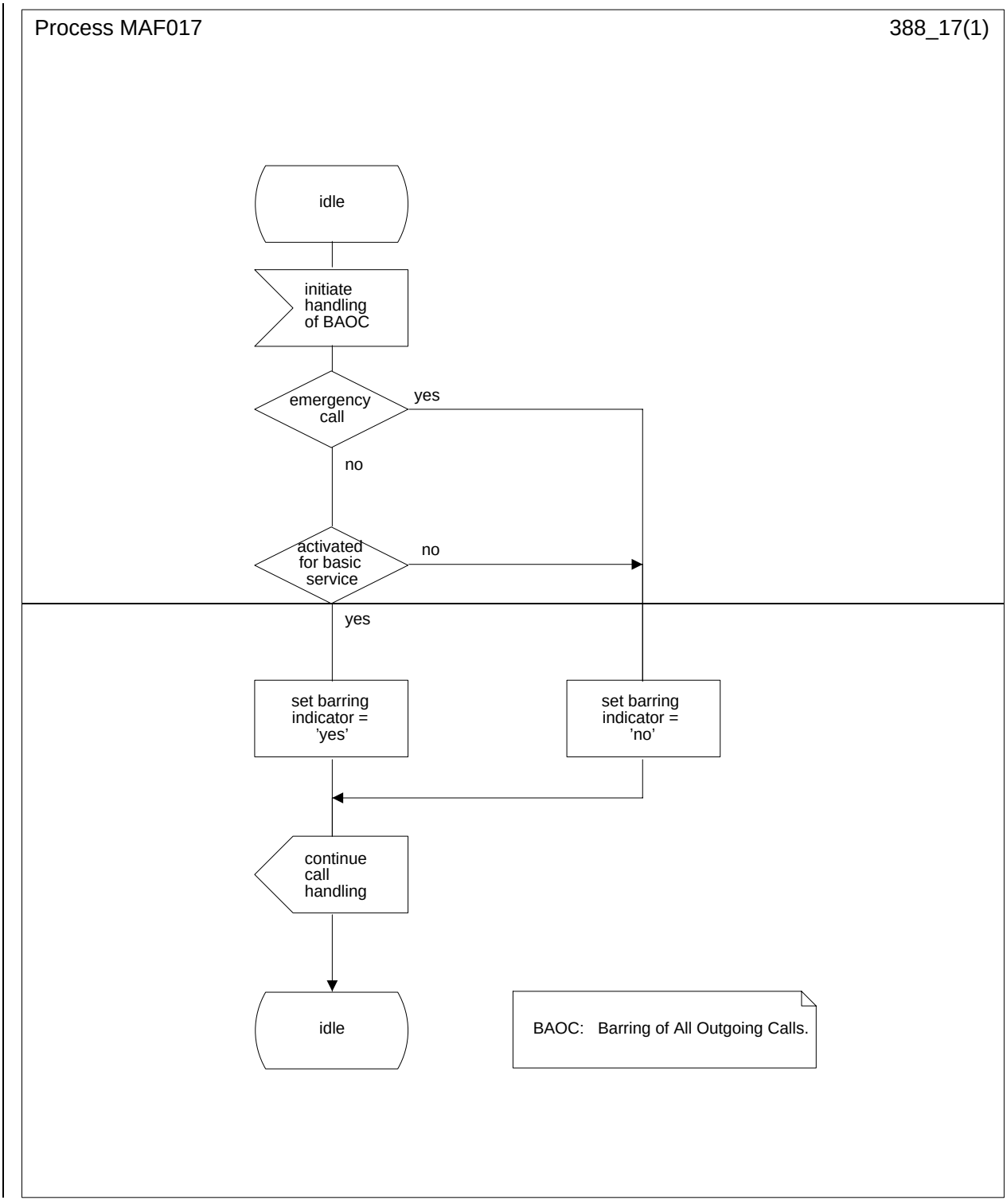
MAF020

Barring of outgoing international calls except those directed to the home PLMN country related authorizations examination.

The ability of a PLMN component to determine the authorizations relating to barring of outgoing international calls except those directed to the home PLMN country. See figure 6.9.

Location: VLR

The information flow for barring of outgoing calls is shown in figure 6.10.


Process MAF017
388_17(1)
idle
initiate handling of BAOC
emergency call
yes
no
activated for basic service
no
yes
set barring indicator = 'yes'
set barring indicator = 'no'
continue call handling
idle
BAOC: Barring of All Outgoing Calls.

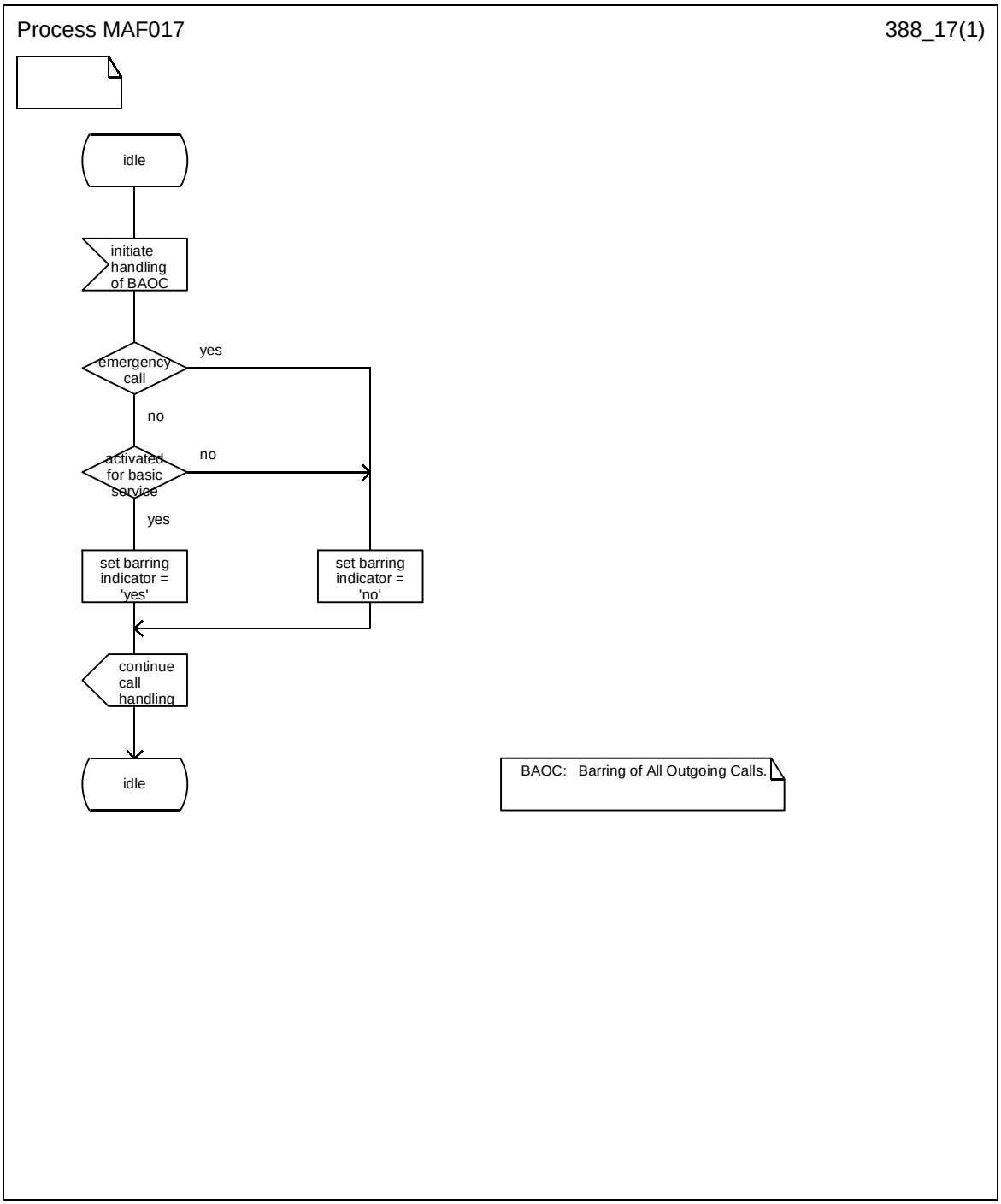
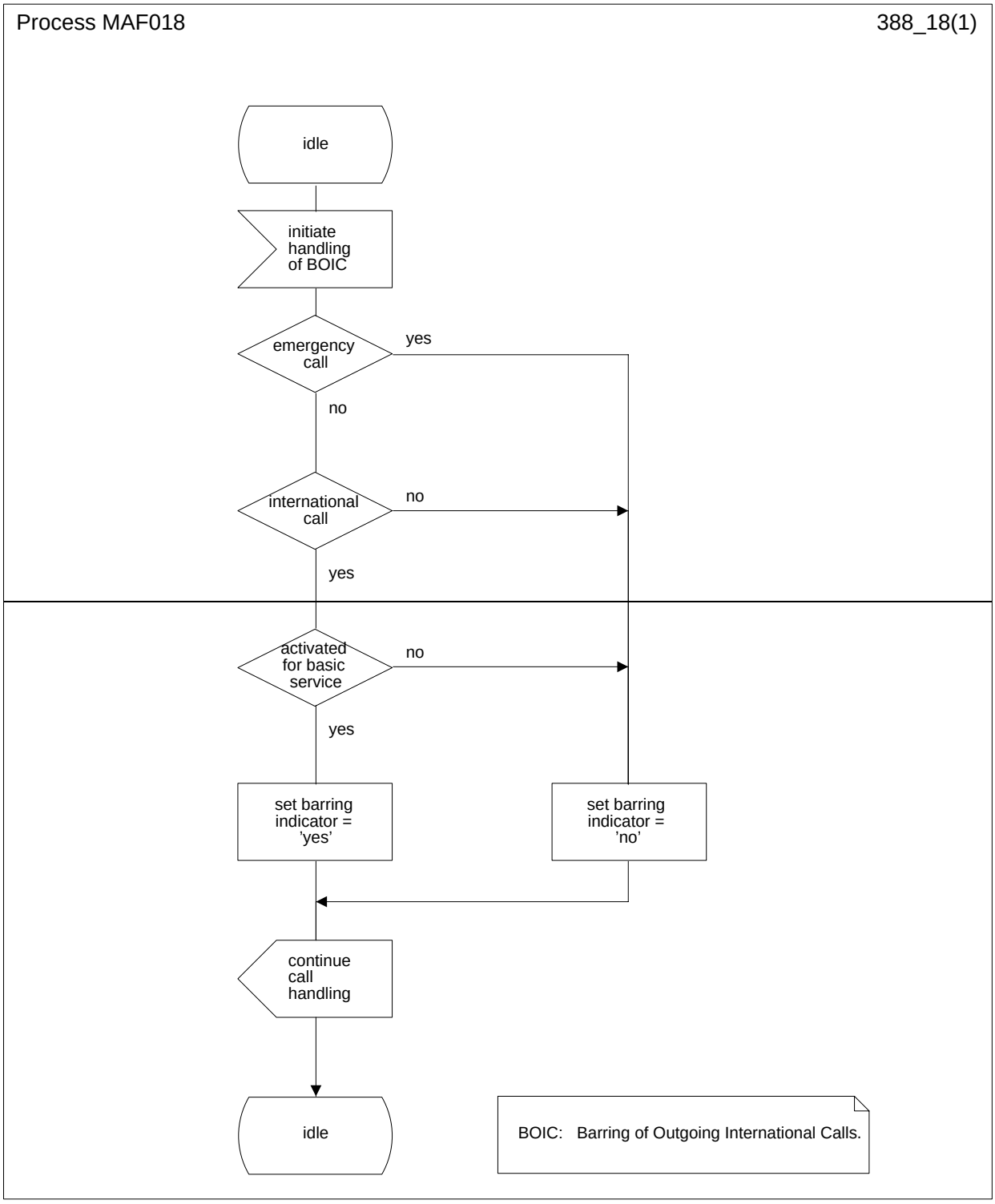


Figure 6.7: MAF017 Barring of all outgoing calls related authorisations examination (VLR)


Process MAF018
388_18(1)
idle
initiate handling of BOIC
emergency call
yes
no
international call
no
yes
activated for basic service
no
yes
set barring indicator = 'yes'
set barring indicator = 'no'
continue call handling
idle
BOIC: Barring of Outgoing International Calls.

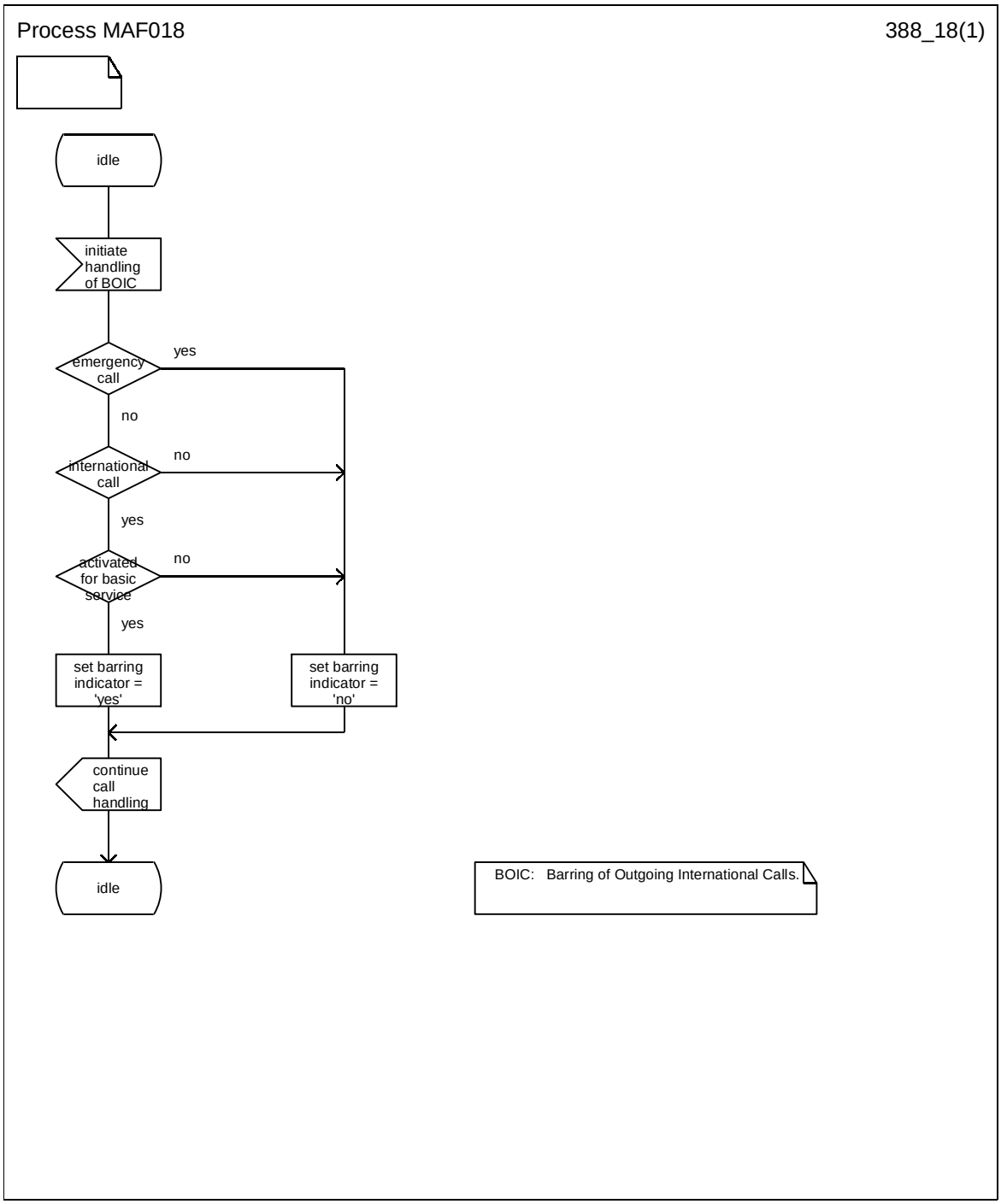
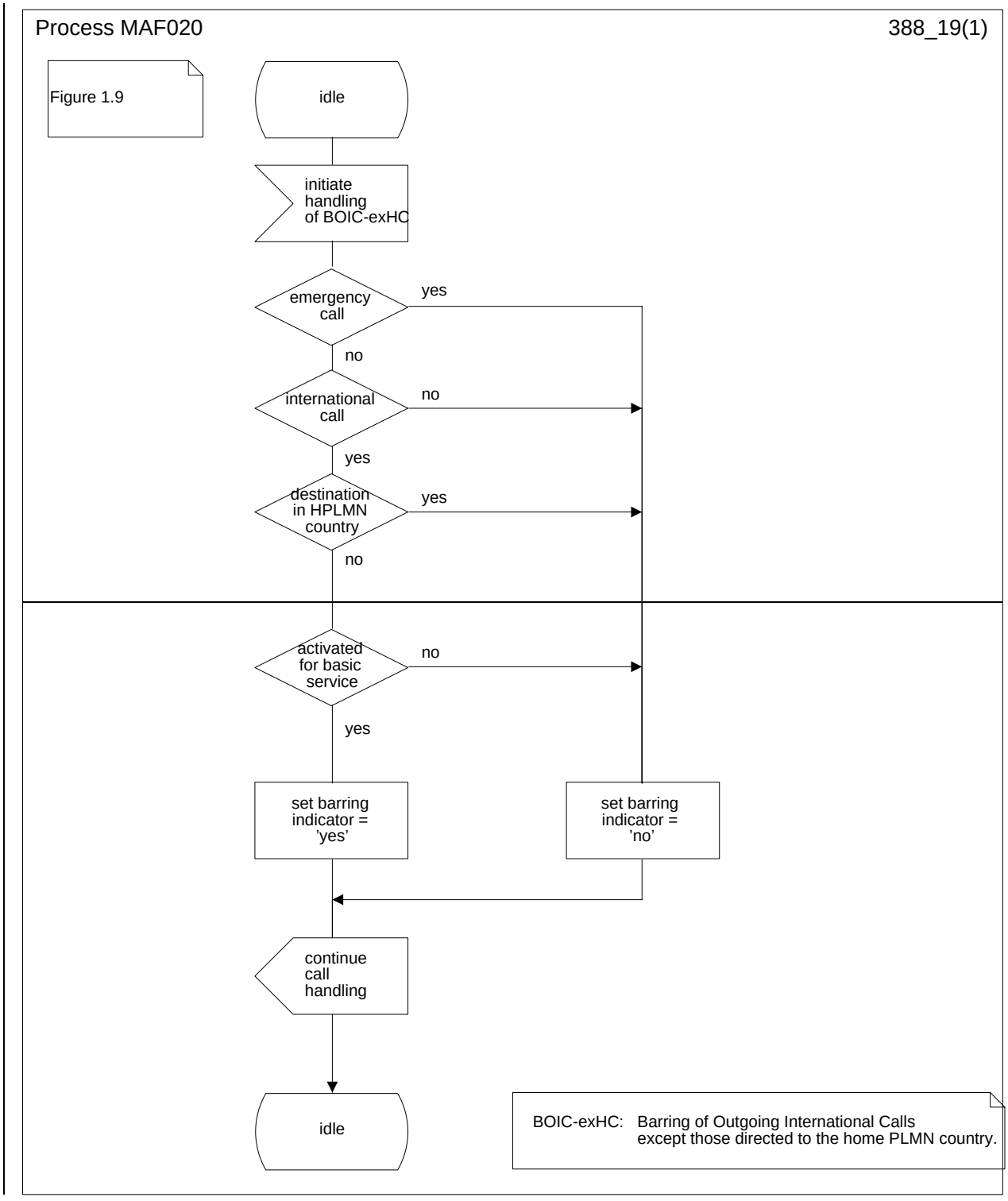


Figure 6.8: MAF018 Barring of all outgoing international calls related authorisations examination (VLR)


Process MAF020
388_19(1)
Figure 1.9
idle
initiate handling of BOIC-exHC
emergency call
yes
no
international call
no
yes
destination in HPLMN country
yes
no
activated for basic service
no
yes
set barring indicator = 'yes'
set barring indicator = 'no'
continue call handling
idle
BOIC-exHC: Barring of Outgoing International Calls except those directed to the home PLMN country.

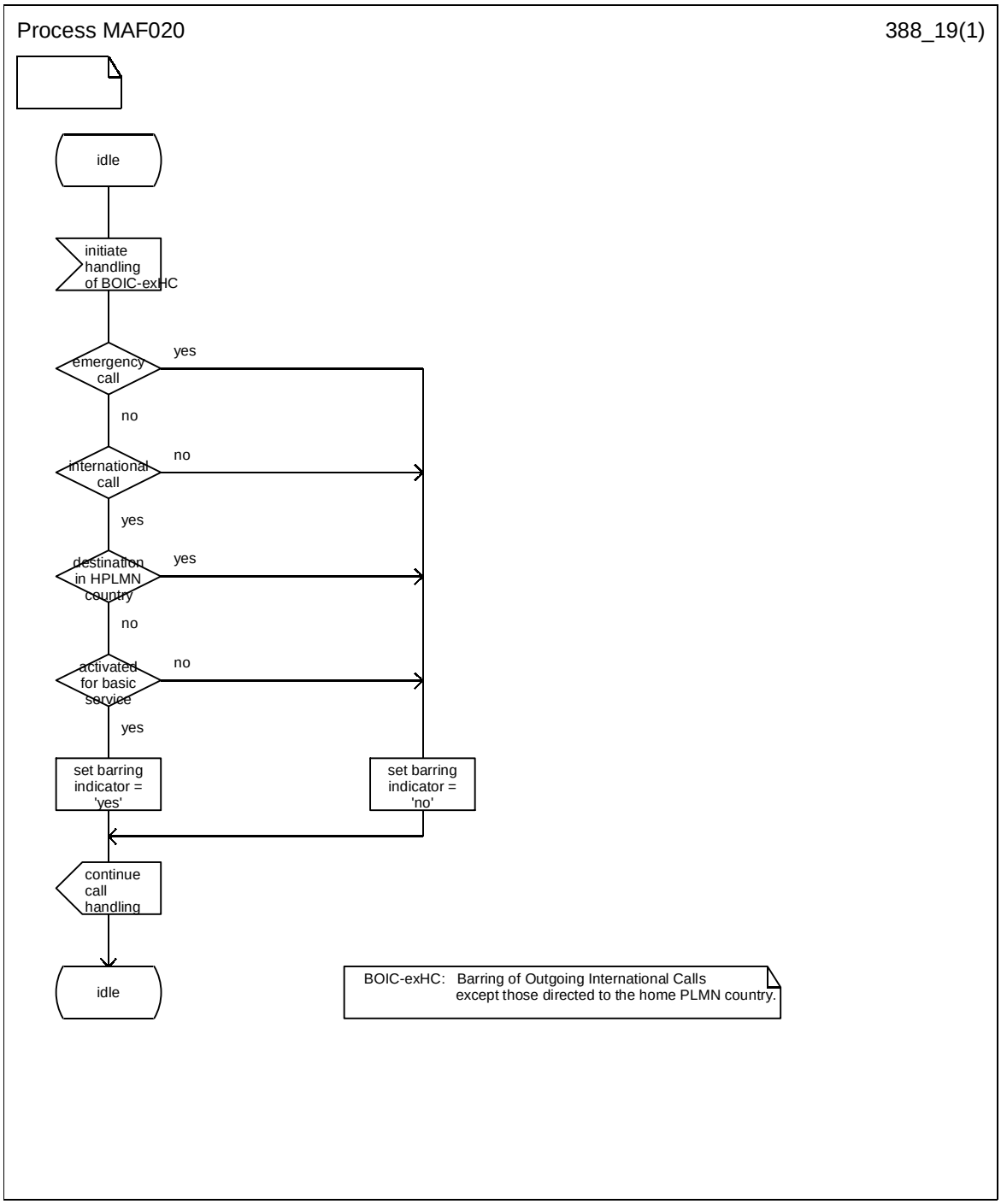
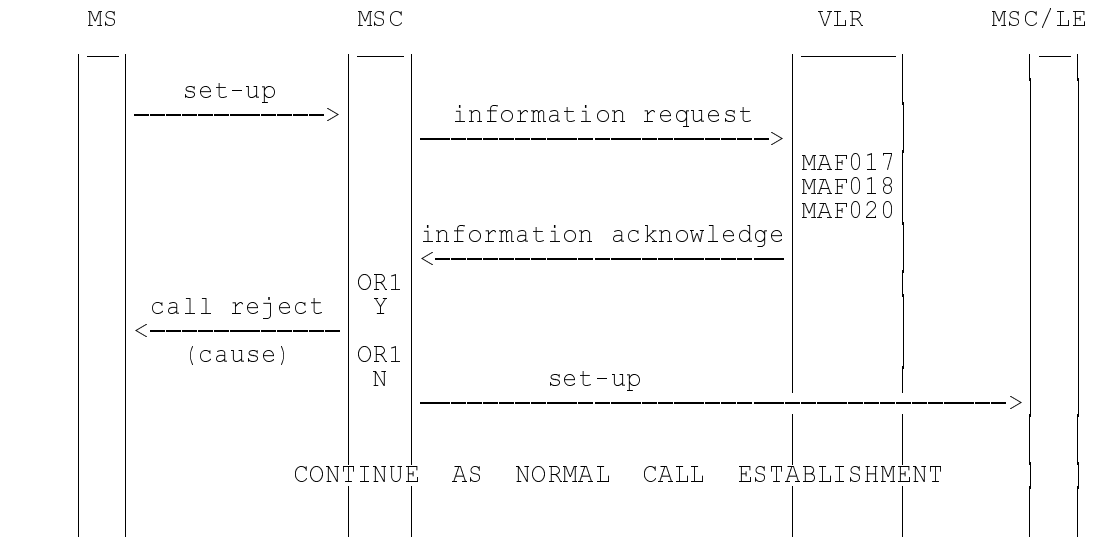


Figure 6.9: MAF020 Barring of outgoing international calls except those directed to the home PLMN country related authorisations examination (VLR)



NOTE: OR1: call barred Y: yes
N: no

Figure 6.10: Information flow for barring of outgoing calls

6.3 Information stored in the HLR

For all call barring supplementary services in the HLR must be stored:

- the subscription option "control of barring services" on per subscriber basis.

  This subscription option takes one of the following values:

  - by subscriber using password;
  - by the service provider.

If the subscription option "control of barring services" has been set to "by subscriber using password" for barring of outgoing calls in the HLR must be stored on per subscriber basis:

- the registration parameter "call barring password".

  The password is valid for all basic services to which barring of outgoing calls applies;

- the status parameter "wrong password attempts counter" associated with the password.

Note that the subscription option and the call barring password are parameters which are associated with all call barring services.

The outgoing calls barring program may have the following logical states (refer to 3G TS 23.011 for an explanation of the notation):

Provisioning State	Registration State	Activation State	HLR Induction State
(Not Provisioned,	Not Applicable,	Not Active,	Not Induced)
(Provisioned,	Not Applicable,	Not Active,	Not Induced)
(Provisioned,	Not Applicable,	Active and Operative,	Not Induced)
(Not Provisioned,	Not Applicable,	Not Active,	Induced)
(Provisioned,	Not Applicable,	Not Active,	Induced)
(Provisioned,	Not Applicable,	Active and Operative,	Induced)

The activation and HLR induction states may be different for each applicable elementary basic service group.

The provisioning state shall be on a per subscriber basis, and hence the same for all basic service groups.

The HLR shall also store the logical state of the outgoing calls barring program (which shall be one of the valid states listed above) for each applicable elementary basic service group.

6.4 State transition model

The following figure shows the successful cases of transition between the applicable logical states of the barring of outgoing call program. The state changes are either caused by actions of the service provider, the mobile user or the network.

Note that error cases are not shown in the diagram as they normally do not cause a state change. Additionally, some successful requests may not cause a state change. Hence, they are not shown in diagram.

The diagram only shows operations on an elementary basic service group.

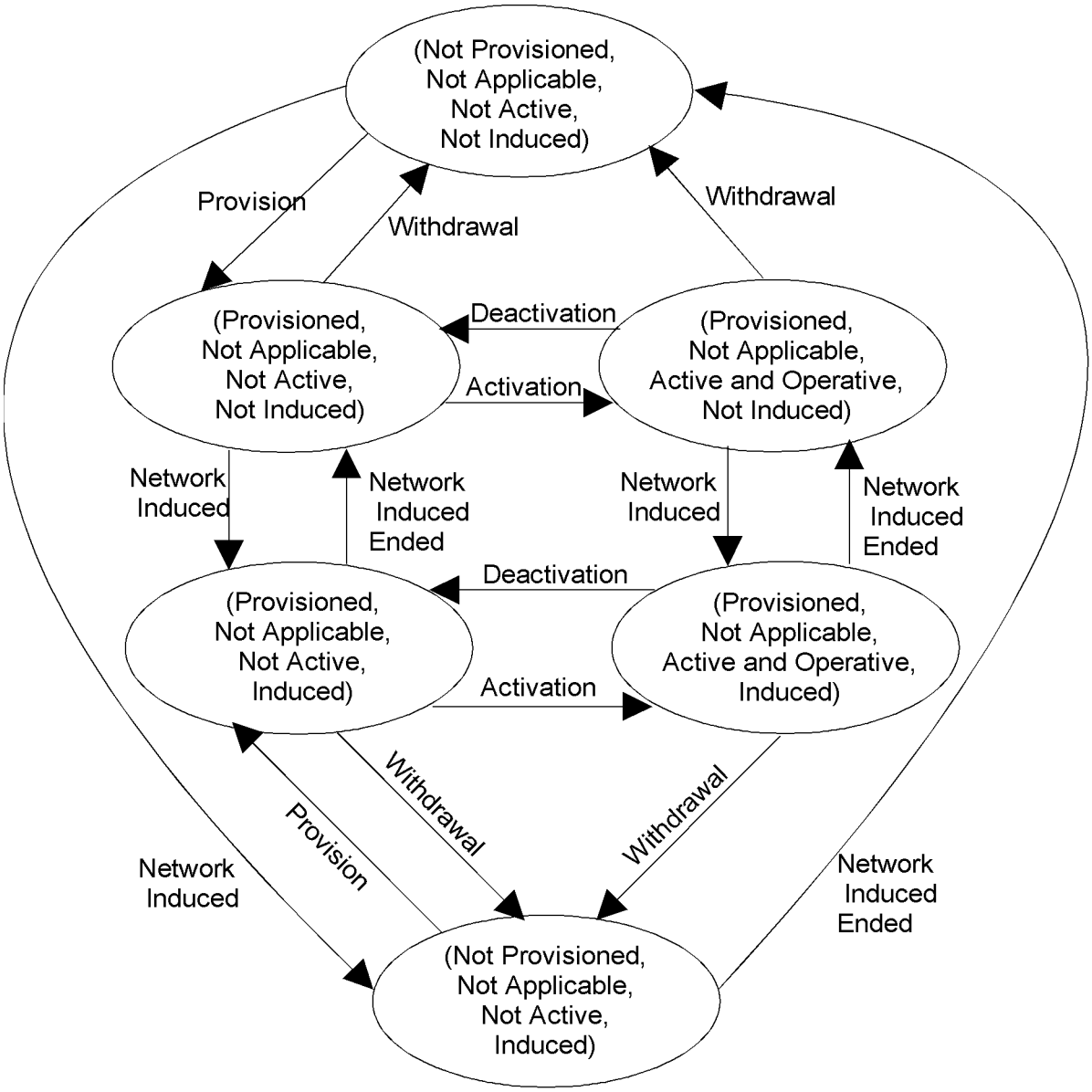


Figure 6.11: State transition model for BAOC, BOIC and BOIC-exHC

6.5 Transfer of information from HLR to VLR

If the provisioning state for the outgoing calls barring program is "Provisioned" then when the subscriber registers on a VLR the HLR shall send that VLR information about the logical state of the program for all relevant elementary basic service groups.

If the HLR induction state for the outgoing calls barring program is "Induced" then when the subscriber registers on a VLR the HLR shall send that VLR information about the logical state of the program for all relevant elementary basic service groups.

If the logical state of the outgoing calls barring program is changed while a subscriber is registered on a VLR then for the affected basic service groups, the HLR shall inform the VLR of the new logical state of the program.

6.6 Information stored in the VLR

For each barring of outgoing calls program the VLR shall store the service state information received from the HLR.

6.7 Handover

Handover will have no impact on the control procedures and the operation of the service.

6.8 Cross Phase compatibility

6.8.1 MS, MSC, VLR or HLR only support Phase 1 control of SS by the subscriber

In response to a Barring of outgoing calls interrogation request, if the MS or any network element involved is of Phase 1, only information concerning basic service groups for which the activation state has the value "Active and Operative" will be returned.

6.8.2 HLR only support Phase 1 updating of subscriber information

If the VLR receives the SS-status parameter from a Phase 1 HLR it shall act as if it has received the SS-Status parameter with the values shown in the following:

1) Activated => P bit = 1, R bit = 0 or 1, A bit = 1, Q bit = 0;

2) Deactivated => P bit = 1, R bit = 0 or 1, A bit = 0, Q bit = 0 or 1.

7 Barring of incoming calls

7.1 Handling of barring of incoming calls

7.1.1 Registration

If the served mobile subscriber at provision time has selected the subscription option "control of barring services by subscriber using password", he has to register a password at provision time. Furthermore the served mobile subscriber can change the password by an appropriate control procedure at any time. The control procedure consists of three steps: first, the old password has to be provided. Secondly, the new password has to be given, after which it has to be verified by providing it once more, see 3G TS 23.011.

If the served mobile subscriber at provision time has selected the subscription option "control of barring services by the service provider" an attempt to register a password will be denied and the served mobile subscriber should receive a notification.

The subscriber can register a new password, thus causing the previous registration to be overridden, see 3G TS 23.011.

7.1.2 Activation

7.1.2.1 General

The procedure for activation of Barring of outgoing calls, described in subclause 1.1.2.1, is valid also for activation of Barring of incoming calls.

The information flow for activation of barring of incoming calls is shown in figure 7.3. For more details see 3G TS 23.011.

7.1.2.2 Interactions between barring of incoming call programs

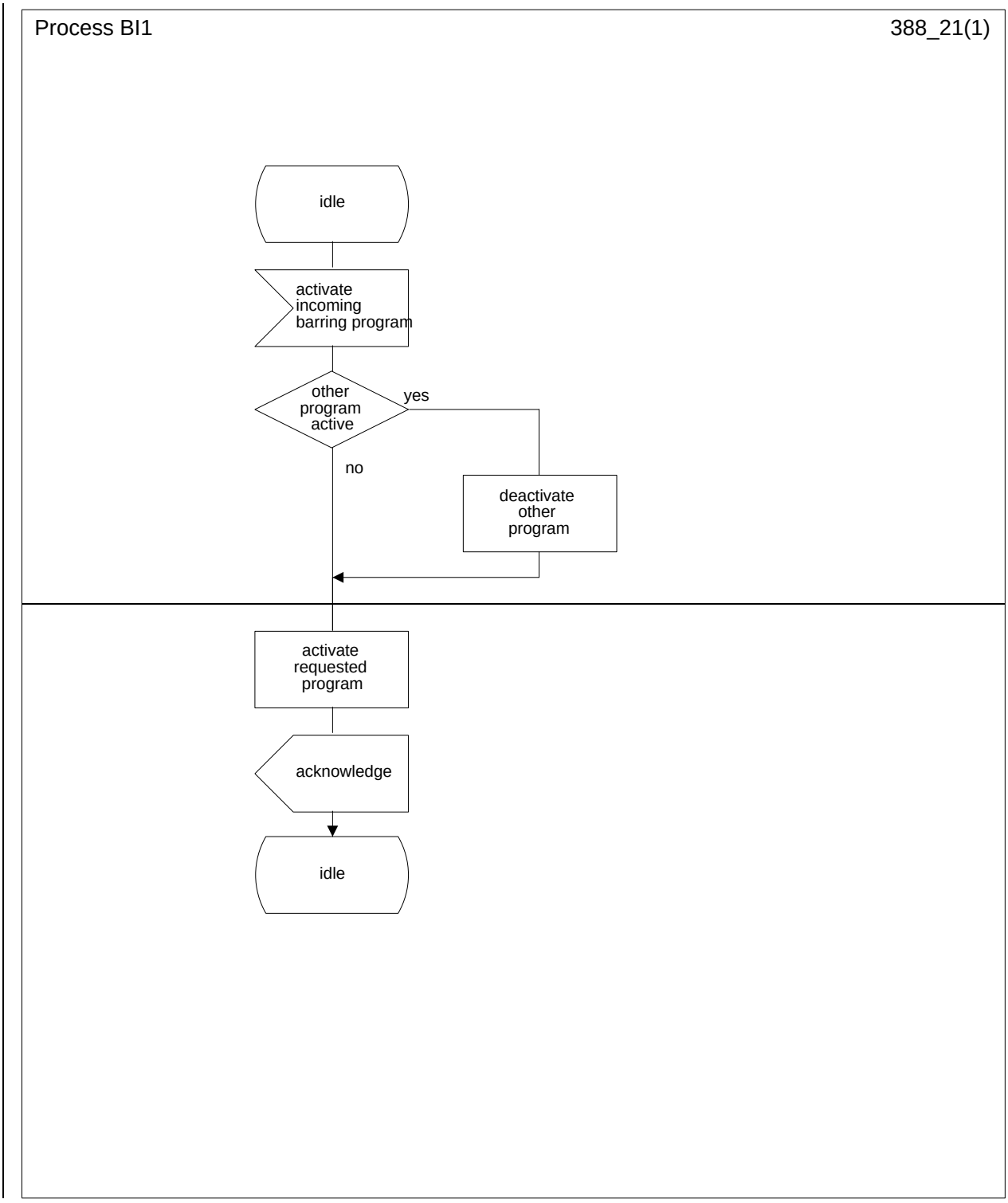
In case the mobile subscriber activates barring of all incoming calls and barring of incoming calls when roaming outside the home PLMN country was already activated, barring of incoming calls when roaming outside the home PLMN country will be deactivated and barring of all incoming calls will be activated.

The SDL diagram in figure 7.1 shows the function to be performed in the HLR in order to deal with this interaction between call barring services.

7.1.2.3 Interactions with call forwarding supplementary services

For interactions with call forwarding supplementary services see 3G TS 22.082.

The SDL diagram in figure 7.2 shows the function to be performed in the HLR in order to deal with the interactions with call forwarding services.


Process BI1
388_21(1)
idle
activate incoming barring program
other program active
yes
no
deactivate other program
activate requested program
acknowledge
idle

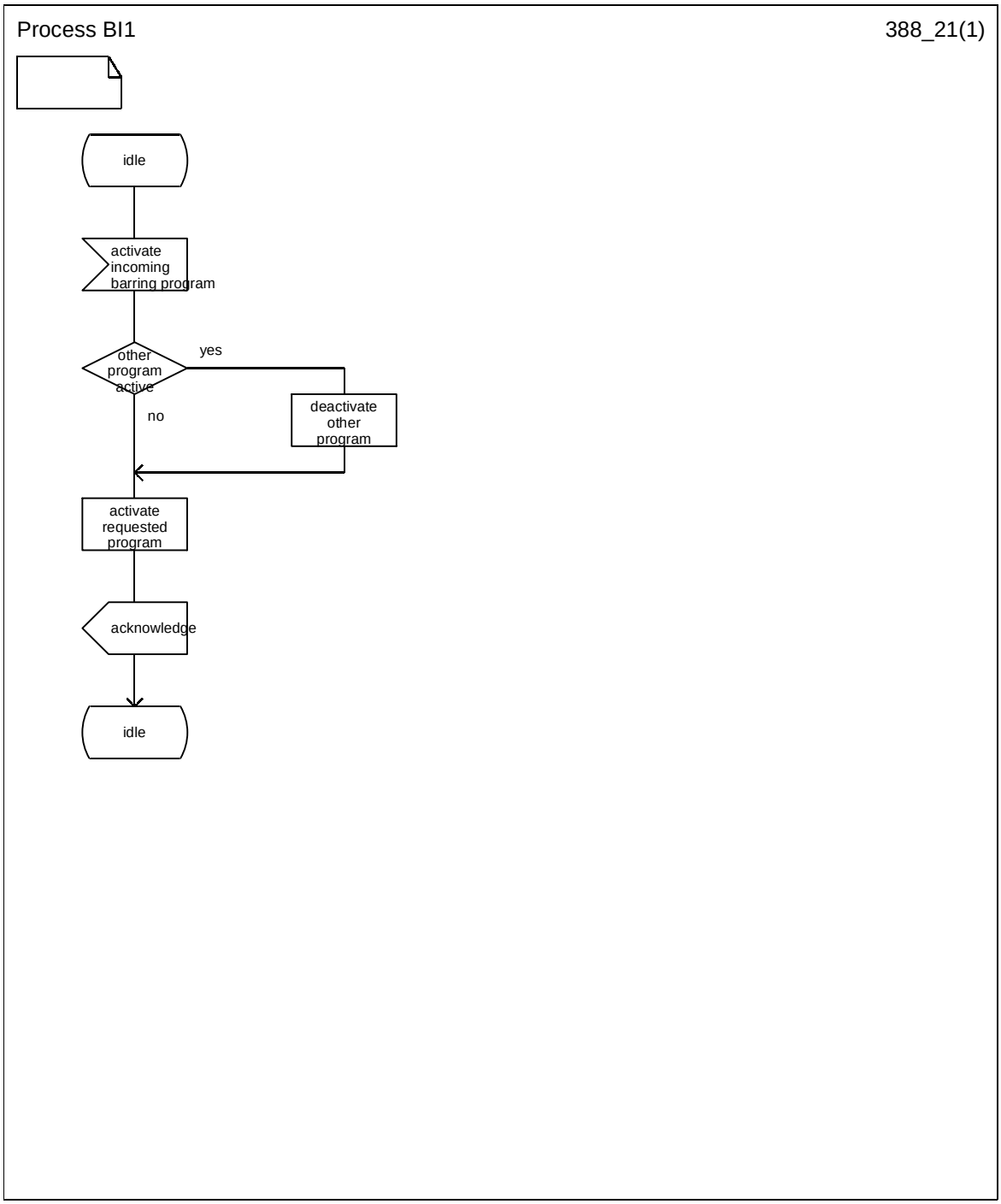
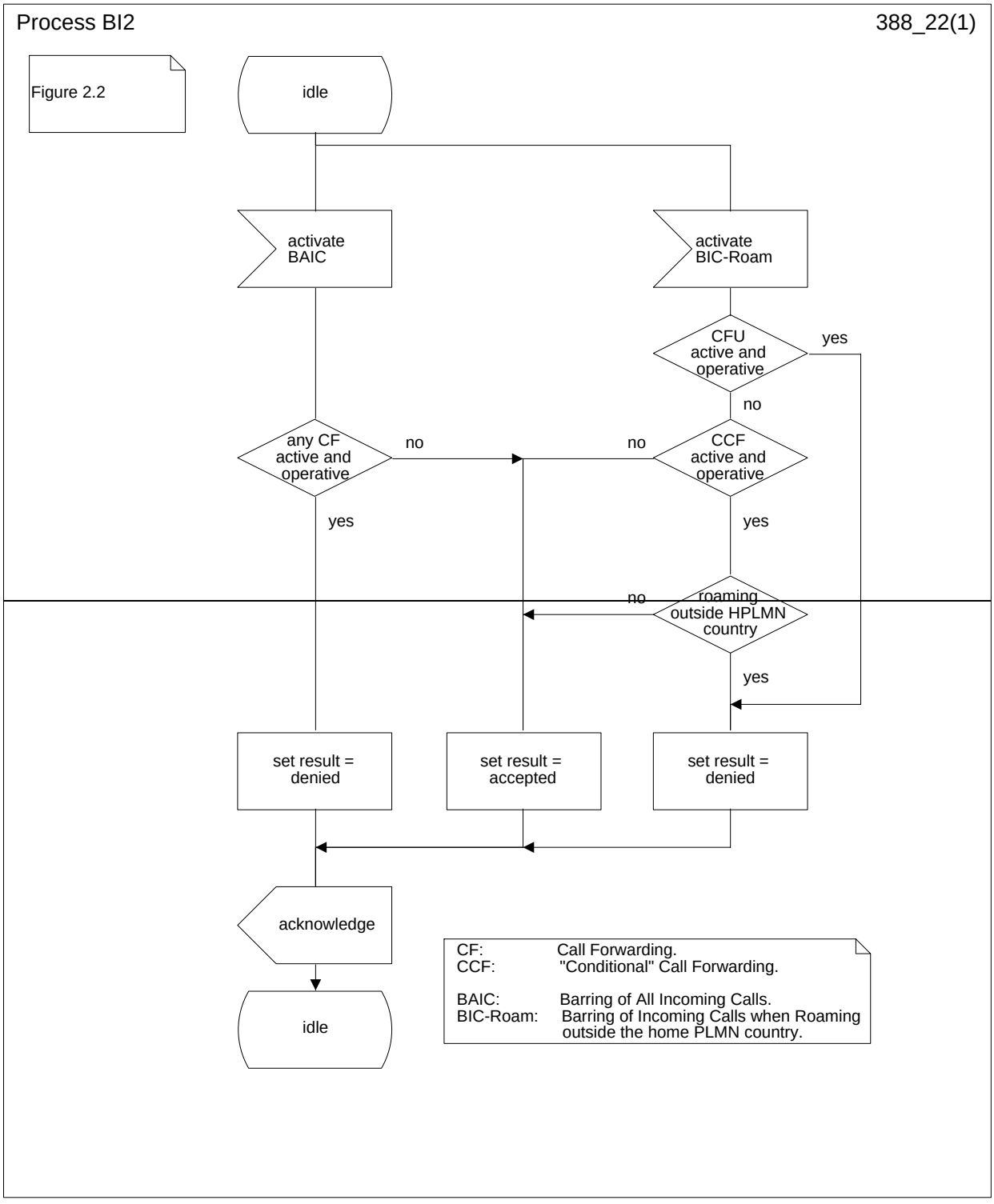


Figure 7.1: BI1 Interaction between call barring programs


Process BI2
388_22(1)
Figure 2.2
idle
activate BAIC
activate BIC-Roam
CFU active and operative
yes
no
any CF active and operative
no
no
CCF active and operative
yes
yes
no
roaming outside HPLMN country
yes
set result = denied
set result = accepted
set result = denied
acknowledge
idle
CF: Call Forwarding.
CCF: "Conditional" Call Forwarding.
BAIC: Barring of All Incoming Calls.
BIC-Roam: Barring of Incoming Calls when Roaming outside the home PLMN country.

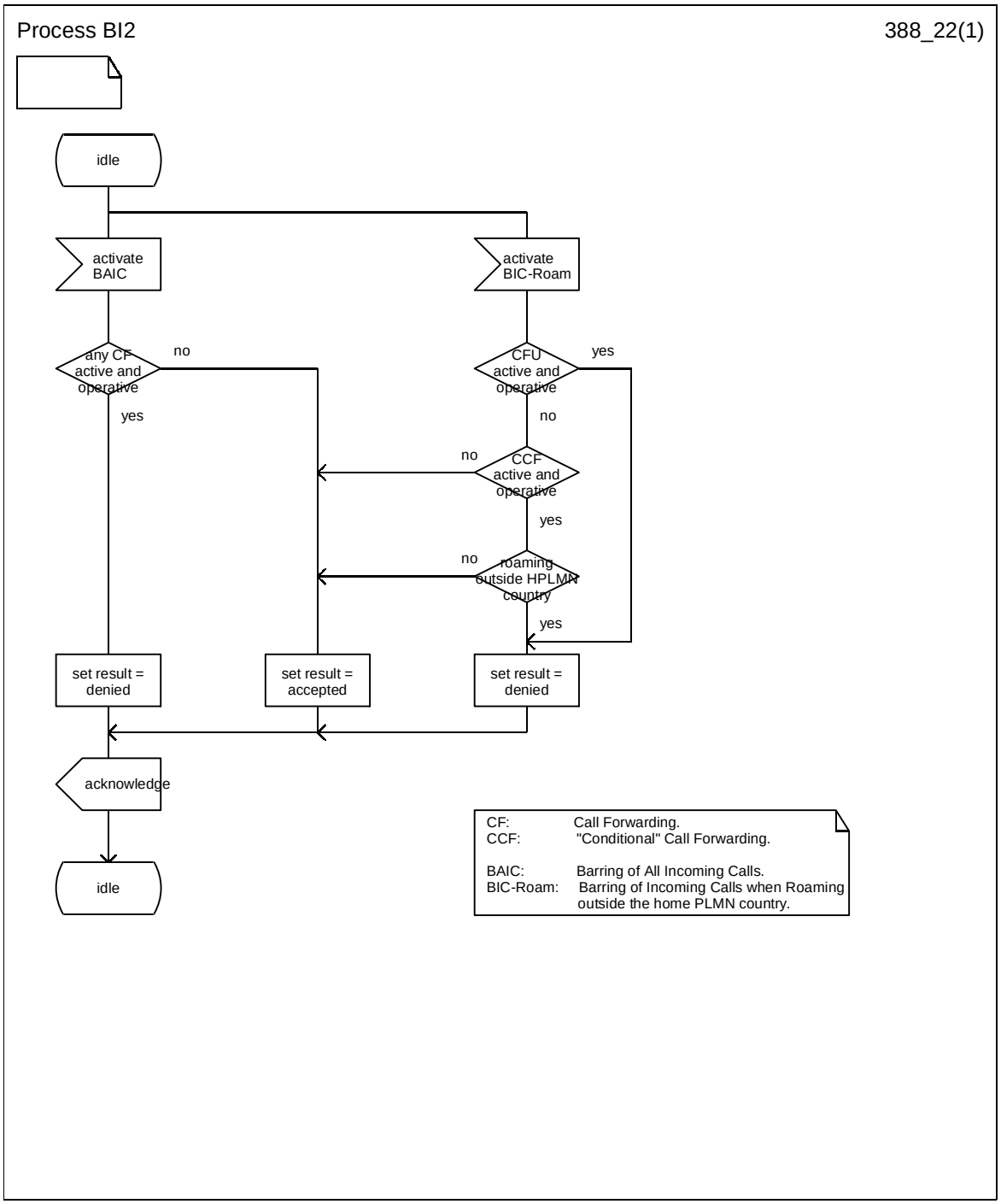
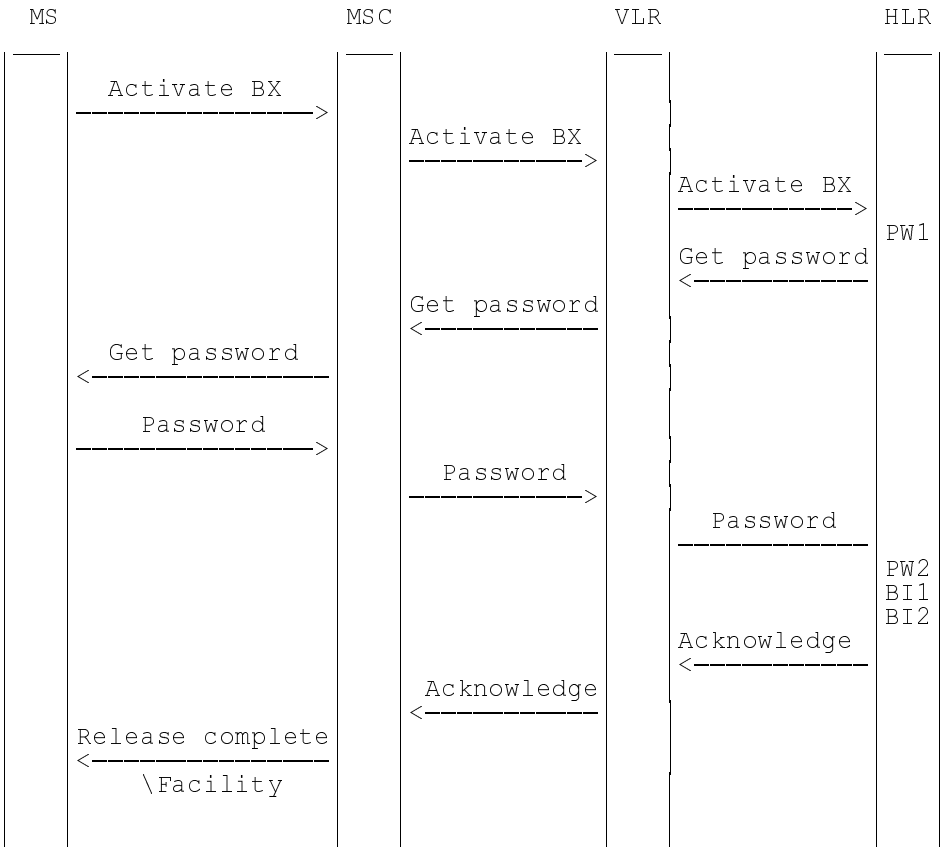


Figure 7.2: BI2 Interaction between call forwarding supplementary services and barring of incoming calls programs



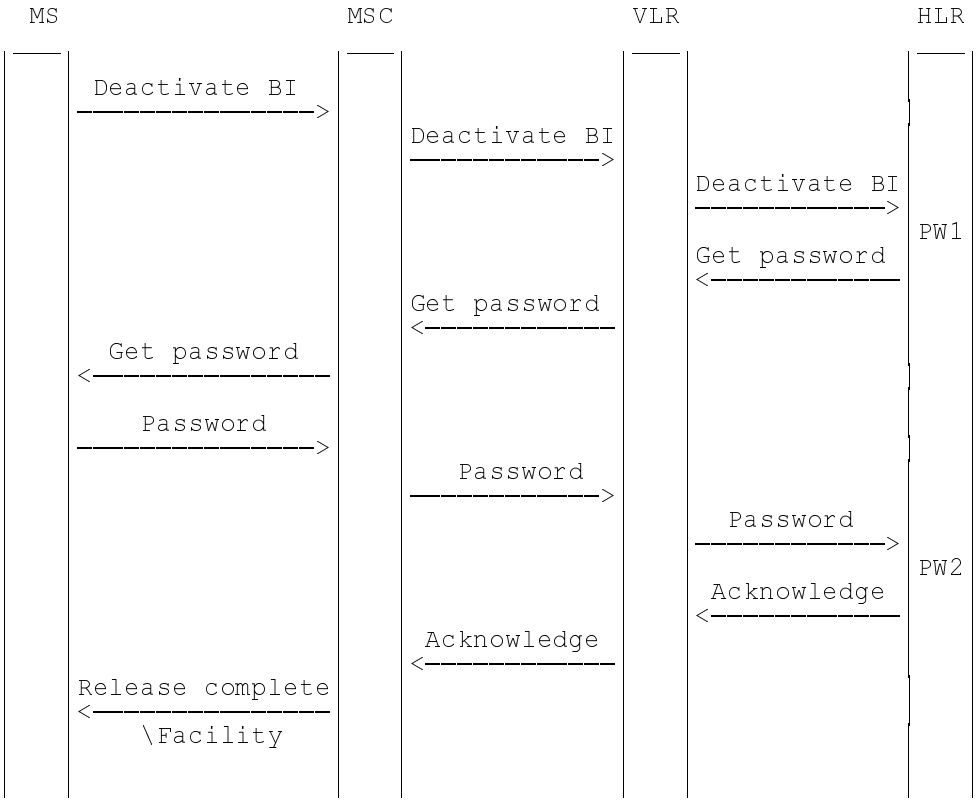
NOTE: BX indicates any of the barring programs.
PW1 and PW2 indicate password handling programs, see 3G TS 23.011.

Figure 7.3: Activation of barring of incoming calls

7.1.3 Deactivation

The procedure for activation of Barring of outgoing calls, described in subclause 1.1.2.1, is valid also correspondingly for deactivation of Barring of incoming calls with the addition that a barring supplementary service, i.e. the Incoming barring service, or All barring services can be signalled.

The information flow for deactivation of barring of incoming calls is shown in figure 7.4. For more details see 3G TS 23.011.



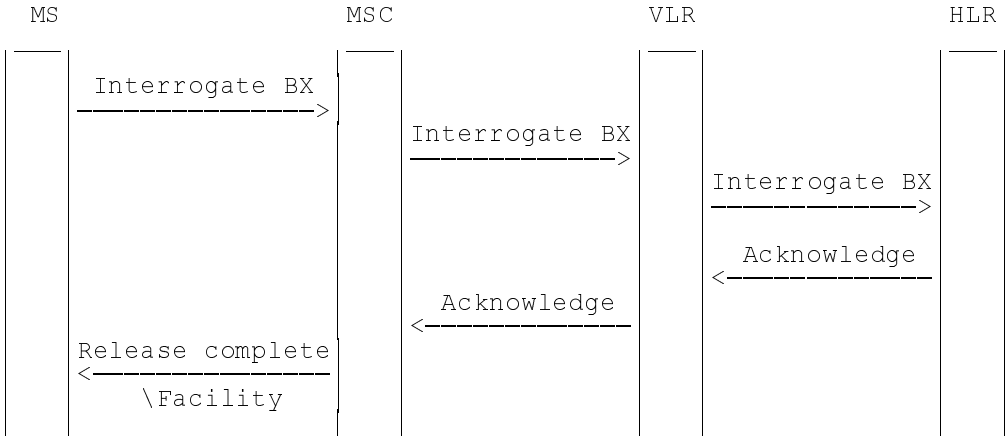
NOTE: BI indicates the general code for barring of incoming calls.
PW1 and PW2 indicate password handling programs, see 3G TS 23.011.

Figure 7.4: Deactivation of barring of incoming calls

7.1.4 Interrogation

The interrogation procedure enables the mobile subscriber to obtain information about the data stored in the PLMN. After having requested this procedure the network shall return a list of all basic services to which the given program is active.

The information flow for interrogation of barring of incoming calls is shown in figure 7.5.



NOTE: BX indicates any of the barring programs.

Figure 7.5: Interrogation of barring of incoming calls

7.2 Functions and information flows

The following Mobile Additional Functions have been identified:

MAF022

Barring of all incoming calls related authorizations examination
The ability of a PLMN component to determine the authorizations relating to barring of incoming calls. See figure 7.6.

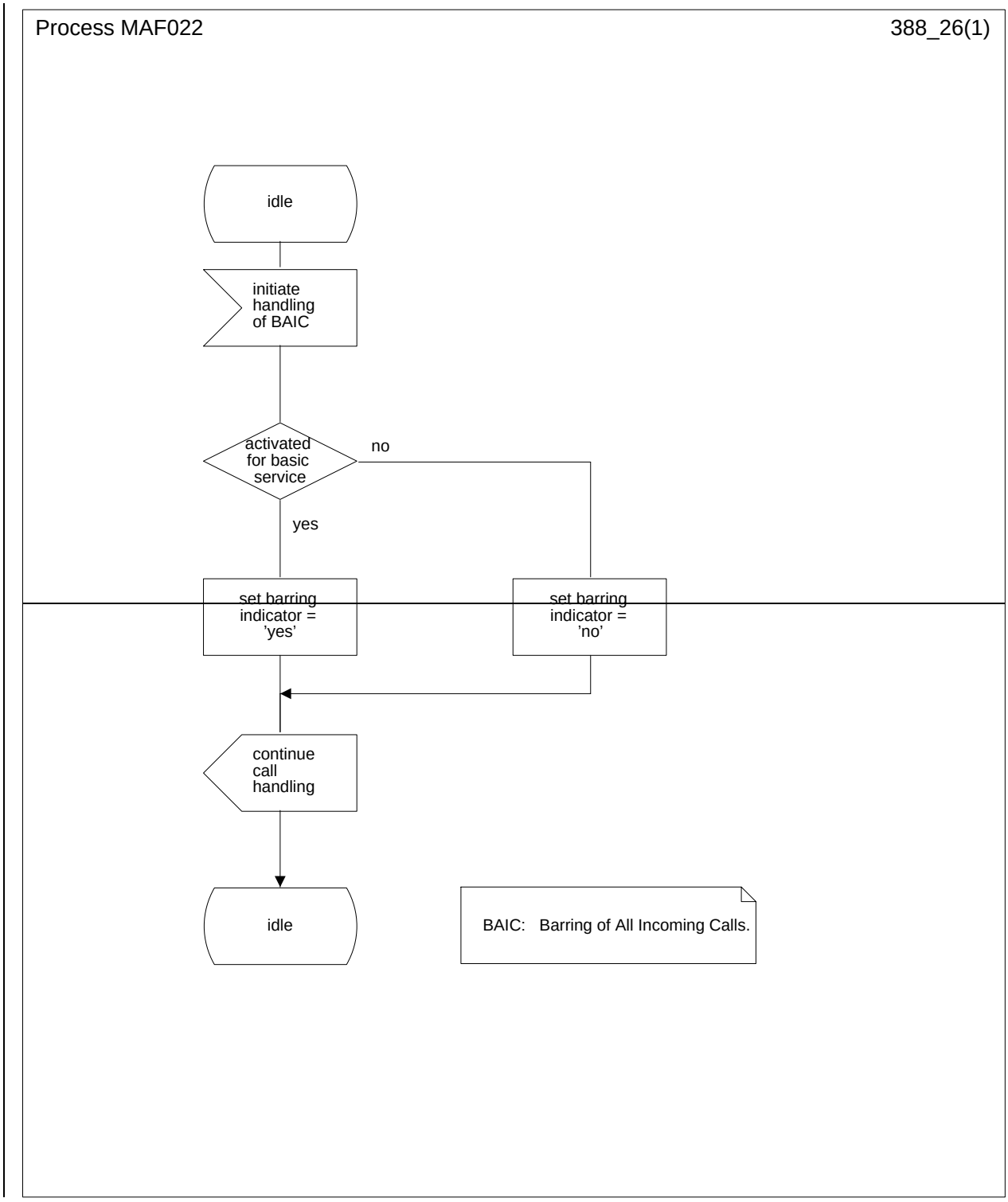
Location: HLR

MAF023

Barring of incoming calls when roaming outside the home PLMN country related authorizations examination
The ability of a PLMN component to determine the authorizations relating to barring of incoming calls when roaming outside the home PLMN country. See figure 7.7.

Location: HLR

The information flow for barring of incoming calls is shown in figure 7.8.


Process MAF022
388_26(1)
idle
initiate handling of BAIC
activated for basic service
no
yes
set barring indicator = 'yes'
set barring indicator = 'no'
continue call handling
idle
BAIC: Barring of All Incoming Calls.

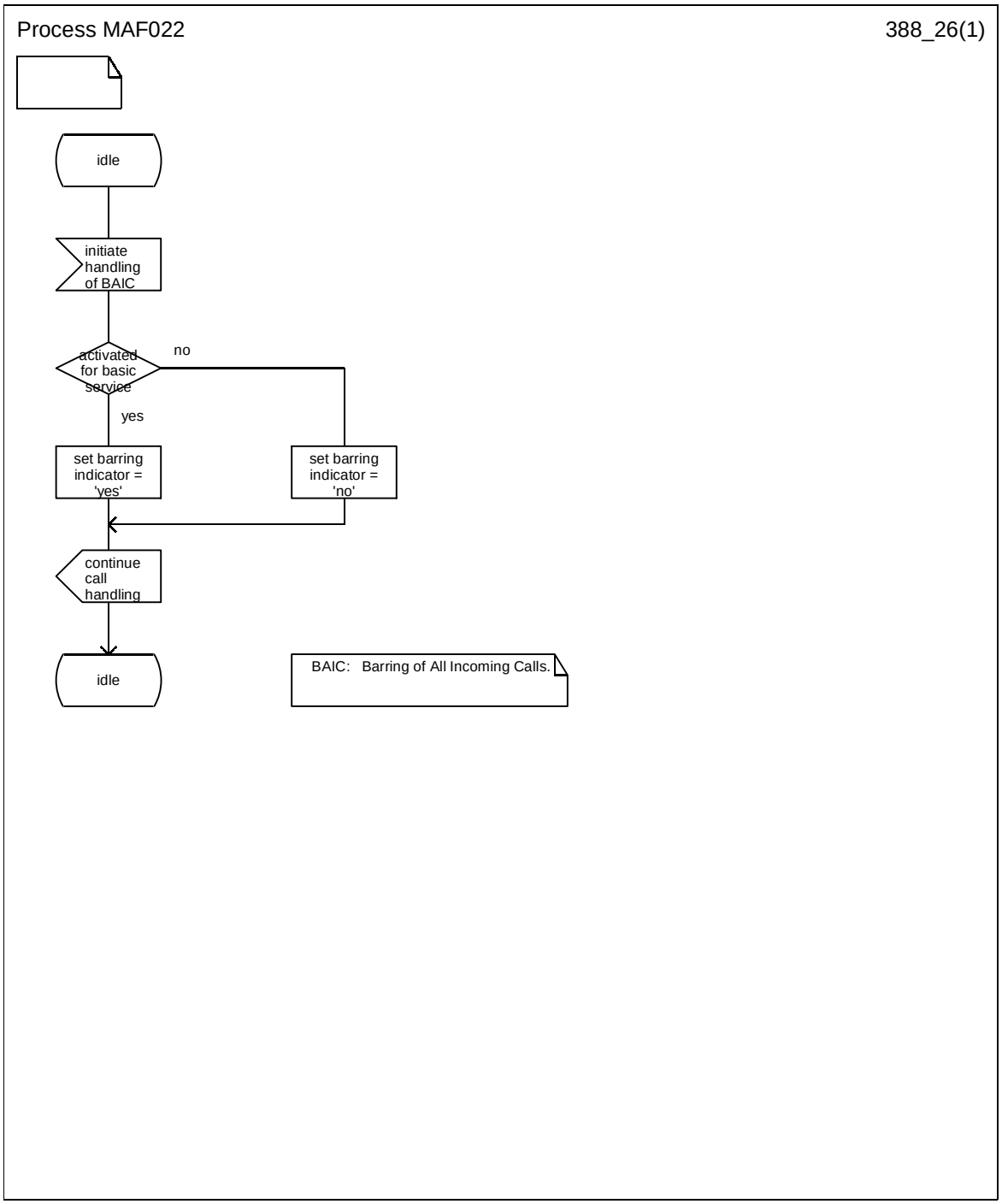
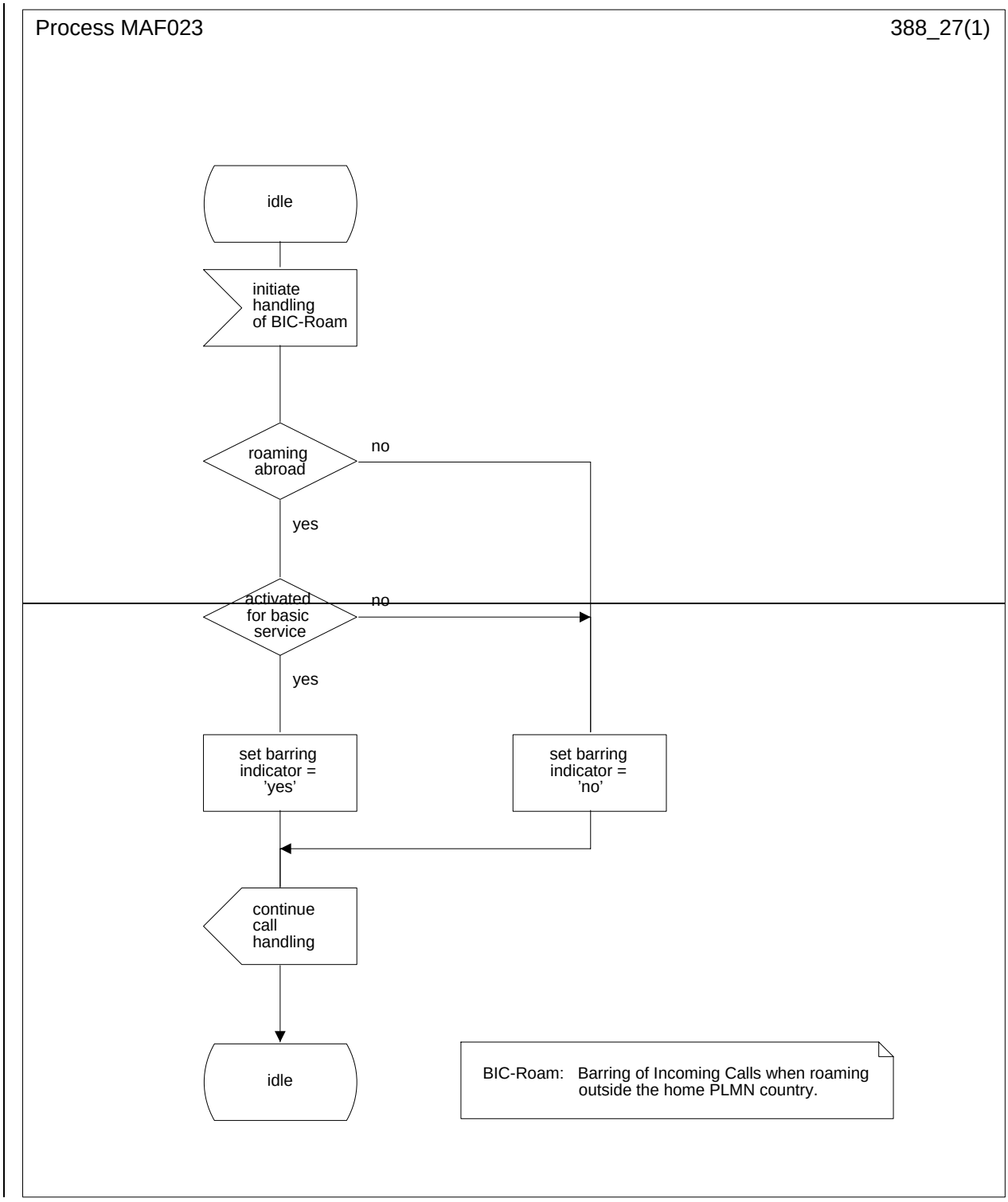


Figure 7.6: MAF022 Barring of all incoming calls related authorisations examination (HLR)


Process MAF023
388_27(1)
idle
initiate handling of BIC-Roam
roaming abroad
no
yes
activated for basic service
no
yes
set barring indicator = 'yes'
set barring indicator = 'no'
continue call handling
idle
BIC-Roam: Barring of Incoming Calls when roaming outside the home PLMN country.

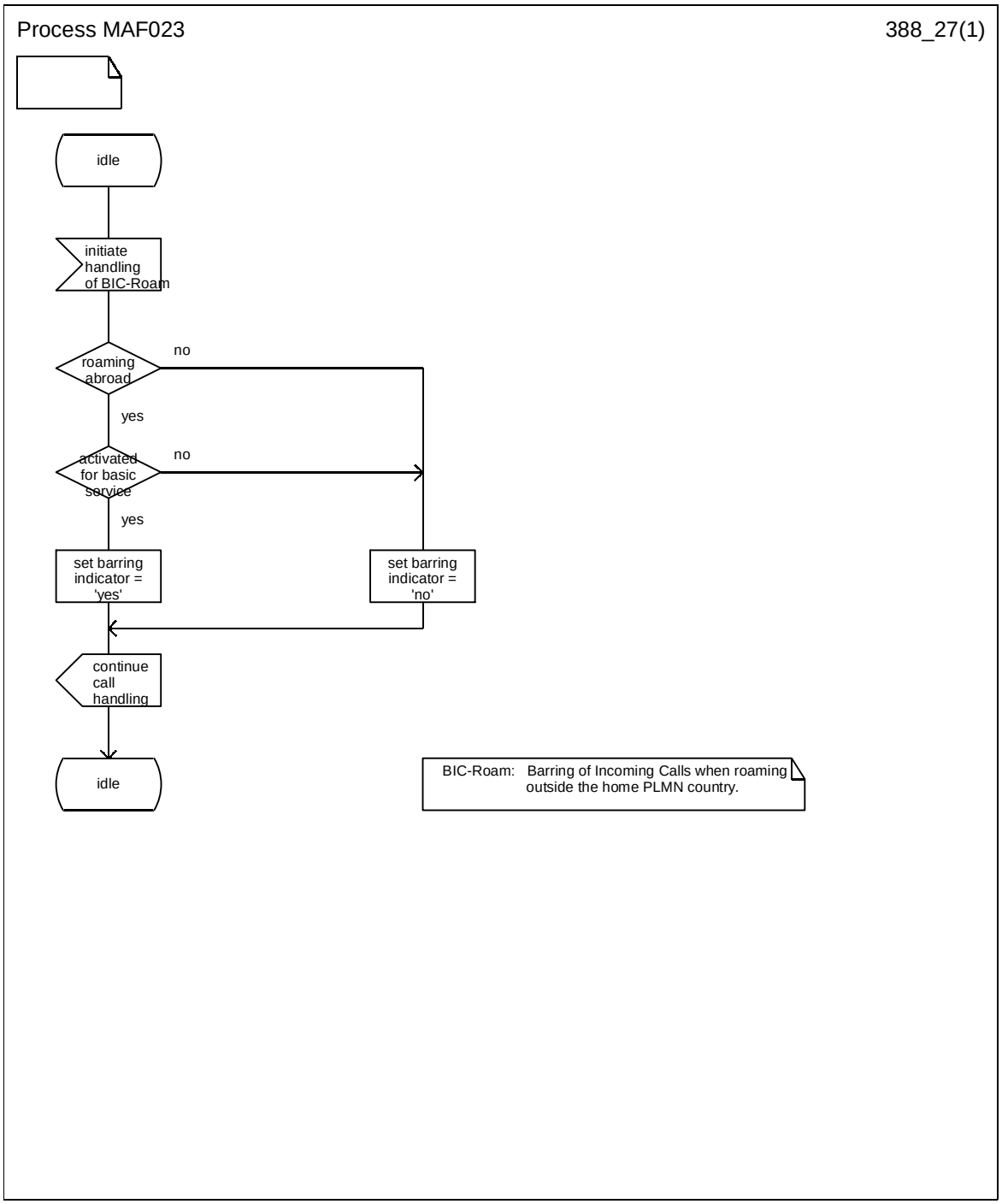

Process MAF023
388_27(1)
idle
initiate handling of BIC-Roam
roaming abroad
no
yes
activated for basic service
no
yes
set barring indicator = 'yes'
set barring indicator = 'no'
continue call handling
idle
BIC-Roam: Barring of Incoming Calls when roaming outside the home PLMN country.

Figure 7.7: MAF023 Barring of incoming calls when roaming outside the home PLMN country related authorisations examination (HLR)

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000437
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.090	CR	002	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#09	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: N4 **Date:** 2000-06-26

Subject: SDL refresh

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

The SDL diagrams in this document have been replaced, without any semantic changes due to the following reasons:

- In the previous version, the diagrams contained nothing but garbage when viewed on-screen.
- Some of the diagrams were, if not impossible, very hard to print.
- A binary version of the SDL diagrams, suitable for standard tools, is needed to assure a qualitative handling of the diagrams in the future. Telelogic Tau SDL Suite (formerly known as SDT) versions of the diagrams have been created and made available, providing a new fresh base for future changes. For obvious reasons, the binary version, to be regarded as the source, should be mirrored in the document. Therefore, the diagrams replacing the previous versions are printouts of the binary versions.

Clauses affected: All figures in the document, containing an SDL diagram.

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:

ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

5.2.5 Handling of unstructured SS operation at the MS

The MS may at any time receive a USSD operation (request or notification) from the MSC.

If the MS receives a USSD transaction while another USSD transaction (network or mobile initiated) or a non-call related supplementary service transaction is in progress, the MS shall reject the new transaction.

If the MS receives a USSD operation when it is in a state where the MMI required is not possible (e.g. during dialling) it shall reject the operation.

If the MS does not support the alphabet indicated in the USSD operation, it shall inform the network.

If the MS is in a state where it can handle the operation, it shall process the operation as follows:

- The MS shall analyse the data coding scheme and decides whether the USSD operation is MMI mode or application mode, . See GSM 02.30 for details of codes

If the data coding scheme corresponds to the MMI mode :

- For a USSD request, the MS shall display the text provided and await user input. If the user enters a response, the MS shall return the response to the MSC, maintaining the transaction. If the user requests release of the transaction, the MS shall release the transaction.

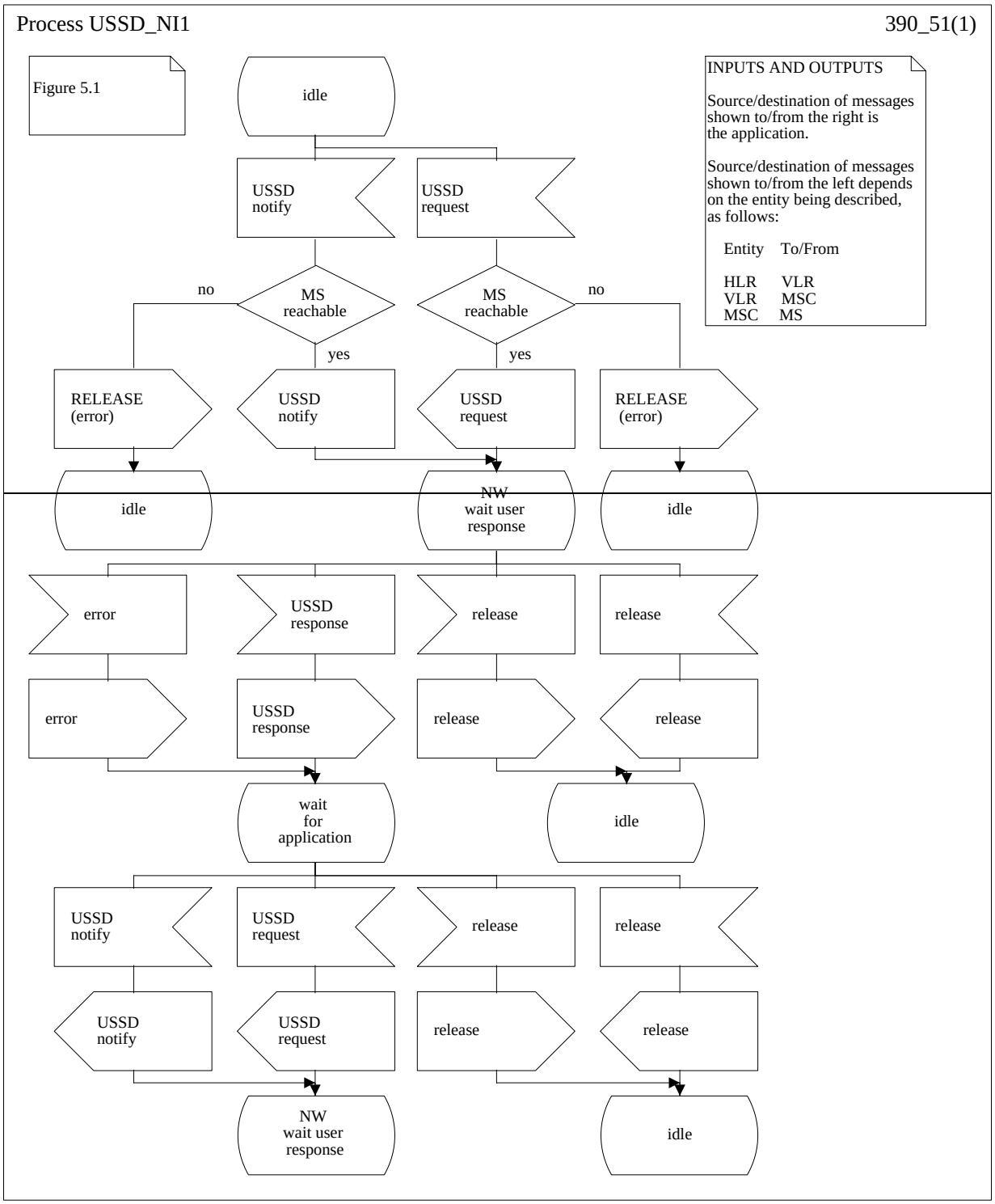
- For a USSD notification, the MS shall display the text provided and send back a response.

If the data coding schemes corresponds to the application mode :

- For a USSD request, the MS shall pass the message to the application addressed in the ME, SIM or TE, and await application response . If the application responds, the MS shall pass the response to the MSC, maintaining the transaction. If the application releases the transaction, the MS shall release the transaction.

- For a USSD notification, the MS shall pass the message to the application addressed in the ME, SIM or TE, and send back a response.

After sending the response to a USSD operation, the MS shall wait for the network to release the transaction. If, while awaiting this release, the MS receives any further USSD operations, it shall process them in the normal way.


Process USSD_NI1
390_51(1)
Figure 5.1
idle
INPUTS AND OUTPUTS
Source/destination of messages shown to/from the right is the application.
Source/destination of messages shown to/from the left depends on the entity being described, as follows:
Entity To/From
HLR VLR
VLR MSC
MSC MS
USSD notify
USSD request
MS reachable
no
yes
RELEASE (error)
USSD notify
USSD request
RELEASE (error)
idle
NW wait user response
idle
error
USSD response
release
release
error
USSD response
release
release
wait for application
idle
USSD notify
USSD request
release
release
USSD notify
USSD request
release
release
NW wait user response
idle

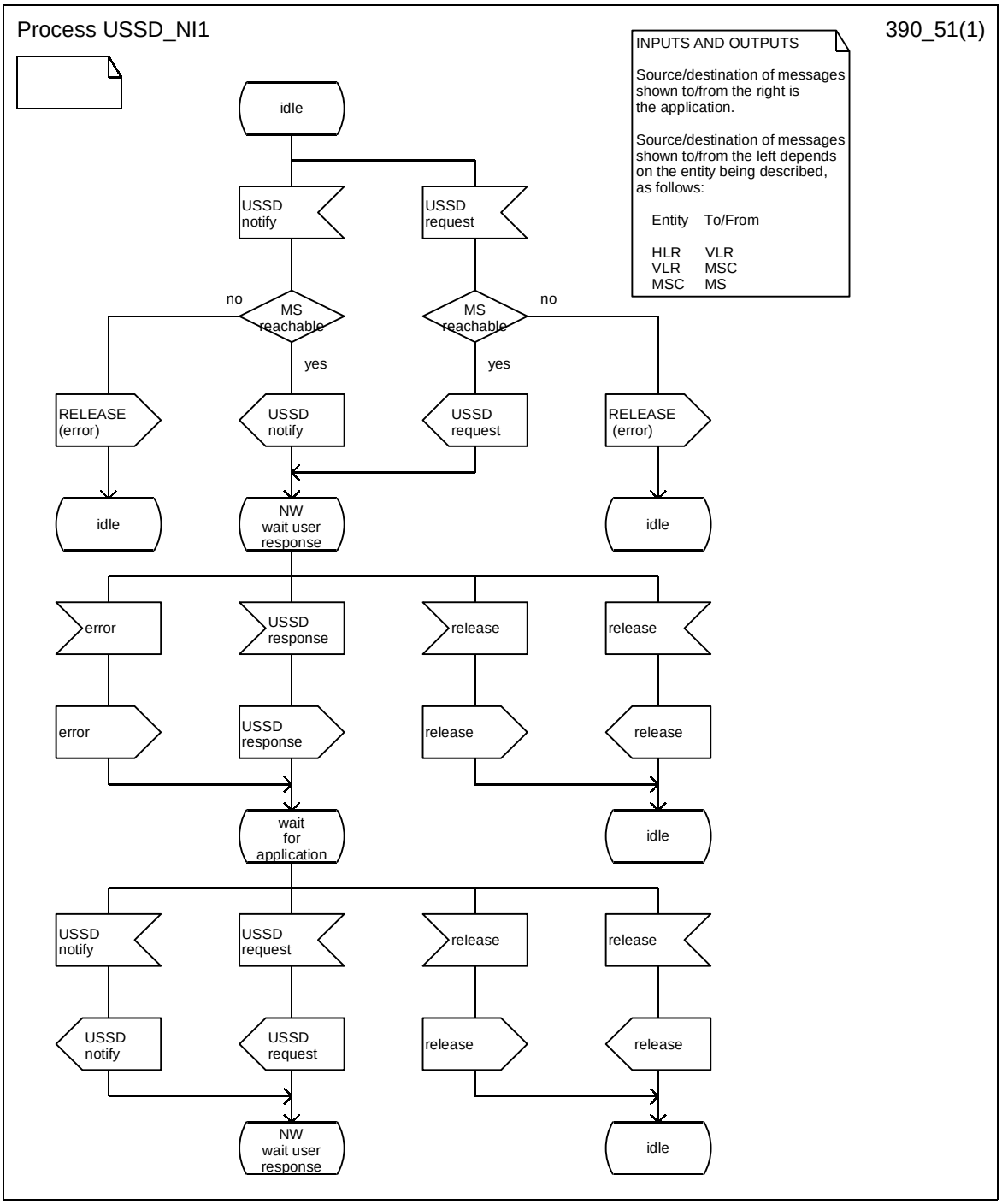
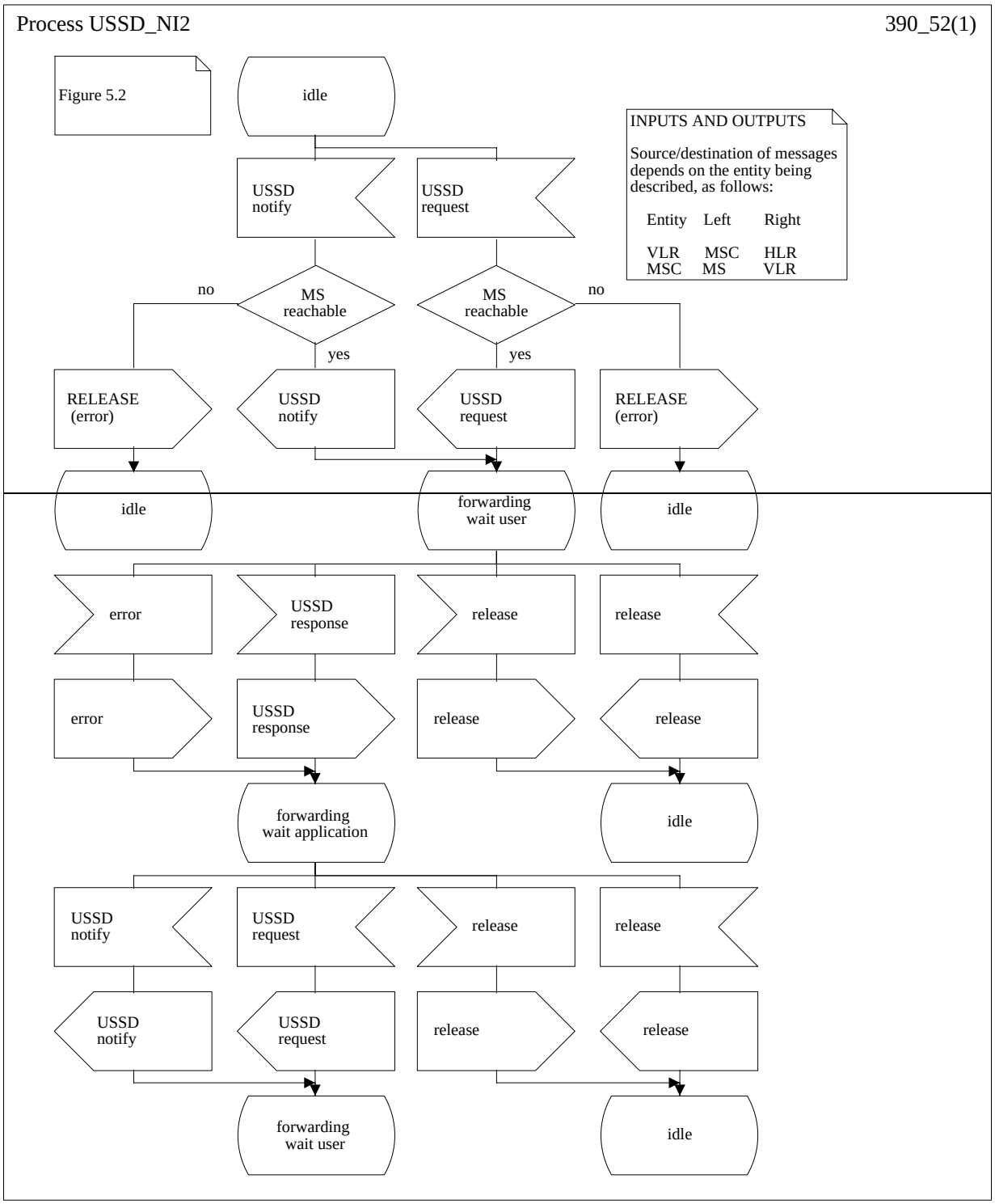


Figure 5.1: Network initiated USSD invoked at HLR, VLR or MSC


Process USSD_NI2
390_52(1)
Figure 5.2
idle
INPUTS AND OUTPUTS
Source/destination of messages depends on the entity being described, as follows:
Entity Left Right
VLR MSC HLR
MSC MS VLR
USSD notify
USSD request
no
MS reachable
MS reachable
no
yes
yes
RELEASE (error)
USSD notify
USSD request
RELEASE (error)
idle
forwarding wait user
idle
error
USSD response
release
release
error
USSD response
release
release
forwarding wait application
idle
USSD notify
USSD request
release
release
USSD notify
USSD request
release
release
forwarding wait user
idle

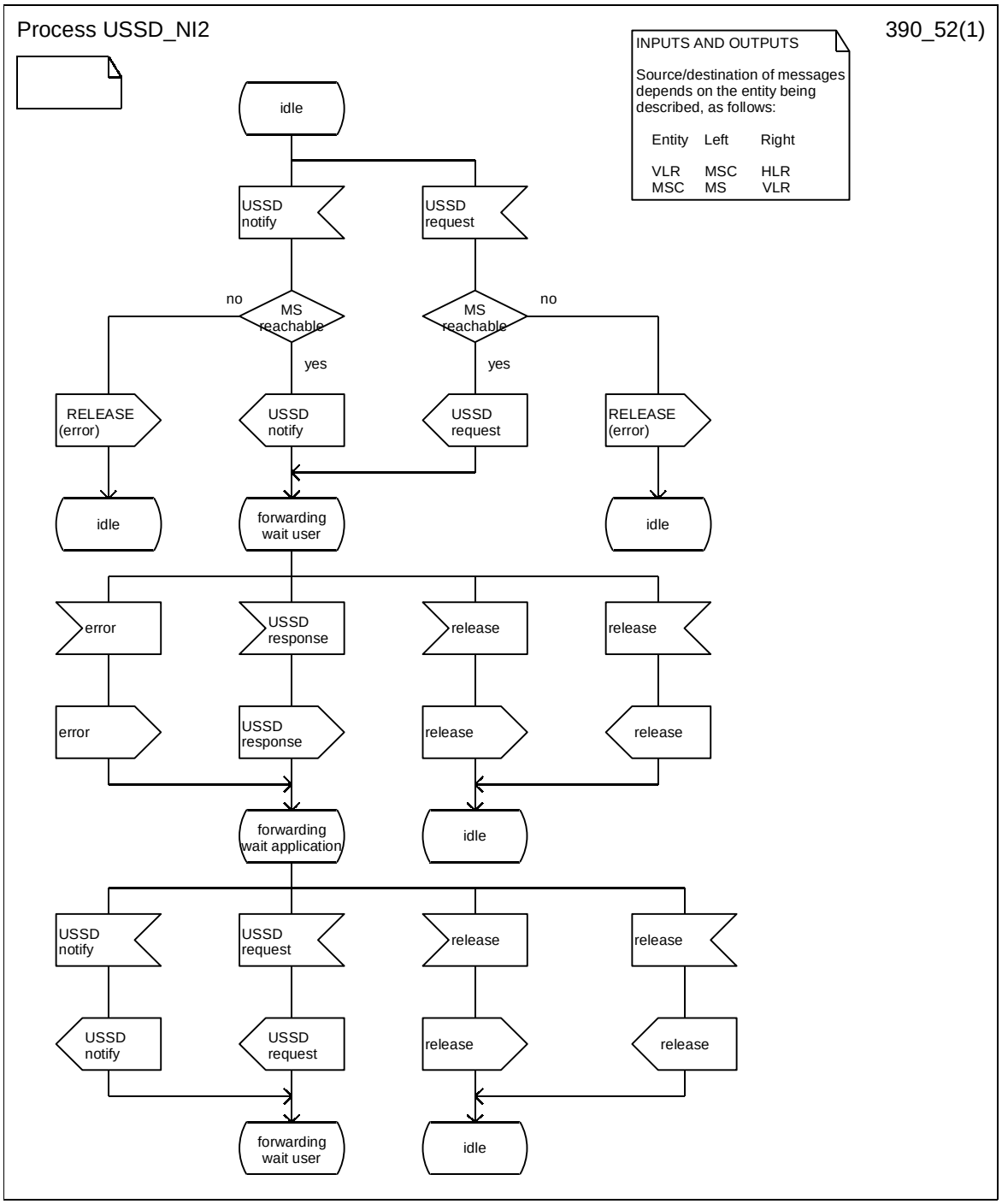
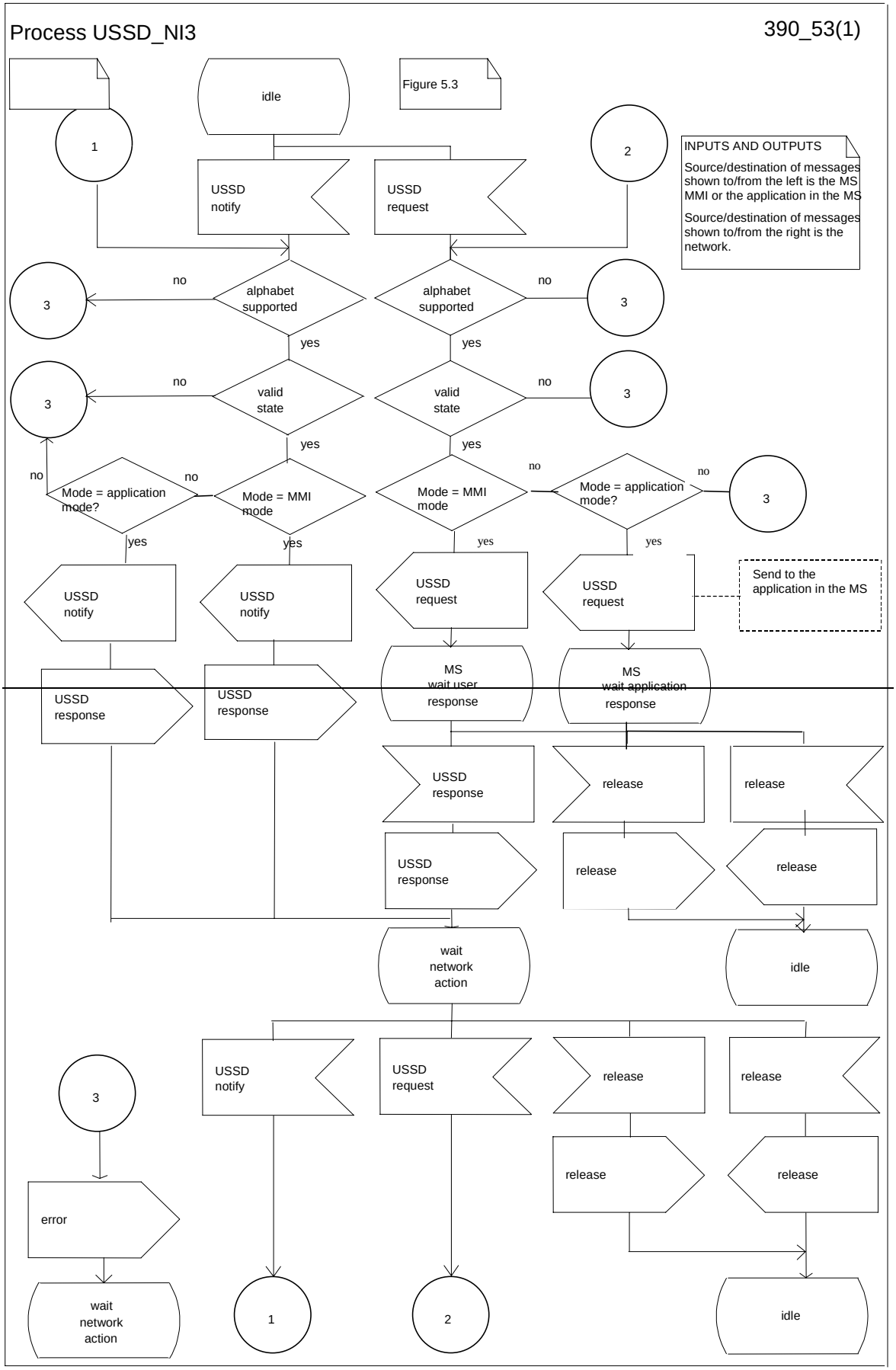


Figure 5.2: Network initiated USSD forwarding at VLR or MSC


Process USSD_NI3
390_53(1)
Figure 5.3
idle
1
2
USSD notify
USSD request
INPUTS AND OUTPUTS
Source/destination of messages shown to/from the left is the MS MMI or the application in the MS
Source/destination of messages shown to/from the right is the network.
3
no
alphabet supported
yes
valid state
Mode = application mode?
Mode = MMI mode
Send to the application in the MS
USSD response
MS wait user response
MS wait application response
release
wait network action
idle
error

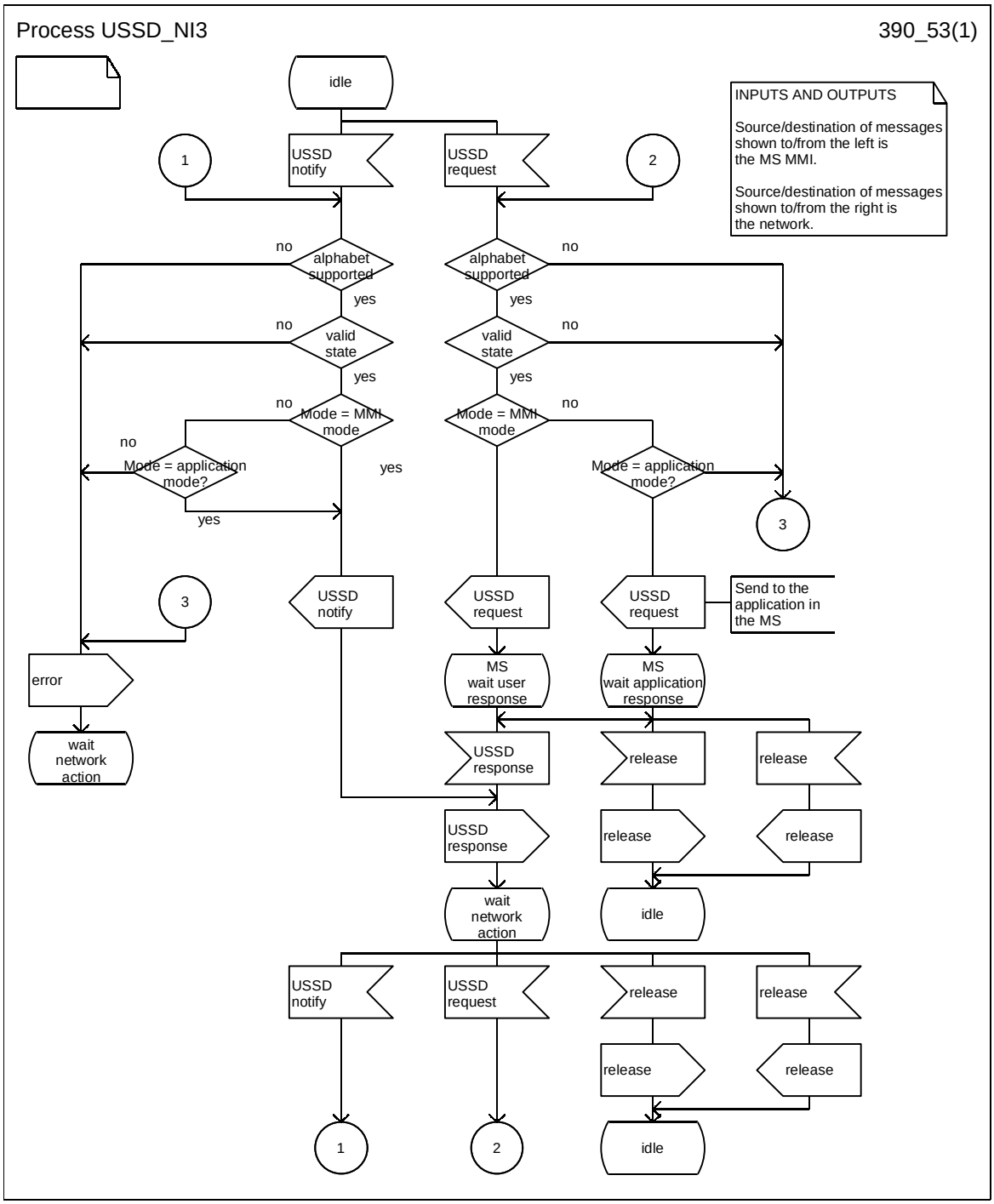


Figure 5.3: Network initiated USSD at MS

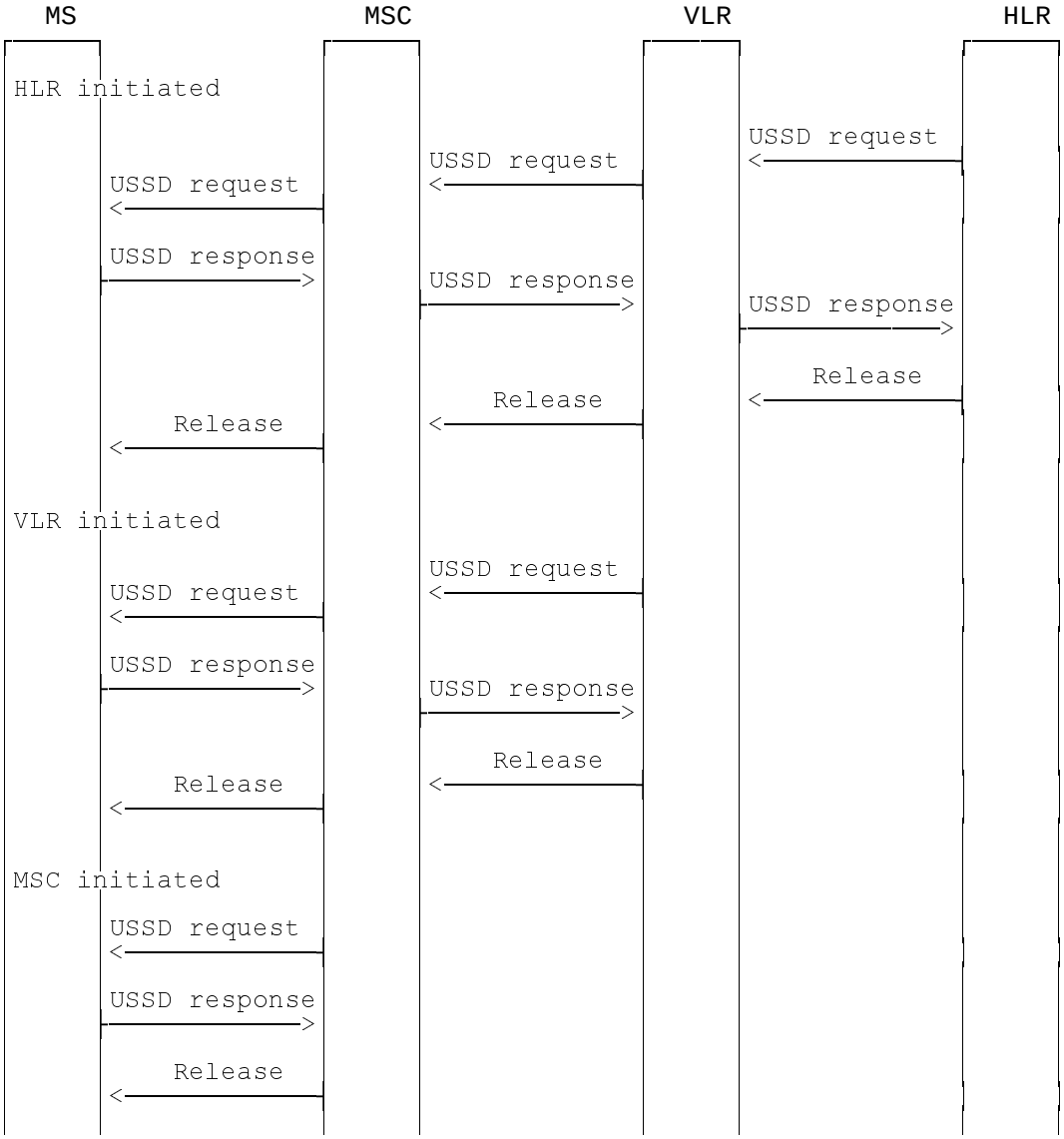


Figure 5.4: Information flow for USSD request (Single Operation)

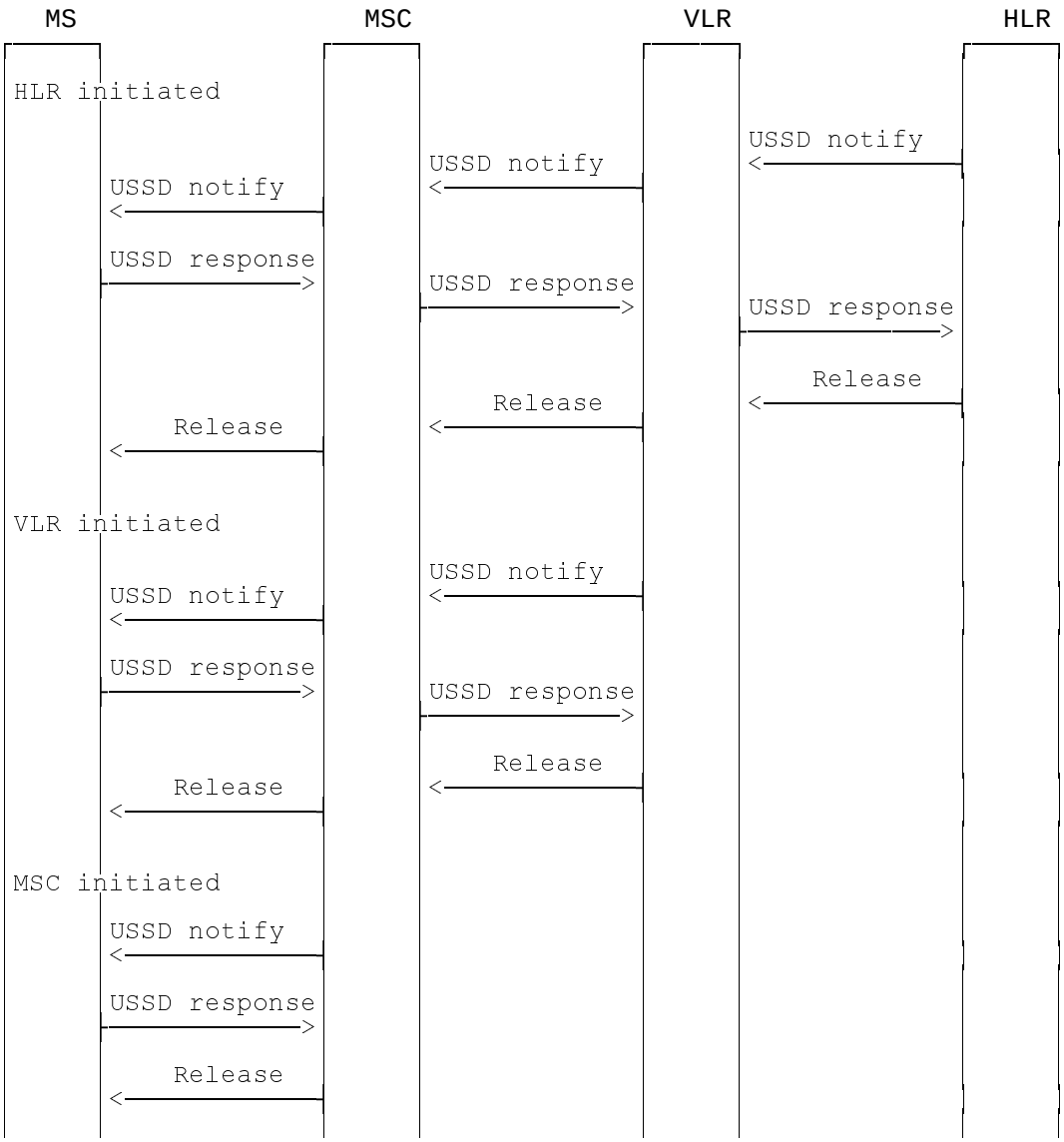


Figure 5.5: Information flow for USSD notification (Single Operation)

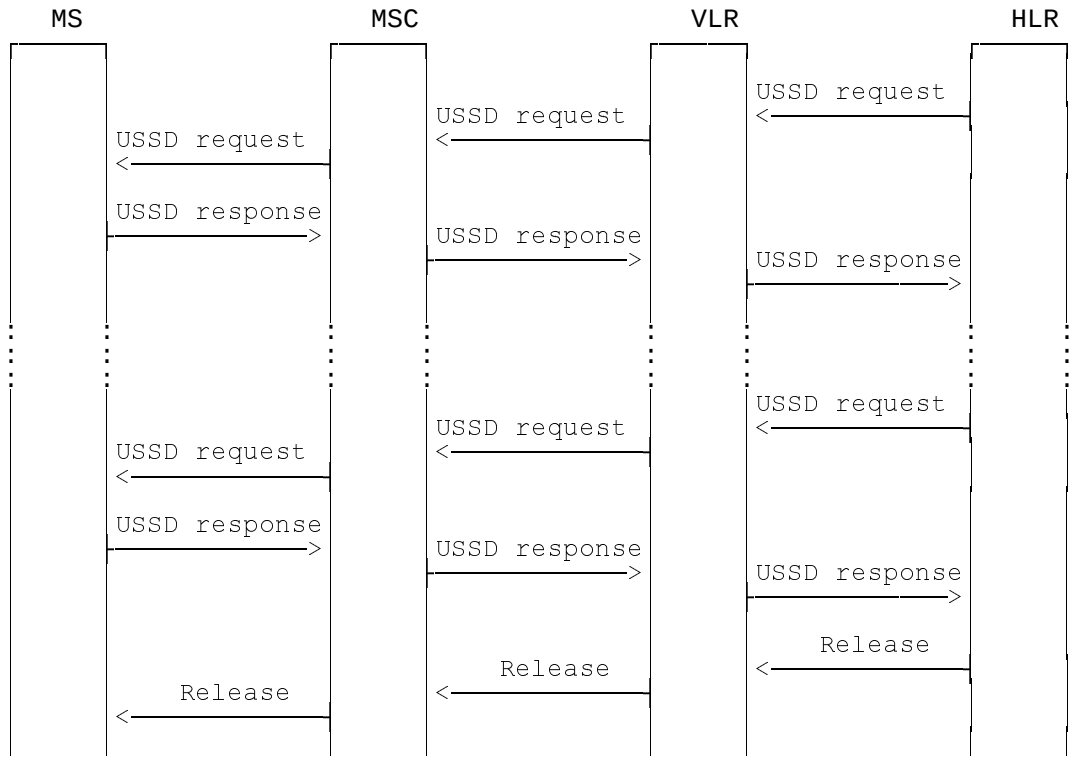


Figure 5.6: Information flow for HLR initiated USSD request (Multiple Operation On Same Transaction)

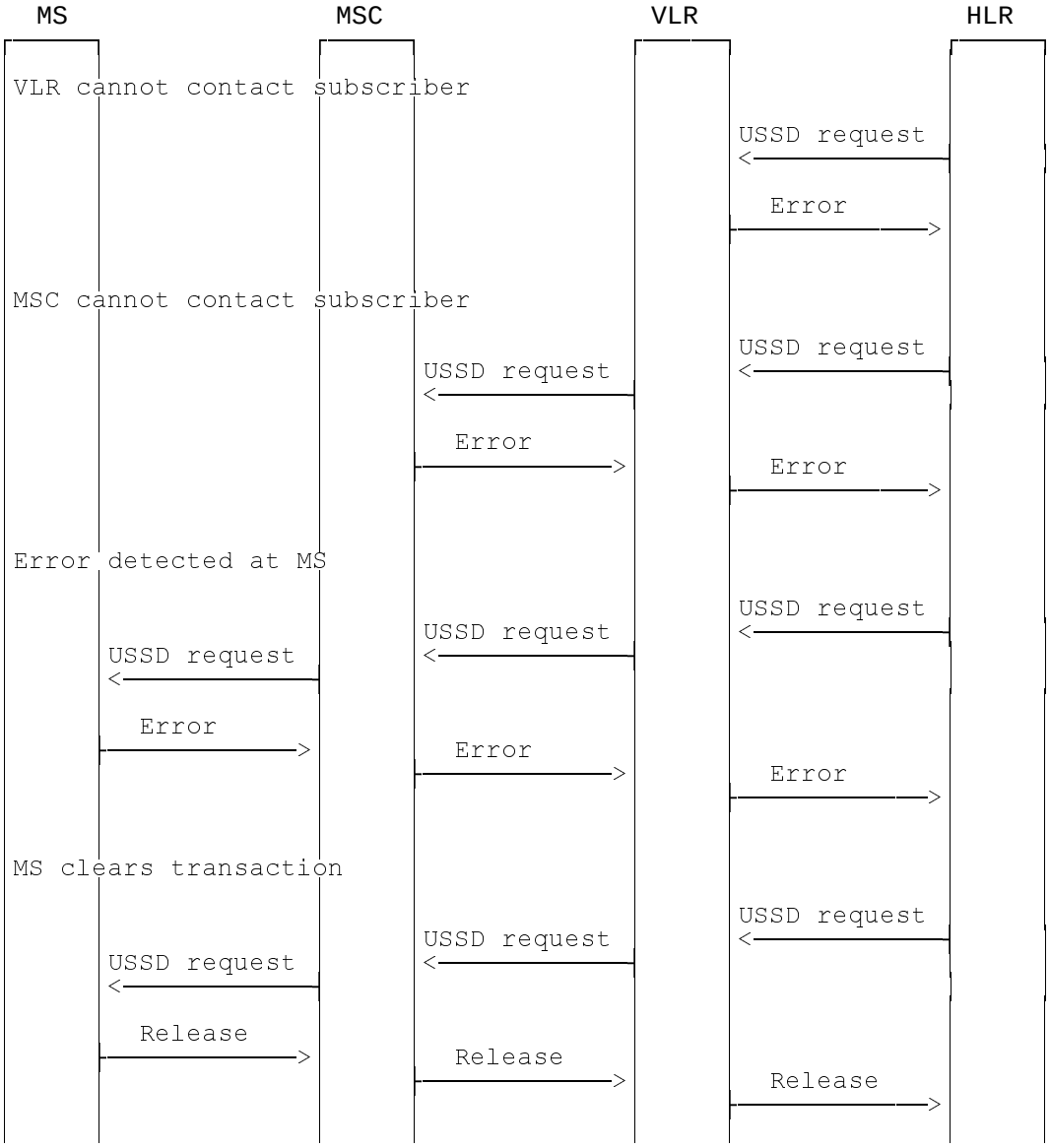


Figure 5.7: Information flow for failed USSD request

5.3 Information stored in the HLR

The HLR shall not store any information specific to the use of USSD, although information may be stored for services which are offered by USSD applications.

5.4 Information stored in the VLR

The VLR shall not store any information specific to the use of USSD, although information may be stored for services which are offered by USSD applications.

5.5 Handover

Handover will have no impact on the operation of this service.

5.6 Cross-phase compatibility

Network initiated USSD shall not be permitted if the MS or any network entity involved in the operation is of Phase 1. If, when setting up a transaction, a network entity discovers that the other end is of Phase 1, it shall reject the request and release the transaction being set up.

6 Mobile initiated unstructured supplementary service data

6.1 Handling of mobile initiated USSD

A MS can at any time initiate a USSD request to the network. No prior provision of the service is required, although provisioning of services which make use of USSD may be required. All USSD messages (requests and responses), contain the USSD string, an alphabet indicator and language indicator.

6.2 Functions and information flows

The following text describes the handling of mobile network initiated USSD. Diagrammatic representations are as follows:

Figure 6.1 SDL, request from user at MS;

Figure 6.2 SDL, request from MS at MSC;

Figure 6.3 SDL, request from application at MSC;

Figure 6.4 SDL, request from MSC at VLR;

Figure 6.5 SDL, request from application at VLR;

Figure 6.6 SDL, request from VLR at HLR;

Figure 6.7 Information flow, no further information required;

Figure 6.8 Information flow, further information required;

Figure 6.9 Information flow for failed USSD request.

6.2.1 Handling of USSD request at MS

When the user or the application in the MS makes a request which the MS determines is to make use of USSD, the MS shall set up a transaction to the network, send the request to the MSC and await a response. When the MS receives the response, it shall display the information contained to the user or relay the message to the application in the MS.

While awaiting the response, the MS may receive a network initiated USSD request or notification on the same transaction. If this occurs, the MS shall process that operation (see section 1) and continue to await the response to the mobile initiated request.

If, when the MS determines that a user request is to make use of USSD, the MS is already involved in a USSD or a non-call related supplementary service transaction, the MS shall reject the request.

6.2.2 Handling of USSD request at MSC

When an MSC receives a USSD request containing an HPLMN service code, it shall set up a transaction to the VLR and forward the request unchanged. If this forwarding fails, an error shall be returned to the MS. The MSC shall be transparent to any further requests or responses (in either direction) for that transaction, passing them between the MS and VLR without taking any action. When one transaction is released (MS-MSC or MSC-VLR), the MSC shall release the other.

If an HPLMN service code is not included, the MSC shall process the request locally (see section 6.2.5).

If the MSC does not support the alphabet used in a USSD request, it shall set up a transaction to the VLR and forward the request unchanged, in the same way as when a HPLMN service code is received.

6.2.3 Handling of USSD request at VLR

When a VLR receives a USSD request containing an HPLMN service code and the user is not in the HPLMN, it shall set up a transaction to the HLR and forward the request unchanged. If this forwarding fails, an error shall be returned to the MS. The VLR shall be transparent to any further requests or responses (in either direction) for that transaction, passing them between the MSC and HLR without taking any action. When one transaction is released (MSC-VLR or VLR-HLR), the VLR shall release the other.

If an HPLMN service code is not included, or the user is in the HPLMN, the VLR shall process the request locally (see subclause 6.2.5).

If the VLR does not support the alphabet used in a USSD request, it shall set up a transaction to the HLR and forward the request unchanged, in the same way as when a HPLMN service code is received and the user is not in the HPLMN.

6.2.4 Handling of USSD request at HLR

An HLR shall always process a USSD request locally (see subclause 6.2.5).

If the HLR does not support the alphabet used in a USSD request, it shall inform the MS and release the transaction.

6.2.5 Processing the USSD request

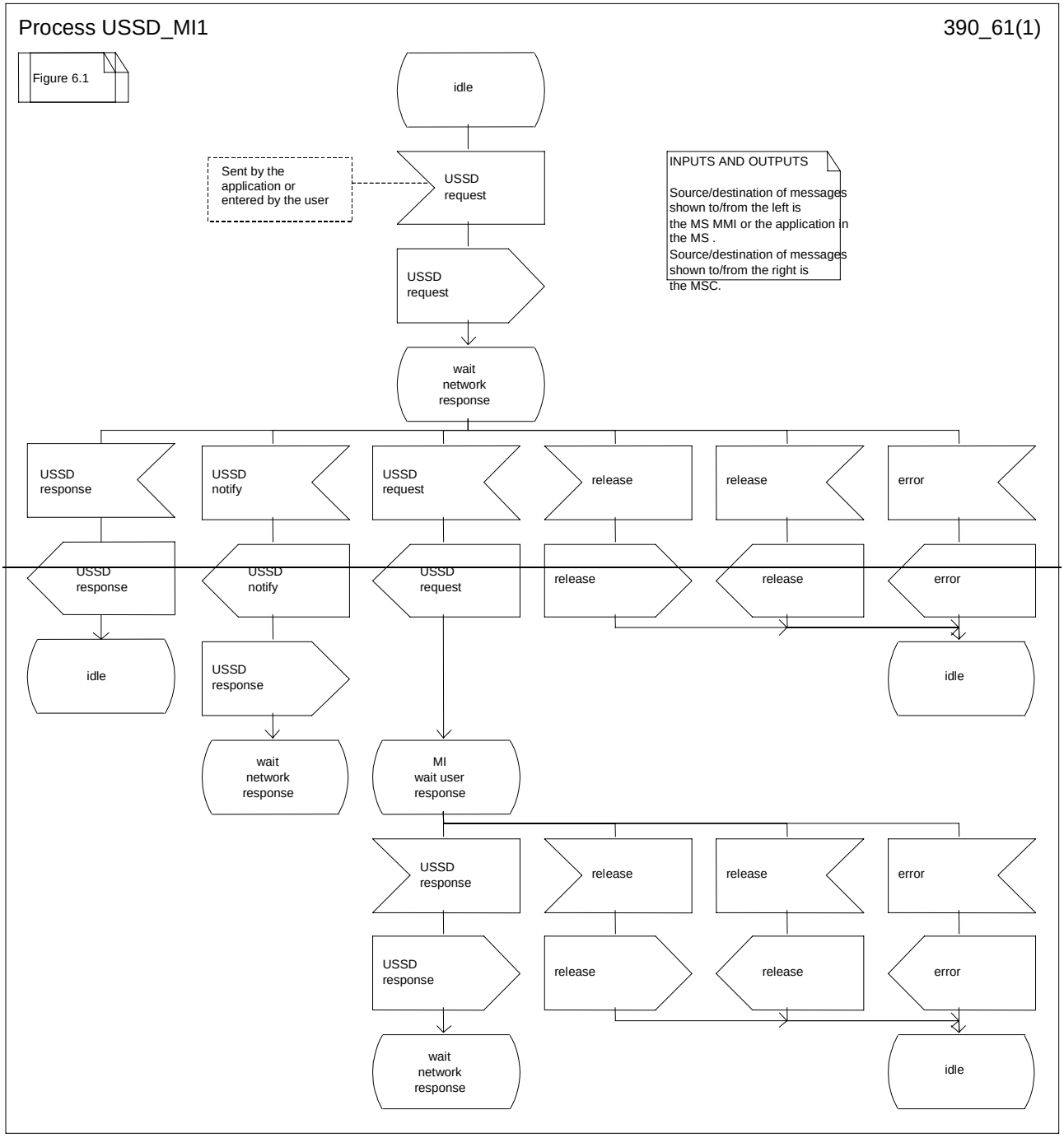
When a network entity is to process a USSD request locally, the request shall be handled by an appropriate application. The location, nature and contents of USSD applications is, by definition, service provider and network operator dependent, but may include:

- Setting up or releasing signalling and/or speech channels;
- Passing the request to another network entity (unchanged or changed);
- Passing a different USSD request to another network entity;

  and/or

- Requesting further information from the MS (one or more times).

Upon completion of handling the request, the network entity shall respond to the request and release the transaction.


Process USSD_MI1
390_61(1)
Figure 6.1
idle
Sent by the application or entered by the user
USSD request
INPUTS AND OUTPUTS
Source/destination of messages shown to/from the left is the MS MMI or the application in the MS .
Source/destination of messages shown to/from the right is the MSC.
USSD request
wait network response
USSD response
USSD notify
USSD request
release
release
error
USSD response
USSD notify
USSD request
release
release
error
idle
USSD response
idle
wait network response
MI wait user response
USSD response
release
release
error
USSD response
release
release
error
wait network response
idle

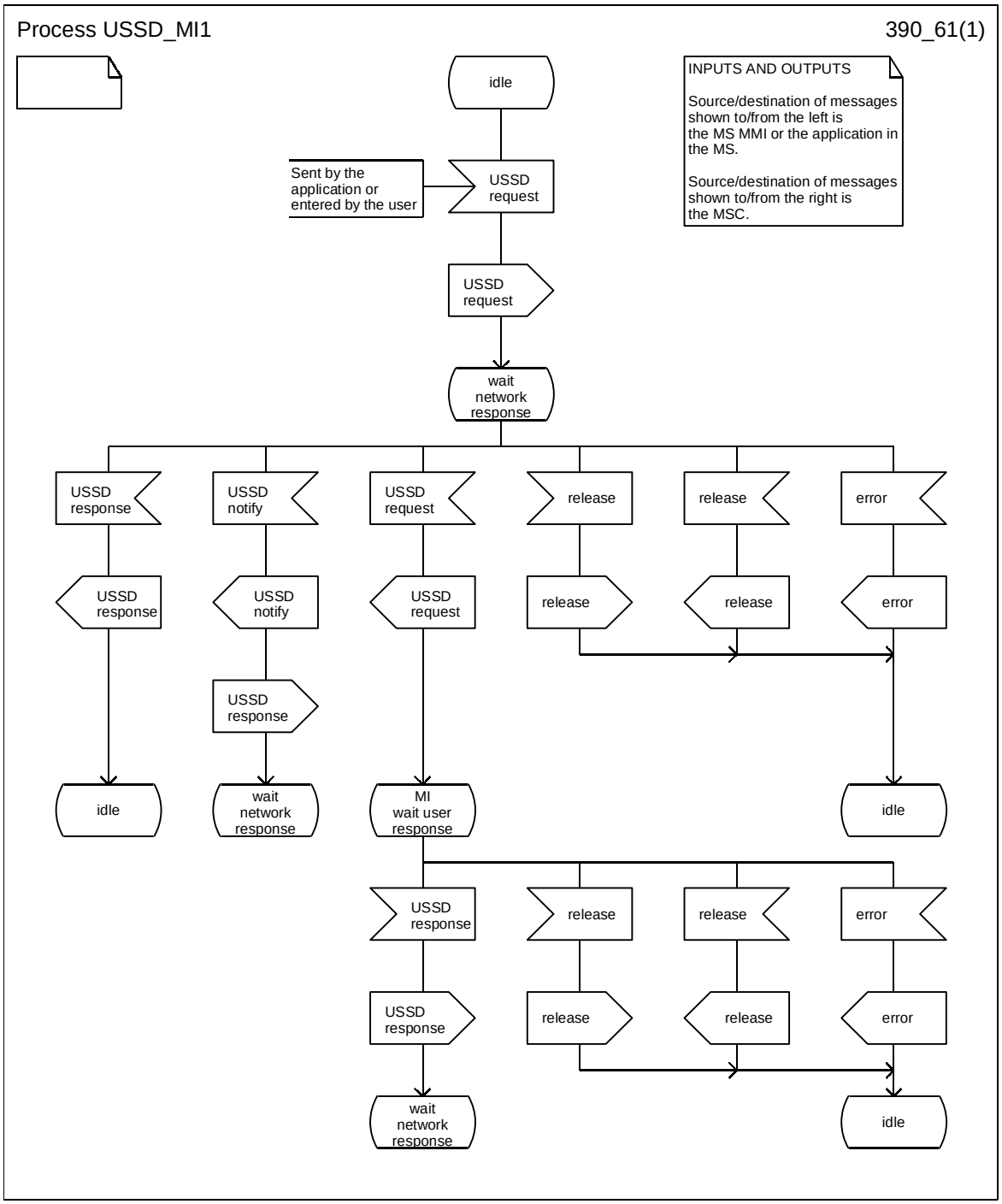
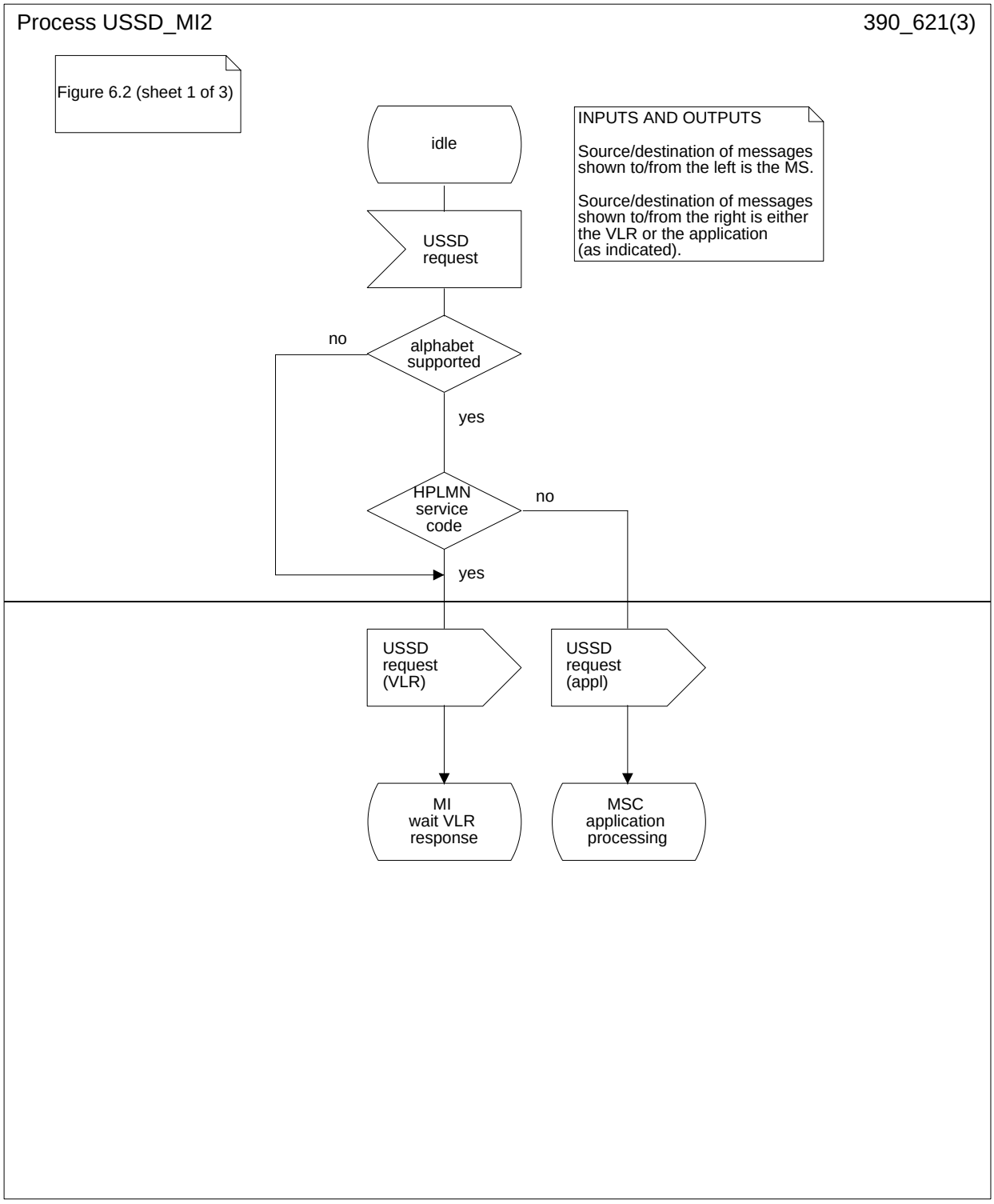


Figure 6.1: Mobile initiated USSD at MS


Process USSD_MI2
390_621(3)
Figure 6.2 (sheet 1 of 3)
idle
INPUTS AND OUTPUTS
Source/destination of messages shown to/from the left is the MS.
Source/destination of messages shown to/from the right is either the VLR or the application (as indicated).
USSD request
no
alphabet supported
yes
HPLMN service code
no
yes
USSD request (VLR)
USSD request (appl)
MI wait VLR response
MSC application processing

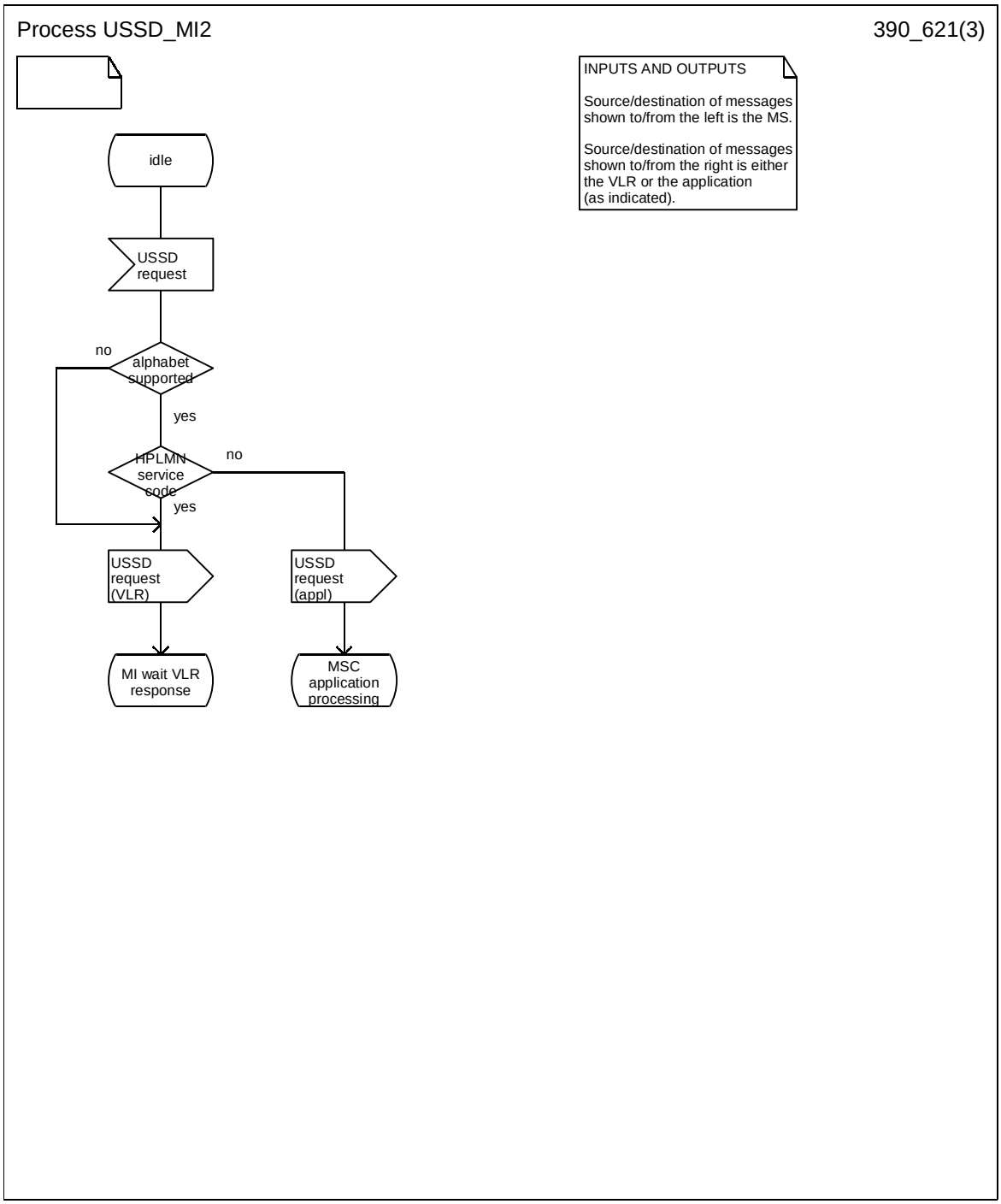
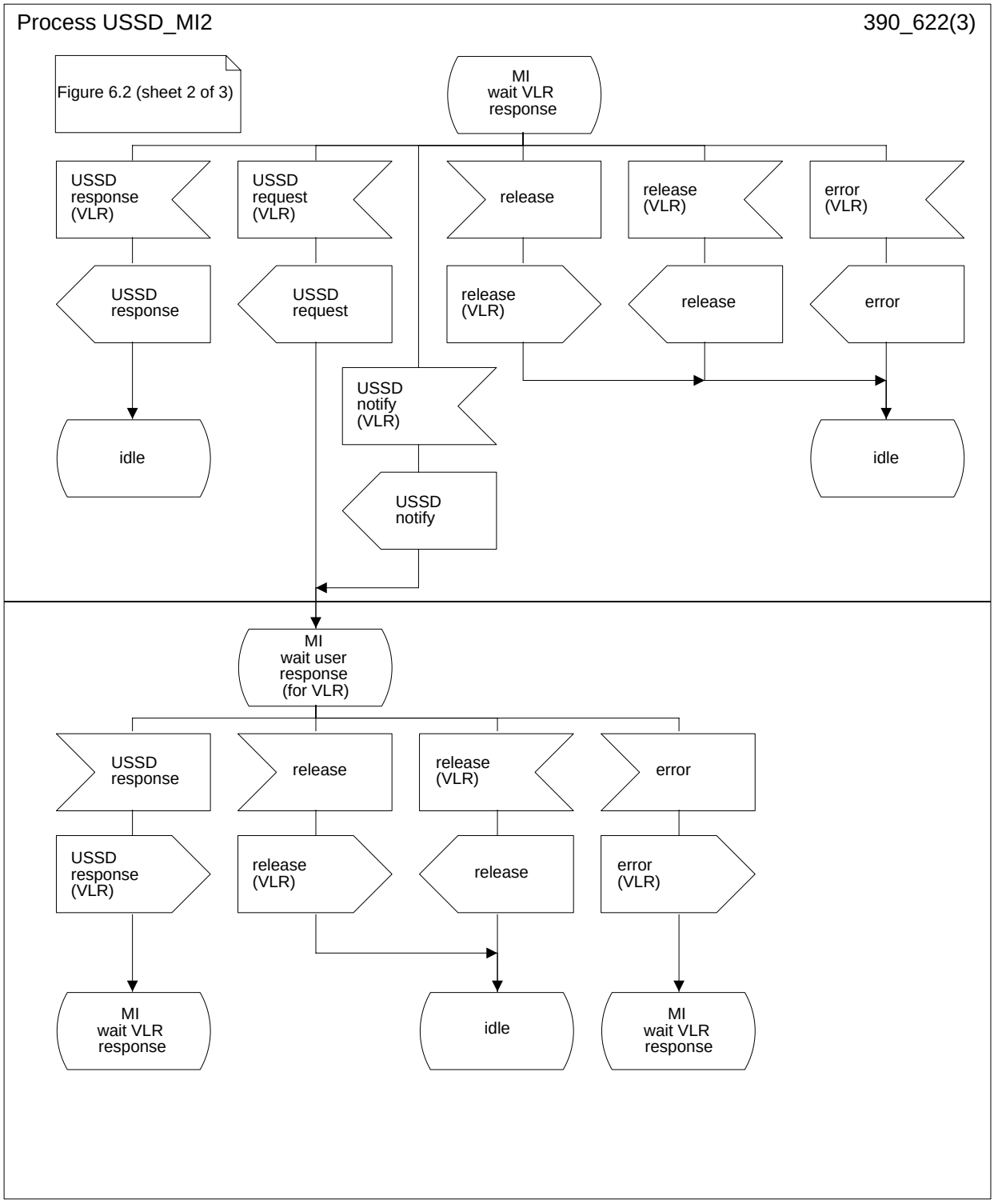


Figure 6.2 (sheet 1 of 3): Mobile initiated USSD at MSC


Process USSD_MI2
390_622(3)
Figure 6.2 (sheet 2 of 3)
MI
wait VLR
response
USSD
response
(VLR)
USSD
request
(VLR)
release
release
(VLR)
error
(VLR)
USSD
response
USSD
request
release
(VLR)
release
error
USSD
notify
(VLR)
idle
idle
USSD
notify
MI
wait user
response
(for VLR)
USSD
response
release
release
(VLR)
error
USSD
response
(VLR)
release
(VLR)
release
error
(VLR)
MI
wait VLR
response
idle
MI
wait VLR
response

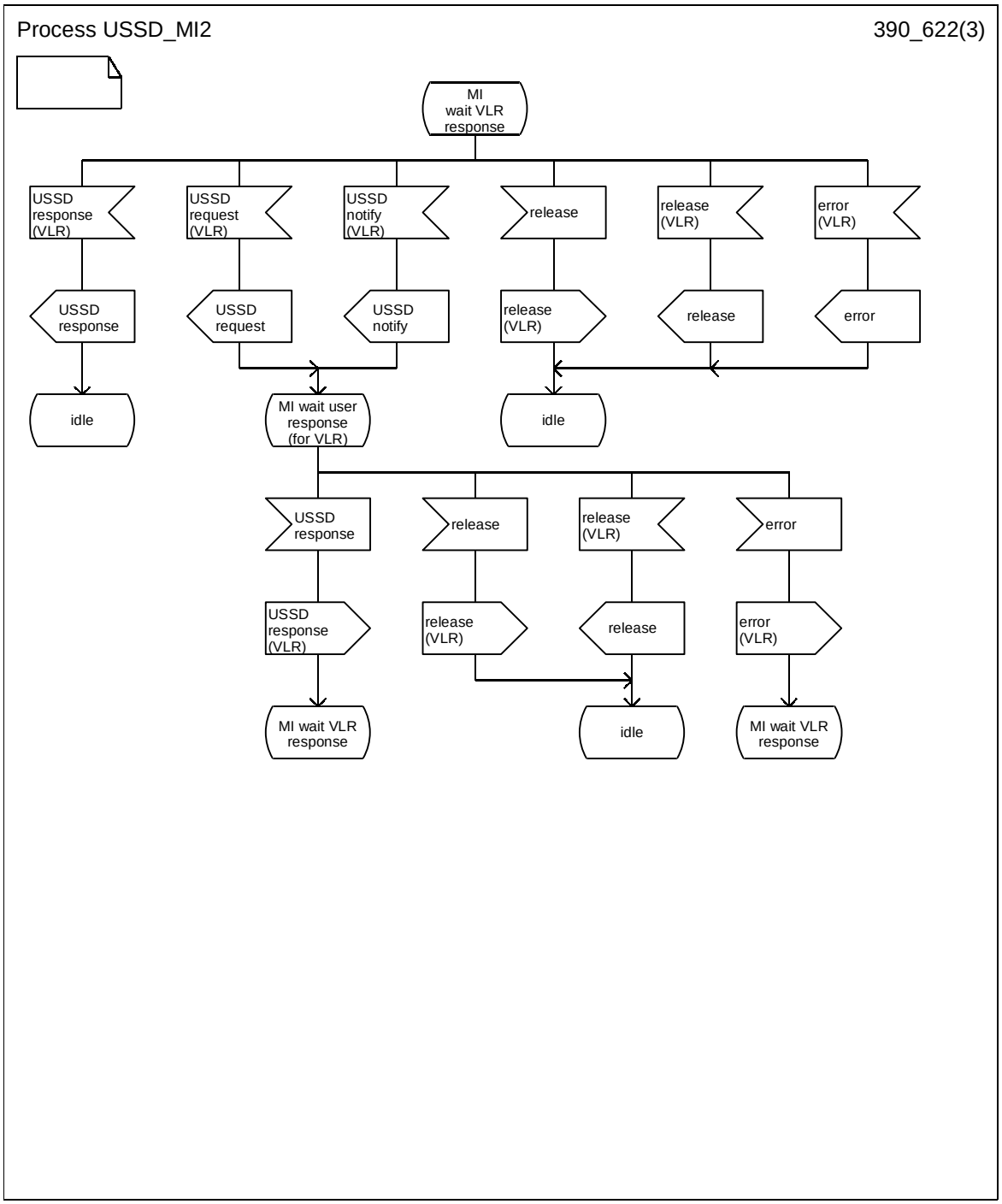
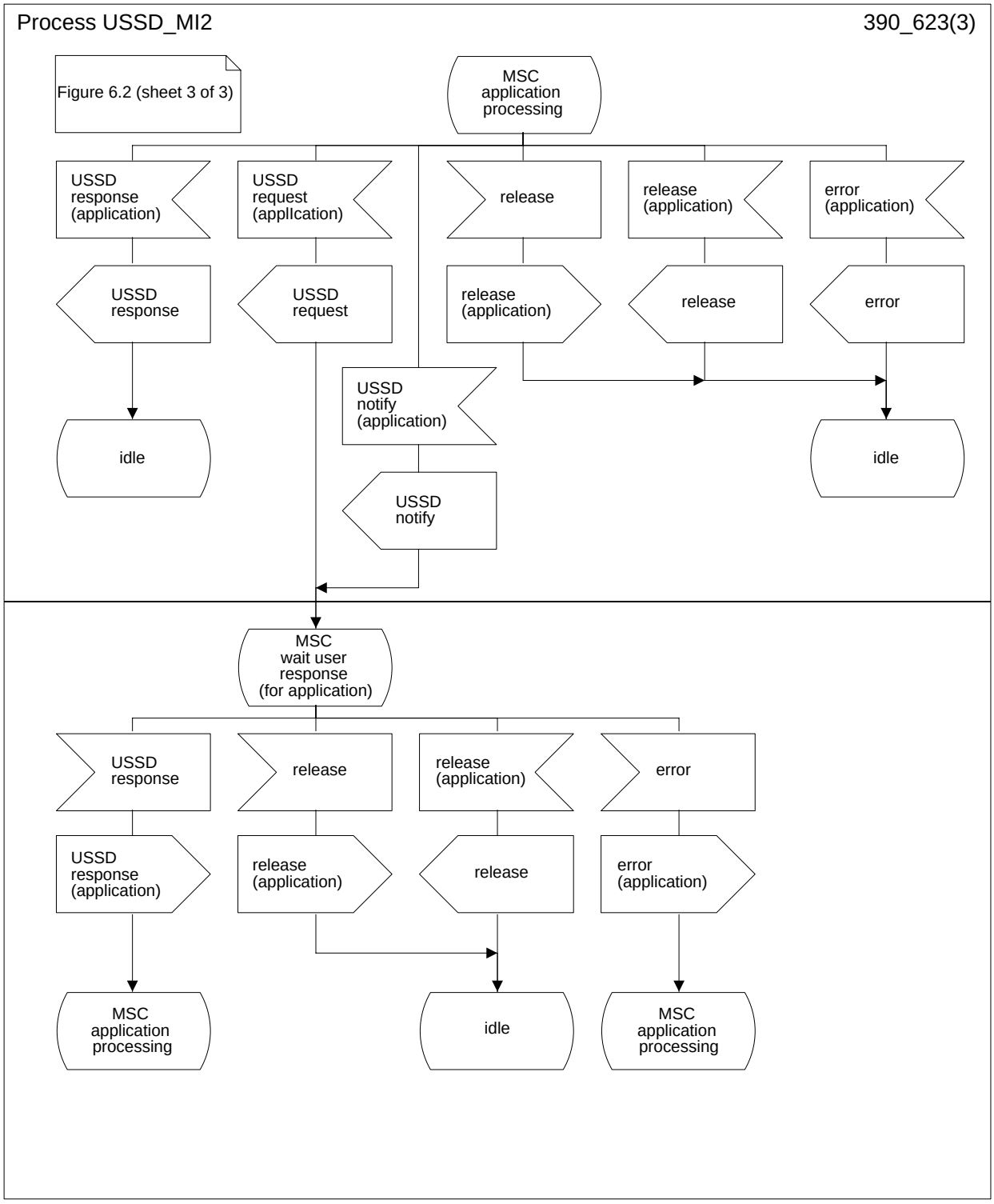


Figure 6.2 (sheet 2 of 3): Mobile initiated USSD at MSC


Process USSD_MI2
390_623(3)
Figure 6.2 (sheet 3 of 3)
MSC application processing
USSD response (application)
USSD request (applIcation)
release
release (application)
error (application)
USSD response
USSD request
release (application)
release
error
USSD notify (application)
idle
idle
USSD notify
MSC wait user response (for application)
USSD response
release
release (application)
error
USSD response (application)
release (application)
release
error (application)
MSC application processing
idle
MSC application processing

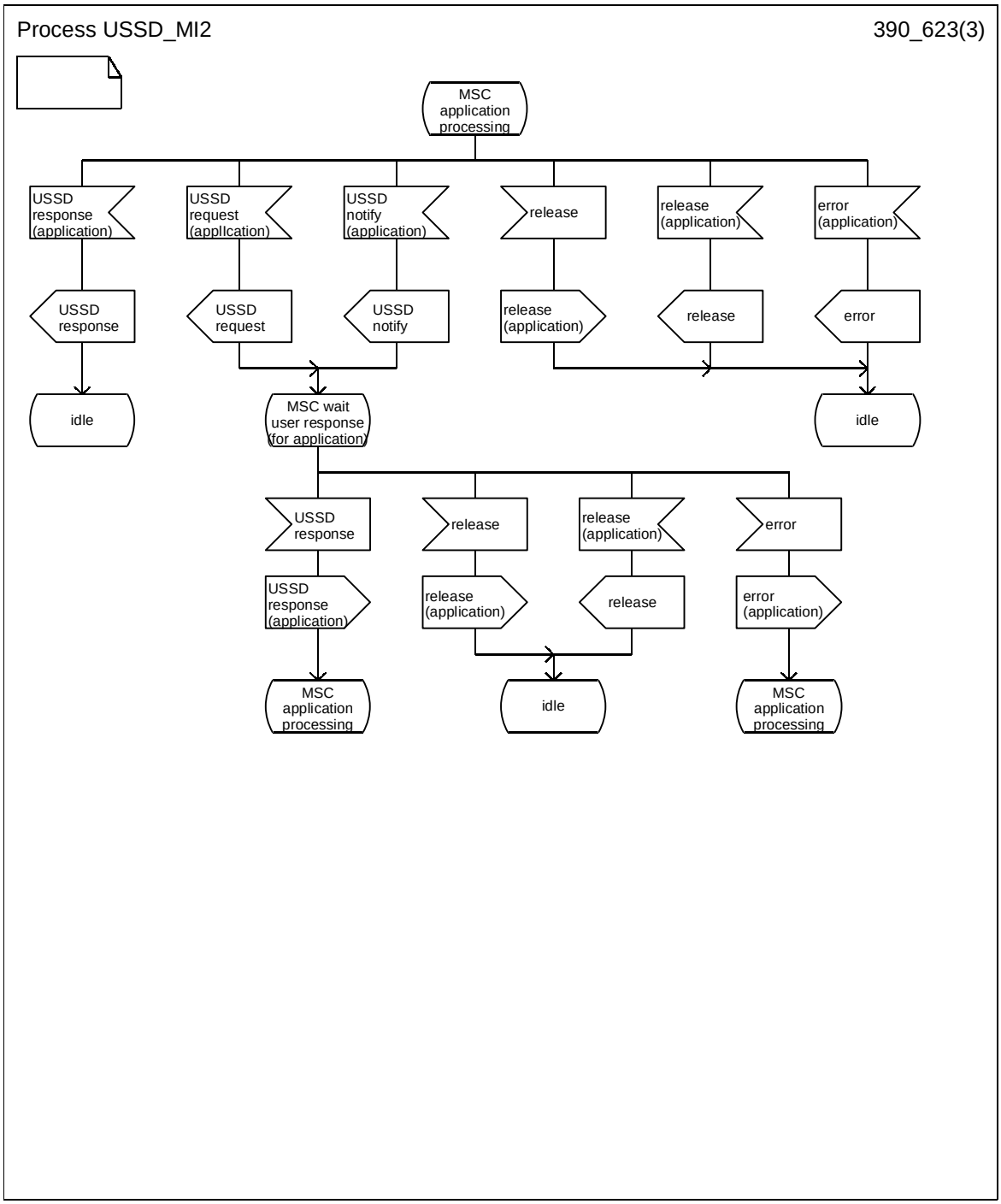
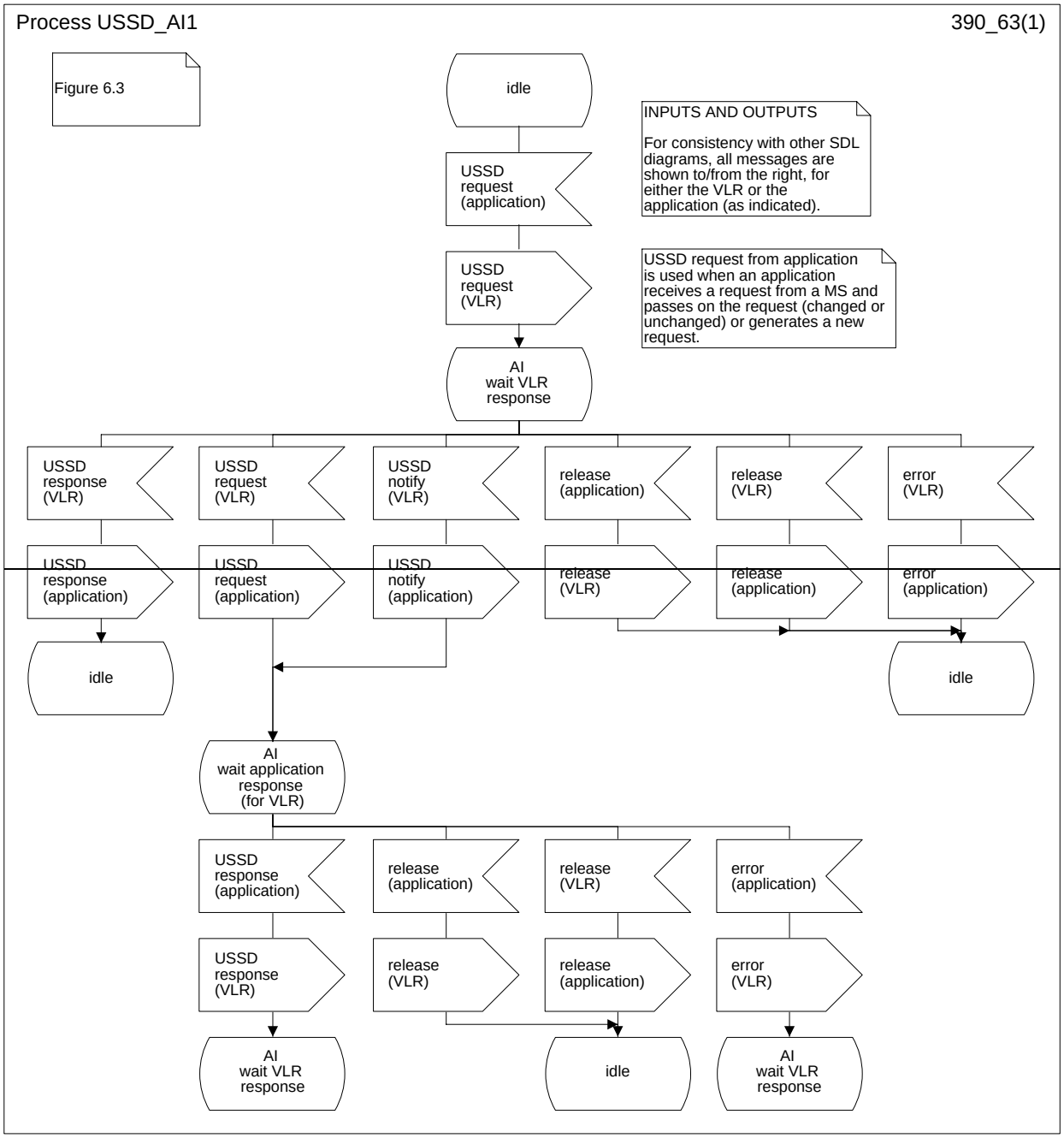


Figure 6.2 (sheet 3 of 3): Mobile initiated USSD at MSC


Process USSD_AI1
390_63(1)
Figure 6.3
idle
USSD request (application)
USSD request (VLR)
AI wait VLR response
INPUTS AND OUTPUTS
For consistency with other SDL diagrams, all messages are shown to/from the right, for either the VLR or the application (as indicated).
USSD request from application is used when an application receives a request from a MS and passes on the request (changed or unchanged) or generates a new request.
USSD response (VLR)
USSD request (VLR)
USSD notify (VLR)
release (application)
release (VLR)
error (VLR)
USSD response (application)
USSD request (application)
USSD notify (application)
release (VLR)
release (application)
error (application)
idle
idle
AI wait application response (for VLR)
USSD response (application)
release (application)
release (VLR)
error (application)
USSD response (VLR)
release (VLR)
release (application)
error (VLR)
AI wait VLR response
idle
AI wait VLR response

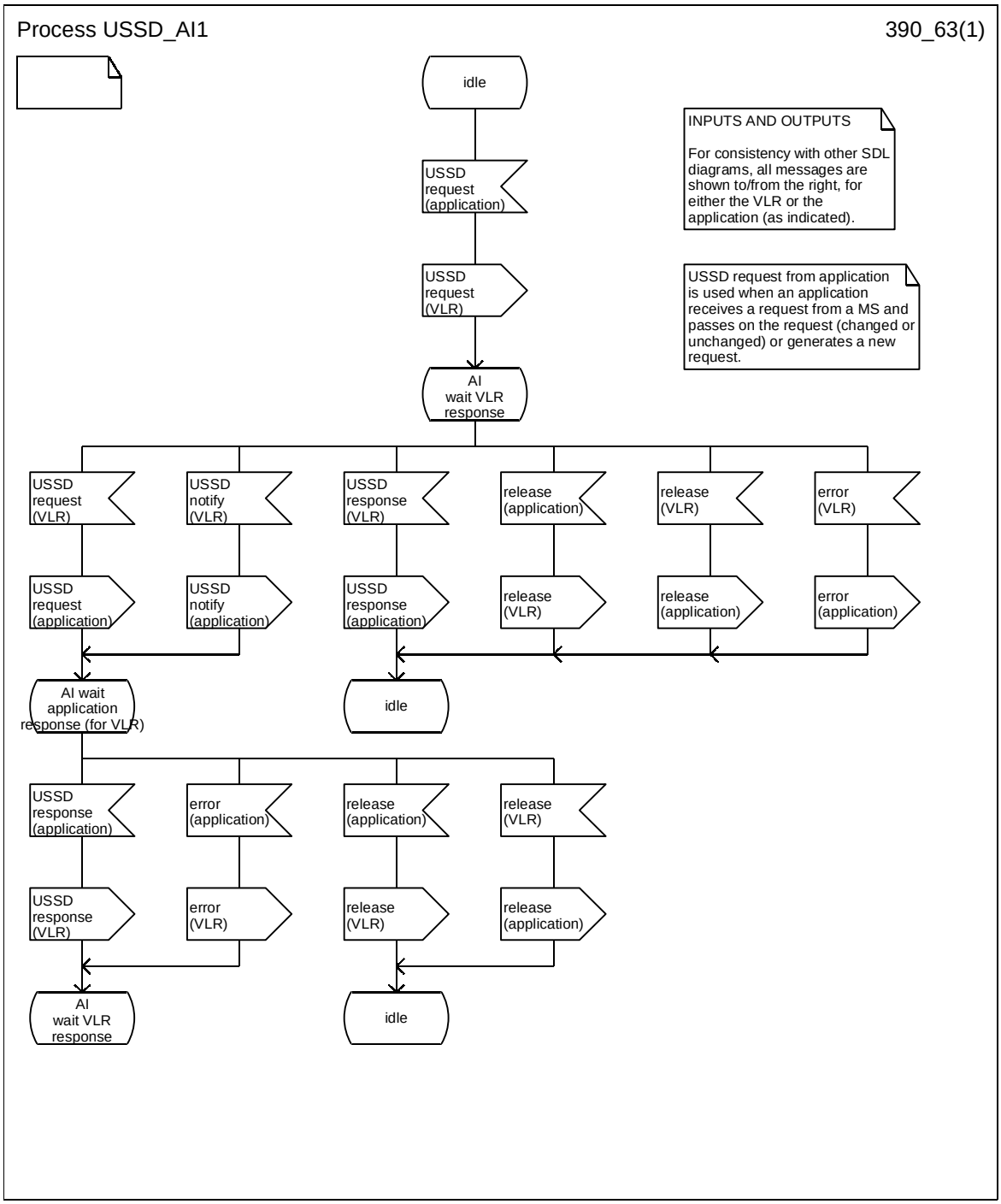
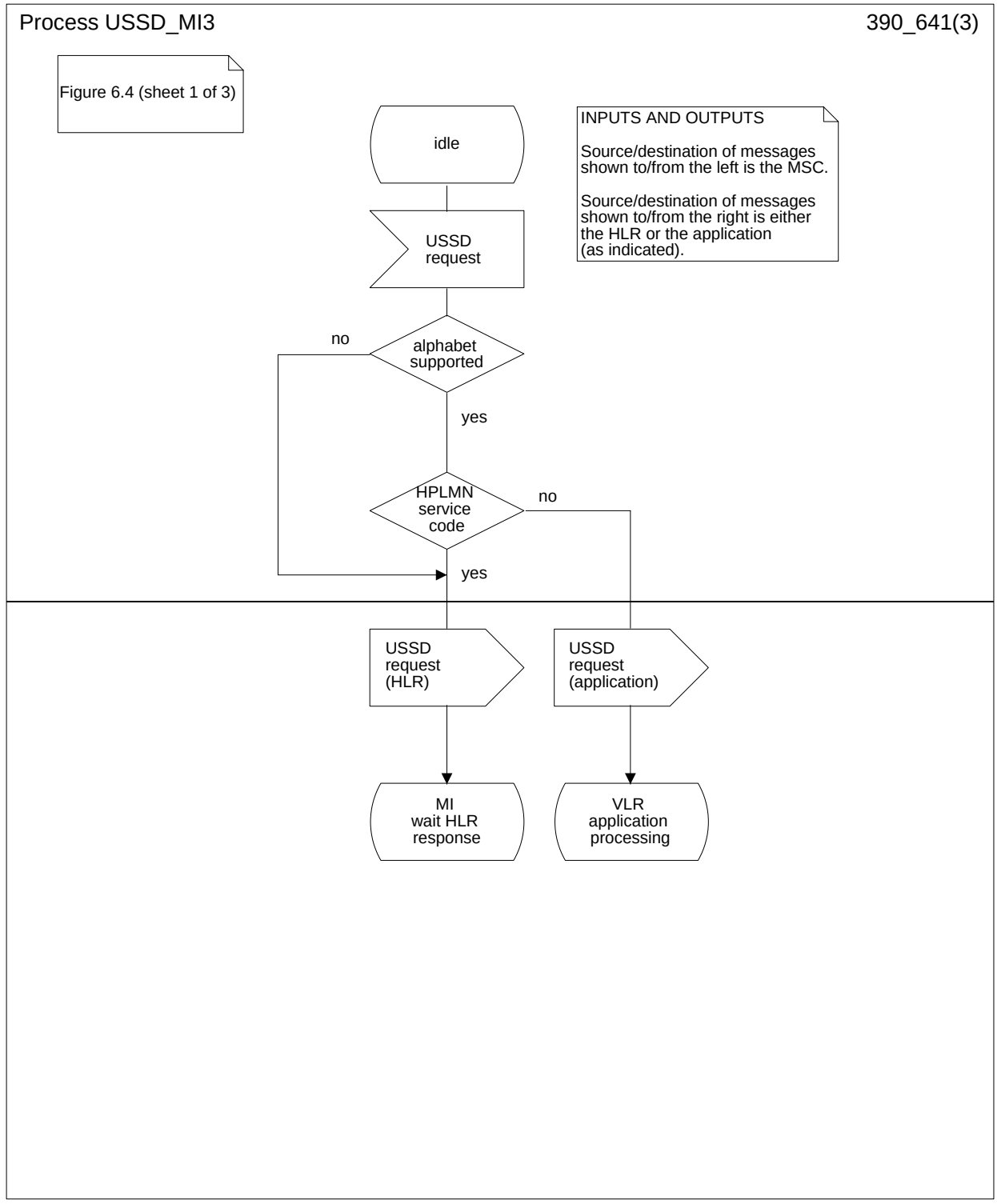


Figure 6.3: Application initiated USSD at MSC


Process USSD_MI3
390_641(3)
Figure 6.4 (sheet 1 of 3)
idle
INPUTS AND OUTPUTS
Source/destination of messages shown to/from the left is the MSC.
Source/destination of messages shown to/from the right is either the HLR or the application (as indicated).
USSD request
no
alphabet supported
yes
HPLMN service code
no
yes
USSD request (HLR)
USSD request (application)
MI wait HLR response
VLR application processing

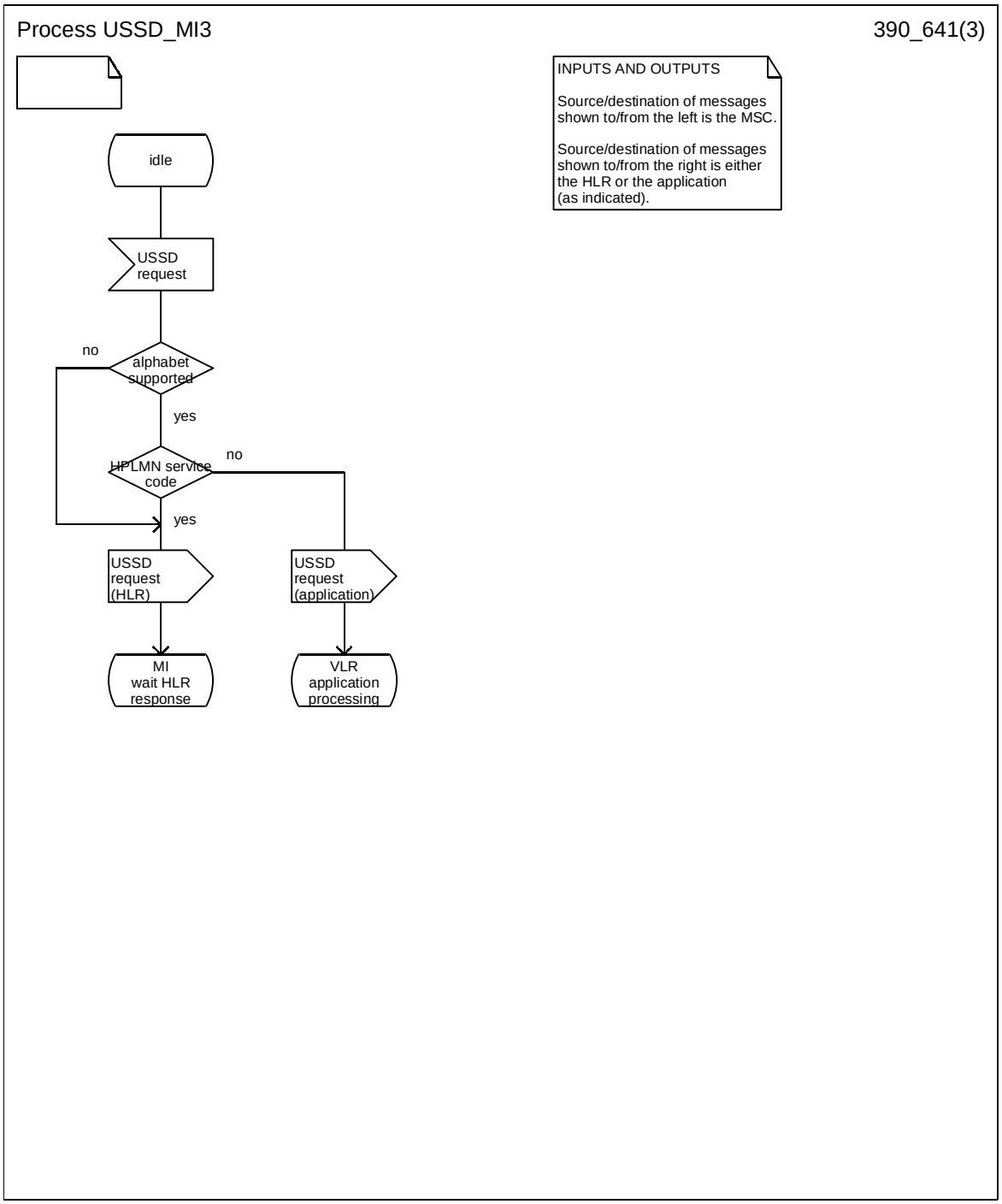
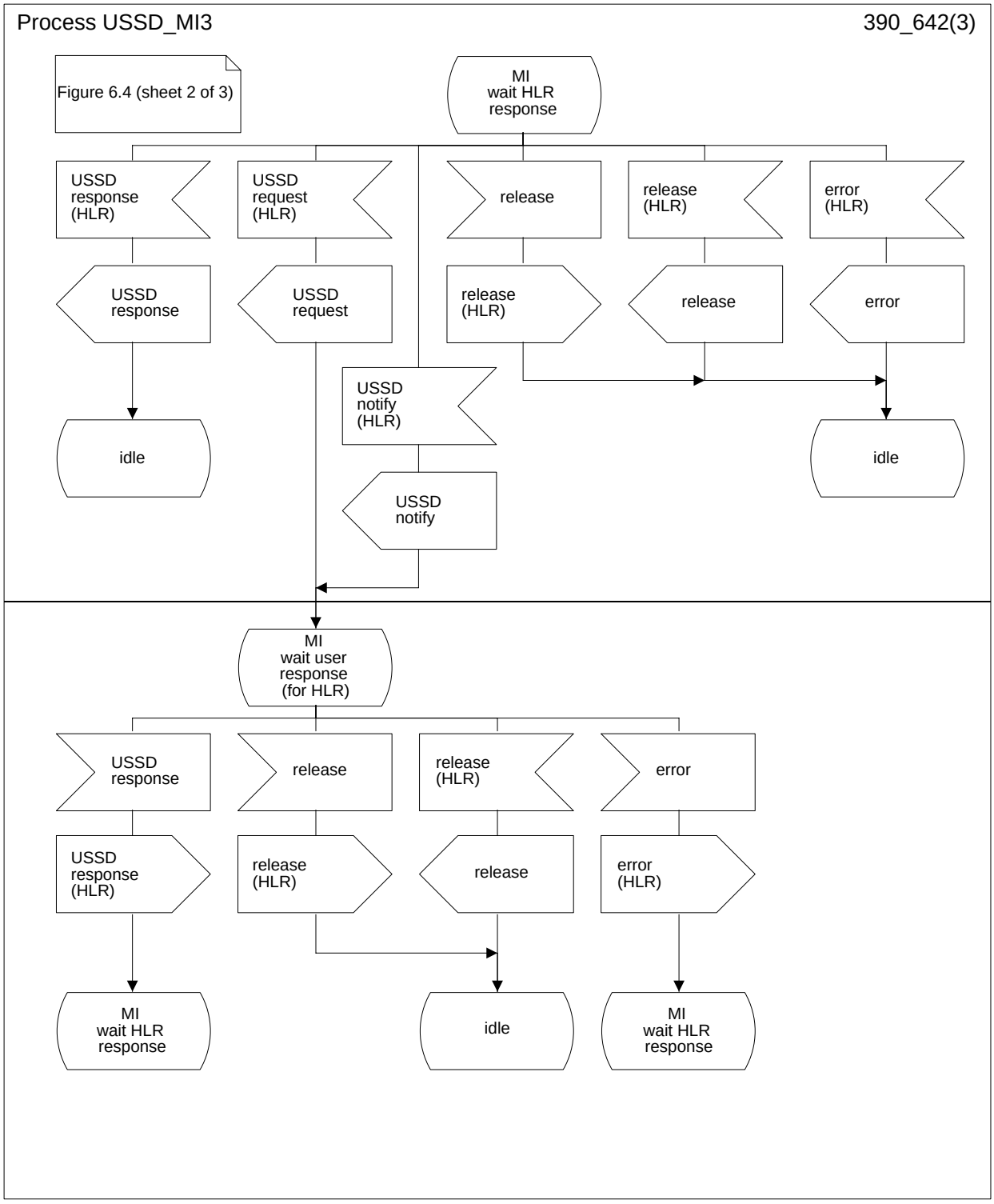


Figure 6.4 (sheet 1 of 3): Mobile initiated USSD at VLR


Process USSD_MI3
390_642(3)
Figure 6.4 (sheet 2 of 3)
MI
wait HLR
response
USSD
response
(HLR)
USSD
request
(HLR)
release
release
(HLR)
error
(HLR)
USSD
response
USSD
request
release
(HLR)
release
error
USSD
notify
(HLR)
idle
idle
USSD
notify
MI
wait user
response
(for HLR)
USSD
response
release
release
(HLR)
error
USSD
response
(HLR)
release
(HLR)
release
error
(HLR)
MI
wait HLR
response
idle
MI
wait HLR
response

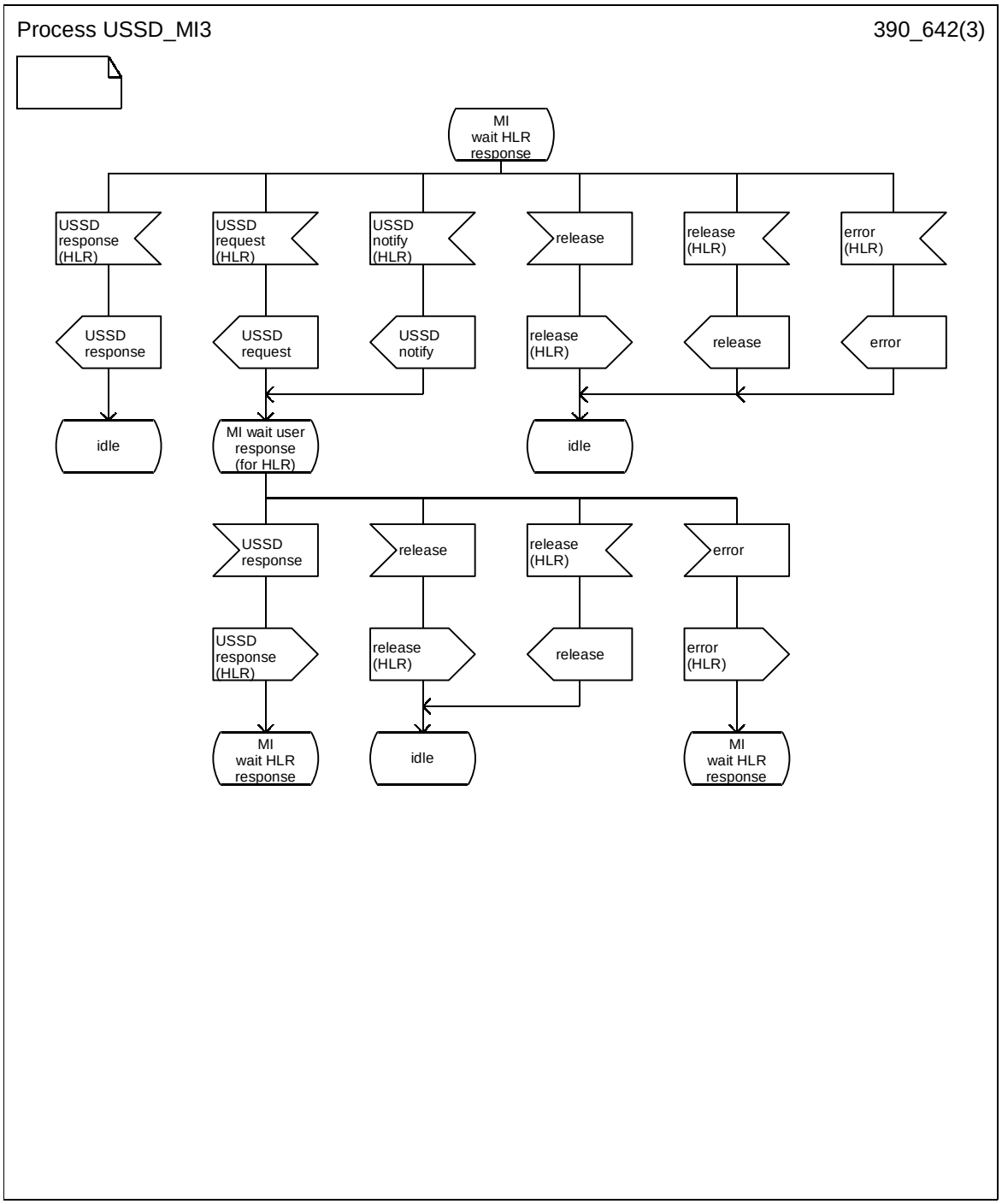
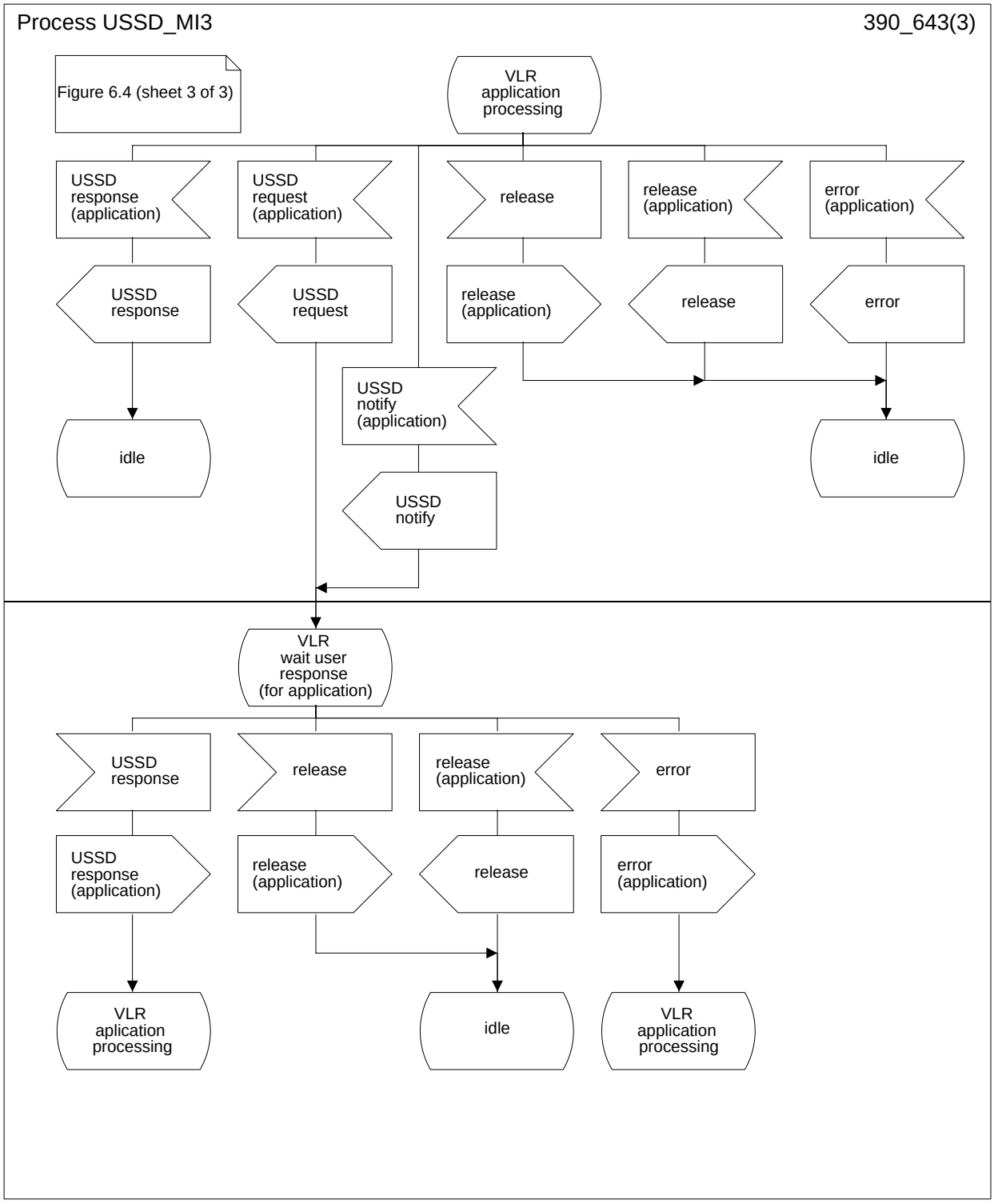


Figure 6.4 (sheet 2 of 3): Mobile initiated USSD at VLR


Process USSD_MI3
390_643(3)
Figure 6.4 (sheet 3 of 3)
VLR application processing
USSD response (application)
USSD request (application)
release
release (application)
error (application)
USSD response
USSD request
release (application)
release
error
USSD notify (application)
idle
idle
USSD notify
VLR wait user response (for application)
USSD response
release
release (application)
error
USSD response (application)
release (application)
release
error (application)
VLR aplication processing
idle
VLR application processing

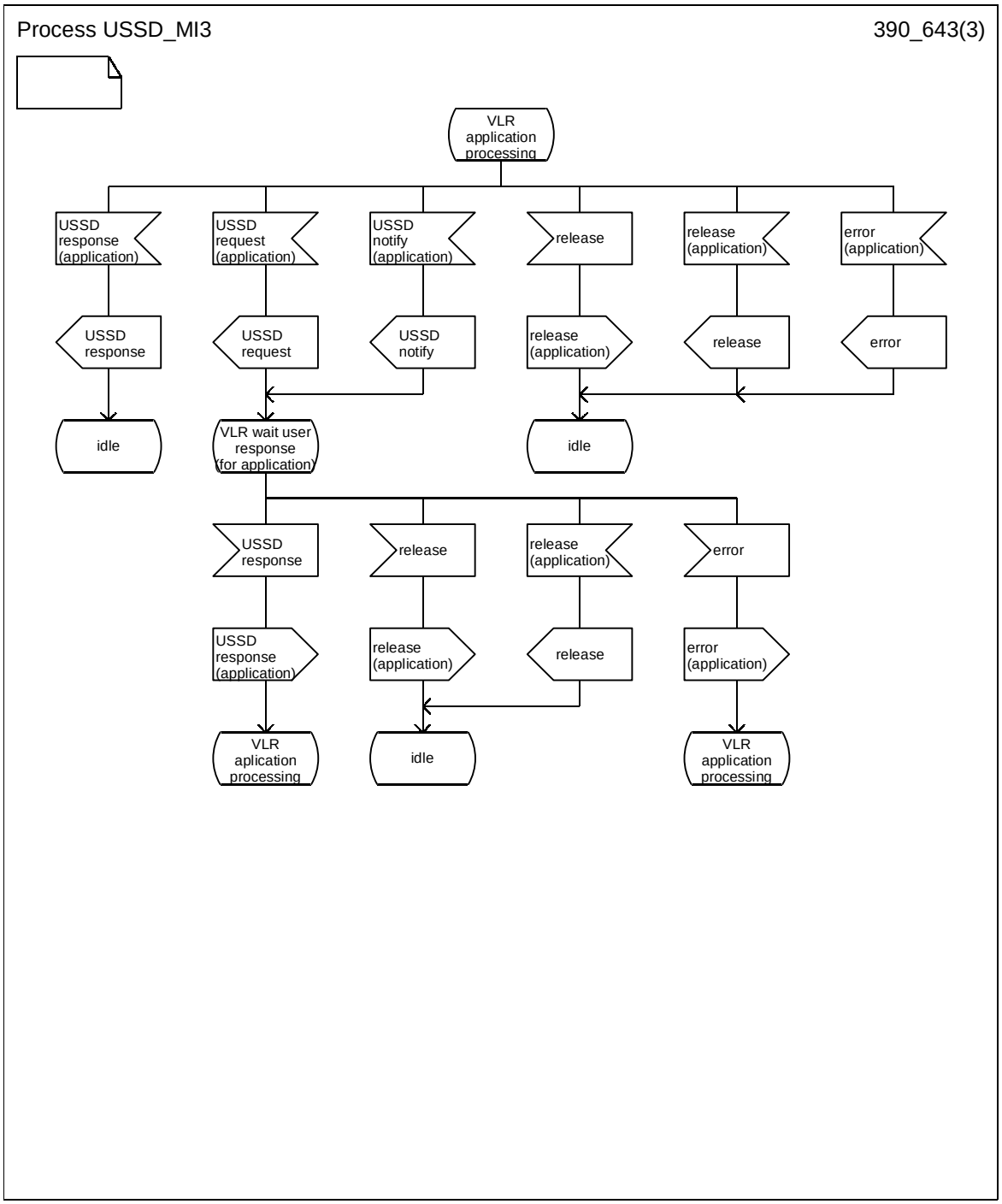
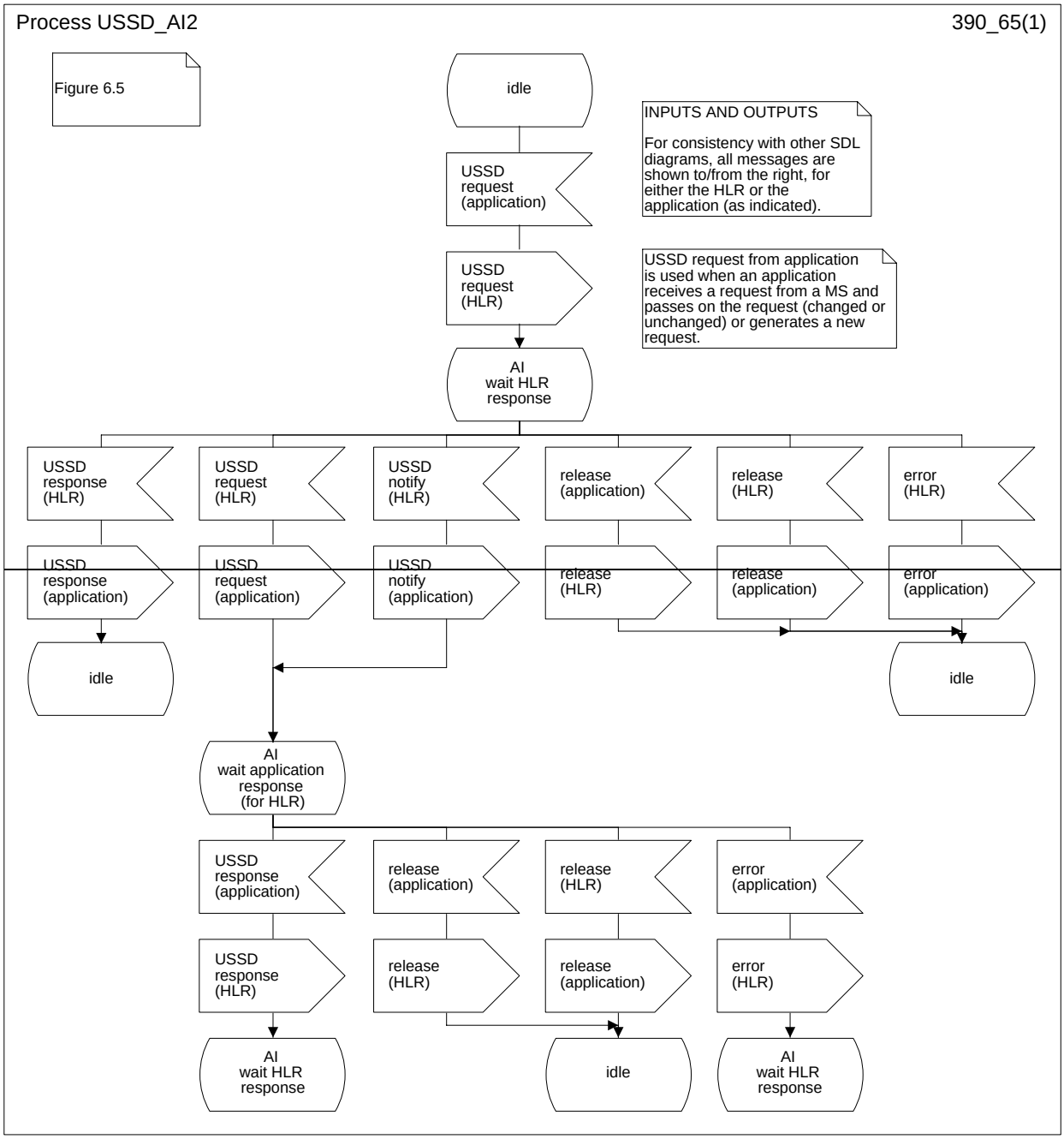


Figure 6.4 (sheet 3 of 3): Mobile initiated USSD at VLR


Process USSD_AI2
390_65(1)
Figure 6.5
idle
USSD request (application)
USSD request (HLR)
AI wait HLR response
INPUTS AND OUTPUTS
For consistency with other SDL diagrams, all messages are shown to/from the right, for either the HLR or the application (as indicated).
USSD request from application is used when an application receives a request from a MS and passes on the request (changed or unchanged) or generates a new request.
USSD response (HLR)
USSD request (HLR)
USSD notify (HLR)
release (application)
release (HLR)
error (HLR)
USSD response (application)
USSD request (application)
USSD notify (application)
release (HLR)
release (application)
error (application)
idle
idle
AI wait application response (for HLR)
USSD response (application)
release (application)
release (HLR)
error (application)
USSD response (HLR)
release (HLR)
release (application)
error (HLR)
AI wait HLR response
idle
AI wait HLR response

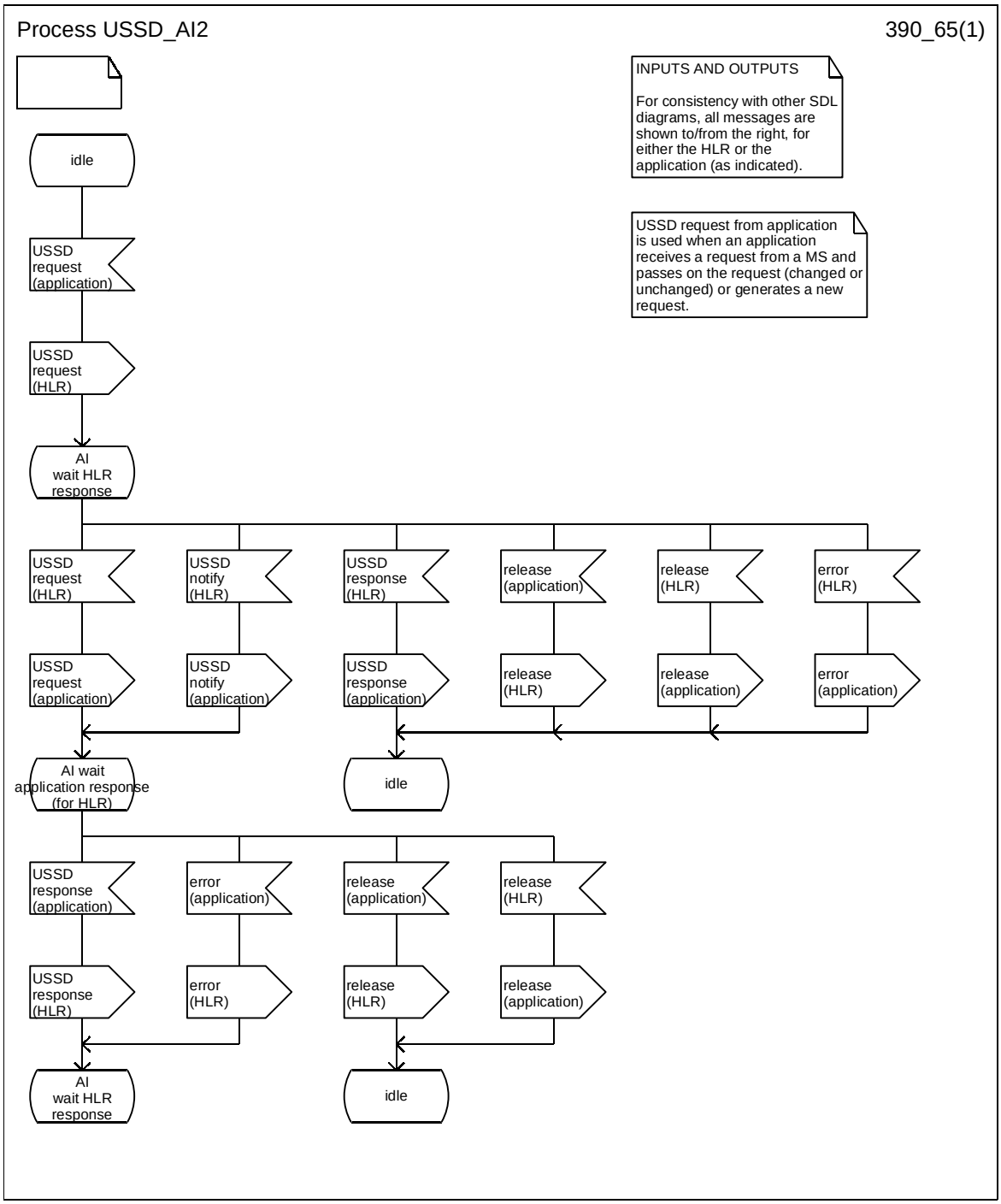
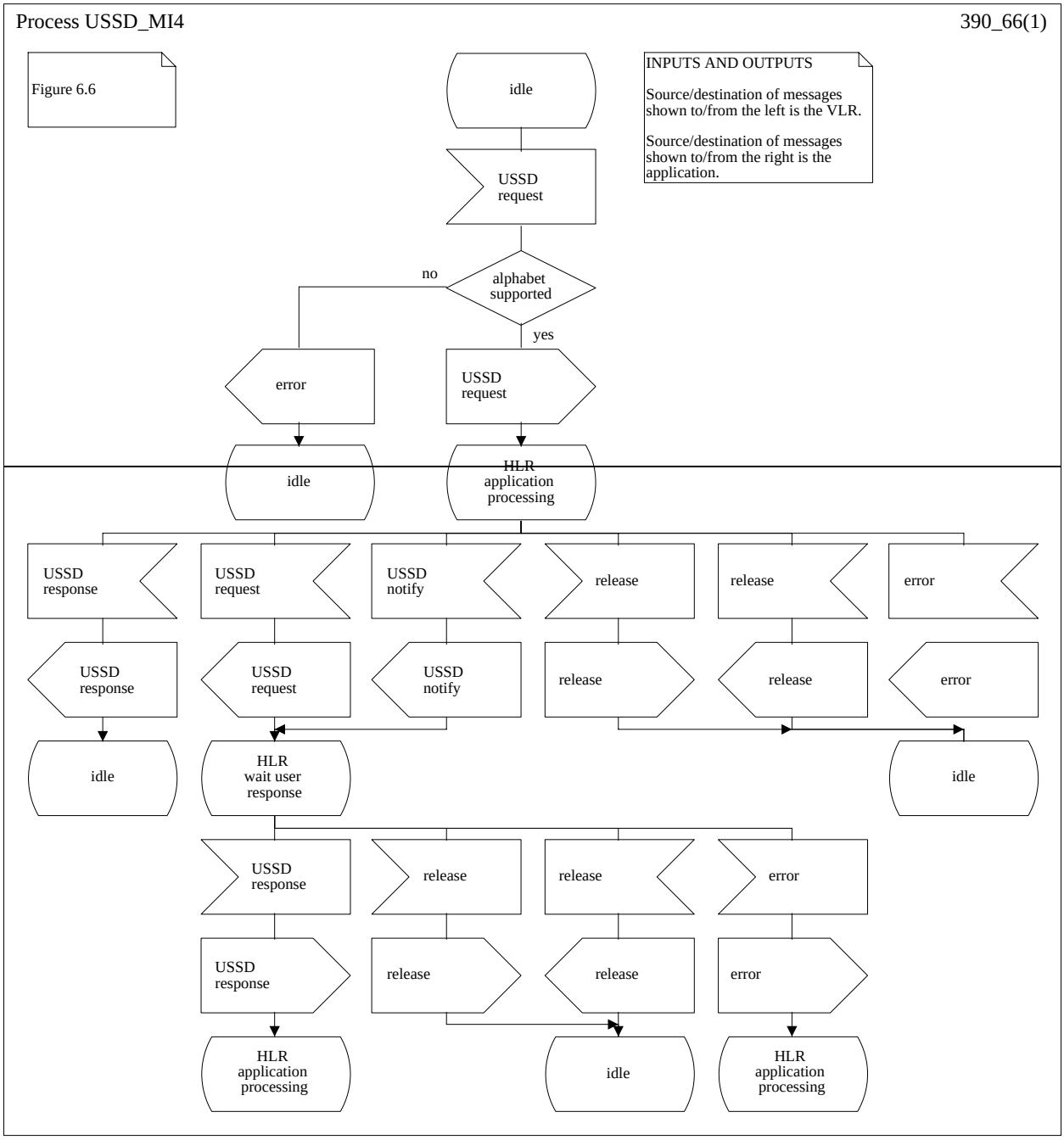


Figure 6.5: Application initiated USSD at VLR


Process USSD_MI4
390_66(1)
Figure 6.6
INPUTS AND OUTPUTS
Source/destination of messages shown to/from the left is the VLR.
Source/destination of messages shown to/from the right is the application.
idle
USSD request
alphabet supported
no
yes
error
USSD request
idle
HLR application processing
USSD response
USSD request
USSD notify
release
release
error
USSD response
USSD request
USSD notify
release
release
error
idle
HLR wait user response
idle
USSD response
release
release
error
USSD response
release
release
error
HLR application processing
idle
HLR application processing

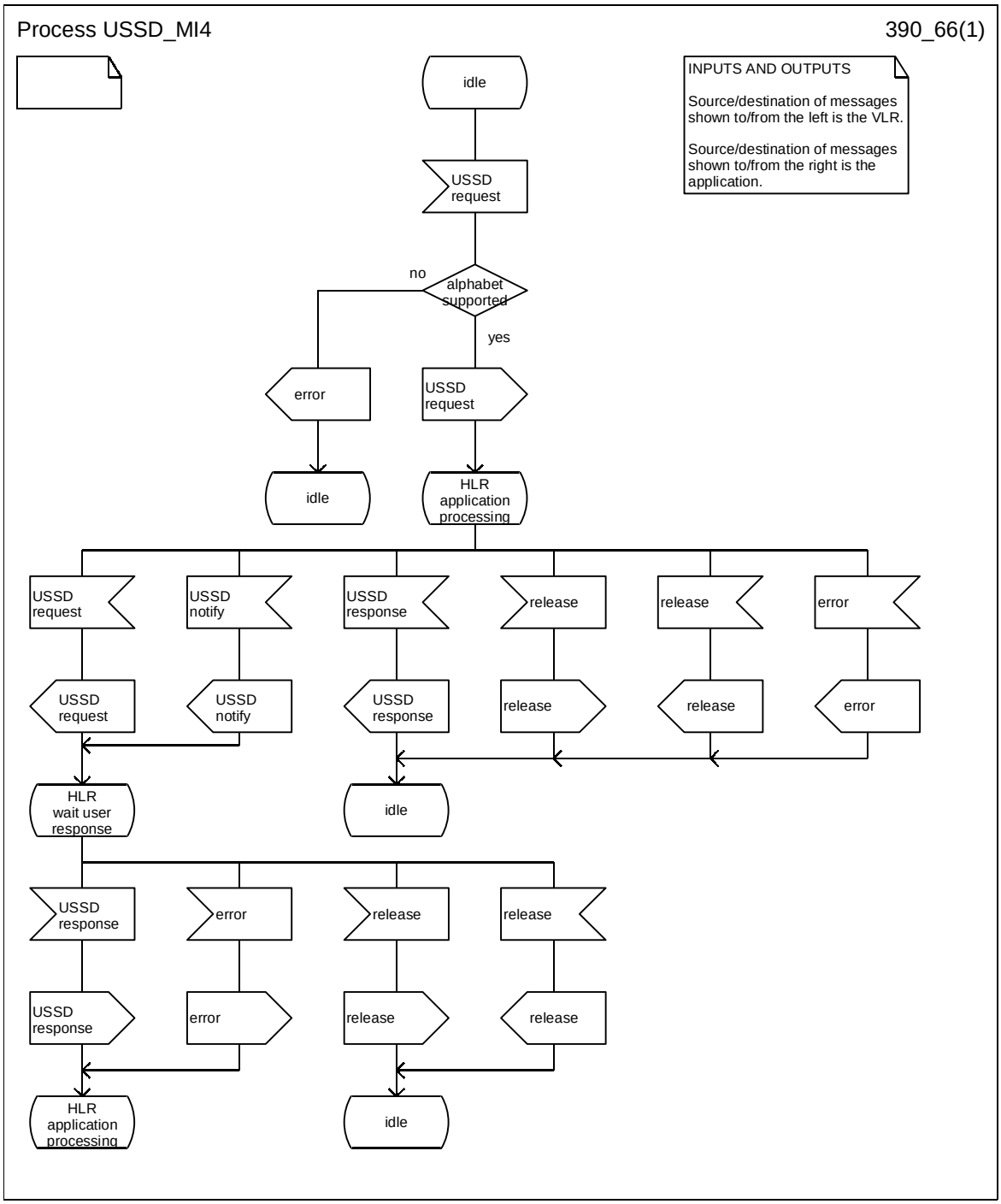


Figure 6.6: Mobile initiated USSD at HLR

3GPP TSG CN WG4
Helsinki, Finland, 17-21 July 2000

Document N4-000438
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

23.091	CR	002	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#09	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: N4 **Date:** 2000-06-26

Subject: SDL refresh

Work item: TEI

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			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change:

The SDL diagrams in this document have been replaced, without any semantic changes due to the following reasons:

- In the previous version, the diagrams contained nothing but garbage when viewed on-screen.
- Some of the diagrams were, if not impossible, very hard to print.
- A binary version of the SDL diagrams, suitable for standard tools, is needed to assure a qualitative handling of the diagrams in the future. Telelogic Tau SDL Suite (formerly known as SDT) versions of the diagrams have been created and made available, providing a new fresh base for future changes. For obvious reasons, the binary version, to be regarded as the source, should be mirrored in the document. Therefore, the diagrams replacing the previous versions are printouts of the binary versions.

Clauses affected: All figures in the document, containing an SDL diagram.

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:

ETSI plans to make the binary versions of the SDL diagrams available on the 3GPP web-site.

4.1 Functions

The following function has been identified for the explicit call transfer service:

MAF027

Explicit Call Transfer related authorizations examination

The ability of a PLMN component to determine the authorizations relating to explicit call transfer. See figure 1.

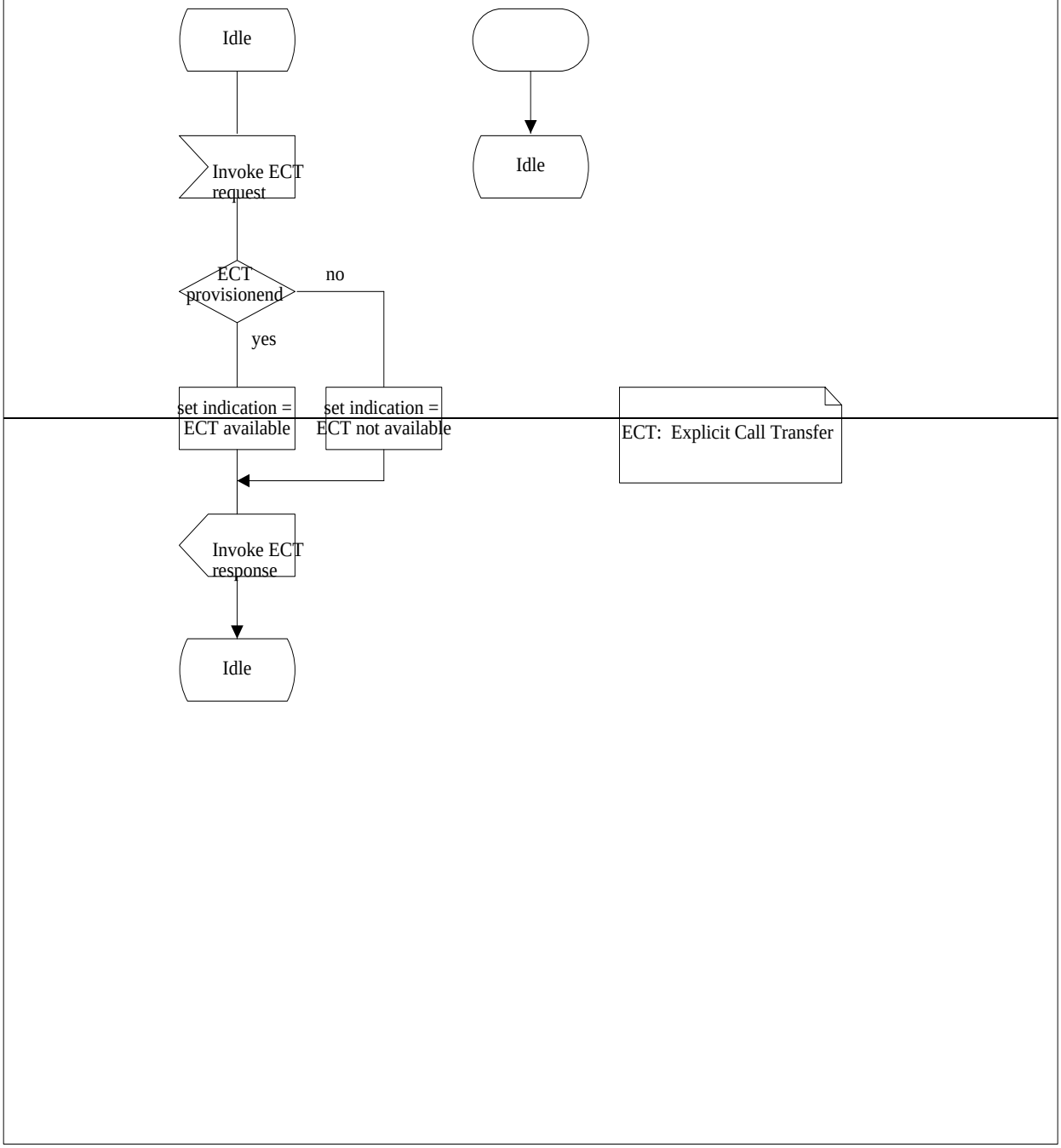
Location: VLR

Within the authorization examinations diagram, the messages shown to and from the left are to and from the MSC.

After receiving a "invoke ECT request" the VLR will check if the Explicit Call Transfer service is provisioned for the served subscriber. If the service is provisioned the VLR send back to the MSC "Explicit Call Transfer available". If the service is not provisioned the VLR will send back to the MSC "Explicit Call Transfer not available". When the response has been sent back to the MSC the process will return to the idle state.

Process MAF027 391_1(1)

Figure 1: Explicit Call transfer related authorisations examination (VLR)



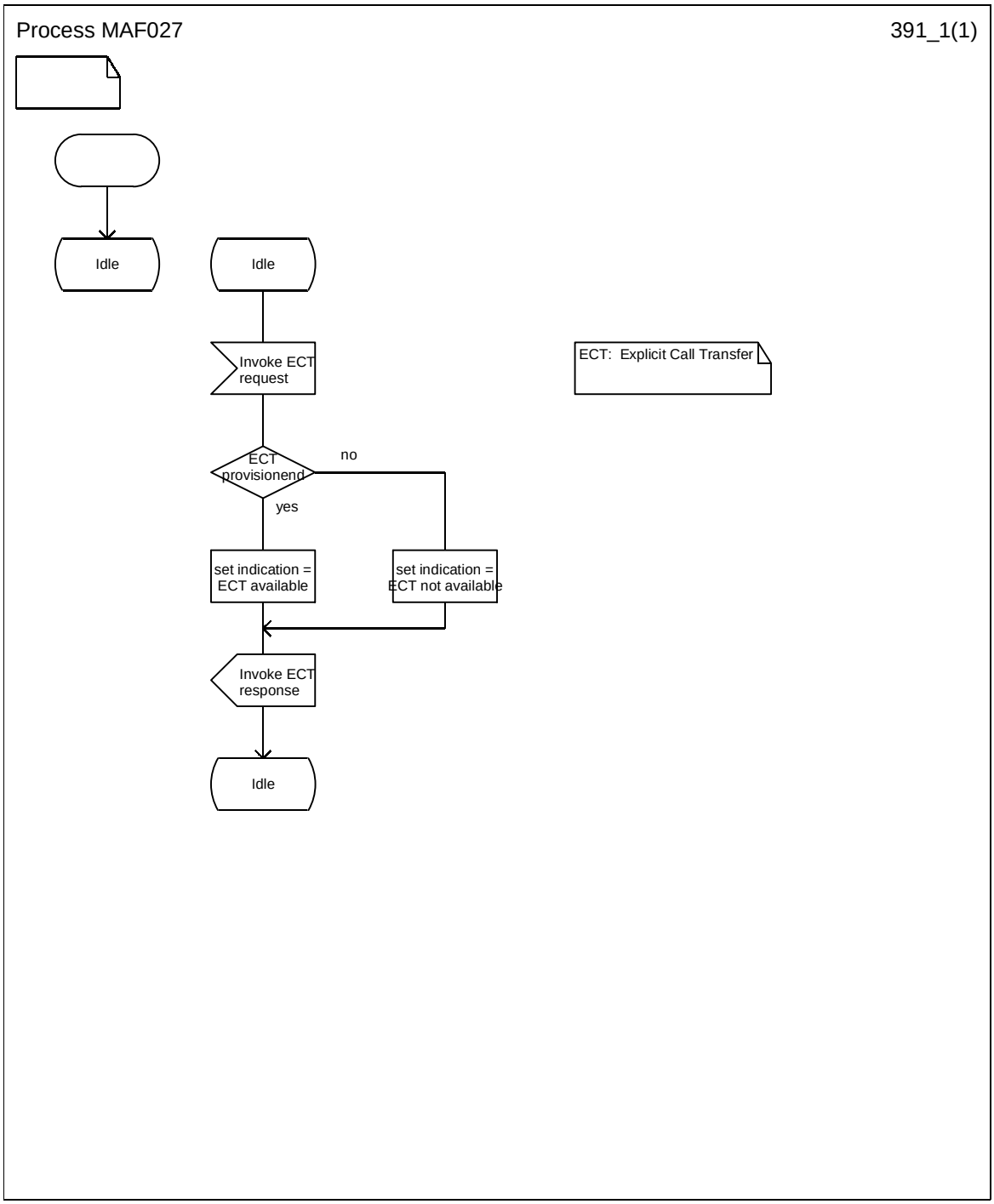


Figure 1: Explicit Call Transfer related authorizations examination (VLR)

4.2 Overall SDL-diagrams and information flows

4.2.1 General description

The overall SDL-diagrams represent the network as a whole. The overall SDL-diagrams show the status of the service as perceived by the served mobile subscriber, as well as the status as perceived by any of the other parties. Besides this, the overall SDL-diagrams show the actions to be taken by the network and the information provided by the network to the users.

Within the overall SDL-diagrams, messages to and from the served mobile subscriber are indicated to and from the left, whereas messages to and from remote parties are indicated to and from the right.

The following states for the invocation of the ECT supplementary service are defined:

a) First Call (Active, Held), Second Call (Active, Idle);

b) Second Call (Active, Held), First Call (Active, Idle);

c) First Call (Active, Held), Second Call (Call Delivered, Idle).

These two dimensional states are also used in the SDLs and information flows:

- the first dimension is a normal basic call state "active" or "call delivered";

- the second dimension is "held" meaning that the call is set on hold.

NOTE: The call state "call delivered" means that a ALERT message has been received in the MS, but no ANSWER MESSAGE (ANM) is received.

In the information, flows it is assumed that the served subscriber is a mobile subscriber and that the other parties are mobile or fixed subscribers.

Party A is the subscriber controlling the Explicit Call Transfer Call (served mobile subscriber). Party B is the first remote party called. Party C is the second remote party called.

The served party is disconnected by the generic disconnect/release procedure after a successful transfer request. The connection of the remote party calls in a new call (transferred call) is located in the MSC.

The first figures of the information flows (figures 4 and 7) show the unsuccessful case of the transfer request (check in the VLR or in the MSC fails).

The second figures (figures 5 and 8) show the successful case of the transfer request.

4.2.2 ECT (both calls answered)

After receipt of a ECT request from the served subscriber, the MSC/VLR will check if the Explicit Call Transfer supplementary service is provisioned for the served subscriber (see also MAF027).

If the ECT Supplementary Service is provisioned, then the MSC/VLR will check if the transfer is barred by virtue of call states or supplementary service interactions (see also figure 3 and subclause 4.3).

If there are no such barring causes then the MSC/VLR also checks if CUG restrictions are infringed (see also figure 3 and subclause 4.3).

If the outcome of these checks are successful and the loop prevention option is supported, an endless loop prevention check shall be performed according to T/S 22-21 (version 9) and DE/SPS6001.22 (version 9).

If the result of this check is also successful the both calls shall be connected in the MSC (without including the served subscriber in this connection), the held party will be retrieved and both remote parties will be notified that call transfer was done.

With this notification the both subscribers will be informed about the state of the other remote party in which call transfer was done ("call transferred, active") and if possible about the identity (Redirection number) of each other (for details see also subclause 4.3).

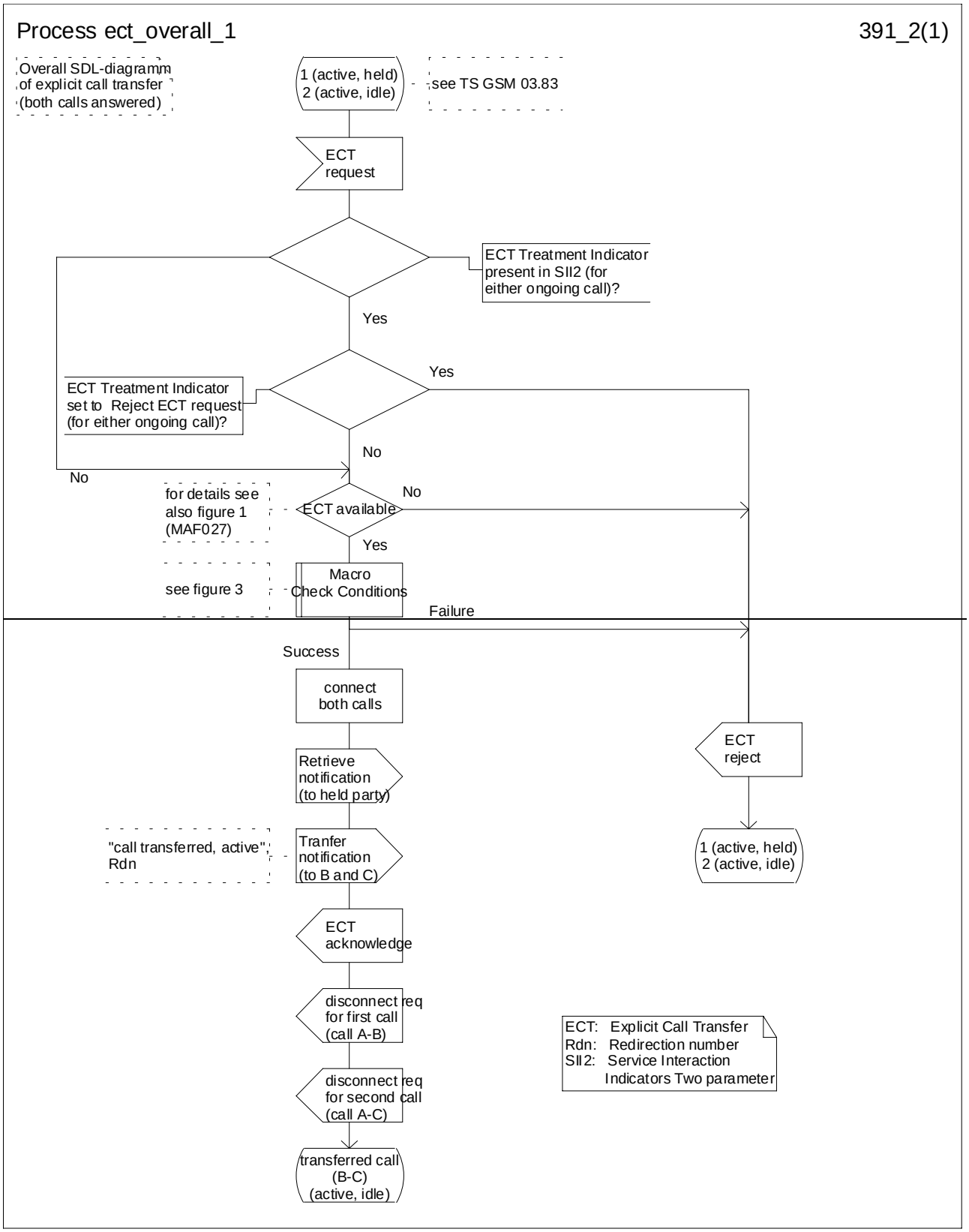
After that the served mobile subscriber will be disconnected from both calls.

If the checks fail the ECT request will be rejected and the two calls remain in the call states in which they were before ECT was attempted.

The overall SDL for Explicit Call Transfer (both calls are answered) is shown in figure 2.

The checks if Explicit Call Transfer is barred or not are shown in figure 3.

The corresponding information flows are given in figure 4 and figure 5.


Process ect_overall_1
391_2(1)
Overall SDL-diagramm of explicit call transfer (both calls answered)
1 (active, held)
2 (active, idle)
see TS GSM 03.83
ECT request
ECT Treatment Indicator present in SII2 (for either ongoing call)?
Yes
Yes
ECT Treatment Indicator set to Reject ECT request (for either ongoing call)?
No
No
for details see also figure 1 (MAF027)
ECT available
No
Yes
see figure 3
Macro Check Conditions
Failure
Success
connect both calls
ECT reject
Retrieve notification (to held party)
"call transferred, active", Rdn
Tranfer notification (to B and C)
1 (active, held)
2 (active, idle)
ECT acknowledge
disconnect req for first call (call A-B)
disconnect req for second call (call A-C)
transferred call (B-C) (active, idle)
ECT: Explicit Call Transfer
Rdn: Redirection number
SII2: Service Interaction Indicators Two parameter

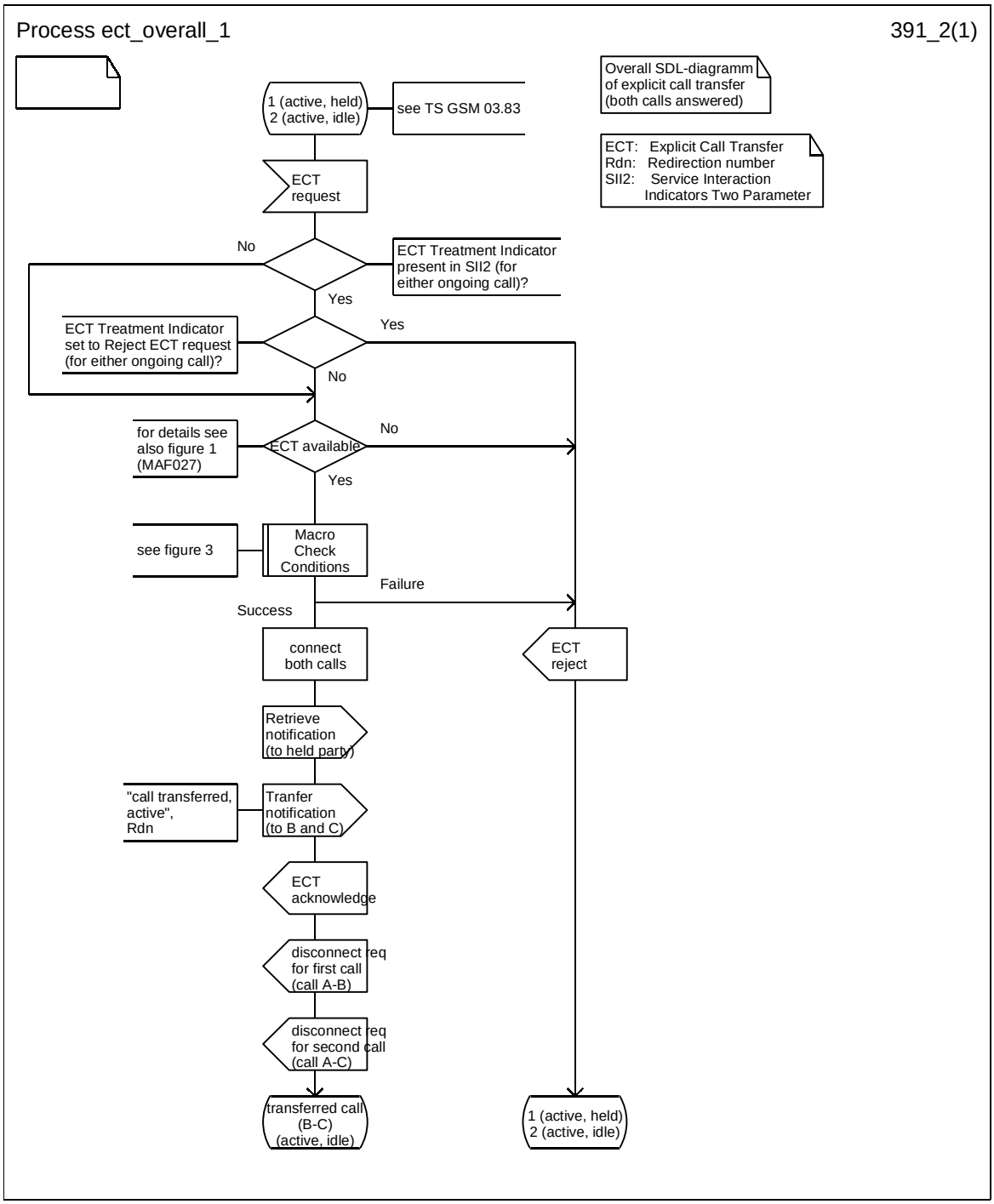
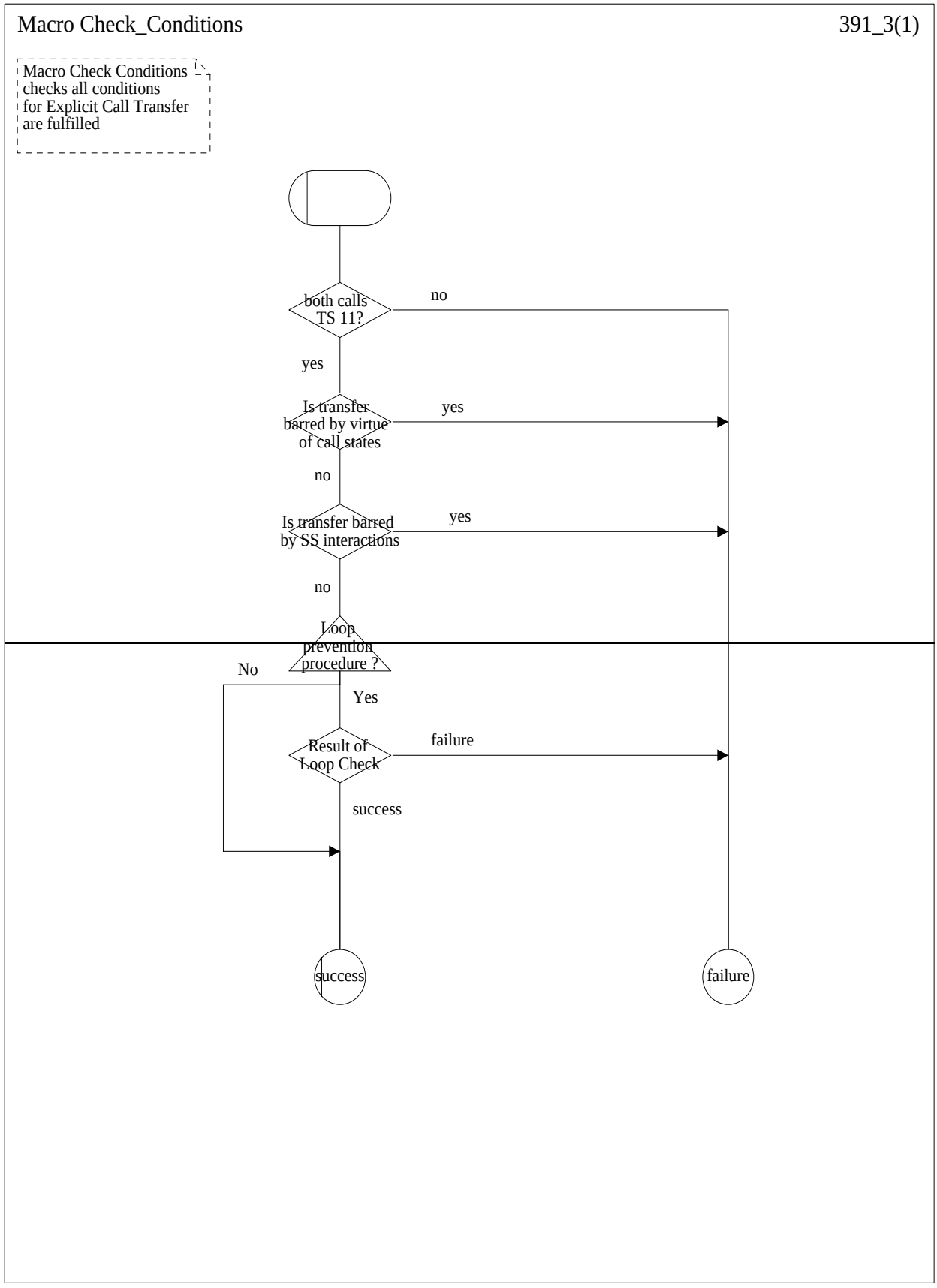


Figure 2: Overall SDL-diagram of Explicit Call Transfer (both calls answered)


Macro Check_Conditions
391_3(1)
Macro Check Conditions checks all conditions for Explicit Call Transfer are fulfilled
both calls TS 11?
no
yes
Is transfer barred by virtue of call states
yes
no
Is transfer barred by SS interactions
yes
no
Loop prevention procedure ?
No
Yes
Result of Loop Check
failure
success
success
failure

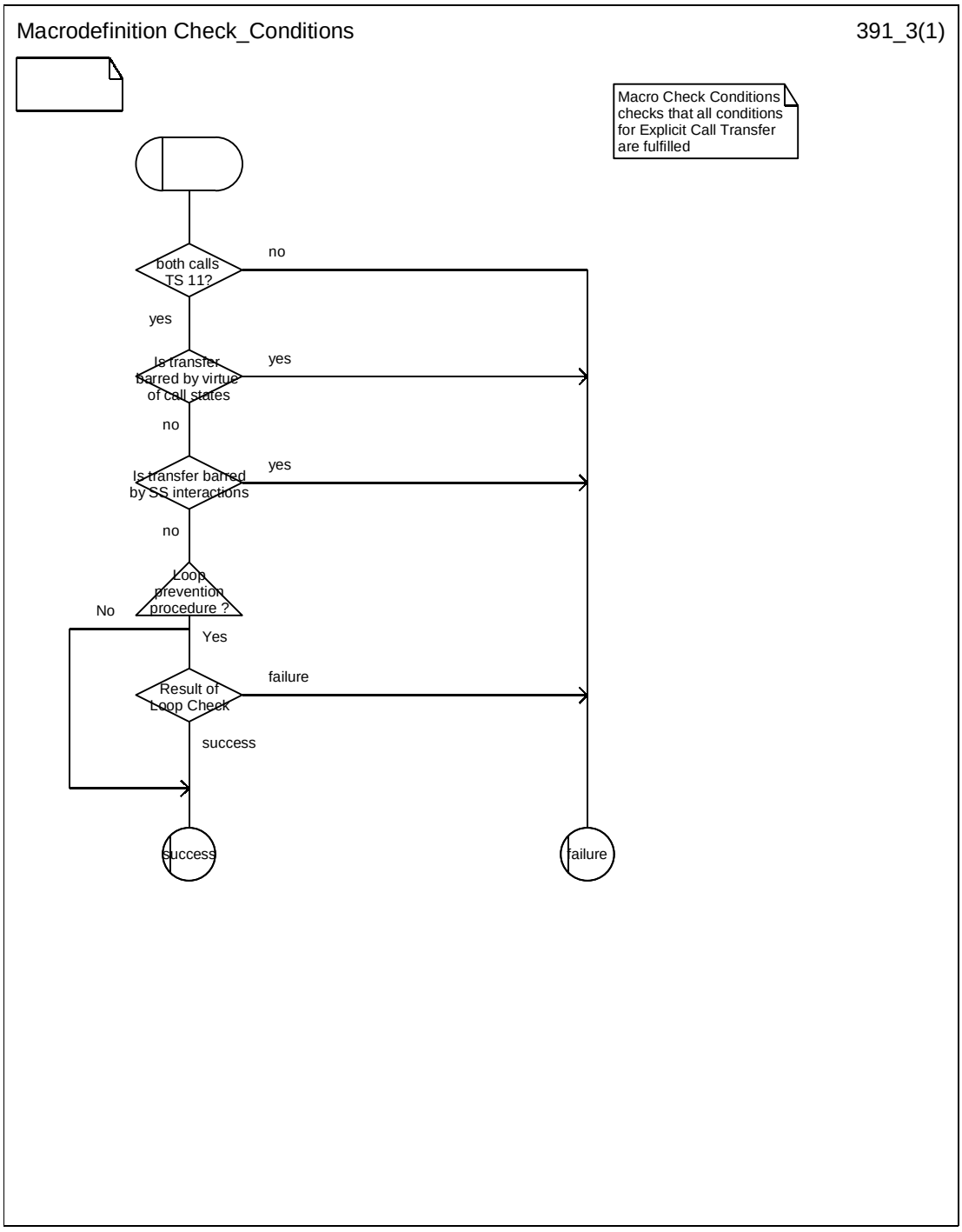
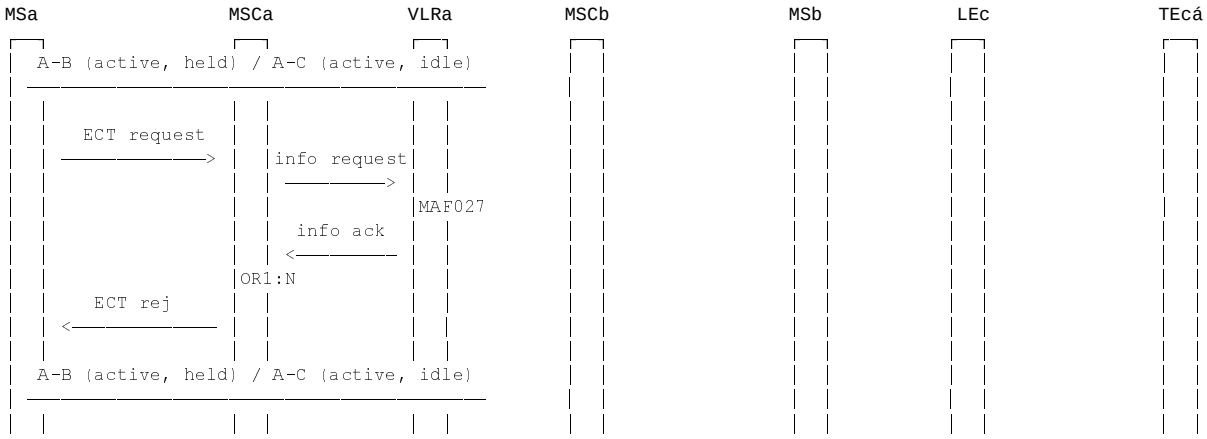
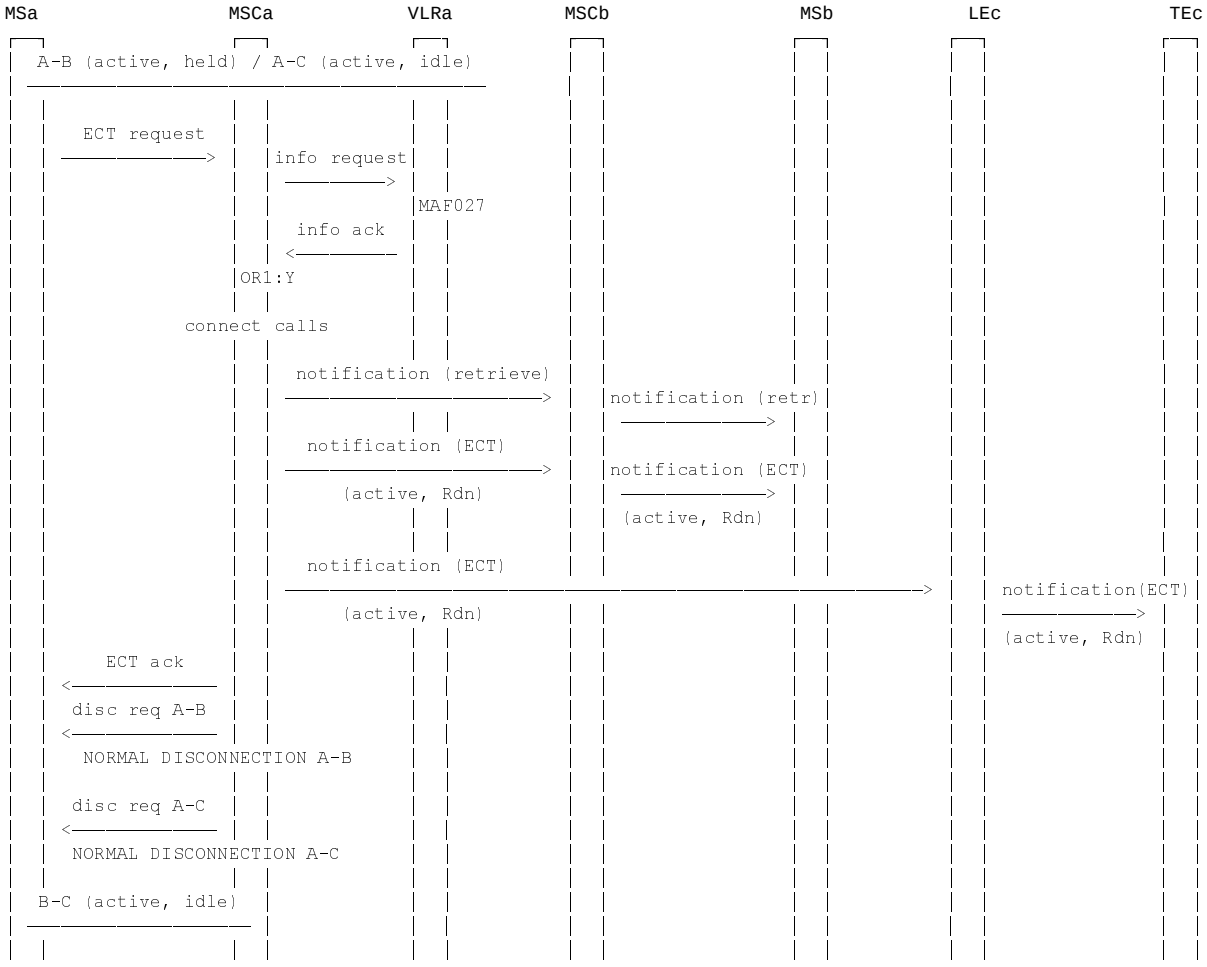


Figure 3: Macro Check Conditions



NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no).

Figure 4: Information flow for failed explicit call transfer request (both calls answered)



NOTE: OR1: Checks in VLR and MSC ok? (Y: yes N: no).

Figure 5: Information flow for successful explicit call transfer (both calls answered)

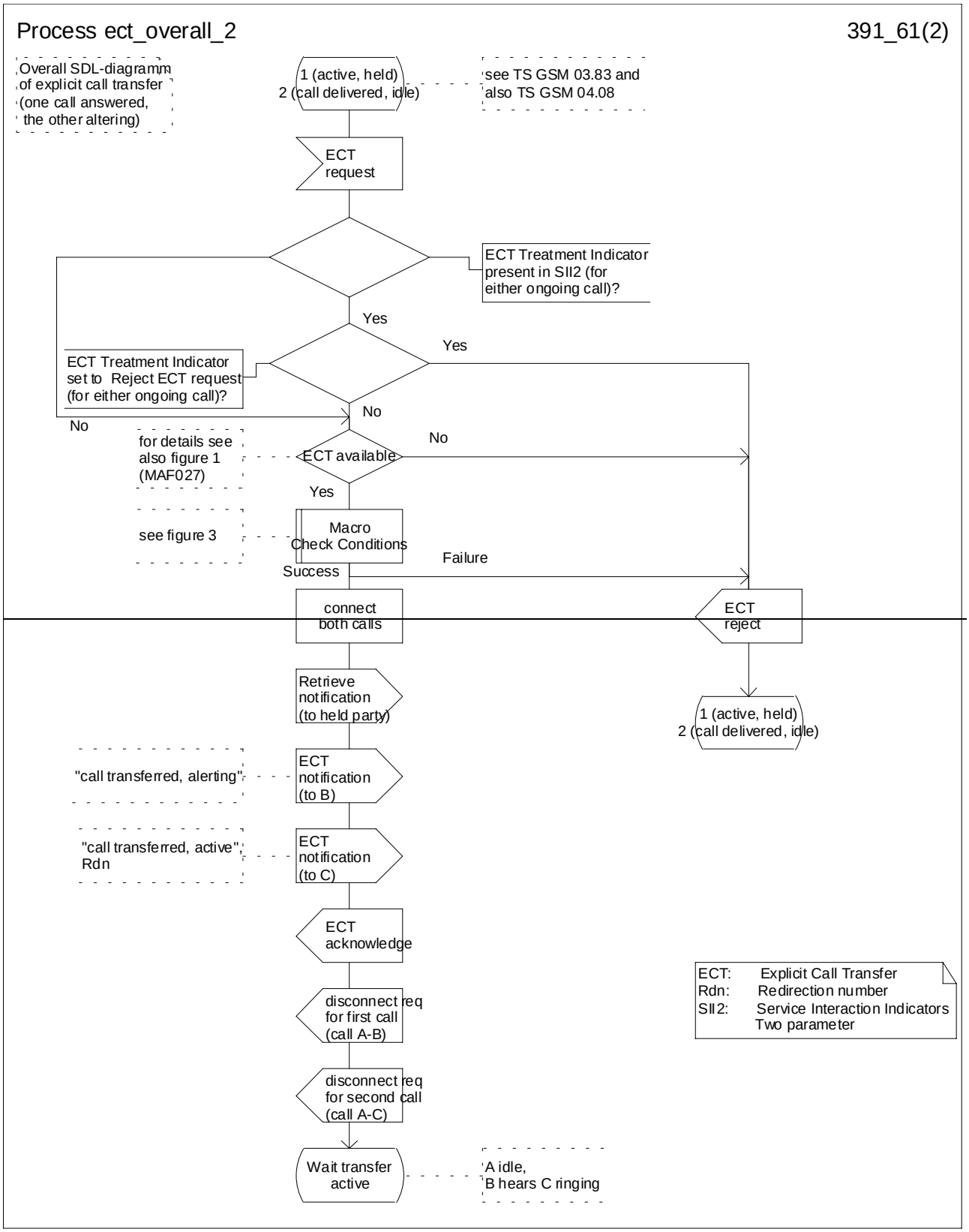
4.2.3 ECT (one call answered, the other alerting)

In this case, generally the same procedures will apply as in the other case (both calls answered). The same checks shall be performed and if all checks are fulfilled both calls shall be connected together (without including the served subscriber in this connection). After the connection of the both calls, both subscriber (B and C) will be notified about the call transfer invocation in the same way as in the case where the two calls are answered.

The transfer notification to the subscriber B will include the information that the transfer was done in the altering state of subscriber C ("call transferred, alerting"). After receipt of the answer message from subscriber C, the subscriber B will be notified again, indicating that answer has taken place subsequent to the alerting transfer ("call transferred, active").

The overall SDL for Explicit Call Transfer (one call answered, the other alerting) is shown in figure 6.

The corresponding information flows are given in figure 7 and figure 8.


Process ect_overall_2
391_61(2)
Overall SDL-diagramm of explicit call transfer (one call answered, the other altering)
1 (active, held)
2 (call delivered, idle)
see TS GSM 03.83 and also TS GSM 04.08
ECT request
ECT Treatment Indicator present in SII2 (for either ongoing call)?
Yes
ECT Treatment Indicator set to Reject ECT request (for either ongoing call)?
Yes
No
No
for details see also figure 1 (MAF027)
ECT available
No
Yes
see figure 3
Macro Check Conditions
Failure
Success
connect both calls
ECT reject
Retrieve notification (to held party)
1 (active, held)
2 (call delivered, idle)
"call transferred, alerting"
ECT notification (to B)
"call transferred, active", Rdn
ECT notification (to C)
ECT acknowledge
ECT: Explicit Call Transfer
Rdn: Redirection number
SII2: Service Interaction Indicators Two parameter
disconnect req for first call (call A-B)
disconnect req for second call (call A-C)
Wait transfer active
A idle,
B hears C ringing

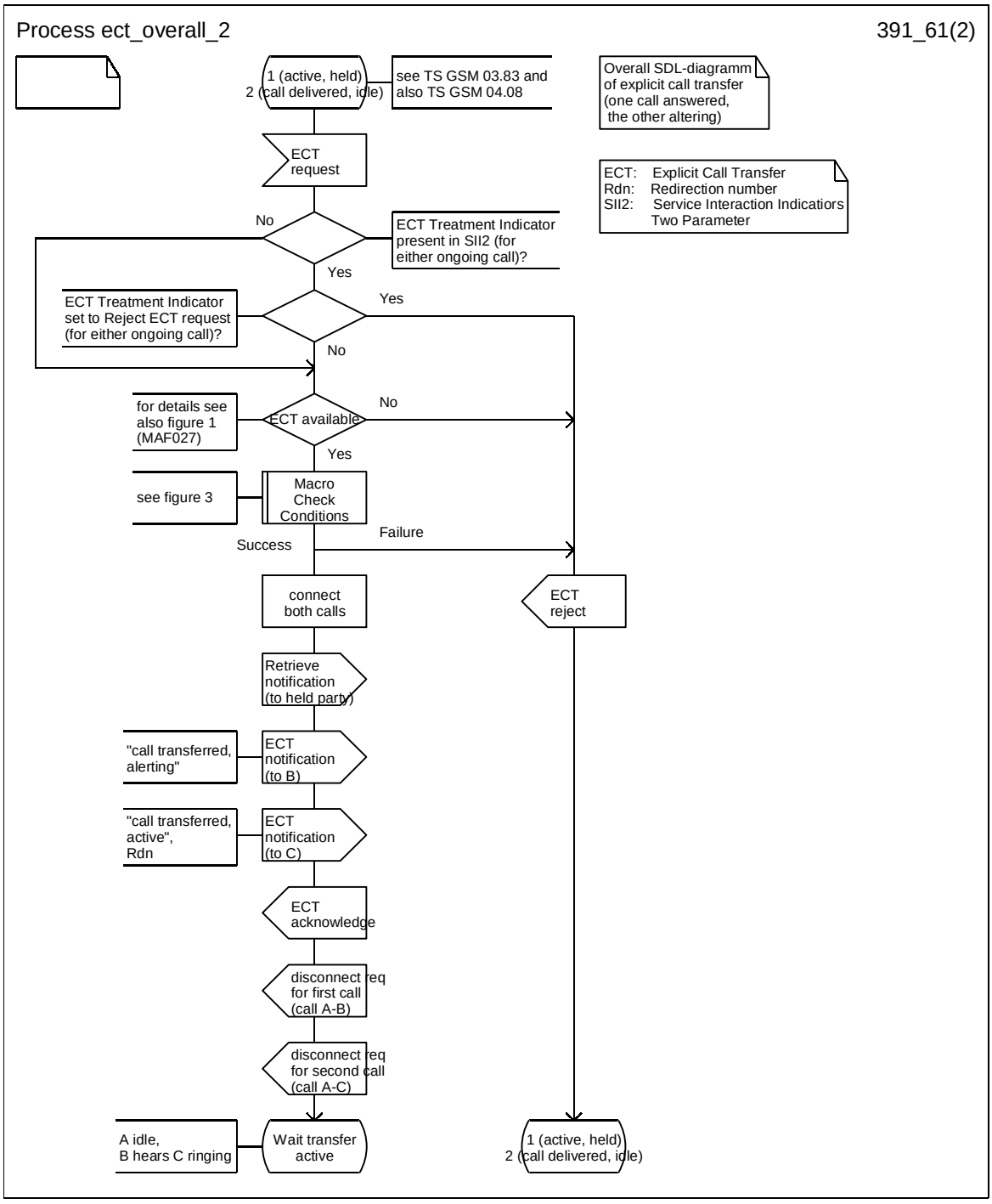
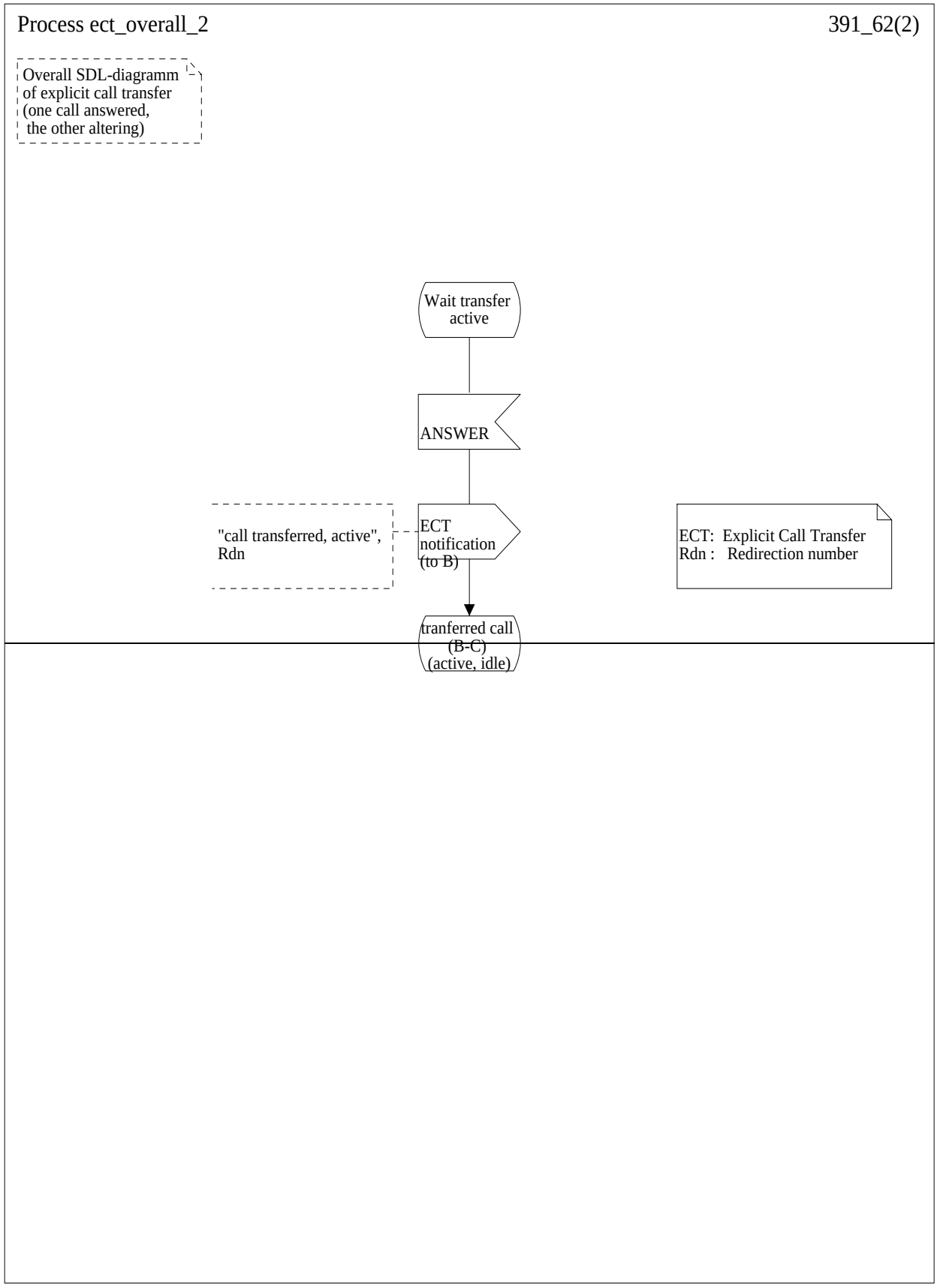


Figure 6: Overall SDL-diagram of explicit call transfer (one call answered, the other alerting) (page 1 of 2)


Process ect_overall_2
391_62(2)
Overall SDL-diagramm of explicit call transfer (one call answered, the other altering)
Wait transfer active
ANSWER
"call transferred, active", Rdn
ECT notification (to B)
ECT: Explicit Call Transfer
Rdn : Redirection number
tranferred call (B-C) (active, idle)

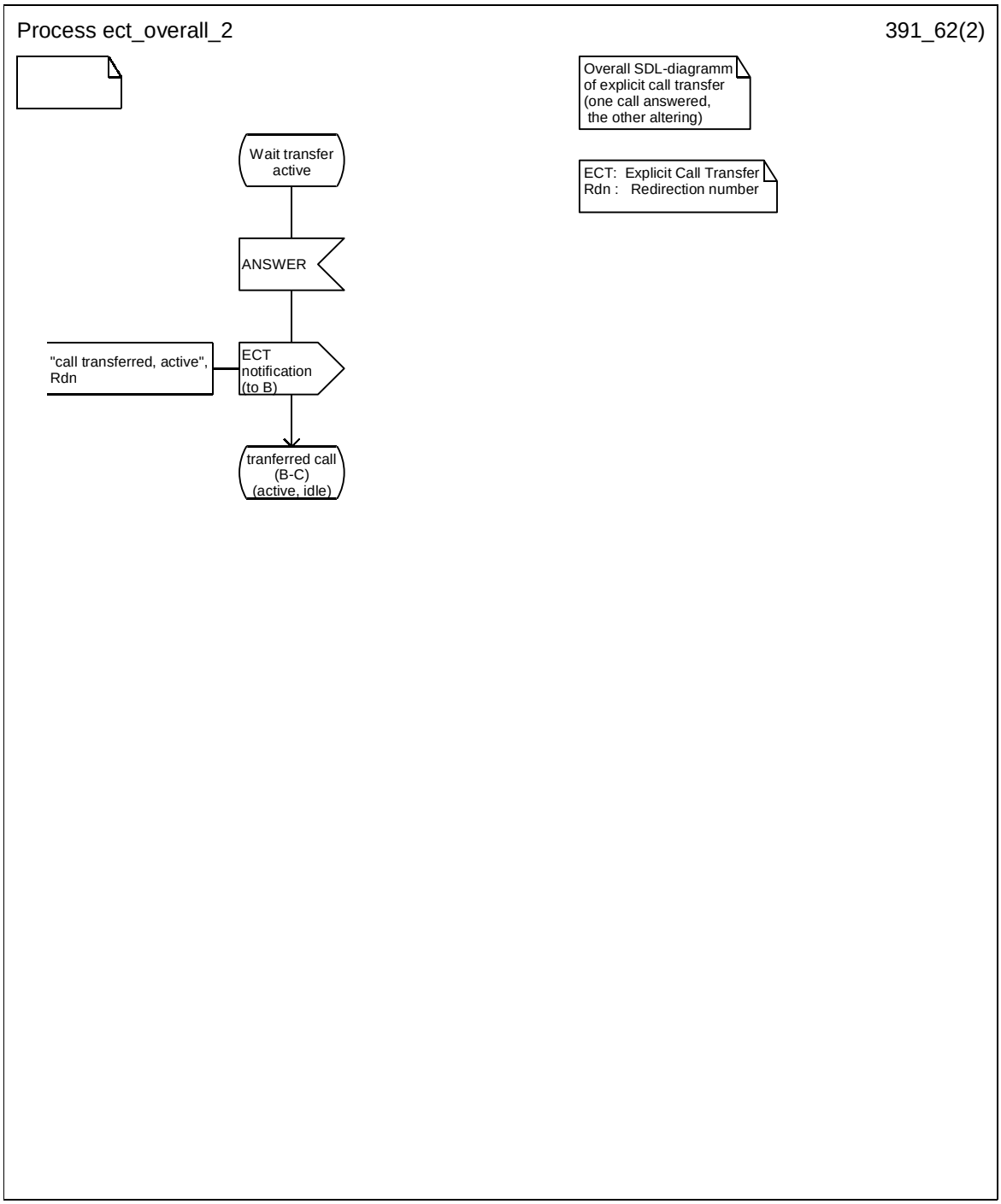


Figure 6: Overall SDL-diagram of explicit call transfer (one call answered, the other alerting) (page 2 of 2)

3GPP TSG-N4 #4
Seattle, USA, 28 Aug - 01 Sep 2000

Tdoc 3GPP ***N4-000749***

CHANGE REQUEST

29.002	**CR**	**185**	Current Version:	3.5.1

For submission to: TSG-CN#09 — for approval [X] / for information [ ] — strategic [ ] / non-strategic [X]

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [ ] Core Network [X]

Source: N4 **Date:** 31th August 2000

Subject: Correction to MSC-A handover SDLs

Work item: TEI

Category:

F	Correction	[ ]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[ ]
D	Editorial modification	[X]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change:

- The new figure 19.2.2/1 (sheet 8 of 13) seems to represent more than just editorial changes (as indicated by CR 143 coversheet)
  - Replaced MAP_Prepare_Subsequent_Handover respond by MAP_forward_access_signalling Request
  - Replaced Call on MSC-B by Wait_for_HO_indication
  - Replaced Wait_for sub_ho_indication by Wait_for_Ho_indication

Clauses affected: 19.2.2.5

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: Header for sheet 8 needs changing 19.2.2_1.7(12) -> 19.2.2_1.8(13)

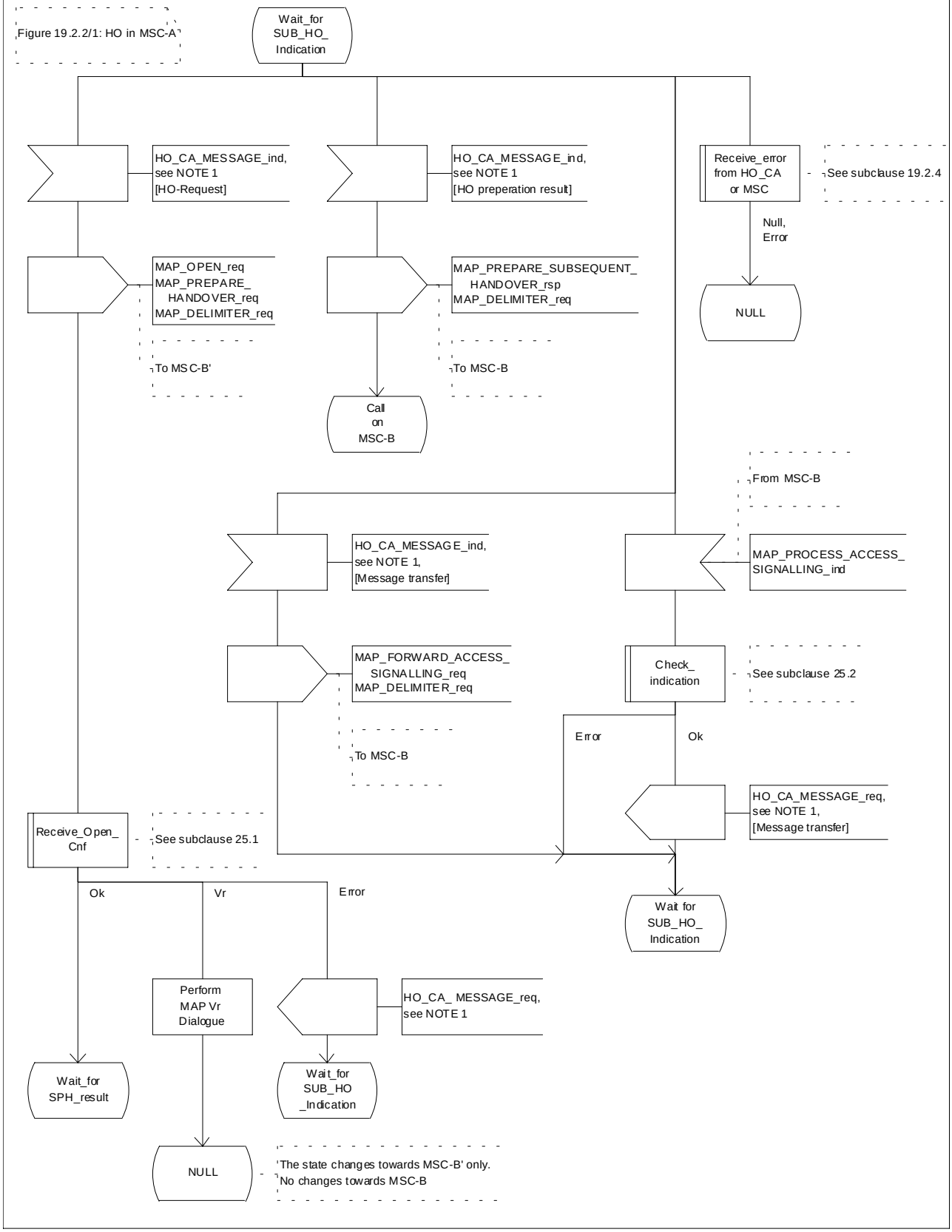


Figure 19.2.2/1: HO in MSC-A
Wait_for SUB_HO_ Indication
HO_CA_MESSAGE_ind, see NOTE 1 [HO-Request]
HO_CA_MESSAGE_ind, see NOTE 1 [HO preperation result]
Receive_error from HO_CA or MSC
See subclause 19.2.4
Null, Error
MAP_OPEN_req
MAP_PREPARE_ HANDOVER_req
MAP_DELIMITER_req
To MSC-B'
MAP_PREPARE_SUBSEQUENT_ HANDOVER_rsp
MAP_DELIMITER_req
To MSC-B
NULL
Call on MSC-B
From MSC-B
HO_CA_MESSAGE_ind, see NOTE 1, [Message transfer]
MAP_PROCESS_ACCESS_ SIGNALLING_ind
MAP_FORWARD_ACCESS_ SIGNALLING_req
MAP_DELIMITER_req
To MSC-B
Check_ indication
See subclause 25.2
Error
Ok
HO_CA_MESSAGE_req, see NOTE 1, [Message transfer]
Receive_Open_ Cnf
See subclause 25.1
Ok
Vr
Error
Wait for SUB_HO_ Indication
Perform MAP Vr Dialogue
HO_CA_ MESSAGE_req, see NOTE 1
Wait_for SPH_result
Wait_for SUB_HO _Indication
NULL
'The state changes towards MSC-B' only.
No changes towards MSC-B

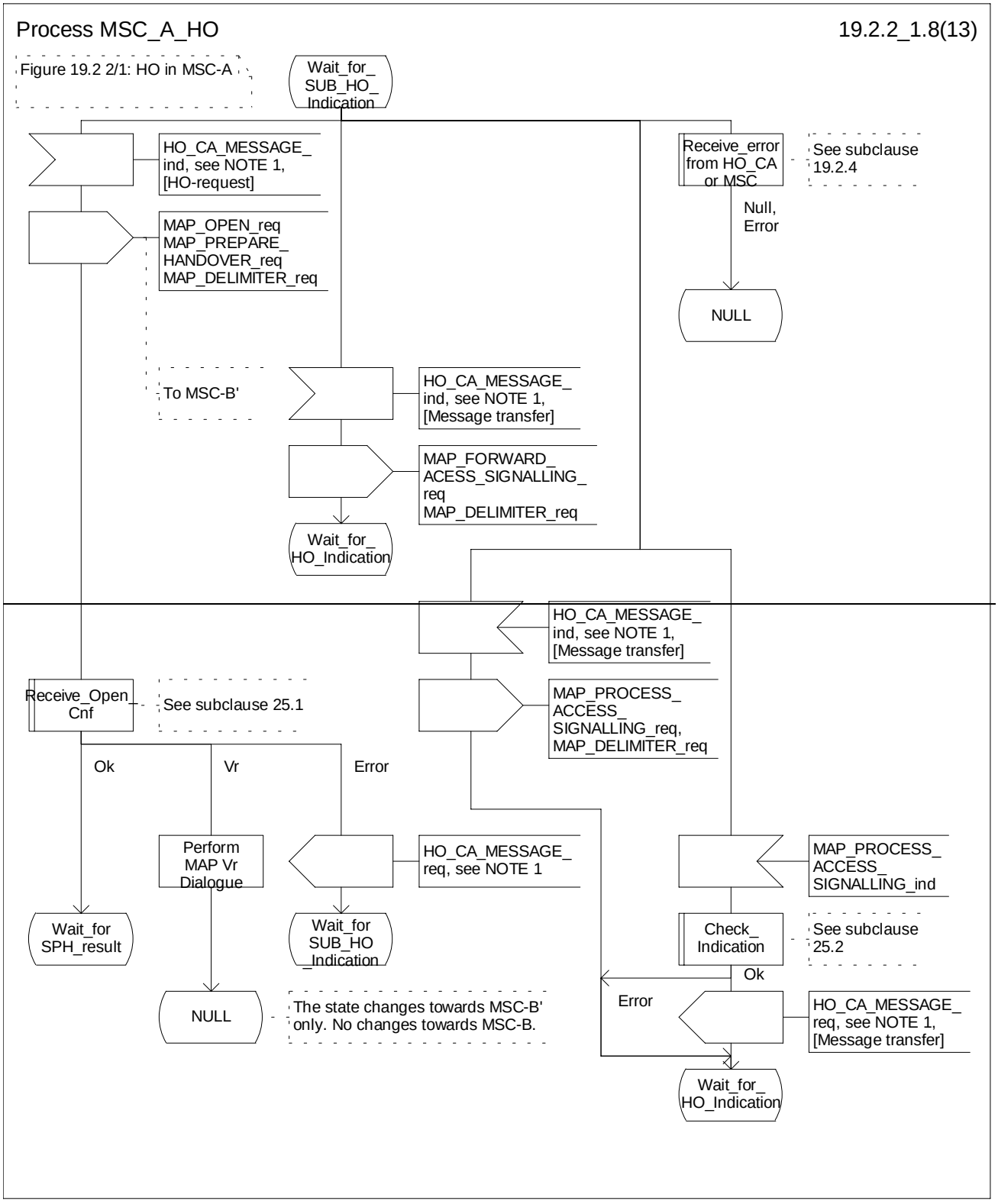


Figure 19.2.2/1 (sheet 8 of 13): Process MSC_A_HO