

ETSI TS 123 097 V17.0.0 (2022-04)



**Digital cellular telecommunications system (Phase 2+) (GSM);
Universal Mobile Telecommunications System (UMTS);
Multiple Subscriber Profile (MSP) (Phase 2);
Stage 2
(3GPP TS 23.097 version 17.0.0 Release 17)**



Reference

RTS/TSGC-0423097vh00

Keywords

GSM,UMTS

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° w061004871

Important notice

The present document can be downloaded from:
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the prevailing version of an ETSI deliverable is the one made publicly available in PDF format at www.etsi.org/deliver.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at <https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

If you find a security vulnerability in the present document, please report it through our Coordinated Vulnerability Disclosure Program:
<https://www.etsi.org/standards/coordinated-vulnerability-disclosure>

Notice of disclaimer & limitation of liability

The information provided in the present deliverable is directed solely to professionals who have the appropriate degree of experience to understand and interpret its content in accordance with generally accepted engineering or other professional standard and applicable regulations.

No recommendation as to products and services or vendors is made or should be implied.

No representation or warranty is made that this deliverable is technically accurate or sufficient or conforms to any law and/or governmental rule and/or regulation and further, no representation or warranty is made of merchantability or fitness for any particular purpose or against infringement of intellectual property rights.

In no event shall ETSI be held liable for loss of profits or any other incidental or consequential damages.

Any software contained in this deliverable is provided "AS IS" with no warranties, express or implied, including but not limited to, the warranties of merchantability, fitness for a particular purpose and non-infringement of intellectual property rights and ETSI shall not be held liable in any event for any damages whatsoever (including, without limitation, damages for loss of profits, business interruption, loss of information, or any other pecuniary loss) arising out of or related to the use of or inability to use the software.

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© ETSI 2022.
All rights reserved.

Intellectual Property Rights

Essential patents

IPRs essential or potentially essential to normative deliverables may have been declared to ETSI. The declarations pertaining to these essential IPRs, if any, are publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<https://ipr.etsi.org/>).

Pursuant to the ETSI Directives including the ETSI IPR Policy, no investigation regarding the essentiality of IPRs, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are trademarks of ETSI registered for the benefit of its Members. **3GPP™** and **LTE™** are trademarks of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners. **oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners. **GSM®** and the GSM logo are trademarks registered and owned by the GSM Association.

Legal Notice

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities. These shall be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between 3GPP and ETSI identities can be found under <http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Legal Notice	2
Modal verbs terminology.....	2
Foreword.....	5
1 Scope	6
2 References	6
3 Definitions and abbreviations.....	7
3.1 Definitions	7
3.2 Abbreviations	7
4 Features needed to support MSP Phase 2.....	7
5 Additional Information stored in network entities	8
5.1 Data stored in the HLR.....	8
5.2 Data stored in the VLR.....	8
6 Additional procedures in network entities.....	8
6.1 OCB_flag	8
6.2 ODB flags.....	9
6.3 HOLD_flag.....	9
6.4 CW_flag.....	9
6.5 MPTY_flag.....	9
6.6 ECT_flag.....	9
6.7 CCBS_flag	10
6.8 CLIR_flag.....	10
7 Description of Multiple Subscriber Profile	10
7.1 Overview	10
7.2 Registration of a Profile	10
7.3 Interrogation.....	12
7.4 Call Handling for an MSP subscriber.....	15
7.4.1 Mobile Originating (MO) call handling.....	15
7.4.2 Mobile Terminating (MT) call handling.....	15
7.5 Functions and Information Flows.....	15
7.5.1 MO call handling in the gsmSCF.....	15
7.5.1.1 Process MO_MSP_Call_gsmSCF.....	15
7.5.1.2 Procedure Set_Calling_Profile_gsmSCF	15
7.5.1.3 Procedure Send_FCI_gsmSCF.....	15
7.5.2 MT call handling in the gsmSCF.....	22
7.5.2.1 Process MT_MSP_Call_gsmSCF	22
7.5.3 SS handling in the gsmSCF	27
7.5.3.1 Procedure Check_CLIR_gsmSCF.....	27
7.5.3.2 Procedure Forwarded_MSP_Call_gsmSCF.....	27
7.5.3.3 Procedure Check_CFU_gsmSCF.....	27
7.5.3.4 Procedure Check_Early_CF_gsmSCF.....	27
7.5.3.5 Procedure Check_Late_CF_gsmSCF.....	27
7.5.3.6 Procedure Check_CFNRy_gsmSCF	27
7.5.3.7 Procedure Check_CFB_gsmSCF	27
7.5.3.8 Procedure Check_CFNRc_gsmSCF	27
7.5.3.9 Procedure Check_CW_gsmSCF	27
7.5.3.10 Procedure Check_HOLD_gsmSCF.....	27
7.5.3.11 Procedure Check_MPTY_gsmSCF.....	27
7.5.3.12 Procedure Check_ACM_gsmSCF.....	27
7.5.3.13 Process AoC_MSP_gsmSCF	27
7.5.3.14 Procedure AoCI_gsmSCF.....	27
7.5.3.15 Procedure AoCC_gsmSCF.....	28

7.5.3.16	Procedure Outgoing_Barring_Check_gsmSCF.....	28
7.5.3.17	Procedure Incoming_Barring_Check_gsmSCF	28
7.5.3.18	Procedure Check_ECT_gsmSCF	28
7.5.3.19	Procedure Check_CCBS_gsmSCF	28
7.5.4	Information flows	47
7.6	SMS handling	50
7.7	Call Independent SS handling	52
7.8	Interaction with Supplementary Services	52
7.8.1	Line Identification services.....	52
7.8.1.1	CLIP	52
7.8.1.2	CLIR	52
7.8.1.3	COLP	52
7.8.1.4	COLR.....	52
7.8.2	Call Hold (HOLD)	52
7.8.3	Call Waiting (CW).....	53
7.8.4	Call Forwarding	53
7.8.5	Multi Party Service (MPTY)	53
7.8.6	Closed User Group (CUG)	53
7.8.7	Advice of Charge (AoC).....	53
7.8.8	Call Barring	54
7.8.9	Explicit Call Transfer (ECT)	54
7.8.10	Completion of Calls to Busy Subscriber (CCBS).....	54
7.8.11	enhanced Multi-Level Precedence and Pre-emption (eMLPP).....	54
7.8.12	User-to-User Signalling (UUS).....	55
7.8.13	Call Deflection (CD).....	55
7.9	Interaction with other services.....	55
7.9.1	The Multi-Numbering Scheme	55
7.9.2	The Short Message Service.....	55
7.9.3	Interactions with CAMEL	55
7.9.4	Interactions with OR.....	55
7.9.5	Operator Determined Barring	55
7.9.6	Roaming Restrictions.....	56
7.10	Data stored in the gsmSCF.....	57
7.11	Equivalent services implemented by the gsmSCF.....	58
7.11.1	Call Forwarding	58
7.11.1.1	Call Forward Unconditional.....	60
7.11.1.2	Call Forward on Busy	60
7.11.1.3	Call Forward on No Reply	61
7.11.1.4	Call Forward on Not Reachable.....	61
7.11.1.5	Early CFNRc.....	61
7.11.1.6	Late CFNRc	63
7.11.2	Call Barring	63
7.11.3	Operator Determined Barring (ODB)	64
7.11.4	Advice of Charge (AoC).....	64
7.12	Exceptional Procedures	64
7.12.1	Roaming into a network not supporting CAMEL Phase 3.....	64
7.12.2	Roaming into a network not supporting CAMEL Phase 2.....	65
7.12.2.1	Actions required on Location Update	65
7.12.2.2	MO call handling	65
7.12.2.3	MT call handling	65
7.12.2.4	MO short message handling	65
7.12.3	Lack of availability of the Network Indication of Alerting feature	65
Annex A (informative): Provision and Withdrawal of MSP		66
A.1	Provision of MSP	66
A.2	Withdrawal of MSP.....	66
Annex B (informative): Change history		67
History		68

Foreword

The present document has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the stage 2 description of the Multiple Subscriber Profile (MSP) Supplementary Service Phase 2. MSP Phase 2 is implemented using CAMEL Phase 3.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: " 3G Vocabulary".
- [2] 3GPP TS 22.030: " Man Machine Interface (MMI) of the Mobile Station (MS)".
- [3] 3GPP TS 22.097: " Multiple Subscriber Profile (MSP) Service Description – Stage 1".
- [4] 3GPP TS 23.008: "Organisation of subscriber data".
- [5] 3GPP TS 23.015: "Technical realization of Operator Determined Barring (ODB)".
- [6] 3GPP TS 23.018: "Basic Call Handling – Technical Realization".
- [7] 3GPP TS 23.067: "enhanced Multi-Level Precedence and Pre-emption service (eMLPP) – Stage 2".
- [8] 3GPP TS 23.072: "Call Deflection (CD); Stage 2".
- [9] 3GPP TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) – Phase 3; Stage 2".
- [10] 3GPP TS 23.079: "Support of Optimal Routeing (SOR); Technical Realisation".
- [11] 3GPP TS 23.081: "Line identification supplementary services – Stage 2".
- [12] 3GPP TS 23.082: "Call Forwarding (CF) supplementary services – Stage 2".
- [13] 3GPP TS 23.083: "Call Waiting (CW) and Call Hold (HOLD) supplementary services – Stage 2".
- [14] 3GPP TS 23.084: "Multi Party (MPTY) supplementary services – Stage 2".
- [15] 3GPP TS 23.085: "Closed User Group (CUG) supplementary services – Stage 2".
- [16] 3GPP TS 23.086: "Advice of Charge (AoC) supplementary services – Stage 2".
- [17] 3GPP TS 23.087: "User-to-User (UUS) Supplementary Service; Stage 2".
- [18] 3GPP TS 23.088: "Call Barring (CB) supplementary services – Stage 2".
- [19] 3GPP TS 23.090: "Unstructured Supplementary Service Data (USSD) – Stage 2".
- [20] 3GPP TS 23.091: "Explicit Call Transfer (ECT) supplementary service – Stage 2".
- [21] 3GPP TS 23.093: "Technical Realization of Completion of Calls to Busy Subscriber (CCBS); Stage 2".

[22] 3GPP TS 24.086: "Advice of Charge (AoC) supplementary services – Stage 3".

3 Definitions and abbreviations

3.1 Definitions

For the purpose of this specification, the following terms and definitions apply:

Default Profile: profile used when the MSP subscriber roams to a non-supporting network.

MSP Subscriber: the subscriber provisioned with the MSP service

Profile Identity: numerical identity (between 1 and 4) of the profile

Profile Status: specifies if the profile is the registered profile and/or the default profile

Registered Profile: profile used for all MO calls and short messages if a profile has not been explicitly selected

3.2 Abbreviations

The abbreviations used in this specification are listed in 3G TR21.905.

For the purpose of this specification, the following abbreviations apply:

CD	The Call Deflection supplementary service
MSP	The Multiple Subscriber Profile supplementary service
UUS	The User-to-User Signalling supplementary service
SI2	The Service Interaction Indicators Two parameter (see 3G TS 23.078)

4 Features needed to support MSP Phase 2

CAMEL Phase 3 is a pre-requisite for MSP Phase 2.

The following CAMEL Phase 3 features are used for MSP Phase 2:

- SI2;
- MO SMS interaction;
- T-BCSM in the VMSC;
- SS-CSI Invocation Notification for CCBS;
- Any Time Modification;
- CUG Handling.

The following CAMEL Phase 2 features are used for MSP Phase 2:

- Network Indication of Alerting pattern;
- Event detection points;
- USSD Interaction;
- Control of Call Duration;
- SS-CSI Invocation Notification for CD;
- Furnish Charging Information.

5 Additional Information stored in network entities

5.1 Data stored in the HLR

The HLR contains all the common data (the data valid for all profiles) and some data specific to the default profile.

The data stored in the HLR are defined in 3G TS 23.008. The elements specifically used for MSP are:

- list of MSISDNs and associated Bearer Capabilities for each profile;
- default profile (associated with the Basic MSISDN);
- capabilities of VLR (support of CAMEL Phase 2 and 3);
- supplementary services (per BSG) provisioned per subscriber (CW, CH, MPTY,...);
- Call Barring Data (see clause 7.6.8: Call Barring);
- ODB Data (see clause 7.7.5: Operator Determined Barring);
- HOLD Data (see clause 7.8.2: Call Hold);
- ECT Data (see clause 7.8.9: Explicit Call Transfer);
- MPTY Data (see clause 7.8.5: Multi Party);
- CCBS Data (see clause 7.8.10: Completion of Calls to Busy Subscriber);
- CW Data (see clause 7.8.3: Call Waiting);
- CLIR Data (see clause 7.8.1.2);
- CAMEL data including the MSP service key, O-CSI, T-CSI, VT-CSI, UG-CSI, SS-CSI and Location information / Subscriber state Interrogation.

5.2 Data stored in the VLR

The data stored in a VLR are defined in 3G TS 23.008. MSP has no impact on the VLR.

6 Additional procedures in network entities

6.1 OCB_flag

The OCB_flag shall be set in the HLR if Call Barrings are provided in the gsmSCF.

If the OCB_flag is set then:

- when the subscriber roams to a VLR which supports CAMEL Phase 2 or later, the HLR shall not send any outgoing call barring supplementary services data to the VLR;
- when the subscriber roams to a VLR which does not support CAMEL Phase 2 or later, the HLR shall send to the VLR outgoing call barring supplementary services data as stored in the HLR;
- the subscriber shall not be allowed to alter the Call Barring data in the HLR.

6.2 ODB flags

The ODB flag for the relevant category shall be set in the HLR if ODB is provisioned in the gsmSCF for that category.

If the ODB flag is set for that category, then:

when the subscriber roams to a VLR which supports CAMEL Phase 2 or later, the HLR shall not send any ODB data for that category to the VLR;

when the subscriber roams to a VLR which does not support CAMEL Phase 2 or later, the HLR shall send to the VLR ODB data for that category as stored in the HLR.

6.3 HOLD_flag

The HOLD_flag shall be set in the HLR if the subscriber data for the HOLD SS are controlled by the gsmSCF.

If the HOLD_flag is set, then:

- when the subscriber roams to a VLR which supports CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the HOLD SS as Active and Operative;
- when the subscriber roams to a VLR which does not support CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the HOLD SS as stored in the HLR.

6.4 CW_flag

The CW_flag shall be set in the HLR if the subscriber data for the CW SS are controlled by the gsmSCF.

If the CW_flag is set, then:

- when the subscriber roams to a VLR which supports CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the CW SS as Active and Operative;
- when the subscriber roams to a VLR which does not support CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the CW SS as stored in the HLR;
- the subscriber shall not be allowed to alter the CW data in the HLR.

6.5 MPTY_flag

The MPTY_flag shall be set in the HLR if the subscriber data for the MPTY SS are controlled by the gsmSCF.

If the MPTY_flag is set, then:

- when the subscriber roams to a VLR which supports CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the MPTY SS as Active and Operative;
- when the subscriber roams to a VLR which does not support CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the MPTY SS as stored in the HLR.

6.6 ECT_flag

The ECT_flag shall be set in the HLR if the subscriber data for the ECT SS are controlled by the gsmSCF.

If the ECT_flag is set, then:

- when the subscriber roams to a VLR which supports CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the ECT SS as Active and Operative;
- when the subscriber roams to a VLR which does not support CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the ECT SS as stored in the HLR.

6.7 CCBS_flag

The CCBS_flag shall be set in the HLR if the subscriber data for the CCBS SS are controlled by the gsmSCF.

If the CCBS_flag is set, then:

- when the subscriber roams to a VLR which supports CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the CCBS SS as Active and Operative;
- when the subscriber roams to a VLR which does not support CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the CCBS SS as stored in the HLR;
- the subscriber shall not be allowed to alter the CCBS data in the HLR.

6.8 CLIR_flag

The CLIR_flag shall be set in the HLR if the subscriber data for the CLIR SS are controlled by the gsmSCF.

If the CLIR_flag is set, then:

- when the subscriber roams to a VLR which supports CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state of the CLIR SS as Active and Operative, and the presentation mode as "temporary (presentation allowed)";
- when the subscriber roams to a VLR which does not support CAMEL Phase 3 or later, the HLR shall send to the VLR the activation state and presentation mode for the CLIR SS as stored in the HLR;
- the subscriber shall not be allowed to alter the CLIR data in the HLR.

7 Description of Multiple Subscriber Profile

7.1 Overview

The MSP service allows the served subscriber to have several profiles, to distinguish between different telecommunication service requirements (e.g. business and home). This is described in 3G TS 22.097. Subscriber data specific to MSP is stored in the HLR and the gsmSCF.

7.2 Registration of a Profile

Registration of a profile allows the subscriber to register a provisioned profile to be used for mobile originated calls and activities. The request to register a profile shall contain the MSP code and the profile identity and will be sent to the gsmSCF using USSD, see 3G TS 23.078 and 3G TS 23.090. The registered profile is stored in the gsmSCF. In response to a successful registration request, the gsmSCF shall return a positive acknowledgement, including the identity of the registered profile, using USSD.

The registration process in the gsmSCF is shown in figure 2. The information flow for successfully registering a profile is shown in figure 1.

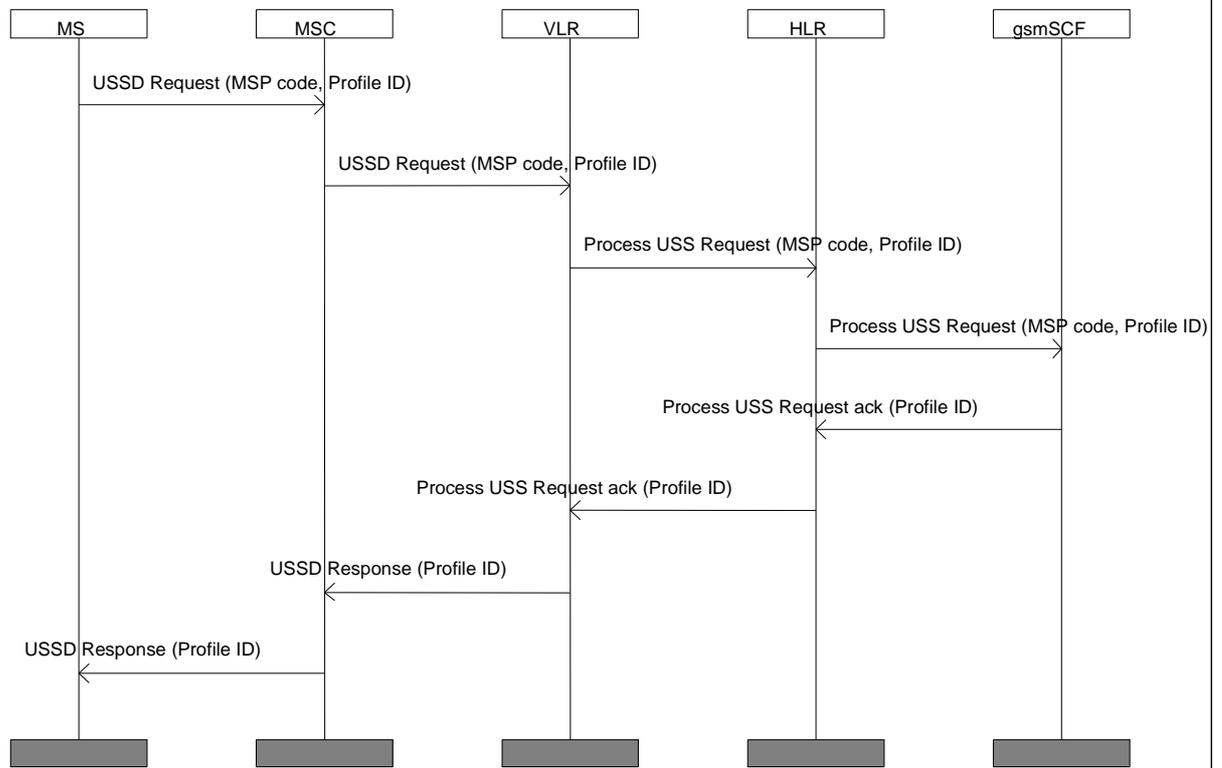


Figure 1: Registration Process: information flow

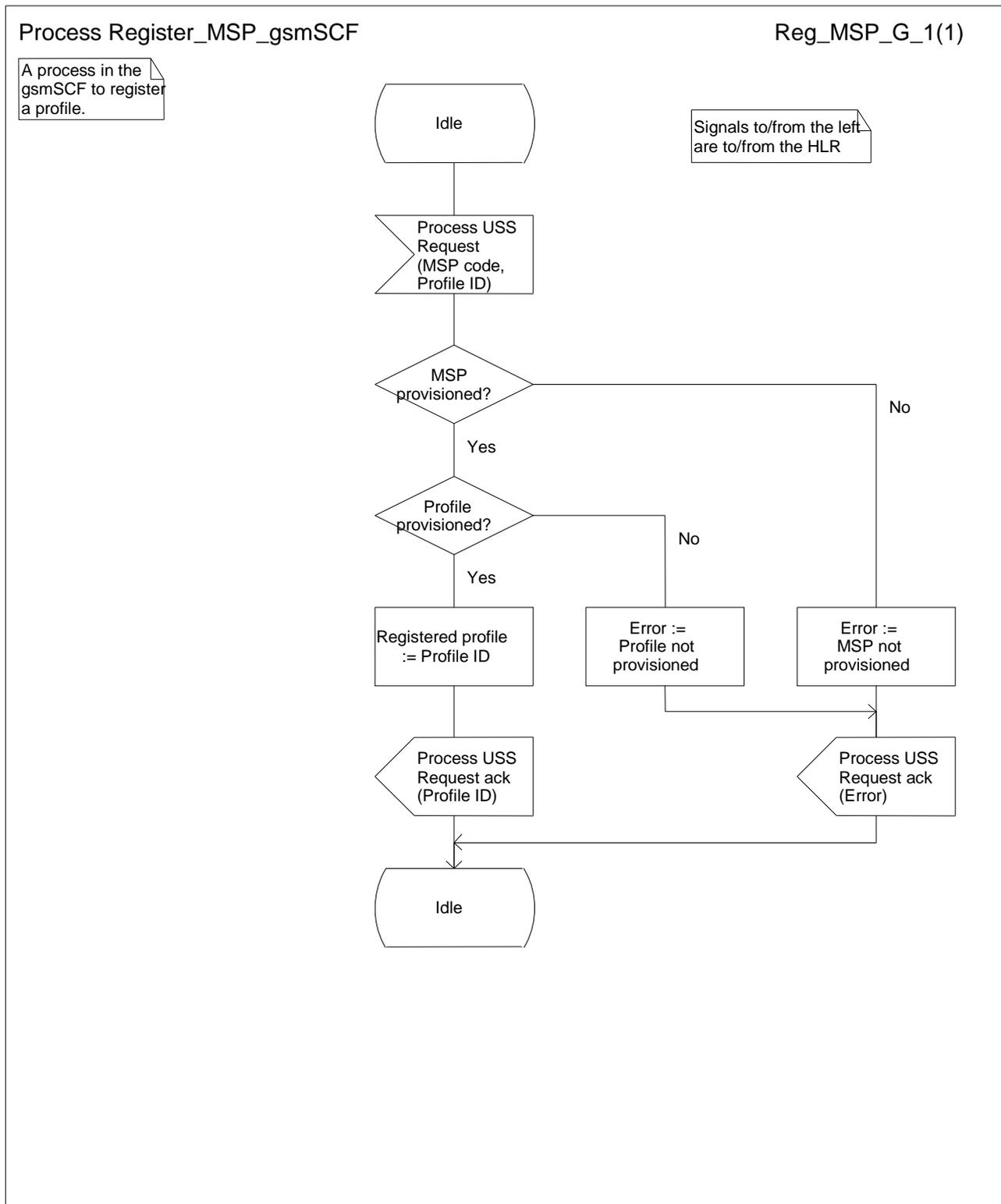


Figure 2: Process Register_MSP_gsmSCF

7.3 Interrogation

The MS can interrogate MSP, using USSD, to identify which profiles are provisioned and which of the provisioned profiles is the currently registered profile. The interrogate MSP operation shall contain the MSP code and will be sent to the gsmSCF using USSD. In response to a successful interrogation request, the gsmSCF shall return the profile identity and profile status for each provisioned profile. If the MSP service is not provisioned then the gsmSCF shall return the service status indicating not provisioned.

The interrogation process is shown in figure 4. The information flow for interrogation of MSP is shown in figure 3.

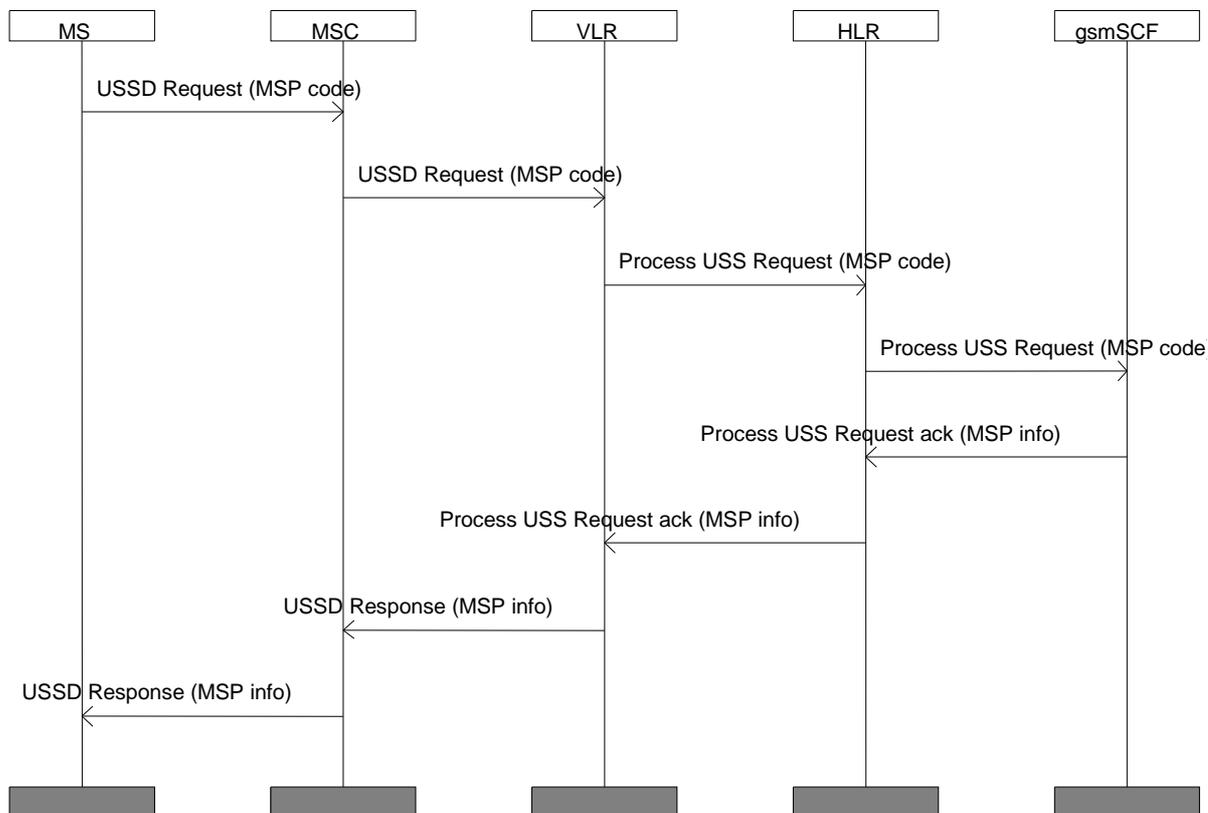


Figure 3: Interrogating MSP: information flow

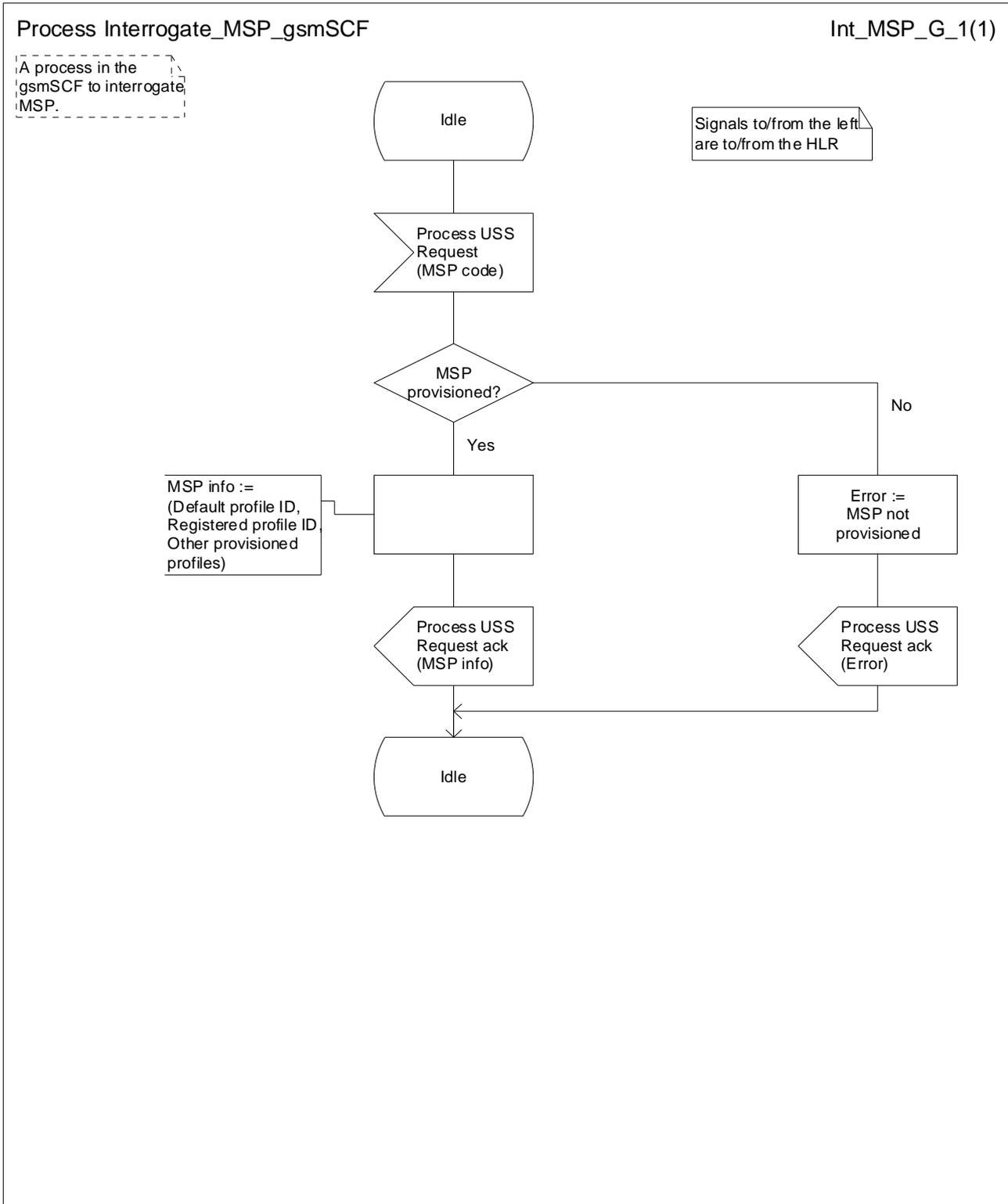


Figure 4: Process Interrogate_MSP_gsmSCF

7.4 Call Handling for an MSP subscriber

The procedure for handling MSP calls can be divided into two areas: mobile originating call handling and mobile terminating call handling.

7.4.1 Mobile Originating (MO) call handling

The served subscriber may use the registered profile or explicitly select a provisioned profile to set up an MO call. If the profile is explicitly selected, the selection information will be included in the called party BCD number and transported to the gsmSCF. If the gsmSCF recognises that a profile has not been explicitly selected (there is no profile selection information in the called party BCD number) then the registered profile is used. The MMI for explicitly selecting a profile is defined in 3G TS 22.030.

The information flow for an MO call is shown in figure 28.

When the gsmSCF receives an Initial_DP message containing MO call parameters from the gsmSSF, the process MO_MSP_Call_gsmSCF will be invoked, see figure 5. All other call handling is described in 3G TS 23.018 and 3G TS 23.078.

7.4.2 Mobile Terminating (MT) call handling

The profile used for an MT call to the served subscriber is determined by the called MSISDN.

The information flow for an MT call is shown in figure 29.

When the gsmSCF receives an Initial_DP message containing MT call parameters from the gsmSSF, the process MT_MSP_Call_gsmSCF will be invoked, see figure 8. All other call handling is described in 3G TS 23.018 and 3G TS 23.078.

7.5 Functions and Information Flows

7.5.1 MO call handling in the gsmSCF

7.5.1.1 Process MO_MSP_Call_gsmSCF

Handles an MO call for an MSP subscriber. See figure 5.

7.5.1.2 Procedure Set_Calling_Profile_gsmSCF

Sets the correct parameters for the calling profile. See figure 6.

7.5.1.3 Procedure Send_FCI_gsmSCF

Sends a Furnish Charging Information message to the gsmSSF. See figure 7.

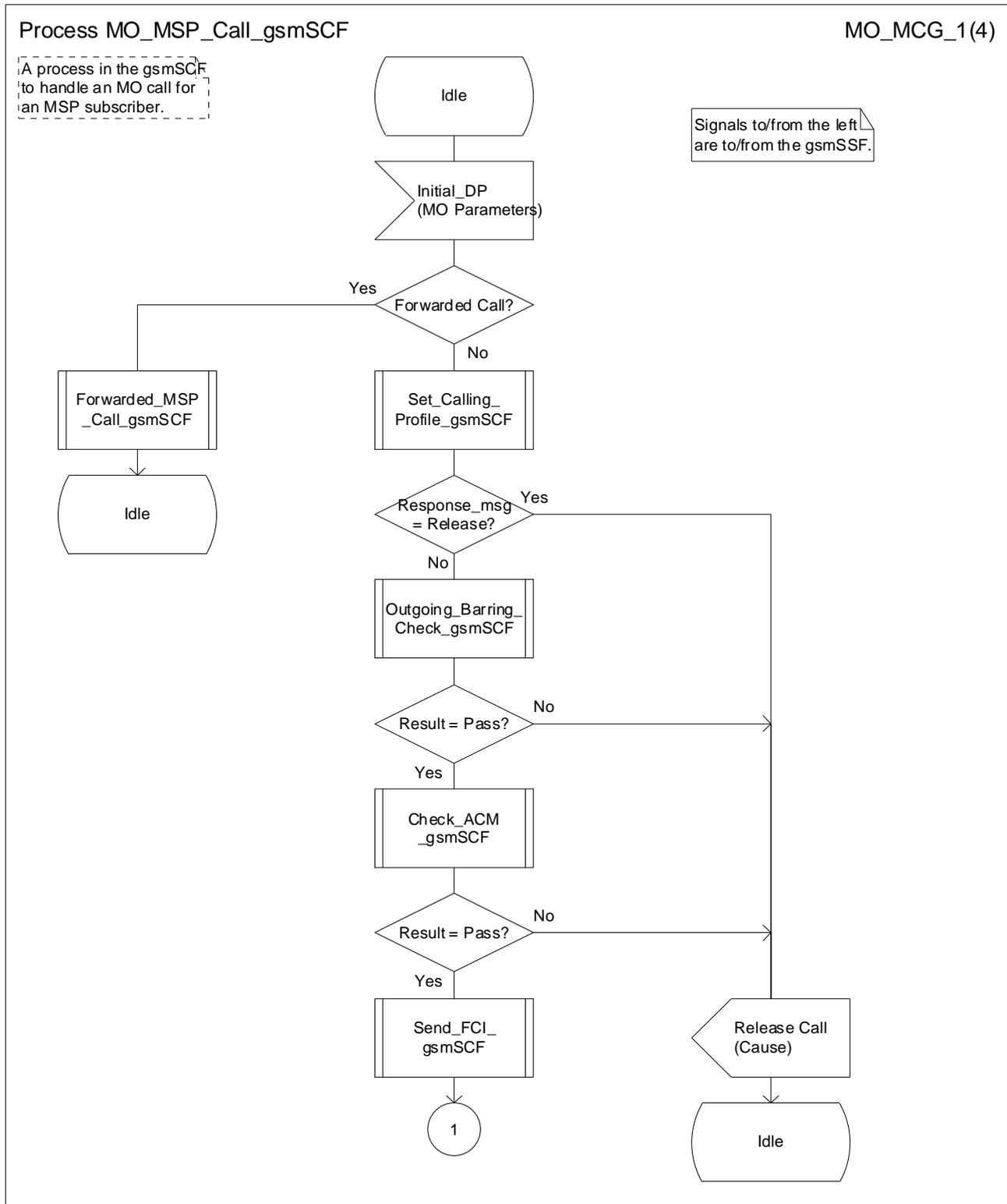


Figure 5a: Process MO_MSP_Call_gsmSCF (sheet 1 of 4)

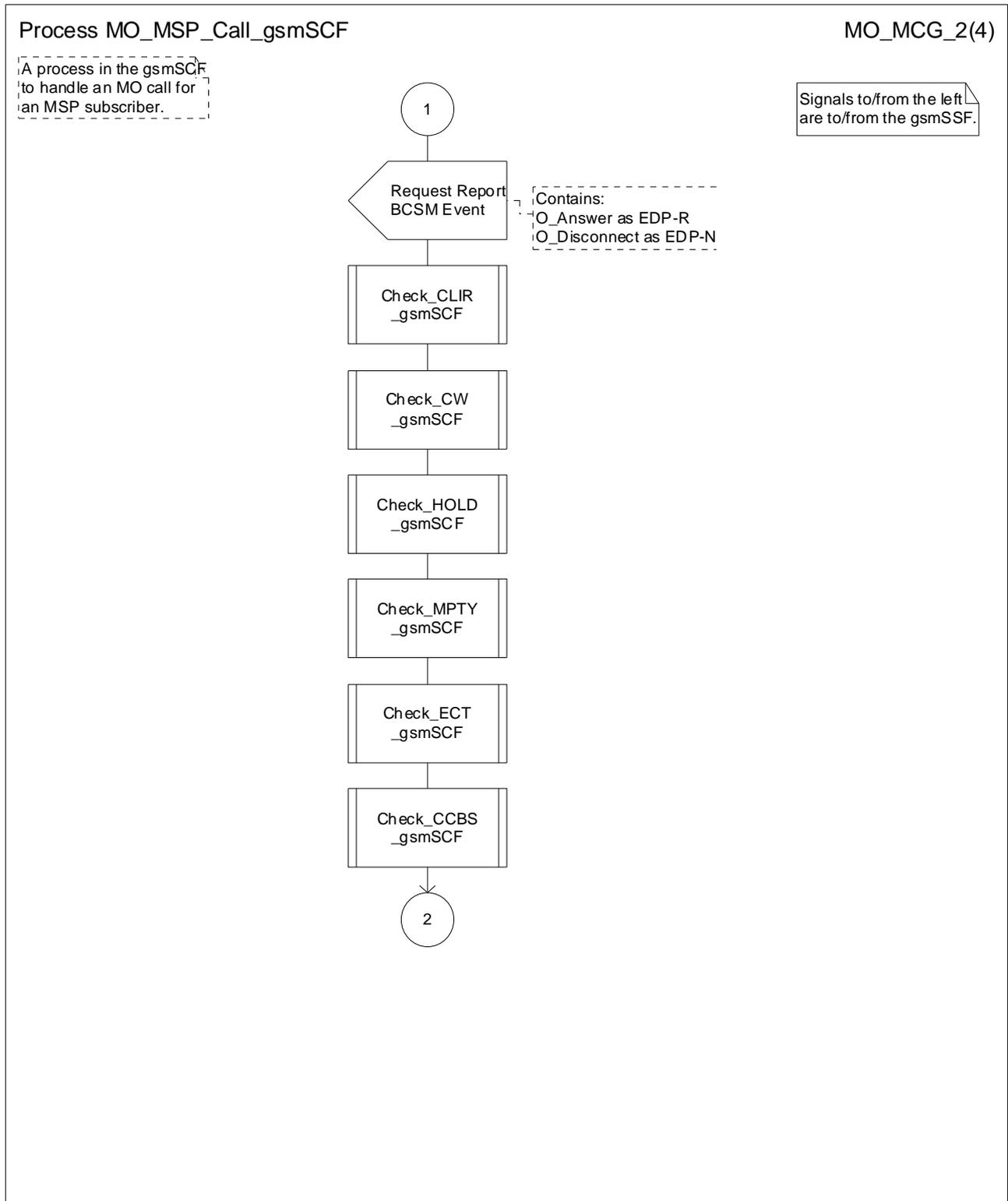


Figure 5b: Process MO_MSP_Call_gsmSCF (sheet 2 of 4)

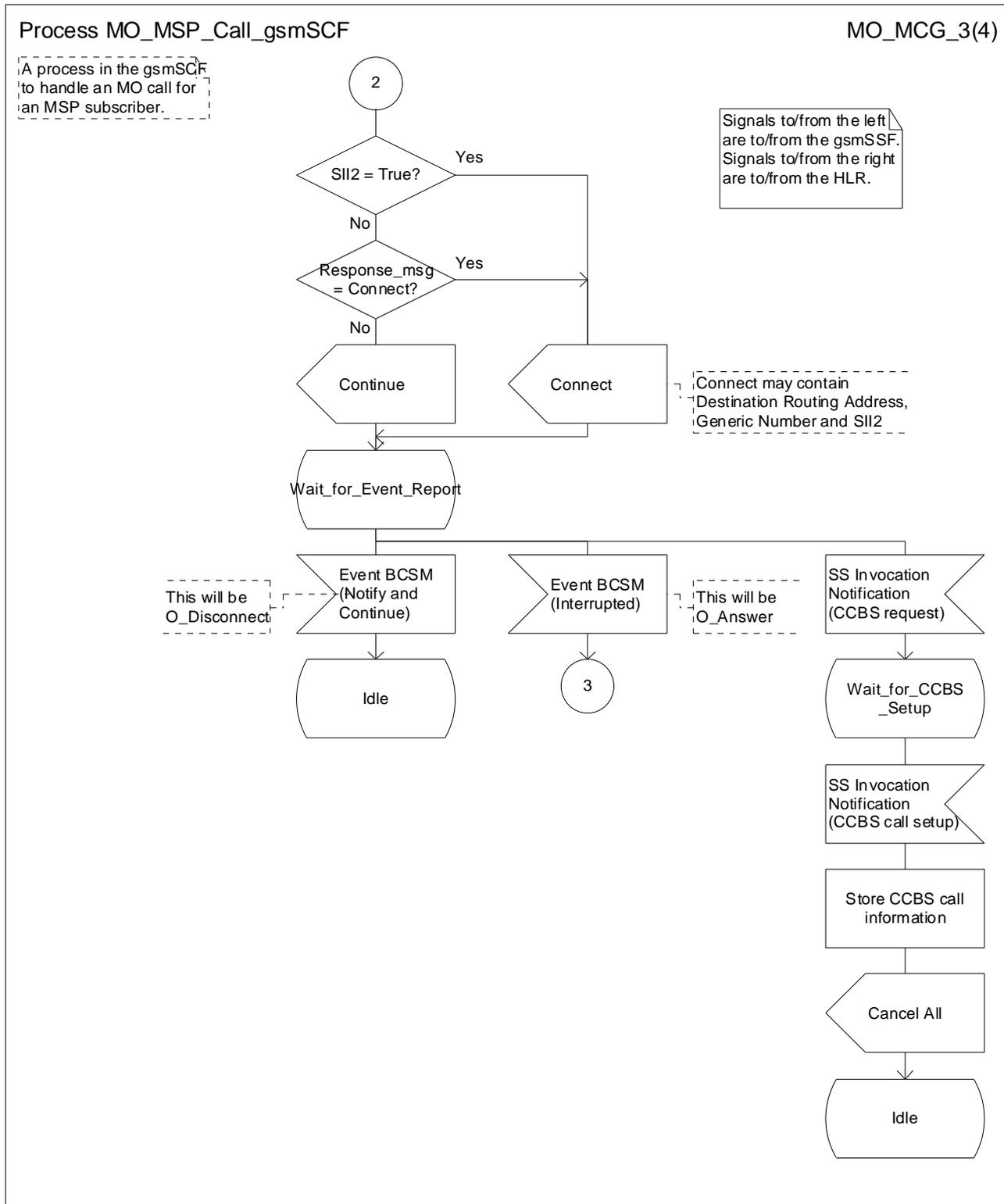


Figure 5c: Process MO_MSP_Call_gsmSCF (sheet 3 of 4)

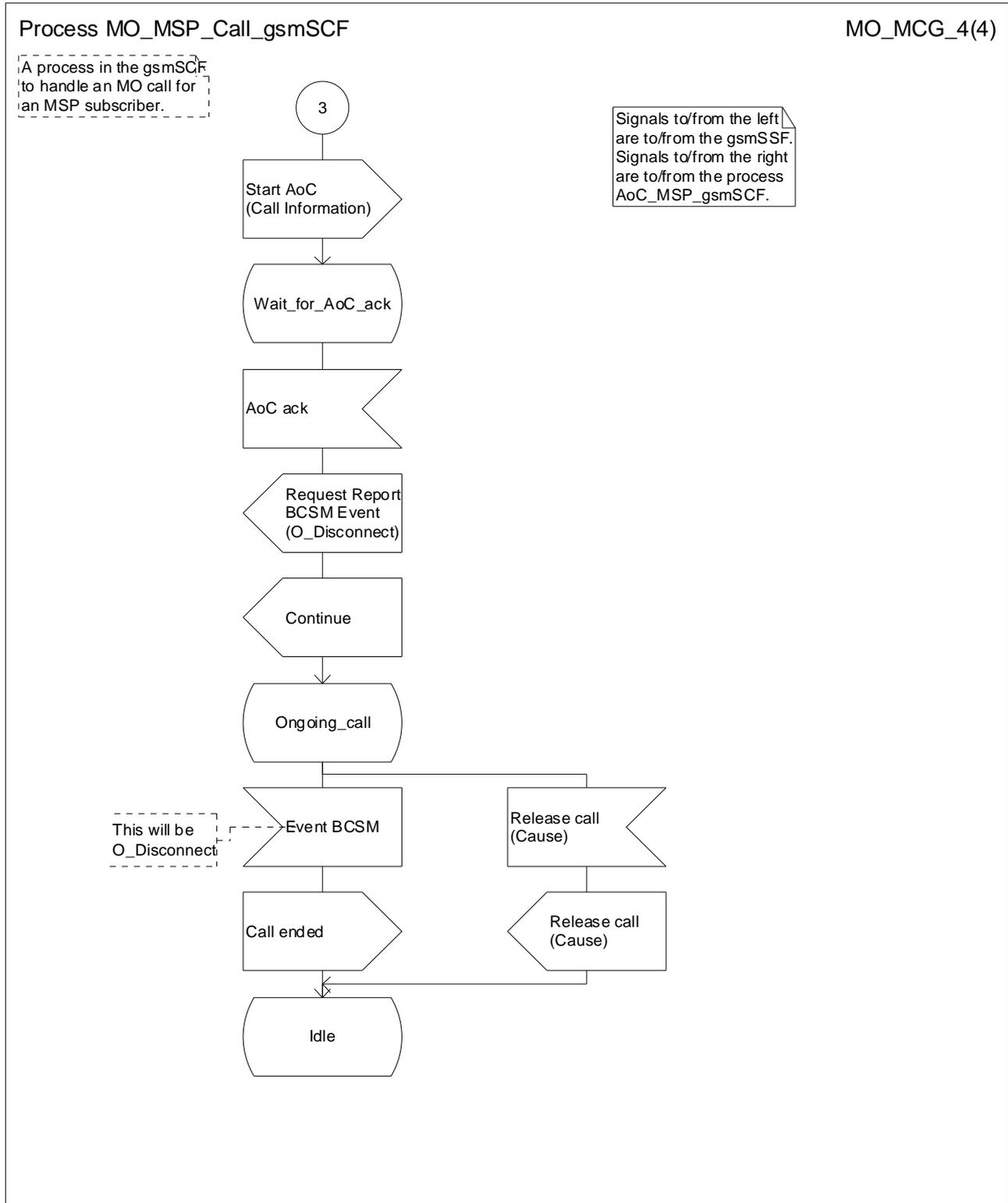


Figure 5d: Process MO_MSP_Call_gsmSCF (sheet 4 of 4)

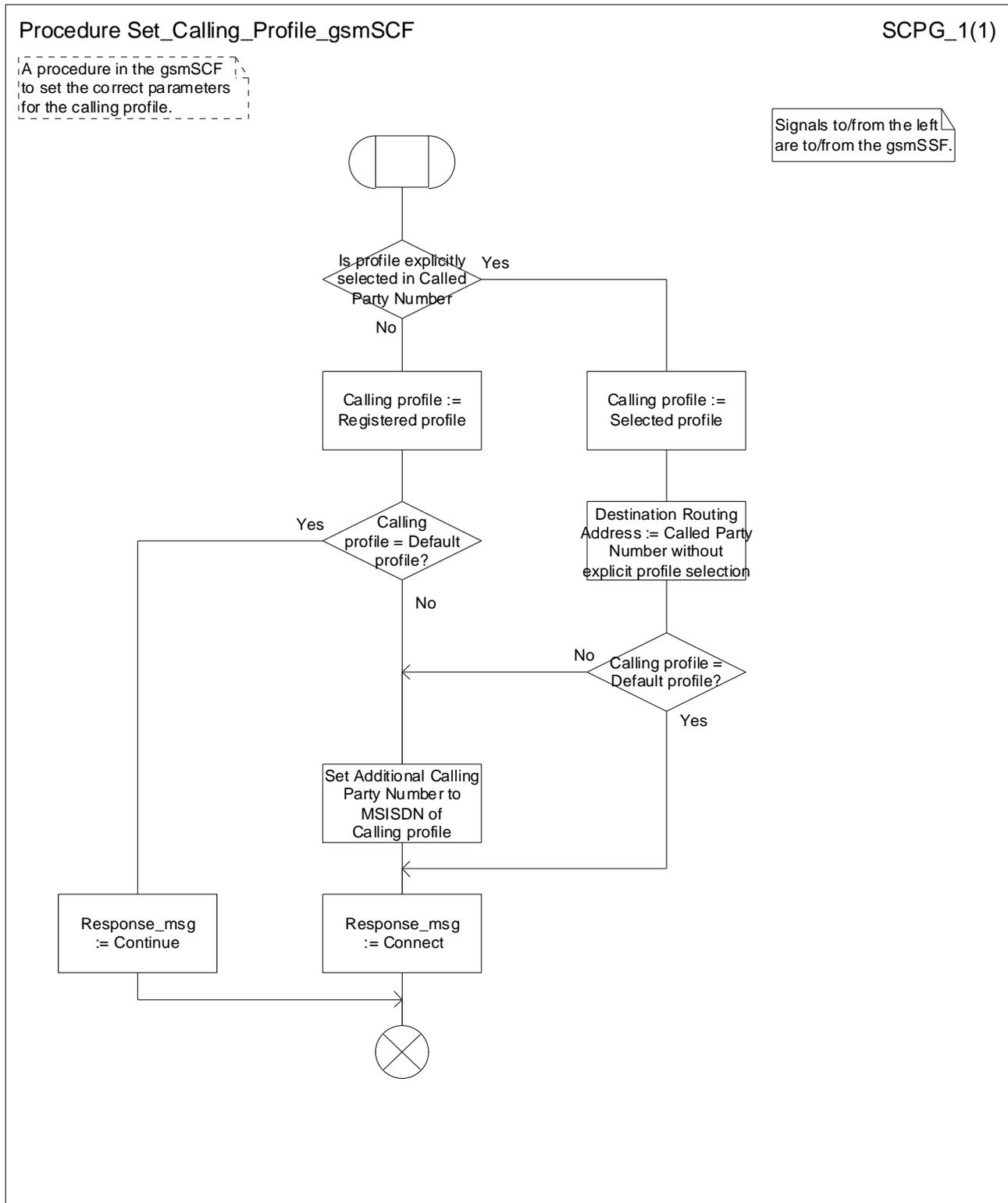


Figure 6: Procedure Set_Calling_Profile_gsmSCF

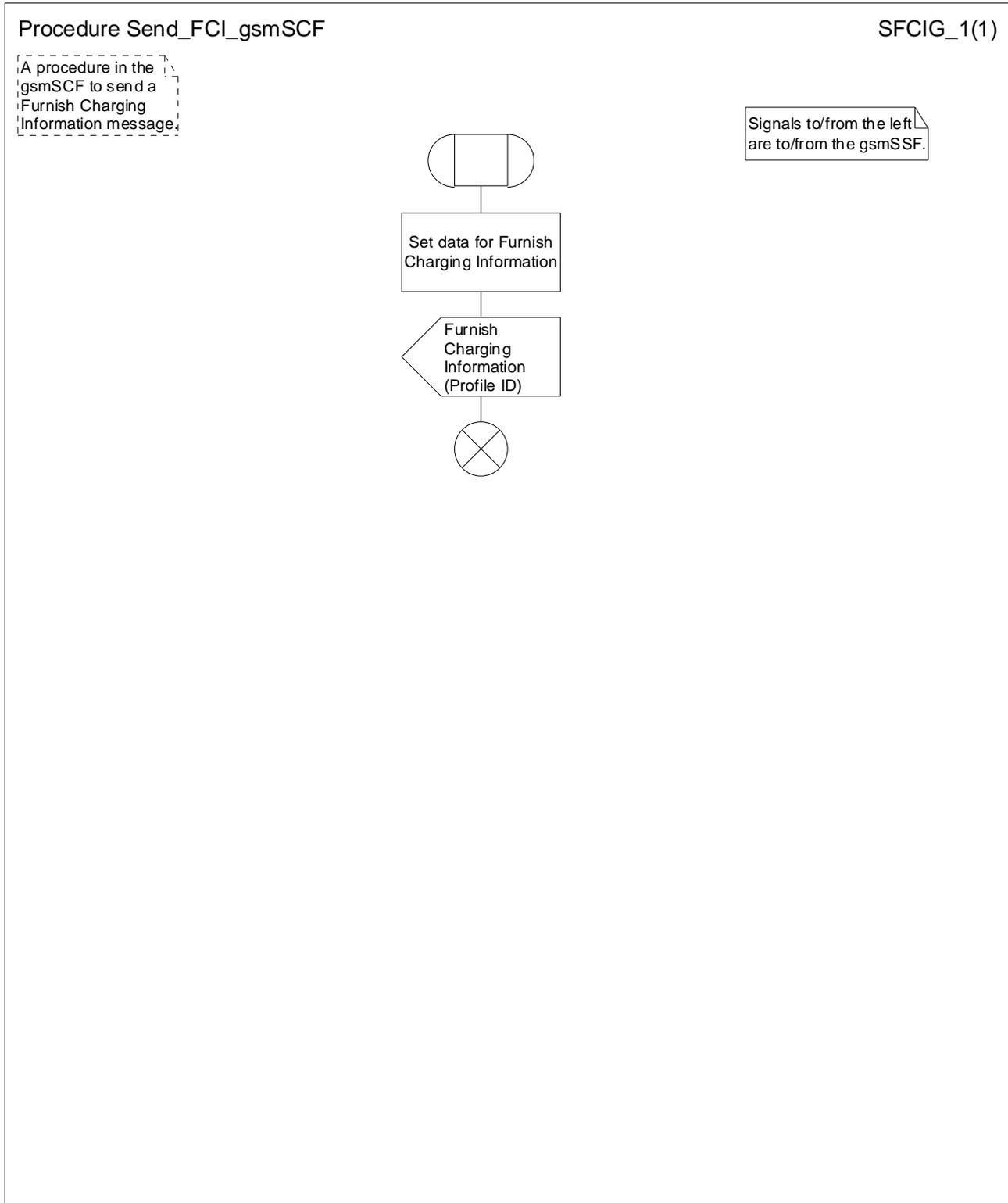


Figure 7: Procedure Send_FCI_gsmSCF

7.5.2 MT call handling in the gsmSCF

7.5.2.1 Process MT_MSP_Call_gsmSCF

Handles an MT call for an MSP subscriber. See figure 8.

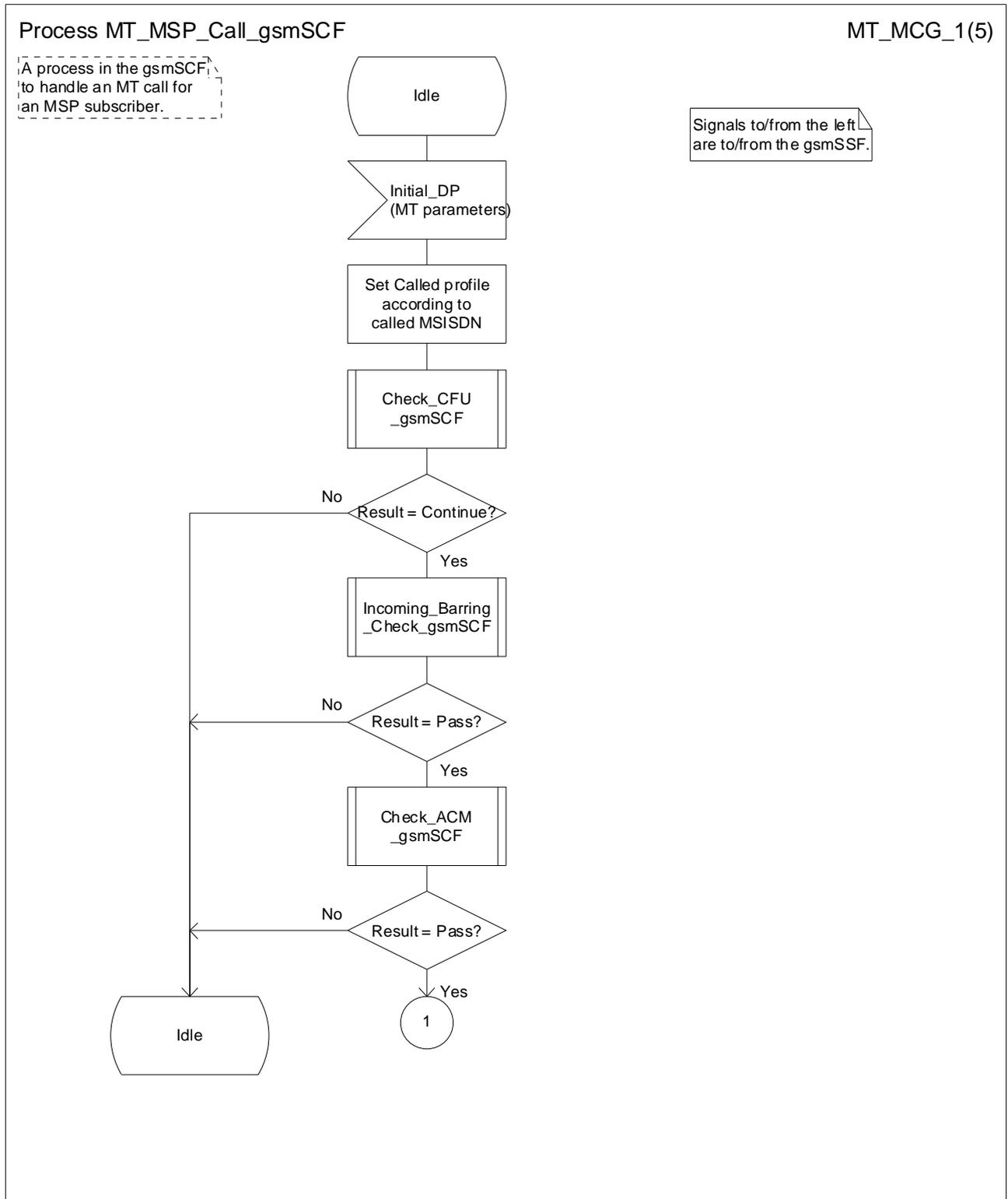


Figure 8a: Process MT_MSP_Call_gsmSCF (sheet 1 of 5)

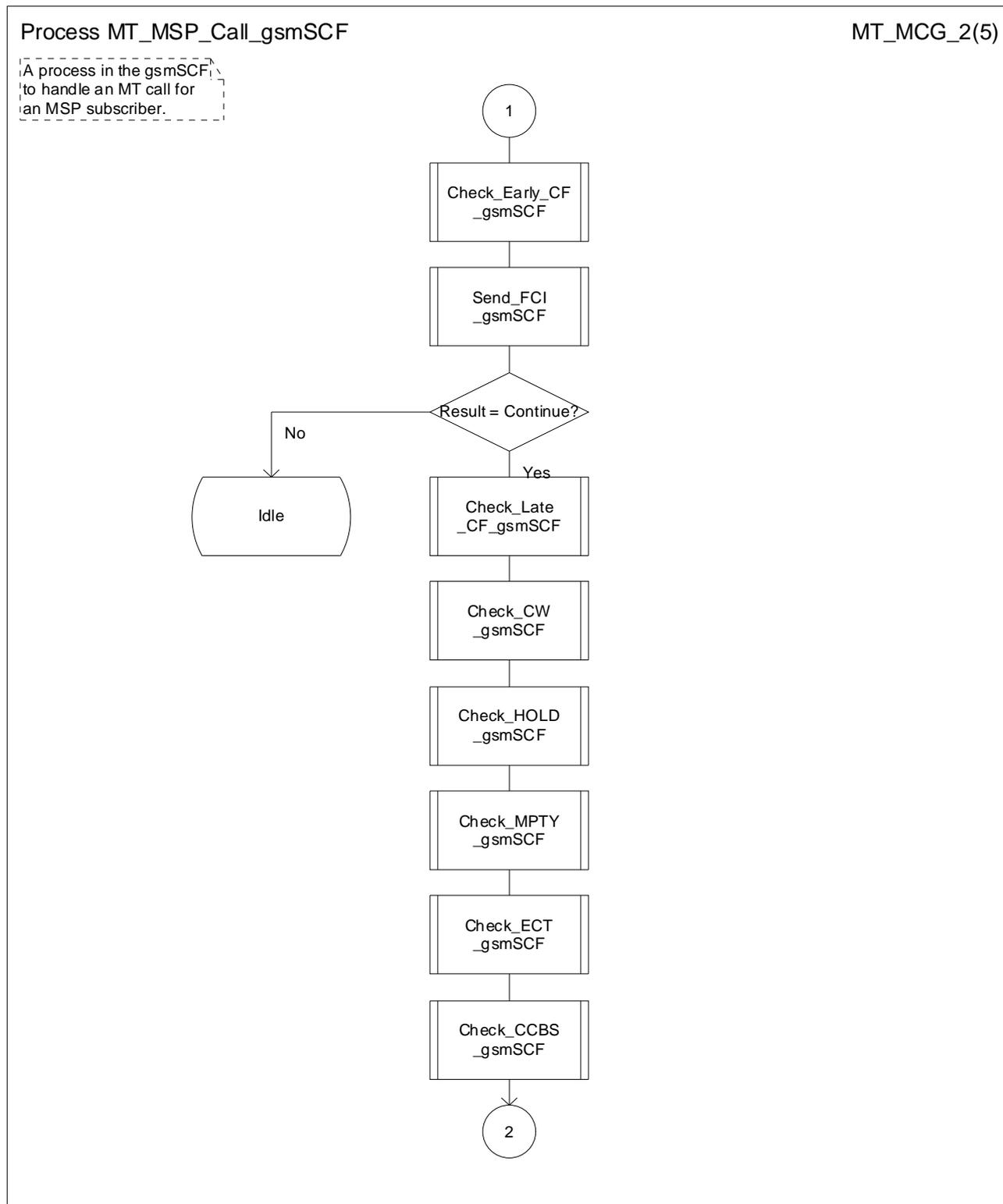


Figure 8b: Process MT_MSP_Call_gsmSCF (sheet 2 of 5)

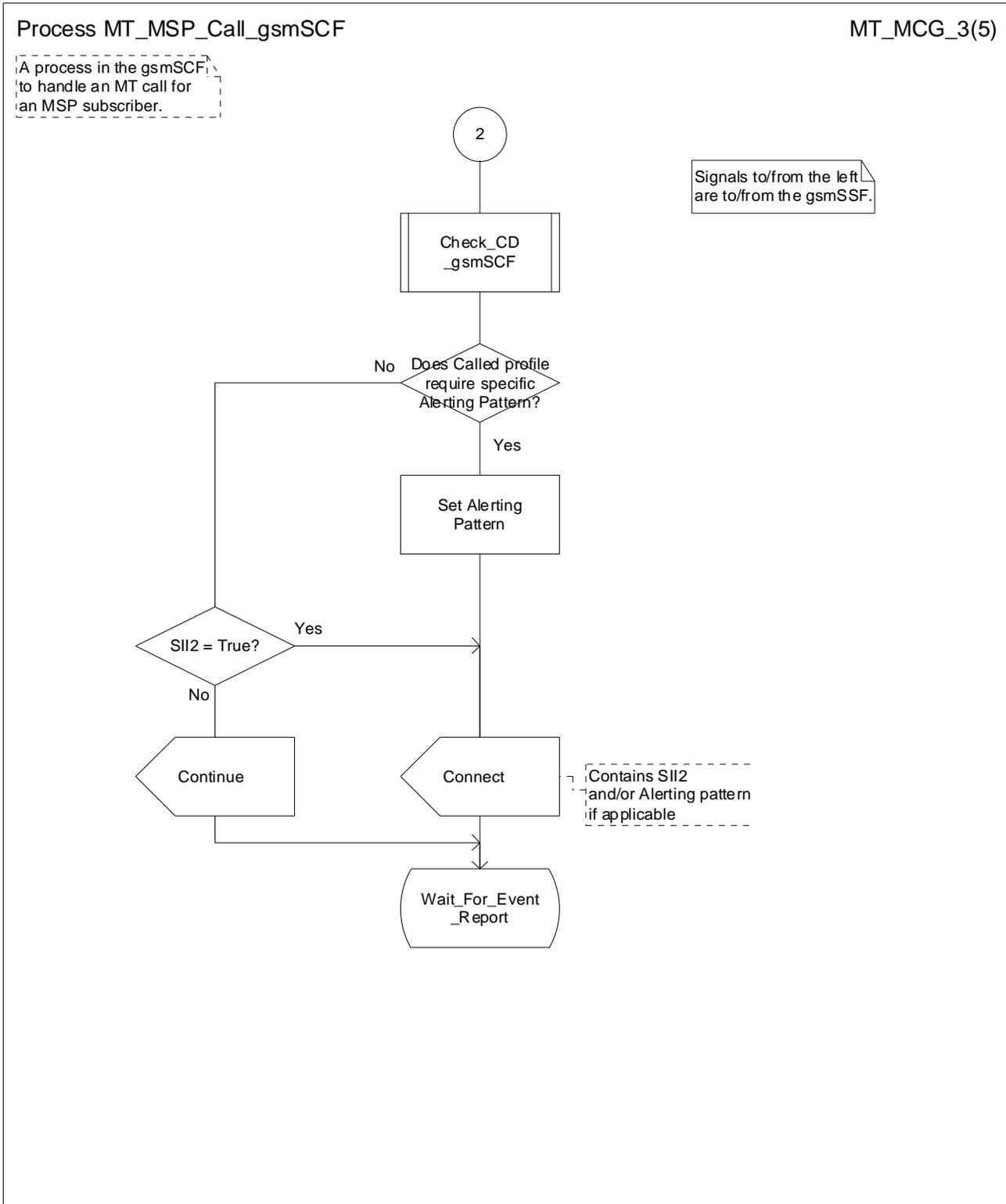


Figure 8c: Process MT_MSP_Call_gsmSCF (sheet 3 of 5)

7.5.3.15 Procedure AoCC_gsmSCF

Applies AoCC per profile. See figure 23.

7.5.3.16 Procedure Outgoing_Barring_Check_gsmSCF

Checks the outgoing call barrings for an MSP subscriber. See figure 24.

7.5.3.17 Procedure Incoming_Barring_Check_gsmSCF

Checks the incoming barrings for the Called profile. See figure 25.

7.5.3.18 Procedure Check_ECT_gsmSCF

Checks whether an ECT request shall be accepted or rejected during the ongoing call. See figure 26.

7.5.3.19 Procedure Check_CCBS_gsmSCF

Checks whether a CCBS request can be planted by/against the MSP subscriber. See figure 27.

Procedure Check_CLIR_gsmSCF

C_CLIR_G_1(1)

A procedure in the gsmSCF to set the CLI Presentation Indicator.

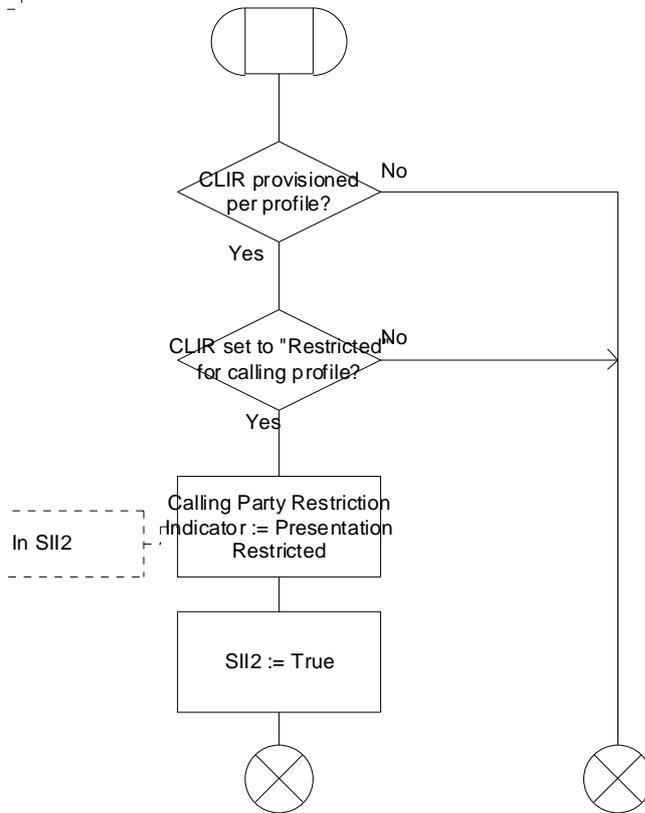


Figure 9: Procedure Check_CLIR_gsmSCF

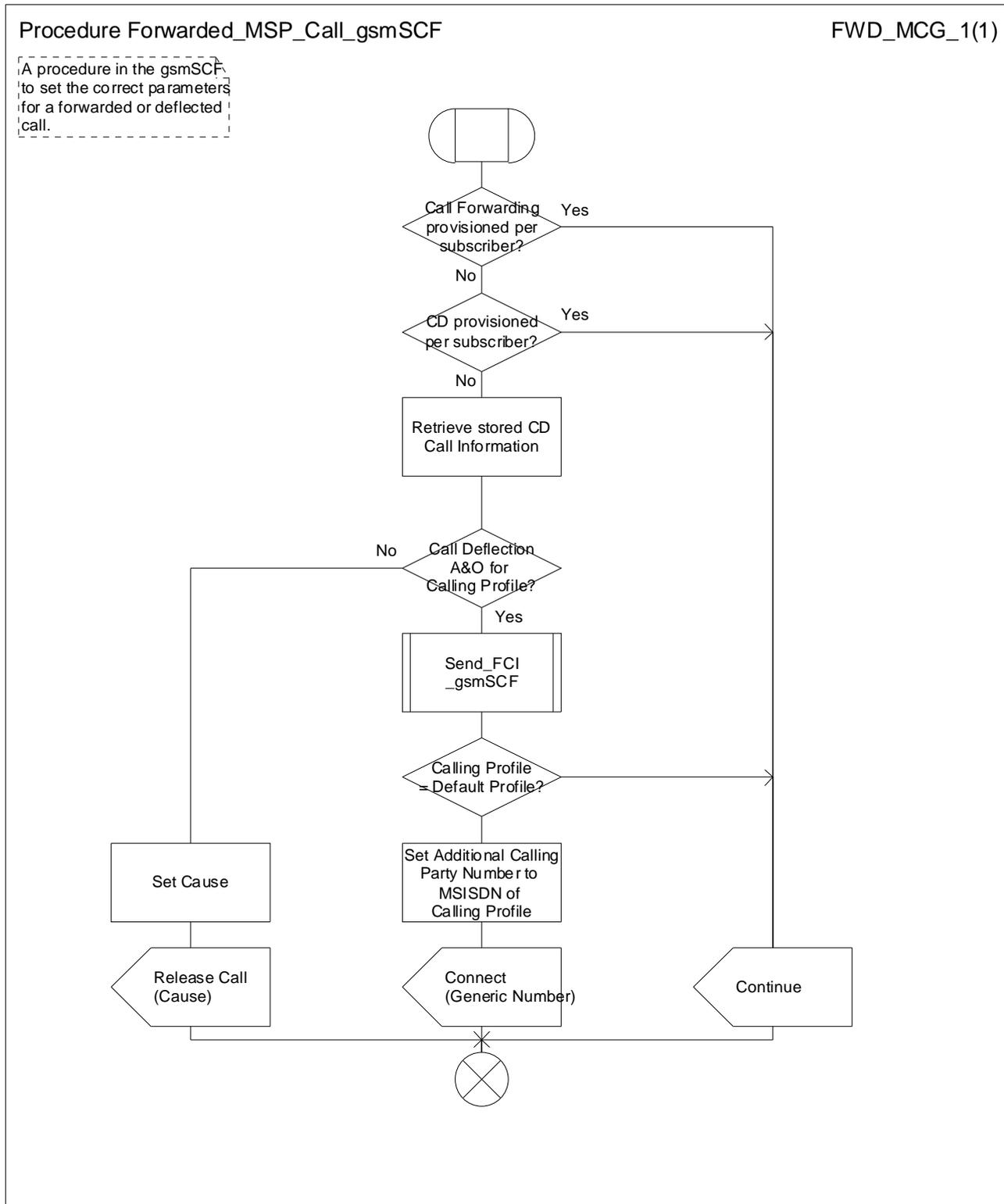


Figure 10: Procedure Forwarded_MSP_Call_gsmSCF

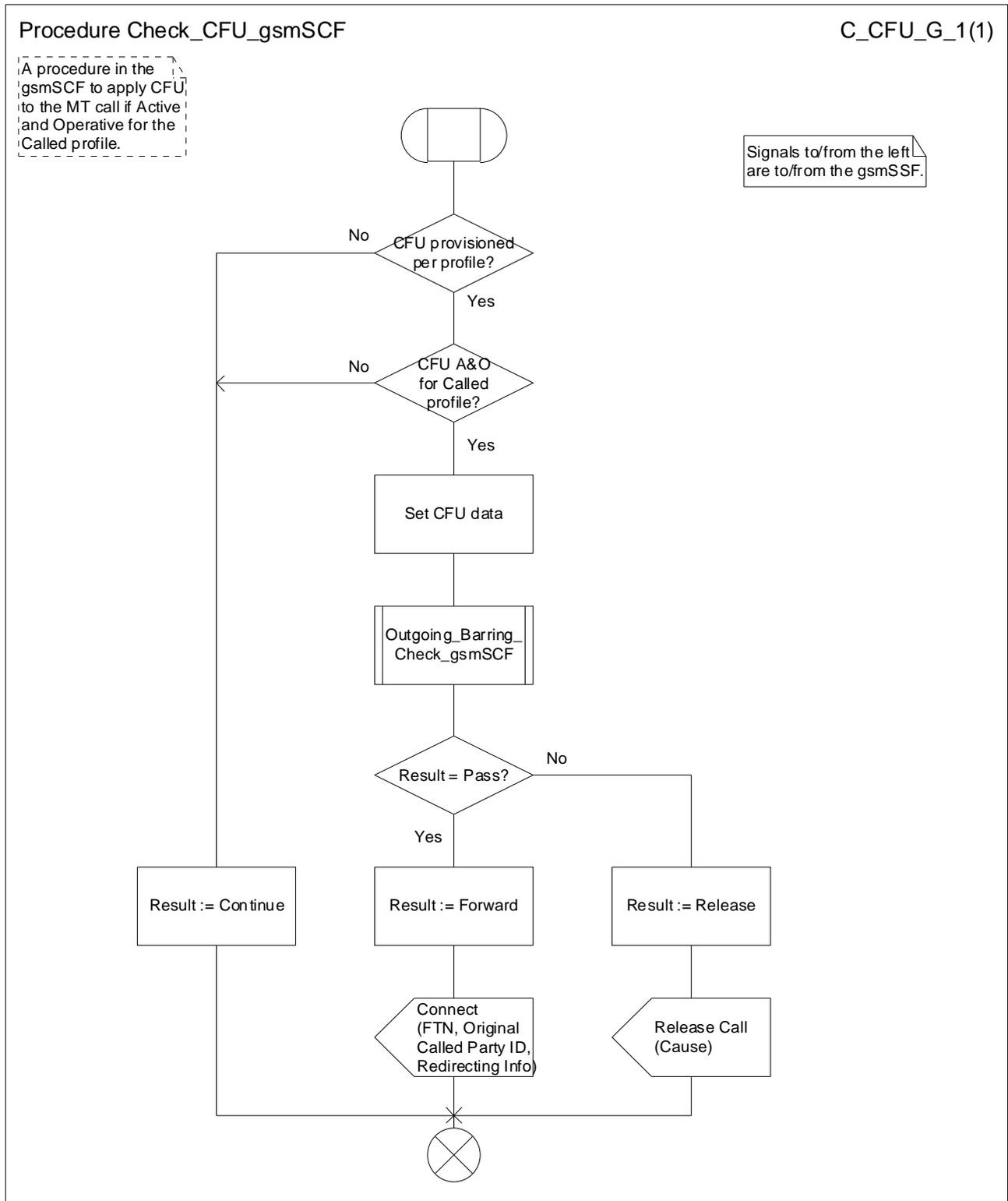


Figure 11: Procedure Check_CFU_gsmSCF

Procedure Check_Late_CF_gsmSCF

CLCFG_1(1)

A procedure in the gsmSCF to arm the detection points required for the provisioned late Call Forwardings on the Called profile.

Signals to/from the left are to/from the gsmSSF.

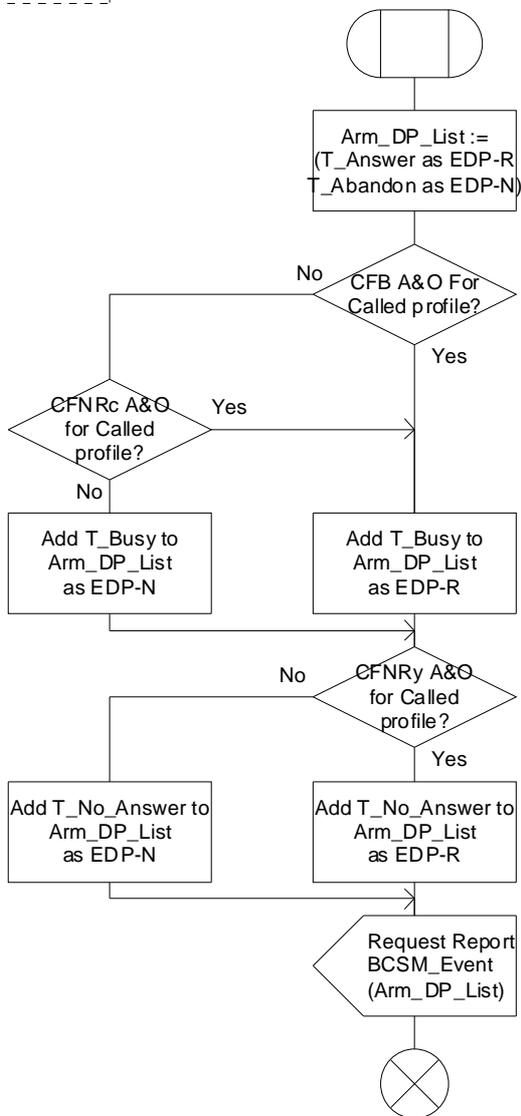


Figure 13: Procedure Check_Late_CF_gsmSCF

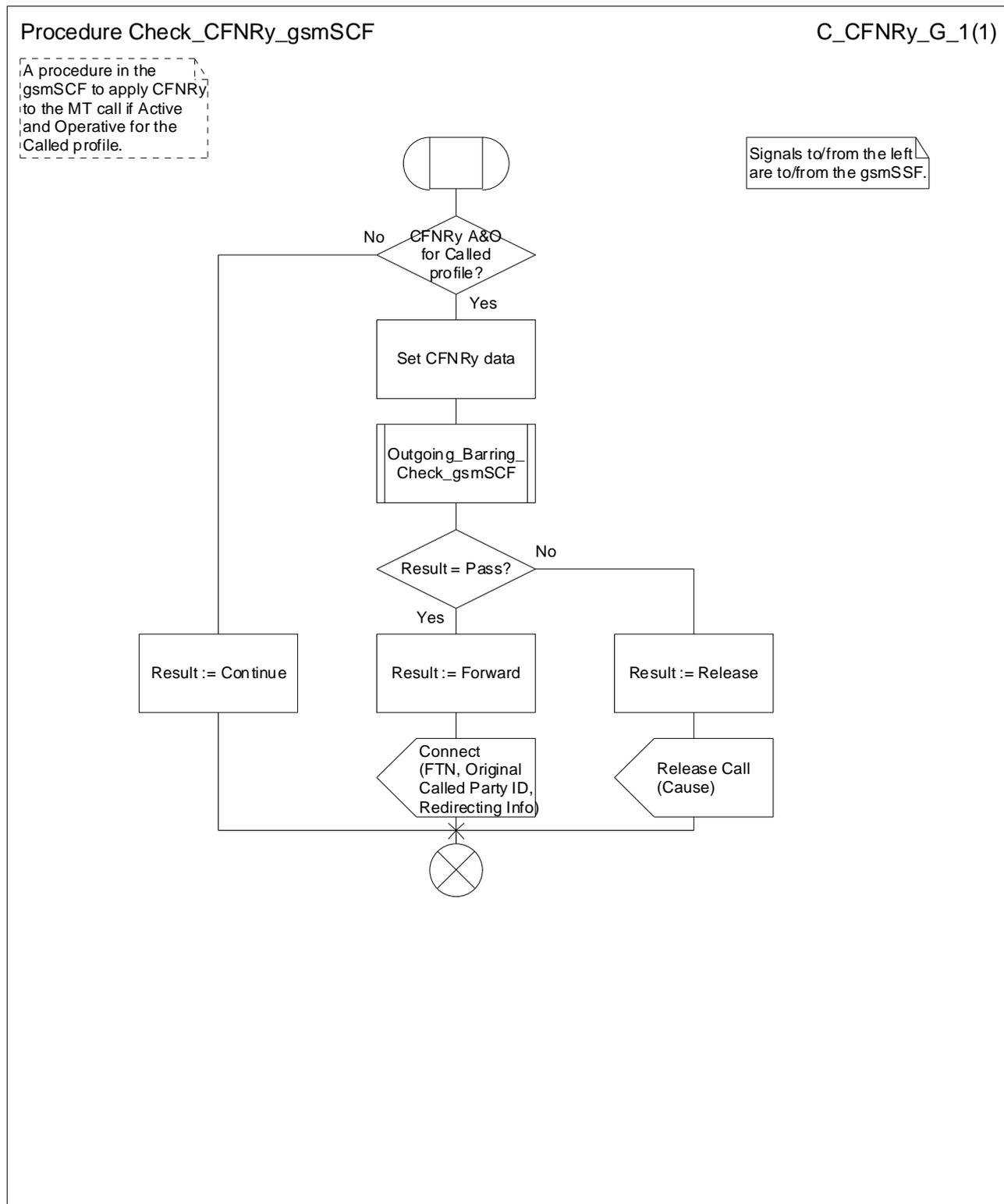


Figure 14: Procedure Check_CFNRy_gsmSCF

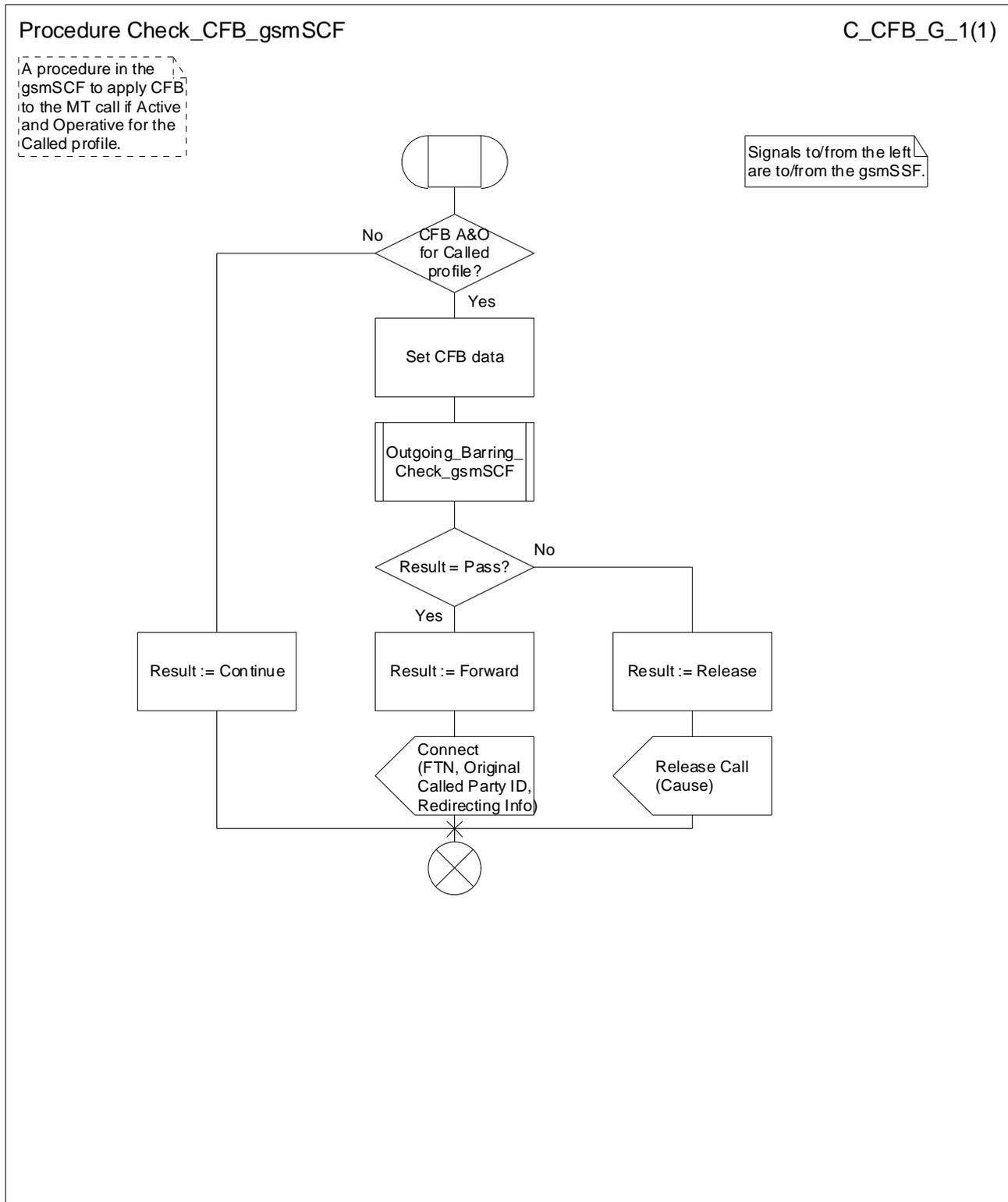


Figure 15: Procedure Check_CFB_gsmSCF

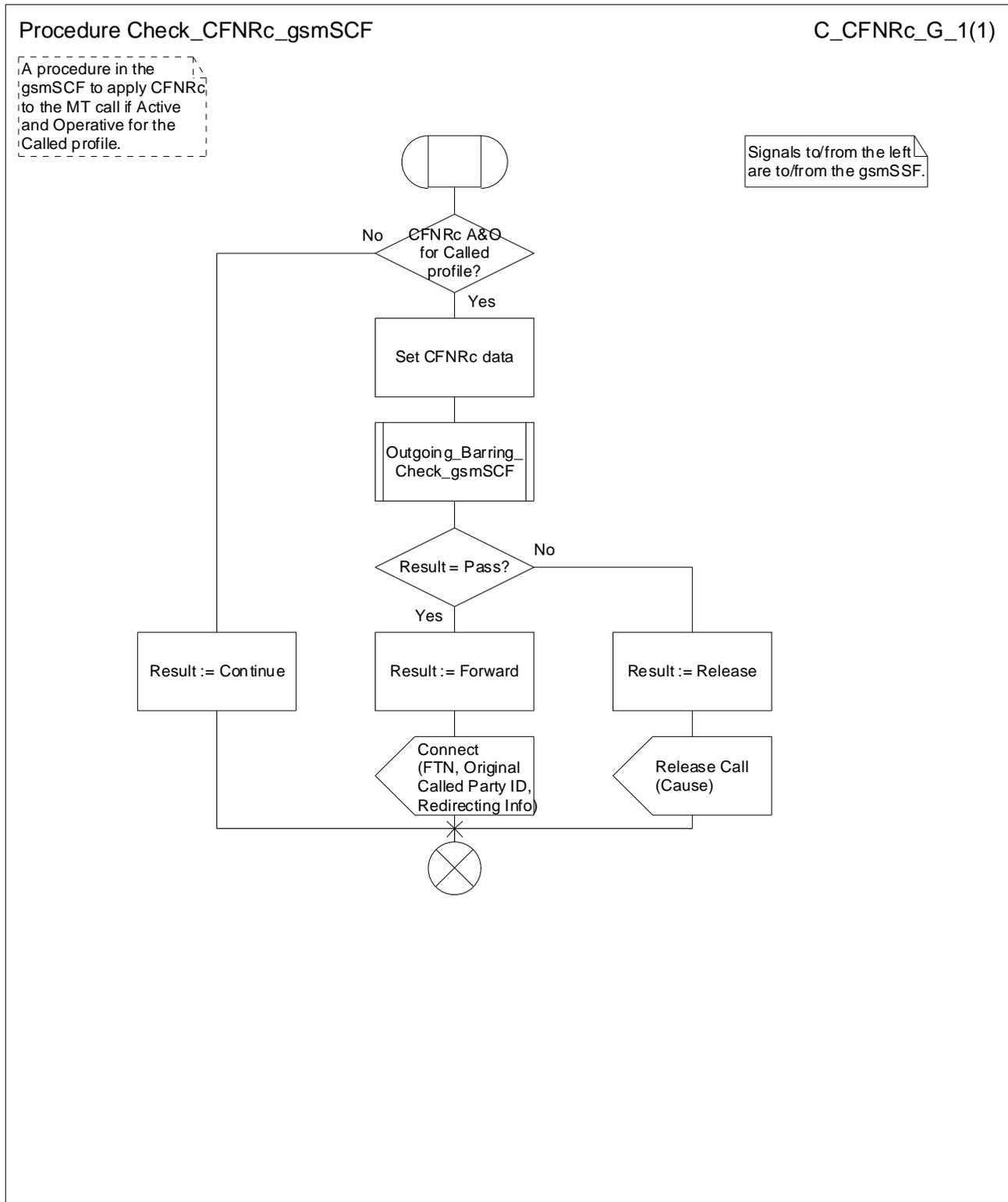


Figure 16: Procedure Check_CFNRc_gsmSCF

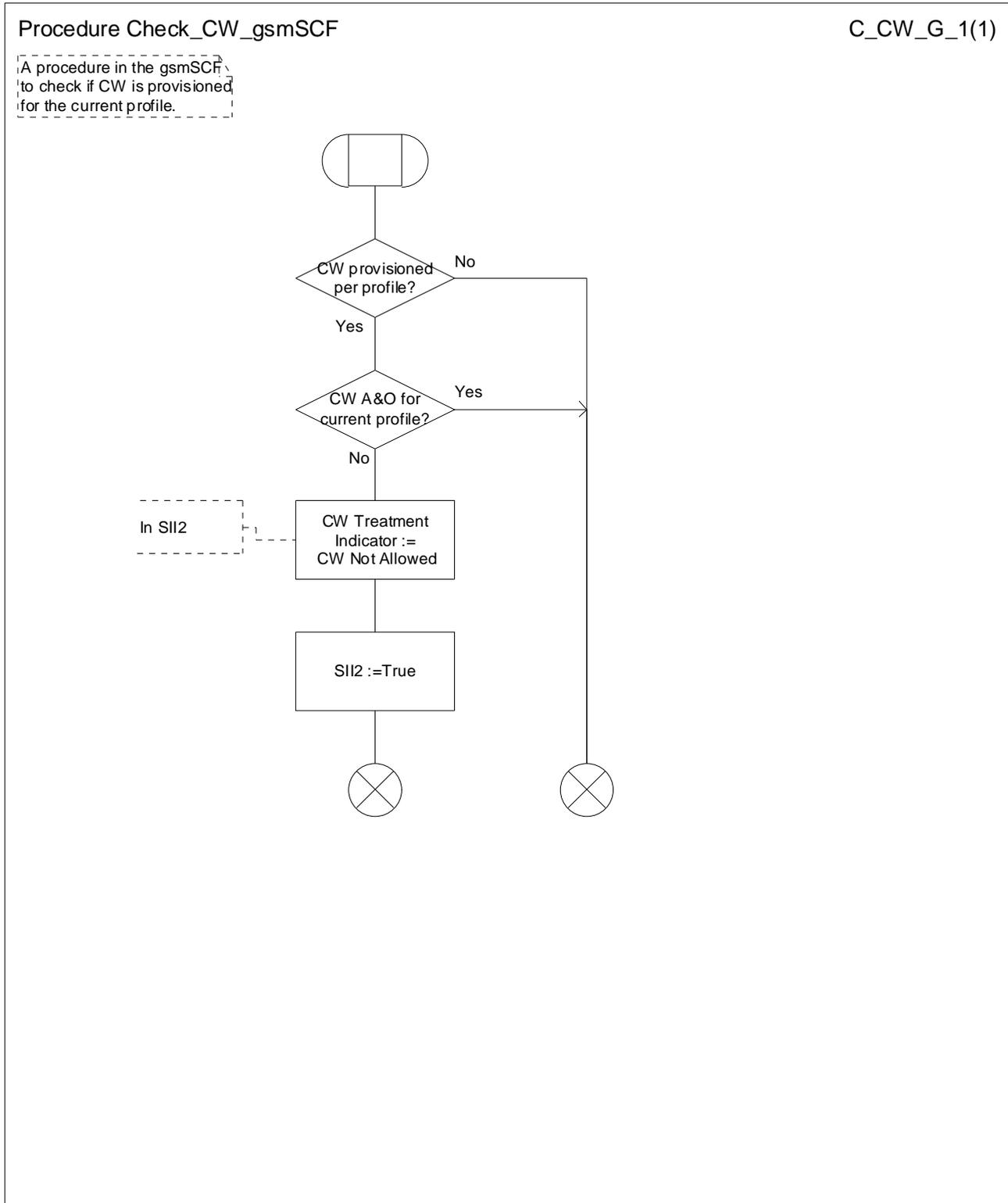


Figure 17: Procedure Check_CW_gsmSCF

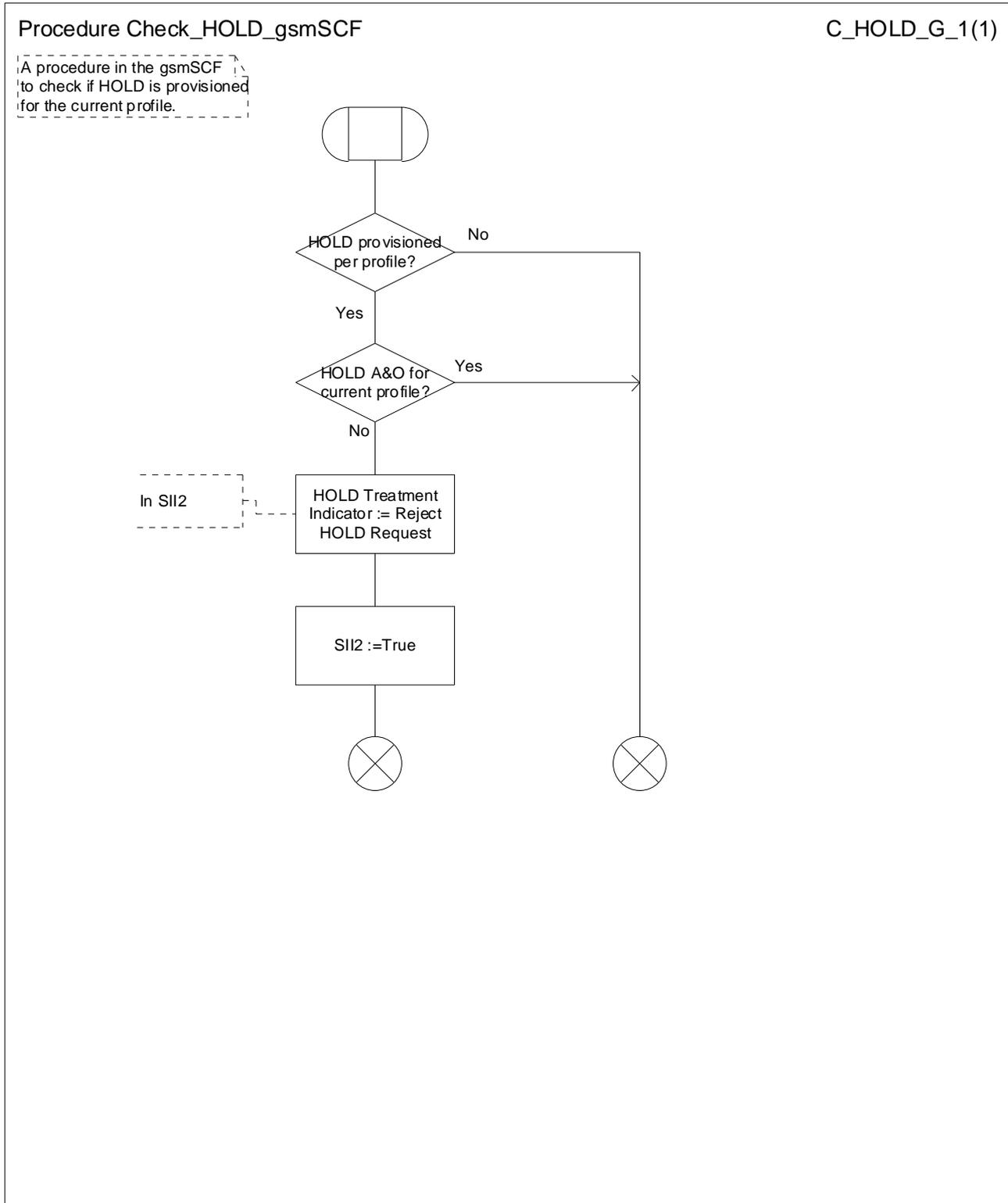


Figure 18: Procedure Check_HOLD_gsmSCF

Procedure Check_MPTY_gsmSCF

C_MPTY_G_1(1)

A procedure in the gsmSCF to check if MPTY is provisioned for the current profile.

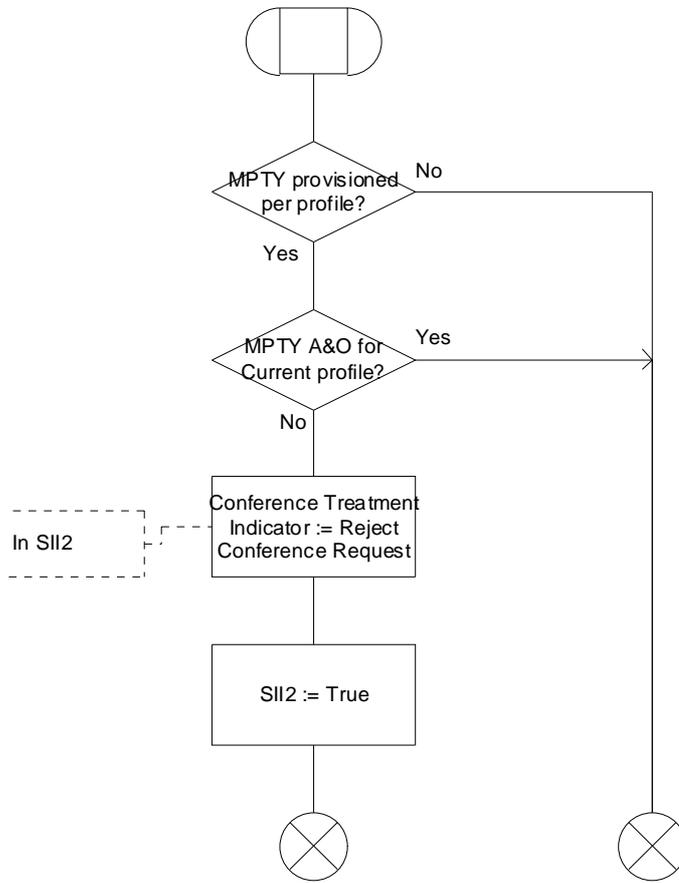


Figure 19: Procedure Check_MPTY_gsmSCF

Procedure Check_ACM_gsmSCF

C_ACM_G_1(1)

A procedure in the gsmSCF to ensure that ACMmax is not exceeded for the profile in use.

Signals to/from the left are to/from the gsmSSF.

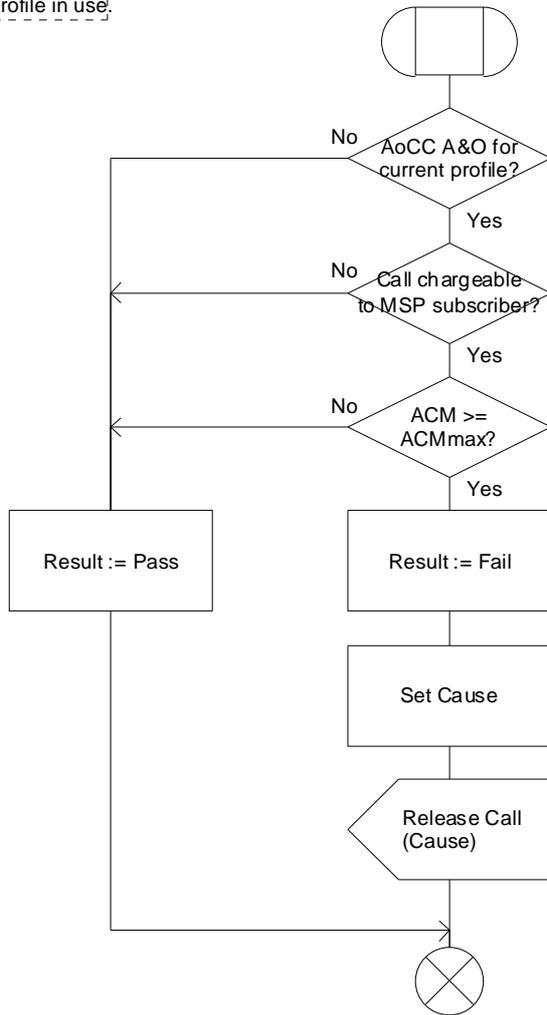


Figure 20: Procedure Check_ACM_gsmSCF

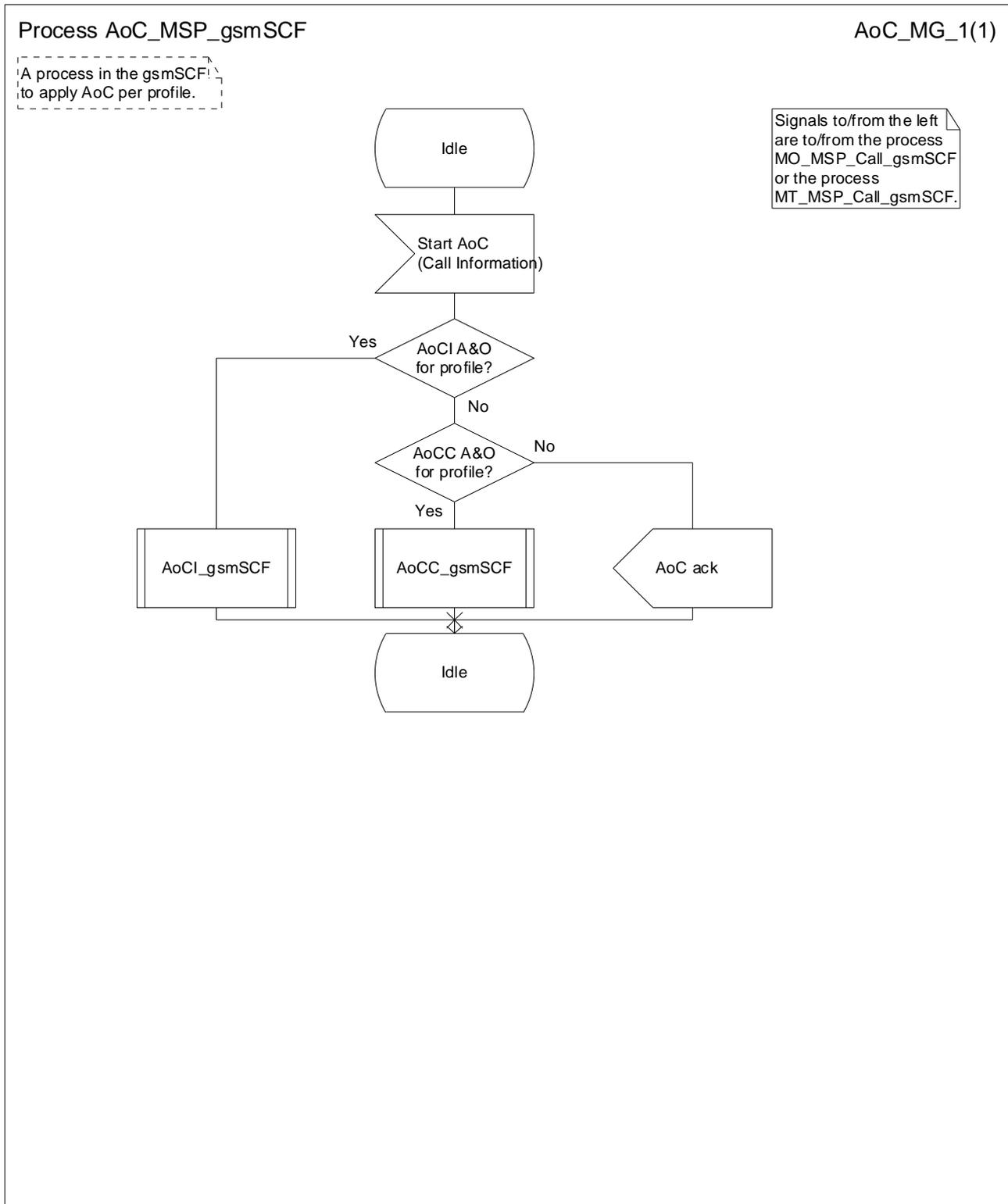


Figure 21: Process AoC_MSP_gsmSCF

Procedure AoCI_gsmSCF

AoCI_G_1(1)

A procedure in the gsmSCF to apply AoCI per profile.

Signals to/from the right are to/from the process MO_MSP_Call_gsmSCF or the process MT_MSP_Call_gsmSCF.

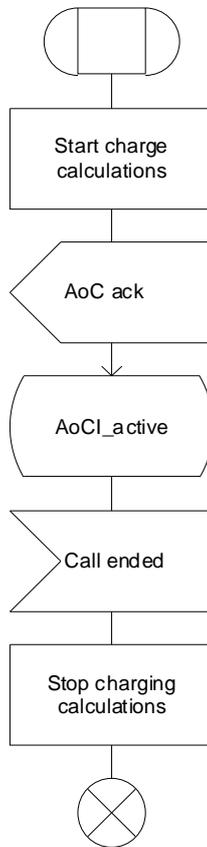


Figure 22: Procedure AoCI_gsmSCF

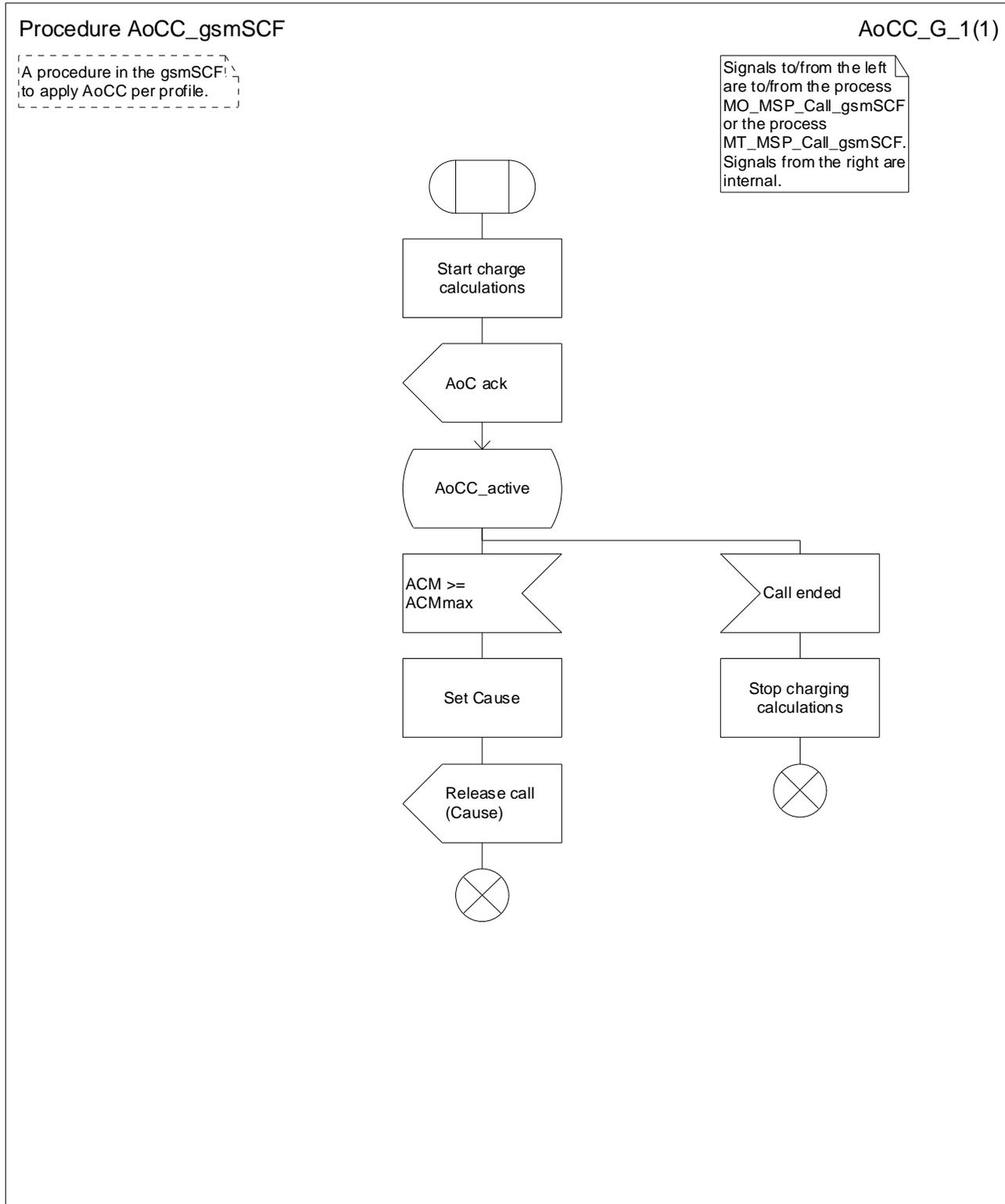


Figure 23: Procedure AoCC_gsmSCF

Procedure Outgoing_Barring_Check_gsmSCF

OBCG_1(1)

A procedure in the gsmSCF to check the outgoing call barrings for an MSP subscriber

Signals to/from the left are to/from the gsmSSF.

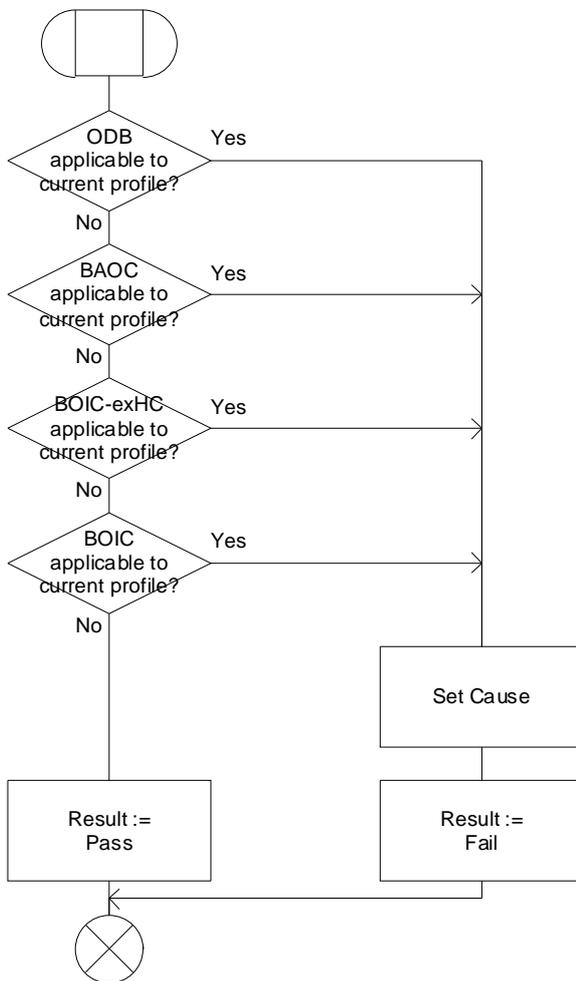


Figure 24: Procedure Outgoing_Barring_Check_gsmSCF

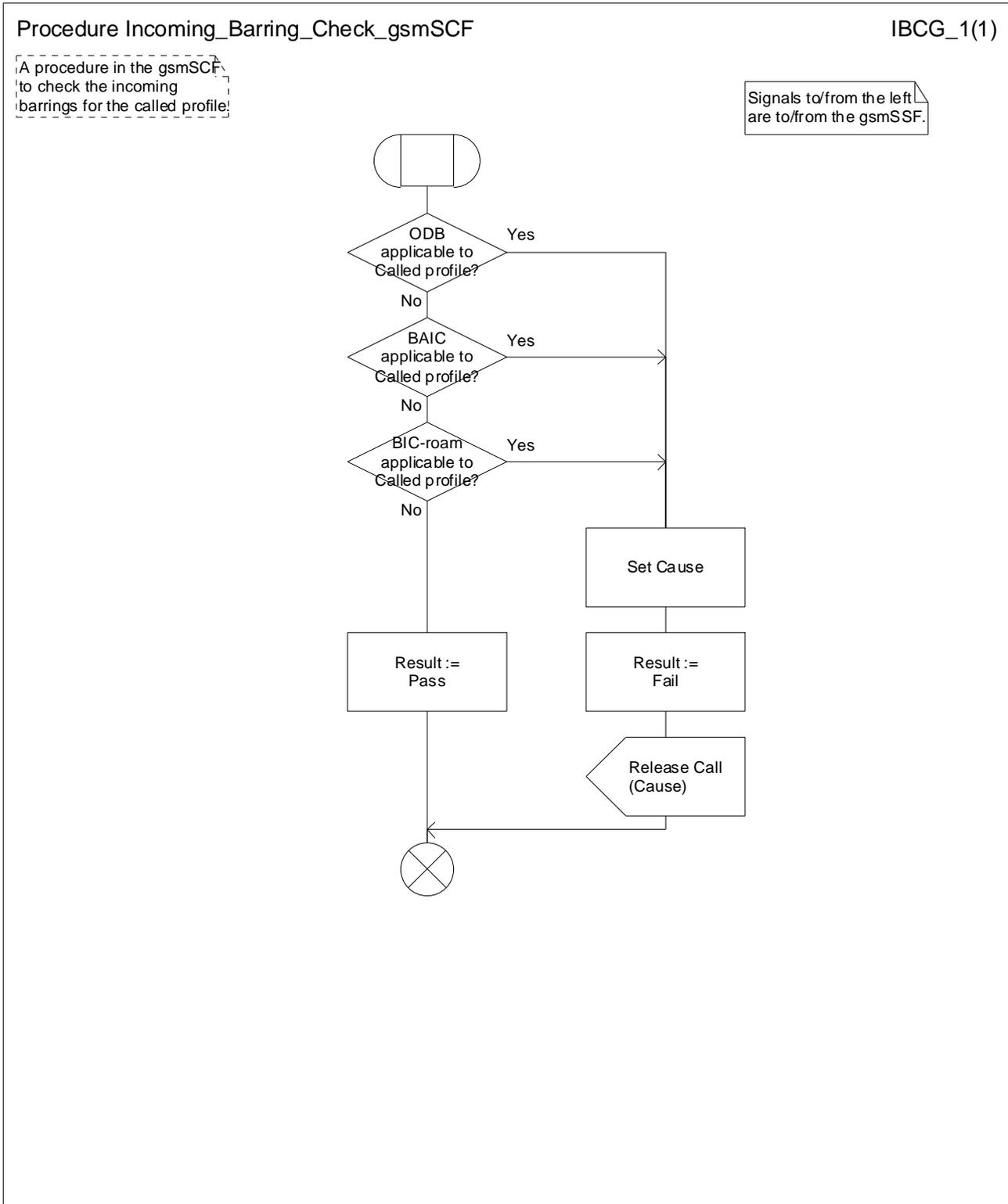


Figure 25: Procedure Incoming_Barring_Check_gsmSCF

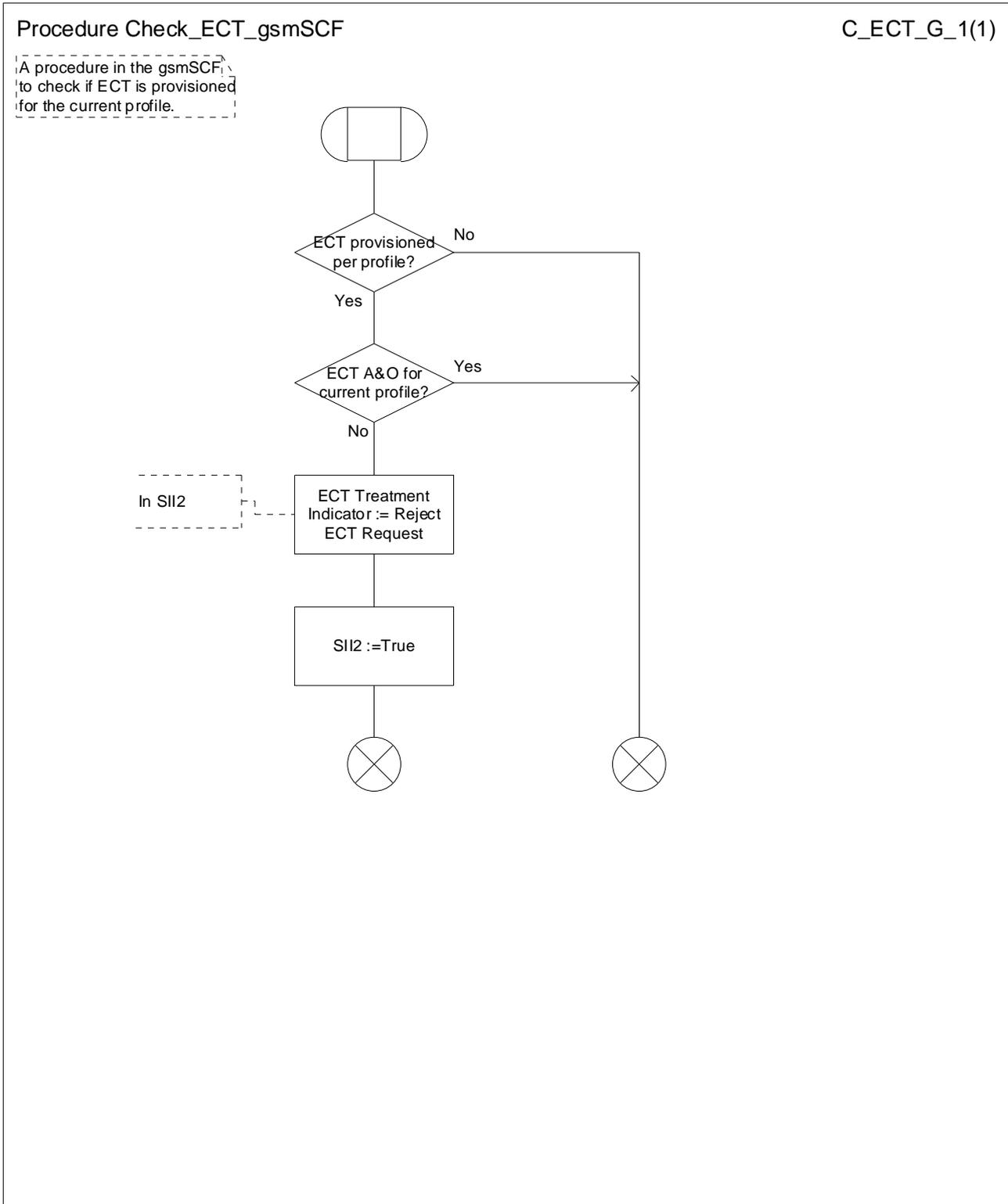


Figure 26: Procedure Check_ECT_gsmSCF

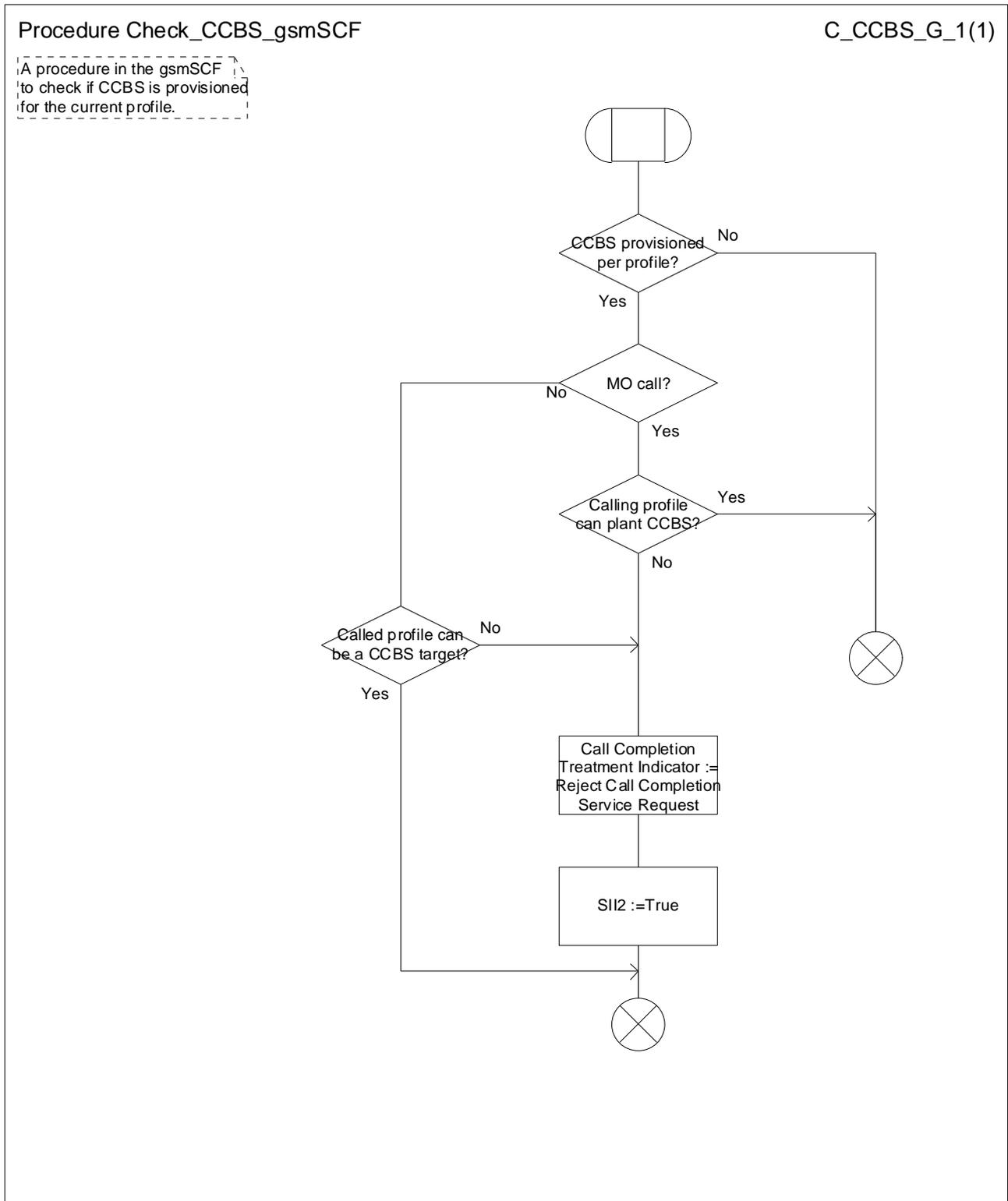


Figure 27: Procedure Check_CCBS_gsmSCF

7.5.4 Information flows

The information flow for a successful MO call by an MSP subscriber is shown in figure 28.

The information flow for a successful MT call to an MSP subscriber is shown in figure 29.

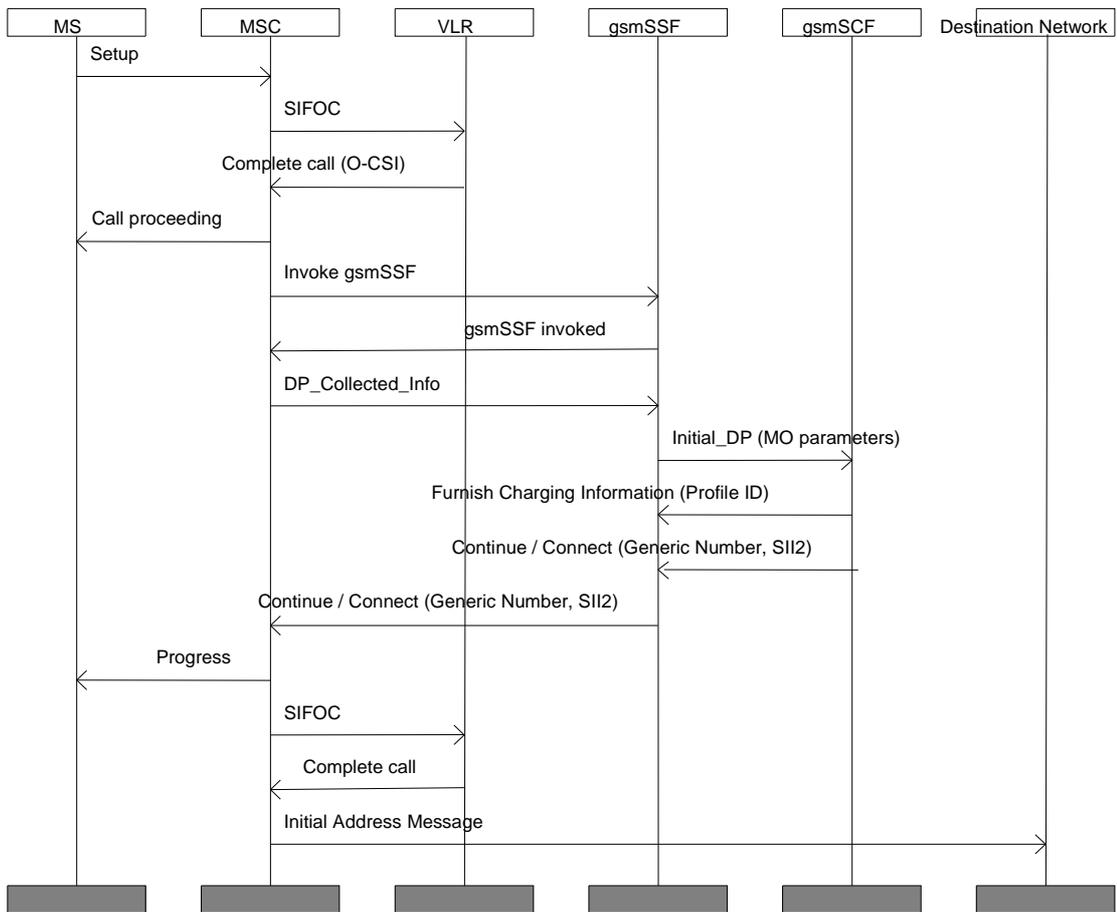


Figure 28: Information flow for a successful MO call

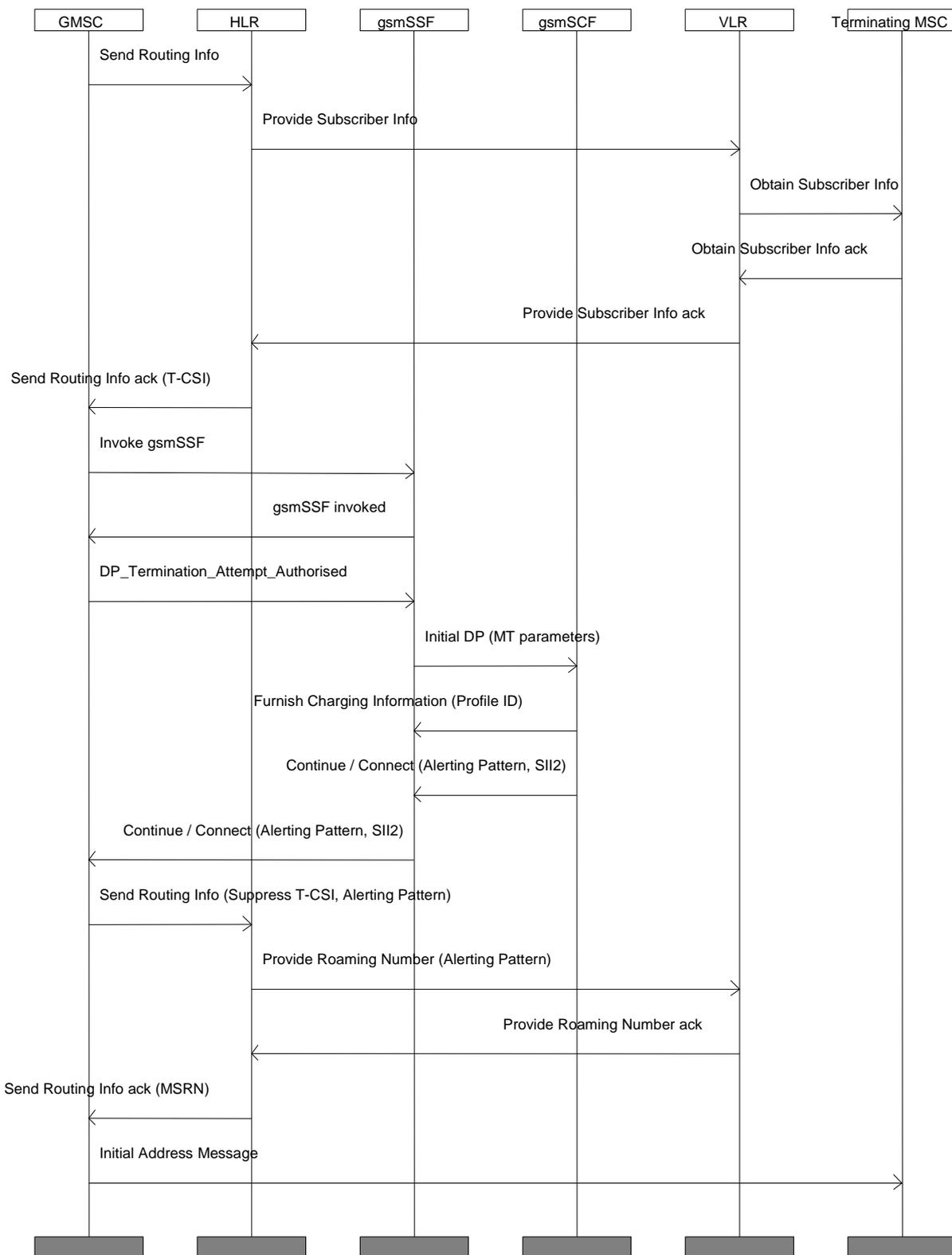


Figure 29: Information flow for a successful MT call to a profile that has no Call Forwardings Active and Operative in the gsmSCF

NOTE: For information flows to a profile that has Call Forwarding services Active and Operative in the gsmSCF, see clause 7.11.1: Call Forwarding.

7.6 SMS handling

MSP Phase 2 does not apply to MT short messages. The MSP subscriber will receive MT short messages but no profile indication will be given.

When the gsmSCF receives an Initial SMS Event message from the gsmSSF, the process MO_MSP_SMS_gsmSCF will be invoked, see figure 30.

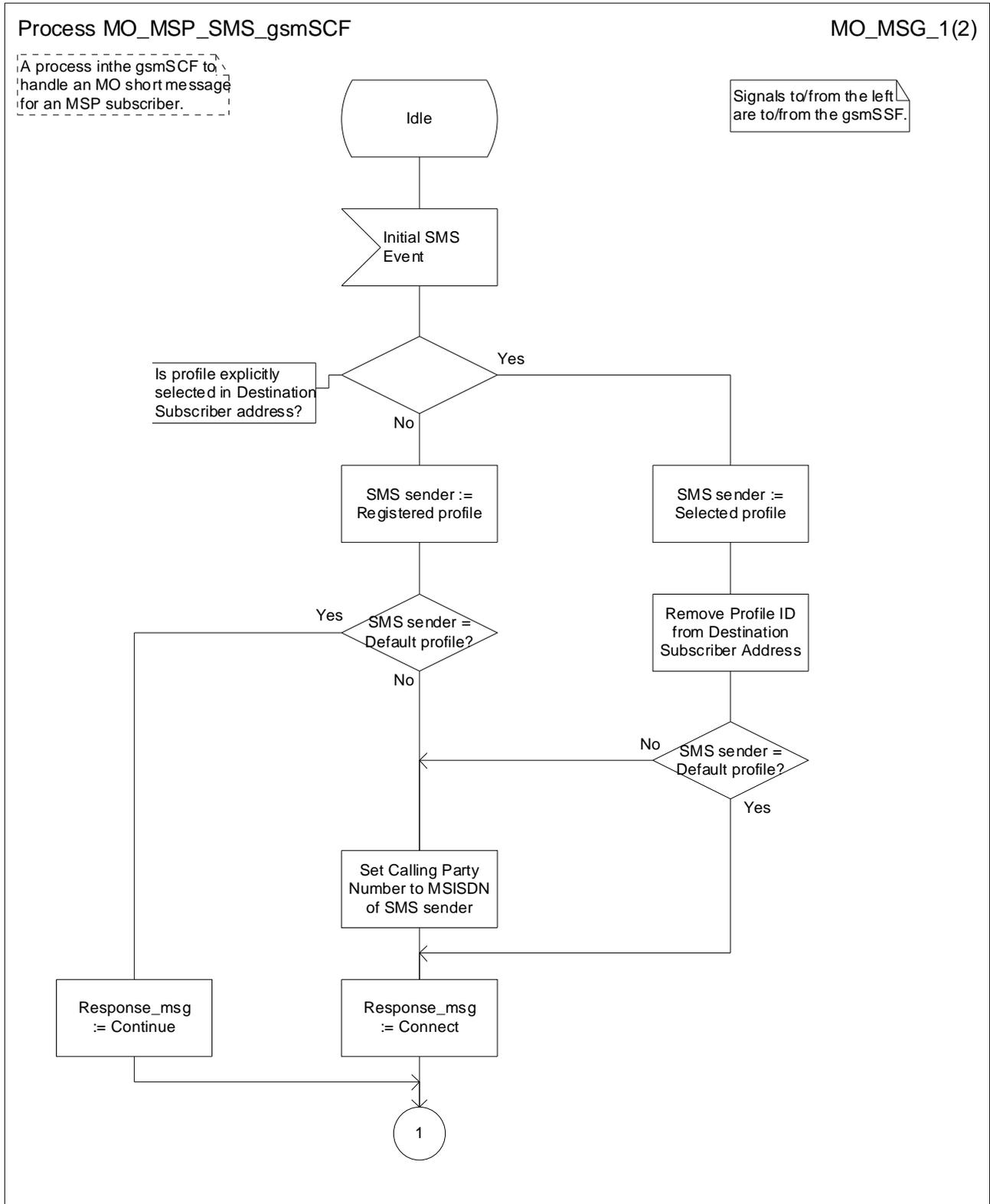


Figure 30a: Process MO_MSP_SMS_gsmSCF (sheet 1 of 2)

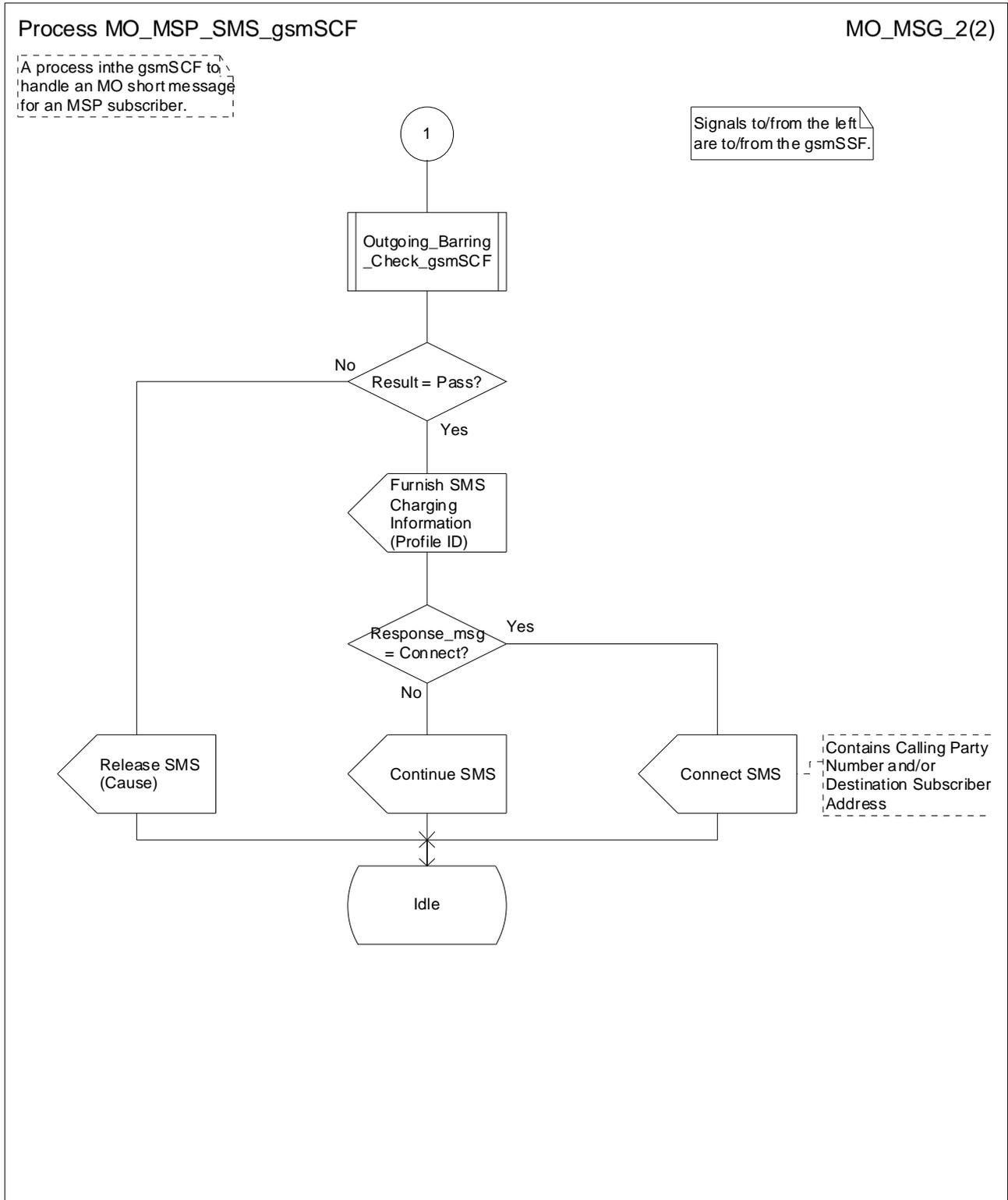


Figure 30b: Process MO_MSP_SMS_gsmSCF (sheet 2 of 2)

7.7 Call Independent SS handling

Supplementary Services provisioned per subscriber will be handled in the usual way.

Supplementary Services provisioned per profile will be controlled using USSD, sent via the VLR and HLR to the gsmSCF.

If Call Barring is provisioned per profile, if the outgoing call barring data for the default profile is changed, the HLR shall be informed using Any Time Modification. On receipt of an Any Time Modification message from the gsmSCF for a subscriber with the OCB_flag set, the HLR will modify the stored Call Barring information for the default profile in accordance with the information in the Any Time Modification message.

7.8 Interaction with Supplementary Services

7.8.1 Line Identification services

7.8.1.1 CLIP

No interaction.

7.8.1.2 CLIR

CLIR can be provisioned per subscriber or per profile.

If CLIR is provisioned per subscriber and CLIR is active, it will be active for all profiles. Data for the CLIR Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. CLIR will function as specified in 3G TS 23.081 and will not distinguish between MSP and non-MSP subscribers.

If CLIR is provisioned per profile then the CLIR_flag shall be set in the HLR (see clause 6.8: CLIR_flag) and the CLIR subscription information for the default profile shall be stored in the HLR in the usual manner. For an MO call, if the CLIR subscription information for the Calling profile indicates that the CLI shall be restricted, the gsmSCF shall set the Calling Party Presentation Indicator to Presentation Restricted in the SII2 parameter.

7.8.1.3 COLP

No interaction.

7.8.1.4 COLR

No interaction.

7.8.2 Call Hold (HOLD)

Call Hold can be provisioned per subscriber or per profile.

If Call Hold is provisioned per subscriber and Call Hold is active, it will be active for all profiles. Data for the Call Hold Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. Call Hold will function as specified in 3G TS 23.083 and will not distinguish between MSP and non-MSP subscribers.

If Call Hold is provisioned per profile then the HOLD_flag shall be set in the HLR (see clause 6.3: HOLD_flag). On receipt of an Initial_DP message for an MO or MT call, the gsmSCF will check the subscription information for the profile in use for that call. If HOLD is not active and operative, then the SII2 will be included in the Connect message with the HOLD Treatment Indicator set to Reject HOLD Request.

7.8.3 Call Waiting (CW)

Call Waiting can be provisioned per subscriber or per profile.

If Call Waiting is provisioned per subscriber and Call Waiting is active, it will be active for all profiles. Data for the Call Waiting Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. Call Waiting will function as specified in 3G TS 23.083 and will not distinguish between MSP and non-MSP subscribers.

If Call Waiting is provisioned per profile then the CW_flag shall be set in the HLR (see clause 6.4: CW_flag). On receipt of an Initial_DP message for an MO or MT call, the gsmSCF will check the subscription information for the profile in use for that call. If Call Waiting is not active and operative, then the SII2 will be included in the Connect message with the CW Treatment Indicator set to CW Not Allowed. The subscriber shall be able to modify CW information per profile by making contact with the gsmSCF using USSD. However, the subscriber shall not be able to modify CW data for the default profile.

7.8.4 Call Forwarding

The Call Forwarding Supplementary Services, described in 3G TS 23.082, can only be provisioned per subscriber. However, services equivalent to the Call Forwarding Supplementary Services, implemented in the gsmSCF, will be available to the MSP subscriber per profile. This is described in clause 7.11.1: Call Forwarding.

If the Call Forwarding Supplementary Services are provisioned per subscriber, then Call Forwarding will function as specified in 3G TS 23.082 and will not distinguish between MSP and non-MSP subscribers.

NOTE 1: If Call Forwarding is provisioned per subscriber in the HLR then Call Forwarding should not be provisioned per profile in the gsmSCF, as this may cause unpredictable behaviour.

NOTE 2: If Call Forwarding is provisioned per subscriber in the HLR then Call Deflection should not be provisioned per profile in the gsmSCF, as this may cause unpredictable behaviour.

7.8.5 Multi Party Service (MPTY)

The Multi Party Supplementary Service can be provisioned per subscriber or per profile.

If MPY is provisioned per subscriber and MPY is active, it will be active for all profiles. Data for the MPY Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. MPY will function as specified in 3G TS 23.084 and will not distinguish between MSP and non-MSP subscribers.

If MPY is provisioned per profile then the MPY_flag shall be set in the HLR (see clause 6.5: MPY_flag). On receipt of an Initial_DP message for an MO or MT call, the gsmSCF will check the subscription information for the profile in use for that call. If MPY is not active and operative, then the SII2 will be included in the Connect message with the Conference Treatment Indicator set to Reject Conference Request.

7.8.6 Closed User Group (CUG)

The Closed User Group Supplementary Service can be provisioned per subscriber or per profile.

If CUG is provisioned per subscriber and CUG is active, it will be active for all profiles. Data for the CUG Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. CUG will function as specified in 3G TS 23.085 and will not distinguish between MSP and non-MSP subscribers. The interaction between CAMEL and CUG is defined in 3G TS 23.078.

CUG provisioning per profile is supported by CAMEL Phase 3 and is FFS.

7.8.7 Advice of Charge (AoC)

The Advice of Charge Supplementary Service can be provisioned per subscriber. However, services equivalent to the Advice of Charge supplementary services, implemented in the gsmSCF, will be available to the MSP subscriber per profile. This is described in clause 7.11.4: Advice of Charge (AoC). Signalling on the access interface will be as specified in 3G TS 24.086.

If AoC is active, it will be active for all profiles. Data for the AoC Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. AoC will function as specified in 3G TS 23.086 and will not distinguish between MSP and non-MSP subscribers.

7.8.8 Call Barring

The Call Barring Supplementary Services, described in 3G TS 23.088, can only be provisioned per subscriber. However, services equivalent to the Call Barring Supplementary Services, implemented in the gsmSCF, can be provided to the MSP subscriber per profile. This is described in clause 7.11.2: Call Barring. This requires the OCB_flag mechanism described in clause 6.1: OCB_flag.

7.8.9 Explicit Call Transfer (ECT)

The Explicit Call Transfer supplementary service can be provisioned per subscriber or per profile.

If ECT is provisioned per subscriber and ECT is active, it will be active for all profiles. Data for the ECT Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. ECT will function as specified in 3G TS 23.091 and will not distinguish between MSP and non-MSP subscribers.

If ECT is provisioned per profile then the ECT_flag shall be set in the HLR (see clause 6.6: ECT_flag). On receipt of an Initial_DP message for an MO or MT call, the gsmSCF will check the subscription information for the profile in use for that call leg. If ECT is not active and operative, then the SII2 will be included in the Connect message with the ECT Treatment Indicator set to Reject ECT Request.

7.8.10 Completion of Calls to Busy Subscriber (CCBS)

CCBS can be provisioned per subscriber or per profile.

If CCBS is provisioned per subscriber and CCBS is active, it will be active over all profiles. Data for the CCBS Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner.

If CCBS is provisioned per profile then the CCBS_flag shall be set in the HLR (see clause 6.7: CCBS_flag).

On receipt of an Initial_DP message for an MO call, the gsmSCF will check the subscription information for the calling profile. If CCBS is not active and operative, then the SII2 will be included in the Connect message with the Call Completion Treatment Indicator set to Call Completion Not Allowed.

On receipt of an Initial_DP message for an MT call, the gsmSCF will check the subscription information for the called profile. If CCBS is not active and operative, then the SII2 will be included in the Connect message with the Call Completion Treatment Indicator sent to Call Completion not allowed.

The subscriber shall be able to modify CCBS information per profile by making contact with the gsmSCF using USSD. However, the subscriber shall not be able to modify CCBS data for the default profile.

If a CFU-equivalent service is activated while there are queue entries in MS-B's target queue, HLR-B will not know about this activation and will process these queue entries as normal. As a consequence, the CCBS calls related to these queue entries will be forwarded to the new destination. CCBS activation is not possible if this forwarded call meets NDUB. This results in expiry of recall timer T9 and deletion of the queue entry from MS-B's target queue. For further details on the interaction between CCBS and CAMEL, refer to 3G TS 23.093.

The same applies to Incoming Call Barring-equivalent services which are activated while there are queue entries in MS-B's target queue.

An MSP subscriber will have CCBS set in the SS-CSI. The gsmSCF will be informed of CCBS Request and CCBS Setup messages for the MSP subscriber. This allows the service logic in the gsmSCF to assign the correct profile to the CCBS call.

7.8.11 enhanced Multi-Level Precedence and Pre-emption (eMLPP)

eMLPP will be provisioned per subscriber. If eMLPP is active, it will be active for all profiles. Data for the eMLPP Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. eMLPP will function as specified in 3G TS 23.067 and will not distinguish between MSP and non-MSP subscribers.

7.8.12 User-to-User Signalling (UUS)

The User-to-User Supplementary Service will be provisioned per subscriber. If UUS is active, it will be active for all profiles. Data for the UUS Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. UUS will function as specified in 3G TS 23.087 and will not distinguish between MSP and non-MSP subscribers.

7.8.13 Call Deflection (CD)

The Call Deflection Supplementary Service will be provisioned per subscriber. If CD is active, it will be active for all profiles. Data for the CD Supplementary Service will be stored in the HLR, and if appropriate in the VLR, in the usual manner. CD will function as specified in 3G TS 23.072 and will not distinguish between MSP and non-MSP subscribers.

When the MSP subscriber deflects an MT call, it triggers an interrogation of the gsmSCF for an MO Call. Using the call reference number, the gsmSCF can recognise that there is an ongoing dialogue for the MT call, and can then retrieve the profile to apply for the deflected call.

This gives the gsmSCF the opportunity to reject the call deflection per profile, providing the MSP subscriber is in a supporting network.

NOTE: Call Deflection should not be provisioned per profile if Call Forwardings are provisioned per subscriber in the HLR as unpredictable behaviour may occur.

7.9 Interaction with other services

7.9.1 The Multi-Numbering Scheme

If the MSP subscriber has different MSISDNs allocated for different Basic Services, all MSISDNs and associated Basic Services will be stored in the HLR. Each MSISDN and associated Basic Services will also be stored in the gsmSCF with associated profile ID.

7.9.2 The Short Message Service

Mobile terminated short messages can be received on any profile although the profile will not be indicated to the user.

It shall be possible to select a profile for mobile originated short messages. If a profile is explicitly selected, the MO short message will be sent by and charged to the selected profile. If a profile is not explicitly selected, the MO short message will be sent by and charged to the registered profile.

7.9.3 Interactions with CAMEL

An MSP subscriber will, by definition, have a CAMEL subscription.

If other CAMEL services are designed in such a way that an MSP subscriber can use them, they will be available to the MSP subscriber. It is a network option to design CAMEL services that interact with MSP.

7.9.4 Interactions with OR

The GMSC in the Interrogating PLMN (IPLMN) needs to support CAMEL Phase 2 capability if the called subscriber is an MSP subscriber.

If an interrogation request is received for an MSP subscriber from a GMSC in the IPLMN that does not support the CAMEL Phase 2 capability, the HLR shall return an OR not allowed negative response (see 3G TS 23.079) to the GMSC. This will force the call to be routed to a GMSC supporting CAMEL Phase 2 capability in the HPLMN.

7.9.5 Operator Determined Barring

ODB, as described in 3G TS 23.015, can only be provisioned per subscriber.

A service, implemented in the gsmSCF equivalent to the ODB service will be available for an MSP subscriber per profile. This is described in clause 7.11.3: Operator Determined Barring (ODB); it requires the mechanism described in clause 6.2: ODB flags..

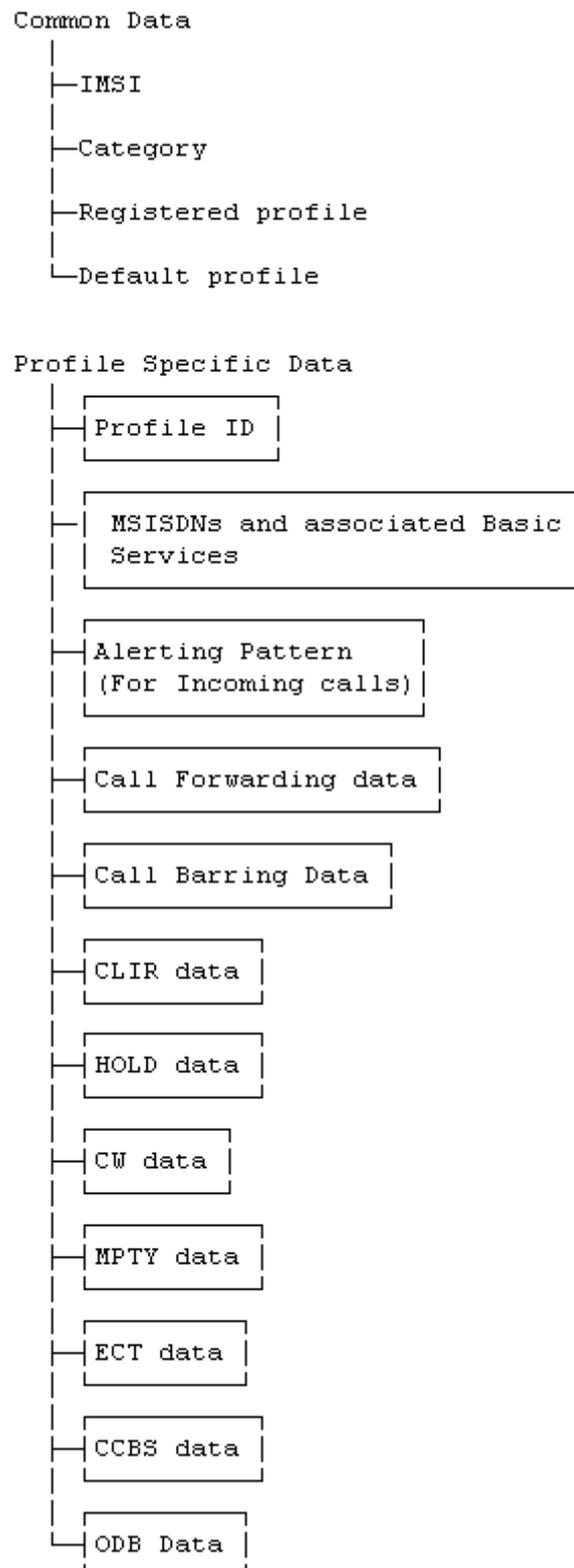
Outgoing ODB for the default profile will be stored in the HLR for use when the subscriber roams into a non-supporting network, see clause 7.11.3: Roaming into a network not supporting CAMEL Phase 2 for further details.

7.9.6 Roaming Restrictions

Roaming Restrictions will apply per subscriber. Data for the Roaming Restrictions will be stored in the HLR in the usual manner.

7.10 Data stored in the gsmSCF

The gsmSCF contains all the data needed to control the MSP service. These data can be divided into the common data (the data valid for all profiles) and the profile specific data.



7.11 Equivalent services implemented by the gsmSCF

7.11.1 Call Forwarding

Call Forwarding services will be provided in the gsmSCF per profile. An MT call to an MSP subscriber will be subject to the provided call forwardings for the called profile.

The Call Forwarding services, implemented by the gsmSCF, should operate in the same way as the Call Forwarding Supplementary Services. The MSP subscriber should have control over the call forwarding data (Registration, Erasure, Activation, Deactivation, and Interrogation). The method for controlling this data is a network option.

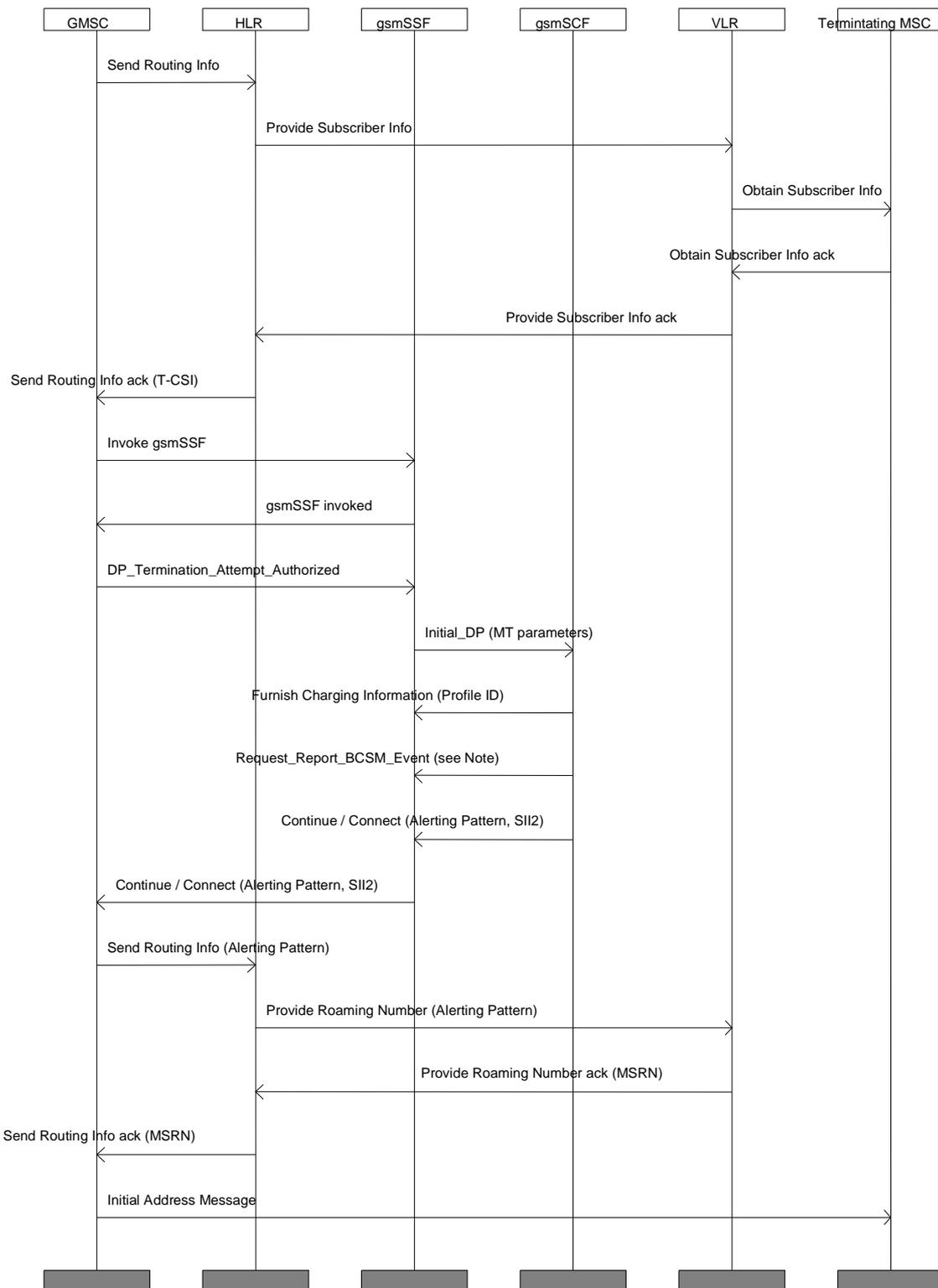


Figure 31: Information flow for a successful MT call to a profile with some Call Forwardings Active and Operative

NOTE: Request_Report_BCSM_Event will contain the list Arm_DP_List (see figure 1). This list will contain the following elements:
 T_Answer EDP-N
 T_Abandon EDP-N
 T_Busy EDP-N (Unless CFB and/or CFNRc are A&O for the called profile, in which case EDP-R)
 T_No_Answer EDP-N (Unless CFNRy is A&O for the called profile, in which case EDP-R)

7.11.1.1 Call Forward Unconditional

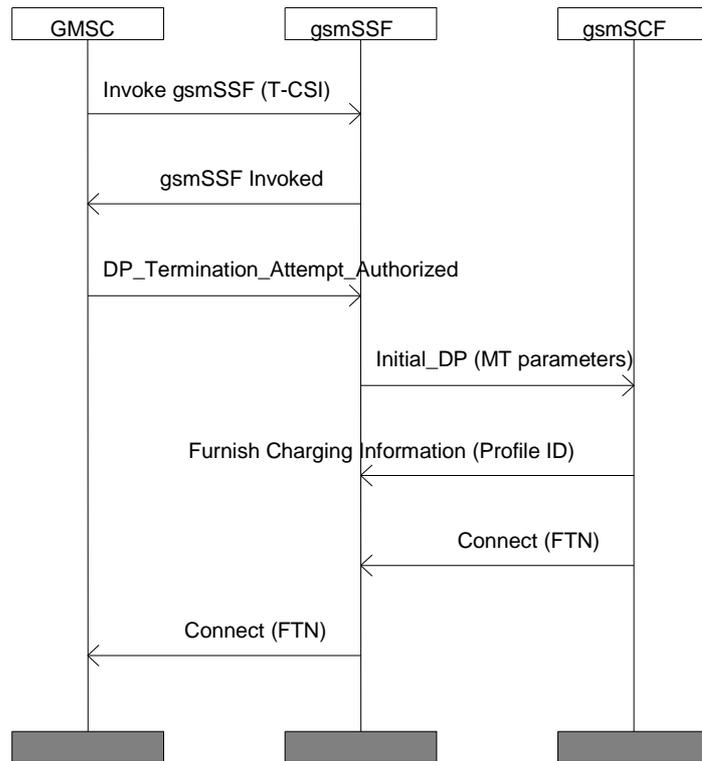


Figure 32: Information flow for an MT call to a profile with CFU active and operative in the gsmSCF

7.11.1.2 Call Forward on Busy

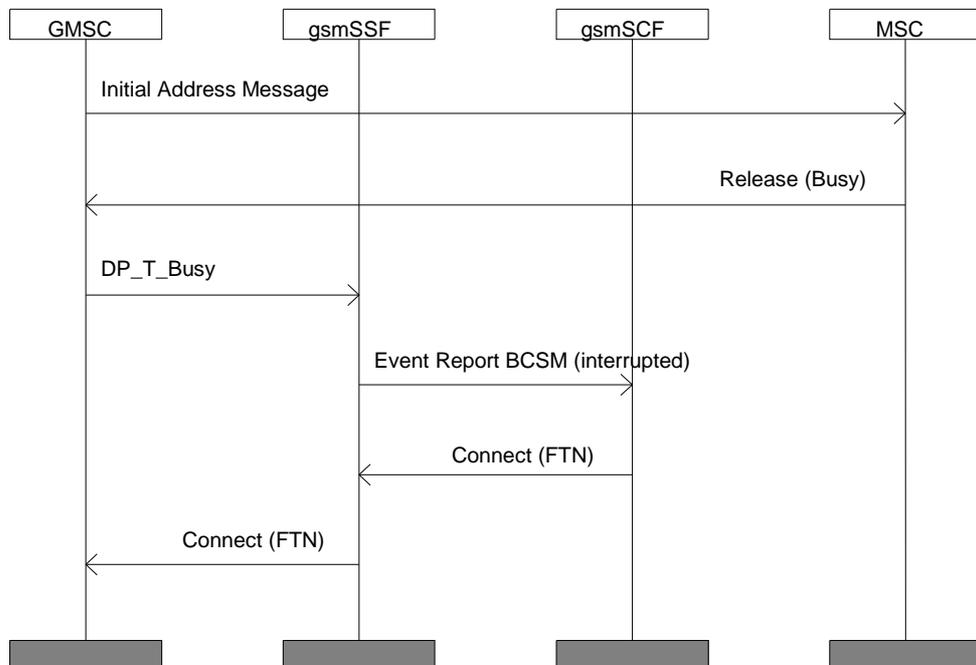


Figure 33: Information flow for an MT call to a profile with CFB active and operative in the gsmSCF, where the called subscriber is NDUB or UDUB

7.11.1.3 Call Forward on No Reply

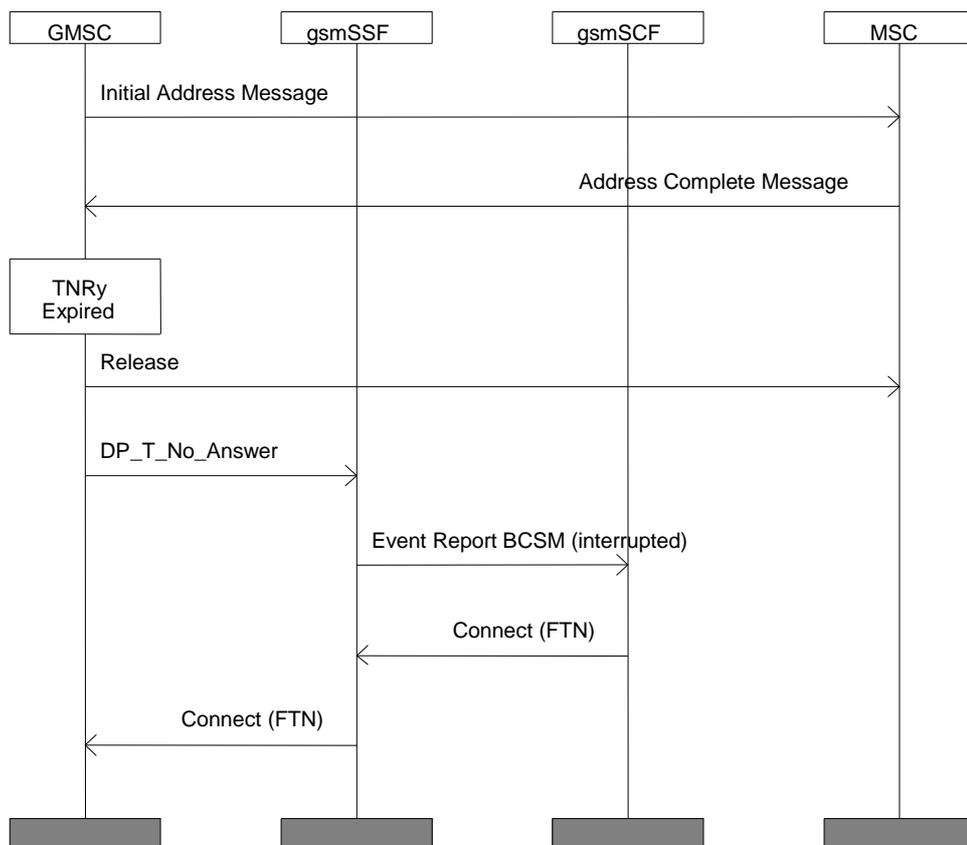


Figure 34: Information flow for an MT call to a profile with CFNRy active and operative in the gsmSCF, where the called party does not answer

NOTE: The timer TNRY is started in the GMSC after the Address Complete Message has been received from the destination exchange. If this timer expires before an Answer message is received from the destination exchange, a release message is sent to the destination exchange and the detection point T_No_Answer is reached. This is specified in 3G TS 23.018 and 3G TS 23.078.

7.11.1.4 Call Forward on Not Reachable

7.11.1.5 Early CFNRc

Early Call Forwarding on Not Reachable will apply if the gsmSCF receives the parameter "subscriber state" set as Not Reachable. Due to the presence of the Location information / Subscriber state Interrogation parameter in the CAMEL data, stored in the HLR, the HLR sends a Provide Subscriber Information message to the VLR. This determines if the subscriber state is Not Reachable.

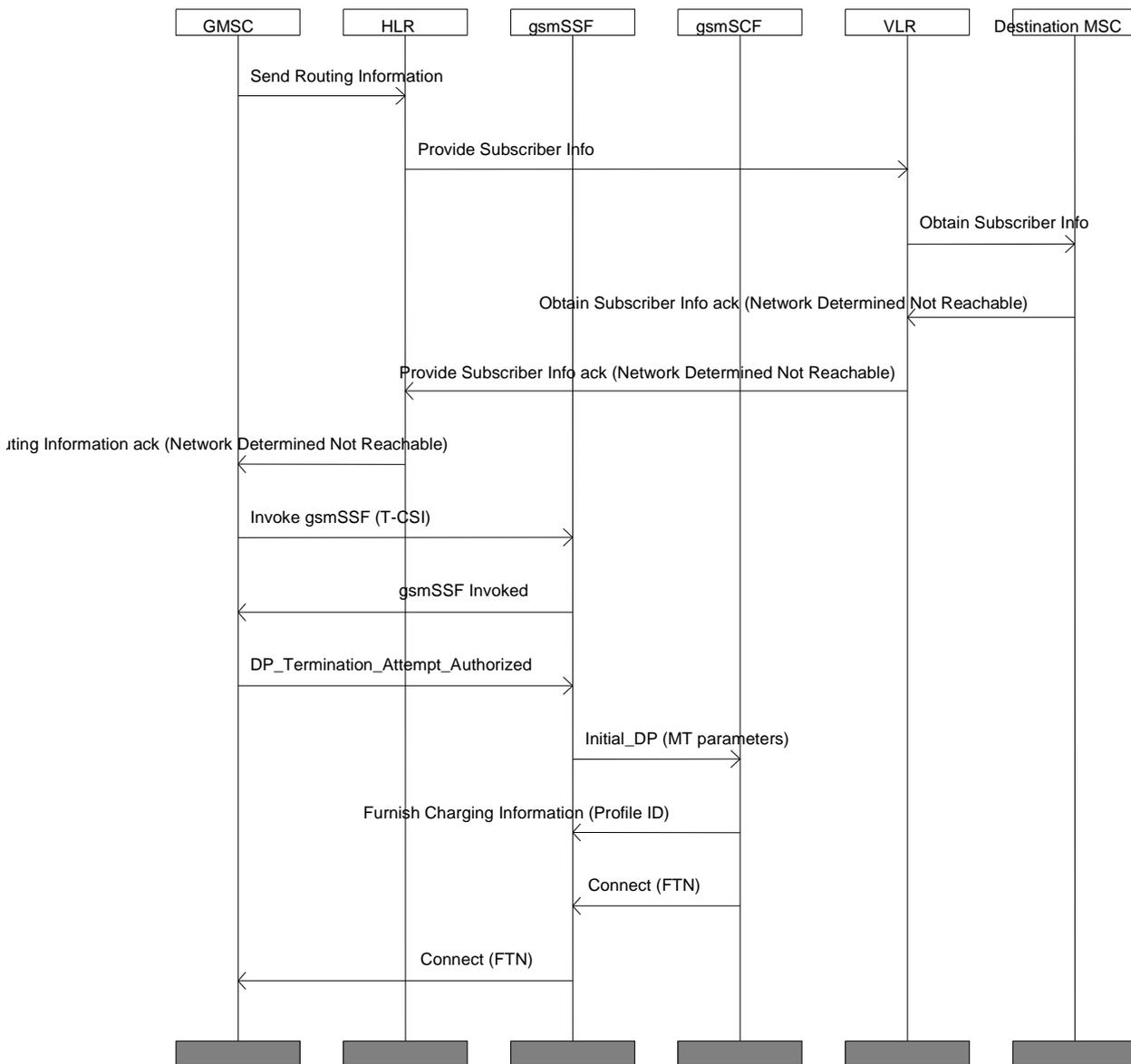


Figure 35: Information flow for an MT call to a profile with CFNRc active and operative in the gsmSCF, where early CFNRc is invoked

7.12.2 Roaming into a network not supporting CAMEL Phase 2

This clause details MSP specific handling for roaming into a network not supporting CAMEL Phase 2. Other handling for this scenario is described in 3G TS 23.078.

7.12.2.1 Actions required on Location Update

The HLR will send the outgoing call barring data and outgoing ODB data, specific to the default profile, to the VLR.

7.12.2.2 MO call handling

When an MSP subscriber roams into a network not supporting CAMEL Phase 2, the default profile will be used for all outgoing traffic.

7.12.2.3 MT call handling

MT calls to any profile will be received by the subscriber (subject to call forwardings and call barrings provided in the gsmSCF on the called profile), although no indication of the called profile will be received.

The HLR will not allow OR, this means that for MT calls, the GMSC will always support CAMEL Phase 2, allowing the gsmSCF to invoke appropriate Call Forwardings and Call Barrings.

7.12.2.4 MO short message handling

MO short messages will be sent from and charged to the default profile.

7.12.3 Lack of availability of the Network Indication of Alerting feature

If an MSP subscriber roams into a network not supporting the Network Indication of Alerting feature, or is using an MS that does not support the Network indication of Alerting feature, then the subscriber will still receive all MT calls, but no indication of the called profile will be given.

Annex A (informative): Provision and Withdrawal of MSP

A.1 Provision of MSP

MSP will be provisioned by prior arrangement with the service provider.

For an existing subscriber converting to an MSP subscriber, all profile specific data will be stored in the gsmSCF and removed from the HLR, and MSP will be provisioned in the HLR.

For a new subscriber provisioned with the MSP service, all profile specific data will be stored in the gsmSCF and MSP will be provisioned in the HLR.

Data specific to the Default Profile will be stored in both the HLR and the gsmSCF.

A.2 Withdrawal of MSP

MSP will be withdrawn when there is only one profile remaining. In this event, the subscriber data will be stored in the HLR and removed from the gsmSCF, and the HLR will remove all MSP markings. The subscriber will then be treated as a normal subscriber.

Annex B (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
Jun 1999						Transferred to 3GPP CN	
CN#04							3.0.0
CN#05		001				Various editorial corrections	3.0.1
CN#06		002				Inclusion of MSP Phase 2 functionality	3.1.0
CN#06		003				Interaction MSP and CF	3.1.0
CN#07		004				Minor editorial corrections	3.1.1
CN#11						Upgrade to Rel-4	4.0.0
CN#16						Release 5 after CN#16	5.0.0
CN#26						Release 6 after CN#26	6.0.0
CT#36						Upgraded unchanged from Rel-6	7.0.0
CT#42						Upgraded unchanged from Rel-7	8.0.0
CT#46		-				Update to Rel-9 version (MCC)	9.0.0
2011-03		-				Update to Rel-10 version (MCC)	10.0.0
2012-09		-				Update to Rel-11 version (MCC)	11.0.0
2014-09		-				Update to Rel-12 version (MCC)	12.0.0
2015-12		-				Update to Rel-13 version (MCC)	13.0.0
2017-03		-				Update to Rel-14 version (MCC)	14.0.0
2018-06		-				Update to Rel-15 version (MCC)	15.0.0
2020-07		-				Update to Rel-16 version (MCC)	16.0.0
2022-03		-				Update to Rel-17 version (MCC)	17.0.0

History

Document history		
V17.0.0	April 2022	Publication