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Introduction

Attached is new technical specification, 3GPP TS 23.278 v 1.0.0, (CAMEL) Phase 4 - Stage 2 IM CN Interworking, that is forwarded to TSG CN Plenary meeting #14 for information.

3GPP TS 23.278 V1.0.0 (2001-12)

Technical Specification

**3rd Generation Partnership Project;
Technical Specification Group Core Network;
Customised Applications for Mobile network Enhanced Logic
(CAMEL) Phase 4 - Stage 2 IM CN Interworking
(Rel-5)**

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Contents

Foreword

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

The present document specifies the stage 2 description for the third phase (see 3GPP TS 22.078 [2]) of the Customized Applications for Mobile network Enhanced Logic (CAMEL) feature within the 3GPP system.

The contents of 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 then 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 for the Customized Applications for Mobile network Enhanced Logic (CAMEL) feature which provides the mechanisms to support services of for the IP Multimedia Core Network (IM CN) Subsystem.

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: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Vocabulary for 3GPP Specifications".

[2]   3GPP TS 22.078: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Customised Applications for Mobile network Enhanced Logic (CAMEL);Service description, Stage 1".

[3]   3GPP TS 22.228: "3rd Generation Partnership Project; Technical Specification Group Systems Aspects; IP Multimedia (IM) Subsystem –Stage 1

[4]   3GPP TS 23.228: "3rd Generation Partnership Project; Technical Specification Group Systems Aspects; IP Multimedia (IM) Subsystem –Stage 1

[5]   3GPP TS 23.218: "3rd Generation Partnership Project; Technical Specification Group Core Networks; IP Multimedia (IM) Session Handling; IP Multimedia Call Model.

[6]   3GPP TS 24.228: "3rd Generation Partnership Project; Technical Specification Group Core Networks; Signalling flows for the IP multimedia call control based on SIP and SDP.

[7]   3GPP TS 29.002: "3rd Generation Partnership Project; Technical Specification Group Core Network; Mobile Application Part (MAP) specification".

[8]   3GPP TS 29.078: "3rd Generation Partnership Project; Technical Specification Group Core Network; Customised Applications for Mobile network Enhanced Logic (CAMEL) Phase 3 CAMEL Application Part (CAP) specification".

3   Definitions and abbreviations

3.1   Definitions

IP Multimedia Core Network Service Switching Function (imcnSSF): functional entity that interfaces the IM-SSF to the gsmSCF. The concept of the imcnSSF is derived from the IN SSF, but uses different triggering mechanisms because of the nature of the mobile network.

IP Multimedia SSF (IM-SSF)

3.2   Abbreviations

Abbreviations used in the present document are listed in 3GPP TR 21.905 [1].
For the purposes of the present document, the following abbreviations apply:

BCSM	Basic Call State Model
CAMEL	Customized Applications for Mobile network Enhanced Logic
CAP	CAMEL Application Part
CSCF	Call State Control Function
DP	Detection Point
EDP	Event Detection Point
FTN	Forwarded To Number
GPRS	General Packet Radio Service
gsmSCF	GSM Service Control Function
gsmSRF	GSM Specialised Resource Function
gsmSSF	GSM Service Switching Function
HPLMN	Home PLMN
HSS	Home Subscriber Server
IE	Information Element
IF	Information Flow
IP	Internet Protocol
ISC	IM-CN Service Control
I-CSCF	Interrogating CSCF
IM	IP Multimedia
IM-BCSM	IP Multimedia Basic Call State Model
IMCN	IP Multimedia Core Network
imcnSSF	IM CN Service Switching Function
IM-CSI	IP Multimedia CAMEL Subscription Information
IM-SSF	IP Multimedia Service Switching Function
IPLMN	Interrogating PLMN
MGCF	Media Gateway Control Function
MO	Mobile Originating
MT	Mobile Terminating
NNI	Network Node Interface
O-IM-BCSM	Originating IP Multimedia Basic Call State Model
O-IM-CSI	Originating IP Multimedia CAMEL Subscription Information
PIC	Point In Call
PLMN	Public Land Mobile Network
P-CSCF	Proxy CSCF
SIP	Session Initiation Protocol
S-CSCF	Serving CSCF
T-IM-BCSM	Terminating IP Multimedia Basic Call State Model
T-IM-CSI	Terminating IP Multimedia CAMEL Subscription Information
TDP	Trigger Detection Point
UNI	User Network Interface
VPLMN	Visited PLMN

4.1 Architecture

This subclause describes the functional architecture needed to support CAMEL interactions with the S-CSCF in the IP Multimedia Subsystem. The IM-SSF is a SIP Application Server that interfaces SIP to CAP. The generic SIP Application Server behaviour of the IM-SSF is specified in TS 23.218[5].

4.1.1   Functional Entities used for CAMEL at IP Multimedia Registration

Figure 4.1 shows the functional entities involved when an MS registers for IP Multimedia session requiring CAMEL support.
Subscriber data is transferred from the HSS to the CSCF during the SIP Registration. The subscriber data includes CAMEL related information.
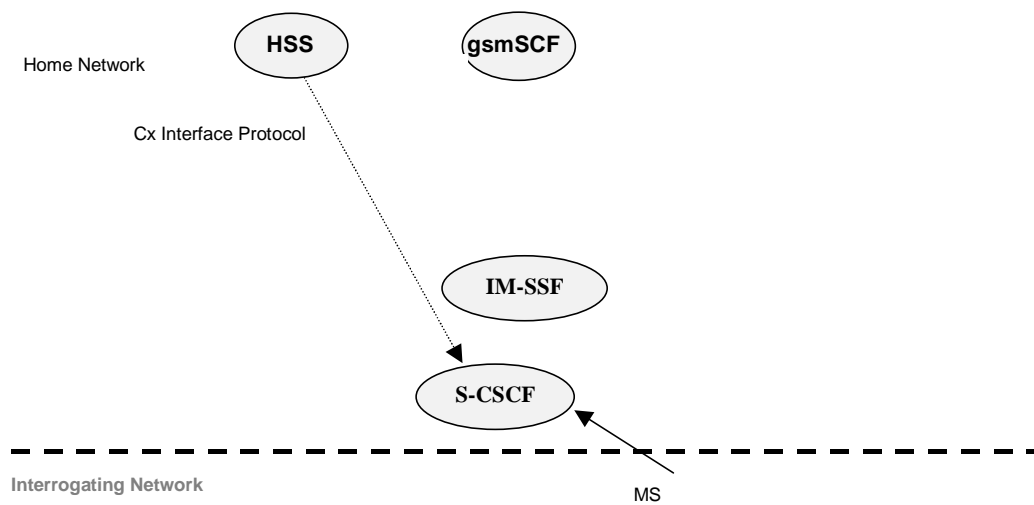
Figure 4.1: Functional architecture for support of CAMEL when mobile registers for IP Multimedia session

4.1.2 Functional Entities used for CAMEL for MO and MT IP Multimedia session

Figure 11.2 shows the functional entities involved in a Mobile Originated IP Multimedia session requiring CAMEL support.
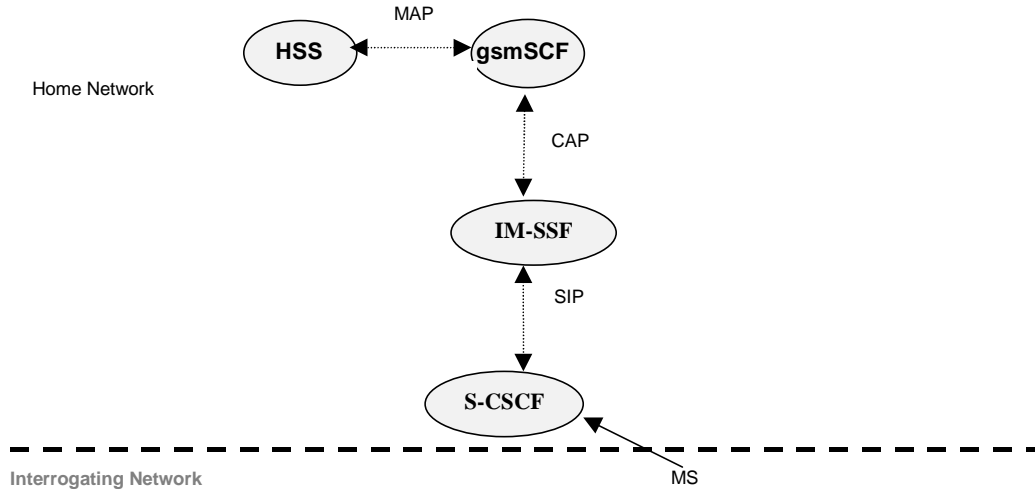
Figure 4.2: Functional architecture for support of CAMEL control of a MO IP Multimedia session

4.2 Interfaces defined for an IM-SSF based Application Server

4.2.1 CSCF - IM-SSF interface

This interface is the IP Multimedia Service Control interface (ISC). This interface shall be based on SIP as detailed in 3GPP TS 23.228 [4].

4.2.2 IM-SSF - gsmSCF interface

This interface is used by the gsmSCF to control an IP Multimedia session in a certain IM-SSF. Relationships between the IM-SSF and the gsmSCF on this interface are opened as a result of the IM-SSF sending a request for instructions to the gsmSCF. This interface shall be based on 3GPP TS 29.078[8].

4.2.3 HSS – CSCF interface

This interface is used to send CAMEL related subscriber data to a CSCF, e.g. IM-CSI.

4.3 Detection Points (DPs)

Certain basic call events may be visible to the GSM Service Control Function (gsmSCF). The DPs are the points in call at which these events are detected.

. Editor's Note: The DPs for Mobile Originated IP Multimedia session and Mobile Terminated IP Multimedia session will be described here

4.4 Description of CAMEL Subscriber Data

4.4.1 IP Multimedia CAMEL Subscription Information (IM-CSI)

This subclause defines the contents of the IP Multimedia CAMEL Subscription Information. This information shall be sent by the HSS to the CSCF via the Cx Interface.

4.4.1.1 gsmSCF Address

Address to be used to access the gsmSCF for a particular subscriber. The address shall be an E.164 number to be used for routeing.

4.4.1.2 Service Key

The Service Key identifies to the gsmSCF the service logic that shall apply.

4.4.1.3 Default IP Multimedia Handling

The Default IP Multimedia Handling indicates whether the IP Multimedia session shall be released or continued as requested in case of error in the IM-SSF to gsmSCF dialogue.

4.4.1.4 TDP List

The TDP List indicates on which detection point triggering shall take place.

4.4.1.5 CAMEL Capability Handling

CAMEL Capability Handling indicates the phase of CAMEL which is asked by the gsmSCF for the service.

4.5 Description of CAMEL State Models

Editor's Note: The text, diagrams and tables in section 4.5 are at an early stage of development. Further work is required to complete section 4.5.

In the IM Subsystem, calls are controlled by the Serving CSCF (S-CSCF) where a subscriber is registered. A state model describes the call control behaviour of an IM-SSF.

4.5.1 General Handling

The Basic Call State Model (BCSM) is used to describe the handling of originating and terminating calls. It identifies the points in a call where gsmSCF based service applications is permitted to interact with the call control capabilities of an IM-SSF. Figure 4.3 illustrates how transitions between states, Detection Points and Points In Call components are shown in the BCSM diagrams.
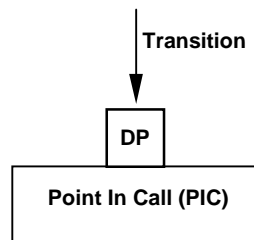
Figure 4.3: BCSM Components

4.5.2 Originating CAMEL Call State Model (O-IM-BCSM)

4.5.2.1 Description of the O-IM-BCSM

The O-IM-BCSM is used to model the behaviour of an IM-SSF for an originating call. When an armed DP is encountered, O-IM-BCSM processing is suspended at the DP and the IM-SSF indicates this to the gsmSCF if appropriate.
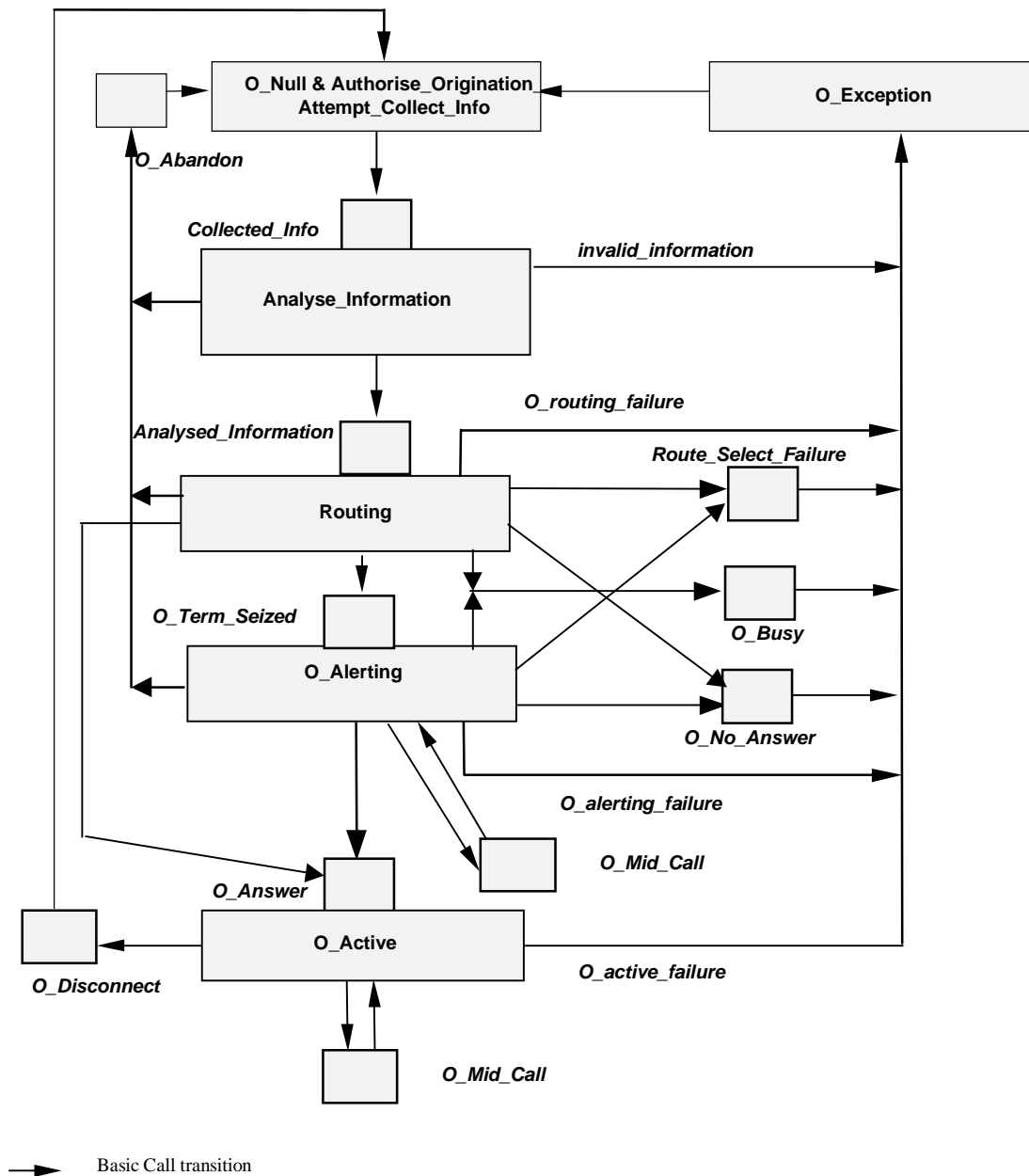
Figure 4.4: Originating CAMEL Call State Model

The following table defines the DPs that apply to originating calls.

Table 4.1: Description of the O-IM-BCSM DPs in an IM-SSF

CAMEL Detection Point:	DP Type	Description:
DP Collected_Info	TDP-R	Indication that the O-IM-CSI is analysed or the gsmSCF has initiated a session attempt. In the later case the DP is neither triggered nor reported.
DP Analysed_Information	TDP-R	Availability of routeing address and nature of address.
DP Route_Select_Failure	TDP-R, EDP-N, EDP-R	Indication that the session establishment failed.
DP O_Busy	EDP-N, EDP-R	Indication that: - a busy indication is received from the terminating party, - a not reachable event is determined upon a SIP error response.
DP O_No_Answer	EDP-N, EDP-R	Indication that: - an application timer associated with the O_No_Answer DP expires, - a no answer event is determined upon SIP a error response
DP O_Term_Seized	EDP-N, EDP-R	Indication that the called party is being alerted.
DP O_Answer	EDP-N, EDP-R	Indication that the session is accepted and answered by the terminating party.
DP_O_Mid_Call	EDP-N, EDP-R	A service/service feature indication is received from the originating party
DP O_Disconnect	EDP-N, EDP-R	A disconnect indication is received from the originating party or from the terminating party.
DP O_Abandon	EDP-N, EDP-R	Indication that a disconnect indication is received from the originating party during the session establishment procedure.

4.5.2.2 Description of Points In Call

This sub-clause describes the Points In Call for originating calls. The entry events, actions and exit events are described for each Point in Call.
Editor's Note: Further work is required to complete the sub-sections below.

4.5.2.2.1 O_Null & Authorise_Origination_Attempt_Collect_Info

4.5.2.2.2 Analyse_Information

4.5.2.2.3 Routing & Alerting

4.5.2.2.4 O_Active

4.5.2.2.5 O_Exception

4.5.3 Mapping of SIP Method/Response to O-IM-BCSM Detection Points

This sub-clause describes mapping of SIP methods and responses to CAMEL Detection Points.

Table 4.2: Mapping of SIP Method/Response to CAMEL O-IM-BCSM DPs

CAMEL O-IM-BCSM DP:	SIP Method/Response
DP Collected_Info	INVITE
DP Analysed_Information	N/A
DP Route_Select_Failure	404 Not Found
	482 Loop Detected
	483 Too Many Hops
DP O_Busy	486 Busy Here
	600 Busy Everywhere
DP O_No_Answer	603 Decline
	408 Request Timeout
DP_O_Term_seized	180 Ringing
DP O_Answer	200 OK
DP_O_Mid_Call	INVITE (Re INVITE case) - FFS
DP O_Disconnect	BYE
DP O_Abandon	CANCEL

Editor's Note: The above mapping is incomplete. Further study is required to complete the table. Use of status code 603 Decline for DP O_No_Answer requires further study. Use of status codes 404, 482, 483 etc for DP Route_Select_Failure requires further study.

Editor's Note: The above mapping needs to consider all potential SIP responses mentioned in RFC 2543bis to determine which ones are appropriate. As indicated above, multiple responses may be mapped to the same DP.

4.5.4 Terminating CAMEL Call State Model (T-IM-BCSM)

4.5.4.1 Description of the T-IM-BCSM

The T-IM-BCSM is used to model the behaviour of an IM-SSF for a terminating call. When a DP is encountered, T-IM-BCSM processing is suspended at the DP and IM-SSF indicates this to the gsmSCF if appropriate.
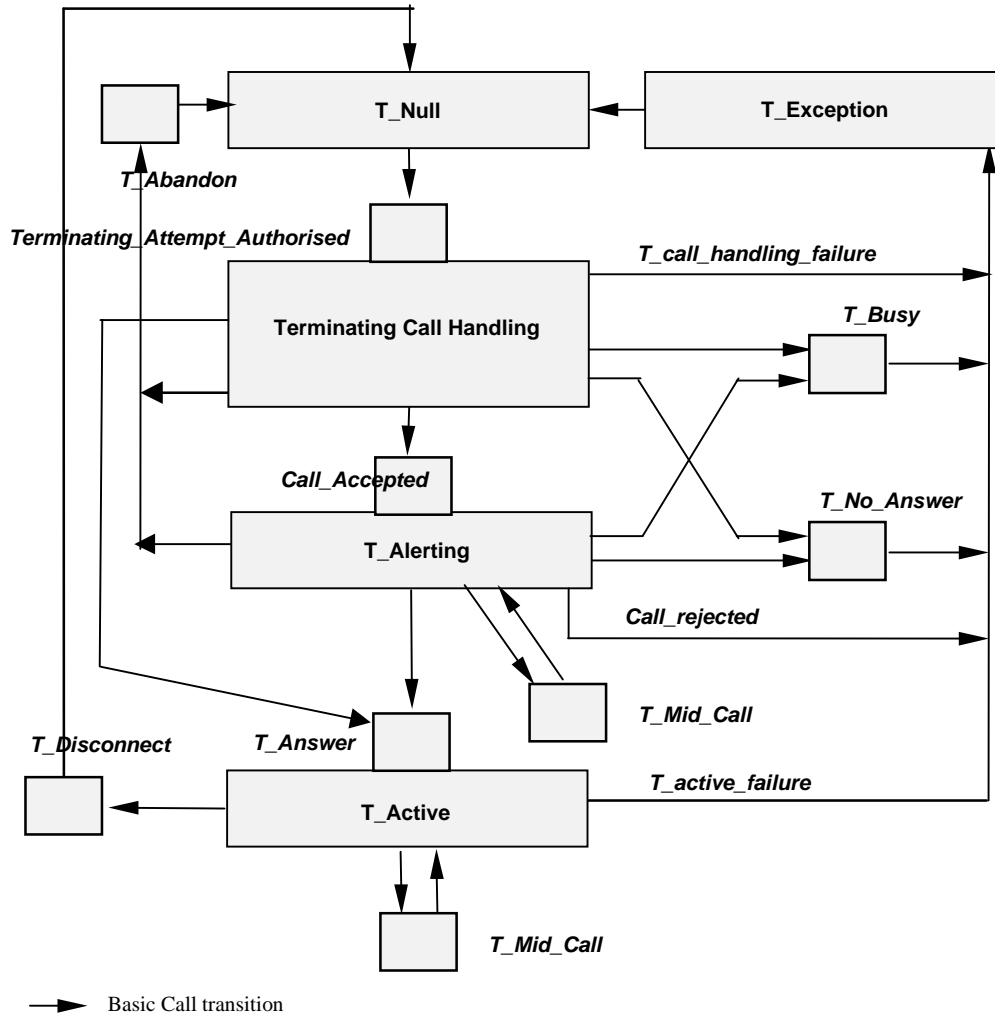
Figure 4.5: Terminating CAMEL Call State Model

The following table defines the DPs that apply to terminating calls.

Table 4.3: Description of T-IM-BCSM DPs in the S-CSCF

CAMEL DP:	DP Type	Description:
DP Terminating_Attempt_ _Authorised	TDP-R	Indication that the T-IM-CSI is analysed.
DP T_Busy	TDP-R, EDP-N, EDP-R	Indication that: - a busy indication is received from the terminating party, - a not reachable event is determined upon a SIP error response.
DP T_No_Answer	TDP-R, EDP-N, EDP-R	Indication that an application timer associated with the T_No_Answer DP expires.
DP T_Call_Accepted	EDP-N, EDP-R	Indication that the called party is being alerted
DP T_Answer	EDP-N, EDP-R	Session is accepted and answered by terminating party.
DP T_Disconnect	EDP-N, EDP-R	A disconnect indication is received from the terminating party or from the originating party.
DP T_Mid_Call	EDP-N, EDP-R	A service/service feature is received from the terminating party
DP T_Abandon	EDP-N, EDP-R	A disconnect indication is received from the originating party during the session establishment procedure.

Editor's Note: Further work is required to complete the DP Type and Description columns in the table above.

4.5.4.2 Description of Points In Call

This sub-clause describes the Points In Call for terminating calls. The entry events, actions and exit events are described for each Point in Call.
Editor's Note: Further work is required to complete the sub-sections below.

4.5.4.2.1 T_Null

4.5.4.2.2 Terminating Call Handling

4.5.4.2.3 T_Active

4.5.4.2.4 T_Exception

4.5.5 Mapping of SIP Method/Response to T-IM-BCSM Detection Points

This sub-clause describes mapping of SIP methods and responses to CAMEL Detection Points.

Table 4.4: Mapping of SIP Method/Response to CAMEL T-IM-BCSM DPs

CAMEL T-IM-BCSM DP:	SIP Method/Response
DP Terminating_Attempt_ _Authorised	INVITE
DP T_Busy	486 Busy Here 600 Busy Everywhere
DP T_No_Answer	603 Decline 408 Request Timeout
DP T_Alerting	180 Ringing
DP T_Answer	200 OK
DP_Mid_Call	INVITE (Re-INVITE case) -FFS
DP T_Disconnect	BYE
DP T_Abandon	CANCEL

Editor's Note: The above mapping is incomplete. Further study is required to complete the table. Use of status code 603 Decline for DP T_No_Answer requires further study.

Editor's Note: The above mapping needs to consider all potential SIP responses mentioned in RFC 2543bis to determine which ones are appropriate. As indicated above, multiple responses may be mapped to the same DP.

5 Procedures for IM-SSF Application Server

The SDLs in this specification illustrate how CAMEL modifies the normal multimedia call. They do not attempt to show all the details of multimedia handling in all the modes that support CAMEL.

The text in this clause is a supplement to the definition in the SDL diagrams; it does not duplicate the information in the SDL diagrams.

5.1 Overall SDL Architecture
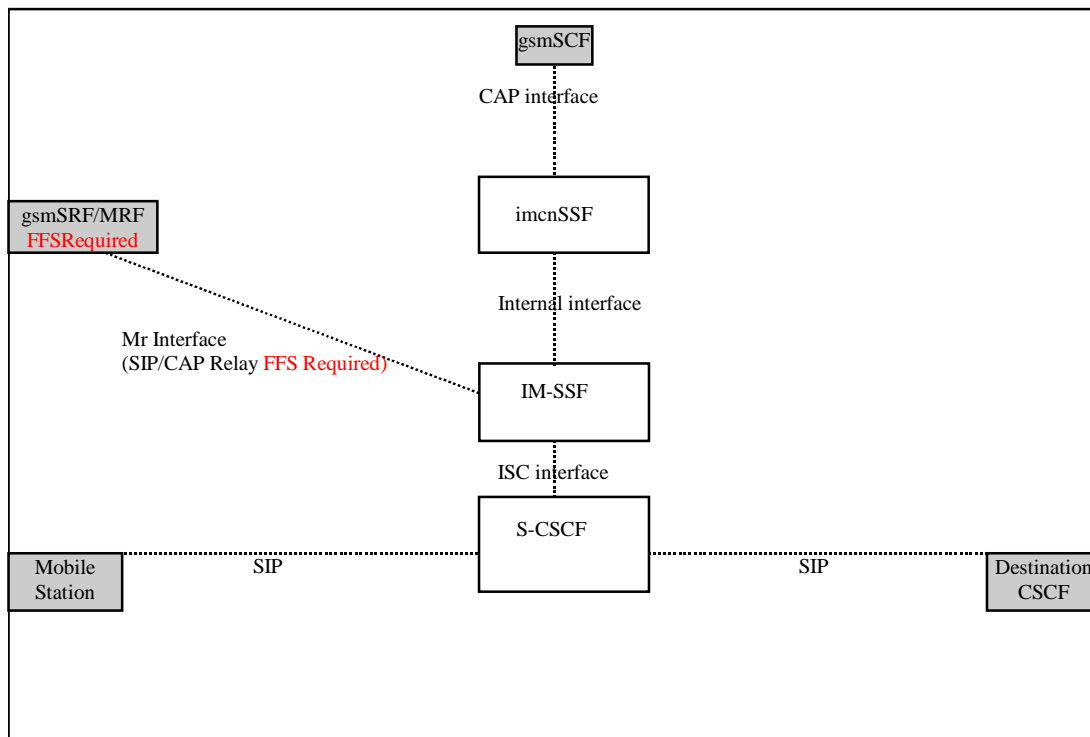
Figure 5.1: Outgoing Case (IM-SSF relay)
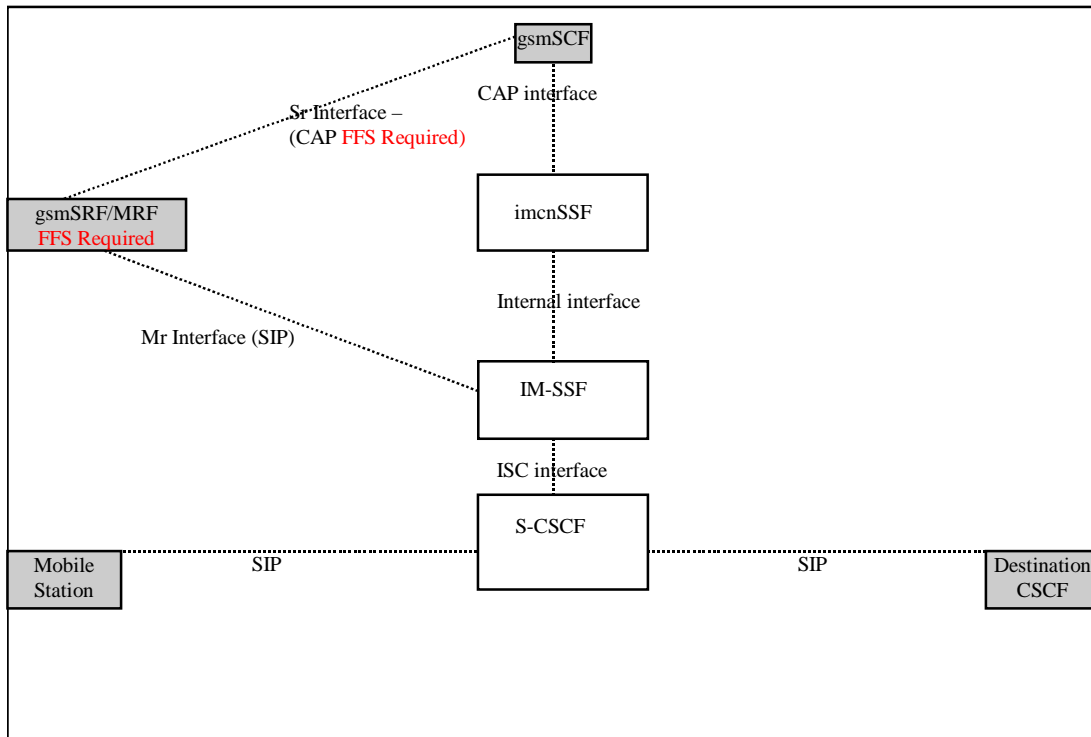
Figure 5.2: Outgoing Case (direct path gsmSCF to gsmSRF/MRCF)

5.1.1 Handling of Registration and Deregistration in the IM-SSF

The functional behaviour of the IM-SSF is specified in 3GPP TS 23.218 [**Error! Reference source not found.**]. The procedures specific to CAMEL are specified in this subclause:

- Procedure CAMEL_IMCN_Register;

- Procedure CAMEL_IMCN_DeRegister.

Procedure in S-CSCF to perform
CAMEL handling for the registration
procedure.

Singnals to/from the left are to/from
the MS, and signals to/from the right
are to/from the HSS.

Suberiber profile
has downloaded?

No

Yes

Cx-Pull

Wait_for_Cx_Pull_Resp

Cx-Pull Resp

Store the Subscriber Info

Cx-Av-Req

Wait_For_Av_Req_Resp

Cx-Av-Req Resp

401
Unauthorized
(AV parameters)

Wait_For_Authentication
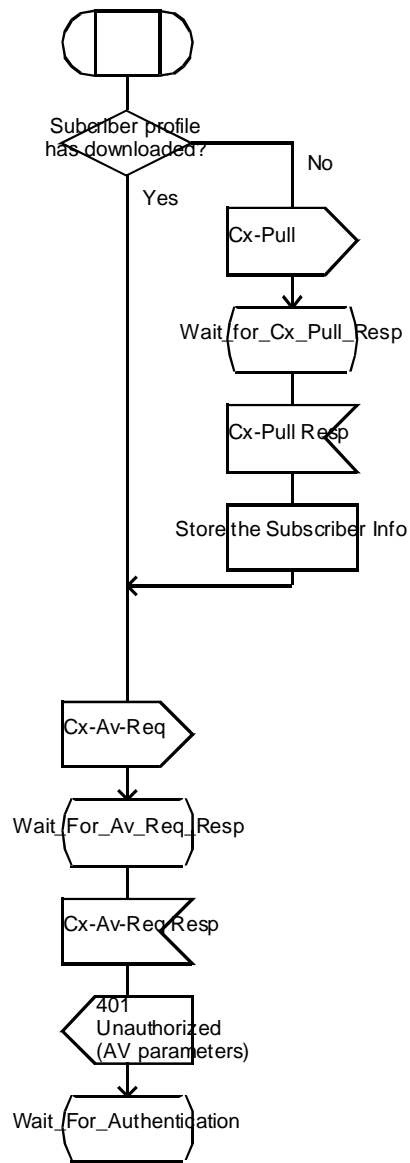
Figure 5.3a

Procedure in S-CSCF to perform CAMEL handling for the registration procedure.

Singnals to/from the left are to/from the MS, and signals to/from the right are to/from the HSS.

Wait_For_Authentication

Register

Cx-Put

Wait_Registration_Result

Cx-Put Resp

Good Registration Result?

Yes

No

200 OK

606 Not Acceptable
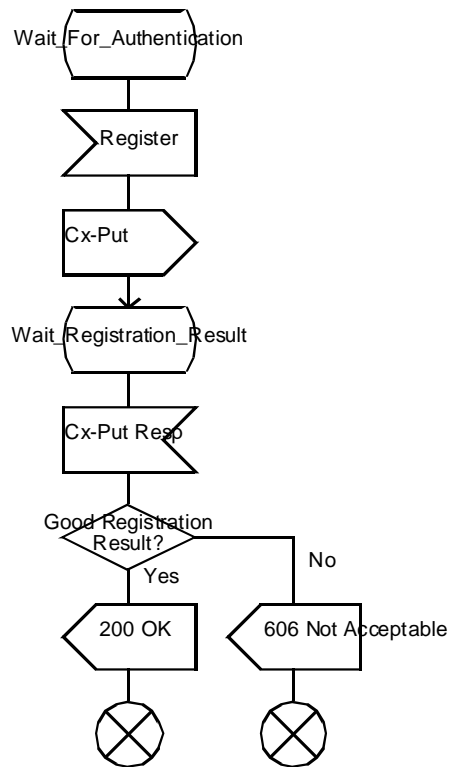
Figure 5.18b
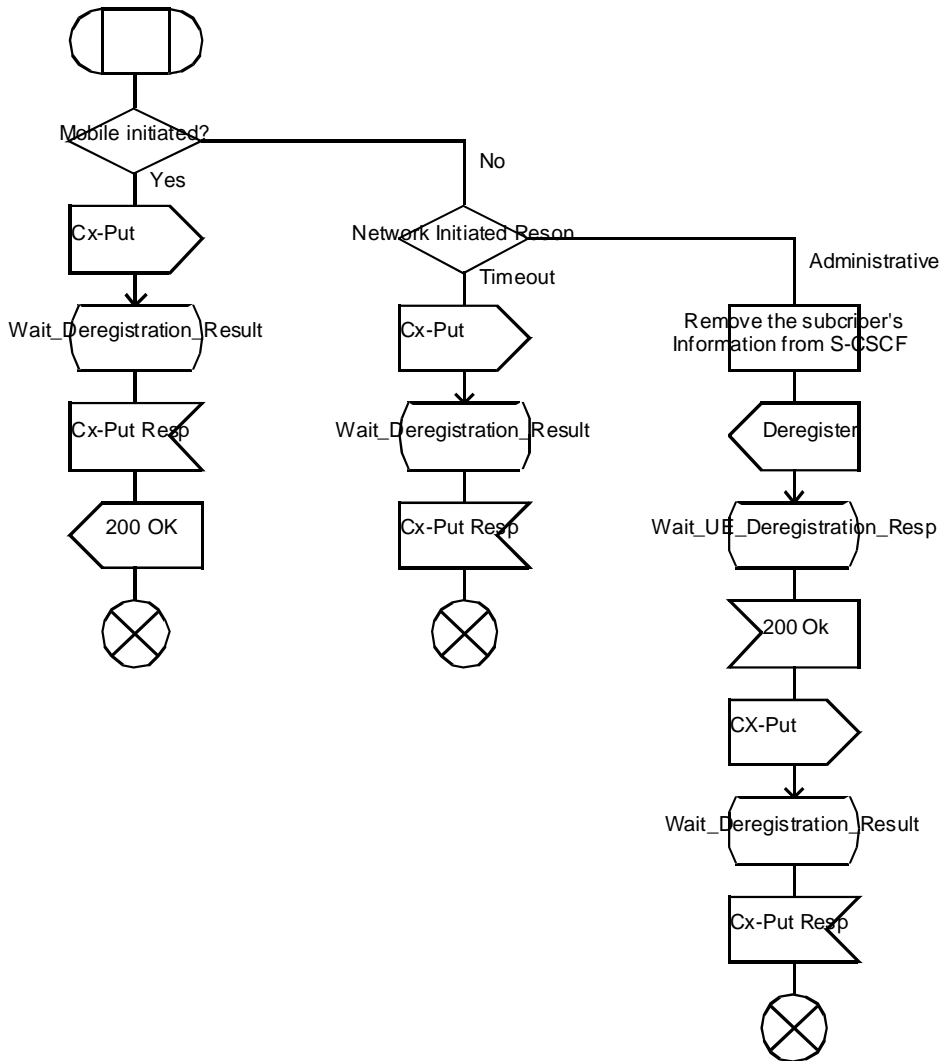
Figure 5.4a

5.1.2   Handling of Mobile Originated Calls in the IM-SSF

The functional behaviour of the IM-SSF is specified in 3GPP TS 23.218 [5]. The procedures specific to CAMEL are specified in this subclause:

-    Procedure CAMEL_IMCN_MO_INVITE;

-    Procedure CAMEL_IMCN_MO_BYE;

- Procedure CAMEL_IMCN_MO_CANCEL;

- Procedure CAMEL_IMCN_MO_Response_Code.

5.1.2.1 Actions of the IM-SSF on receipt of Int_Error

The IM-SSF checks the default Call Handling parameter in the relevant CSI.
If the default call handling is release, a BYE indication is sent to the MS. The IM-SSF then releases all resources and the invoked CAMEL procedure ends.
If the call handling is continue, the IM-SSF continues processing without CAMEL support.

5.1.2.2 Actions of the IM-SSF on receipt of Int_Continue

The IM-SSF continues processing without any modification of call parameters.

5.1.2.3 Actions of the IM-SSF on receipt of Int_Continue_With_Argument

The IM-SSF continues processing with modified call parameters. The IM-SSF shall modify the call parameters by the information received in the Int_Continue_With_Argument message. Call parameters that are not included in the Int_Continue_With_Argument_Message are unchanged.

5.1.2.4 Actions of the IM-SSF on receipt of Int_Connect

The IM-SSF continues processing with modified call parameters. The IM-SSF shall transparently modify the call parameters with the received information. Call parameters which are not included in the Int_Connect message are unchanged.

5.1.2.5 Actions of the IM-SSF on receipt of Int_Release_Call

A BYE is sent to the MS, and a BYE is sent to the destination CSCF. The release cause received in the Int_Release_Call is used. The IM-SSF then releases all call resources and all CAMEL processing ends.

/* Procedure in the IM-SSF to perform CAMEL handling for an outgoing call INVITE request. */

/* Signals to/from the left are to/from the MS; signals to/from the right are to/from the S-CSCF. */

CAMAEL_IMCN_MO_OCSI_INIT

Result?
Fail
Pass

1

CAMEL_IMCN_MO_DCSI_INIT

Result?
Fail   Abort
Pass

'Set D-CSI suppression'

CAMEL_OCH_IMCN1

Result= Reconnect?
No   Yes

606 Not Acceptble

Result:= Pass

Reconnect:= True

1

CAMEL_IMCN_MO_NCSI_INIT

Result?
Fail   Abort
Pass

CAMEL_Invocation?
True   False

'Set O-CSI suppression'

Destination address := Called Party Number'

Result:= Pass

Result:= Fail
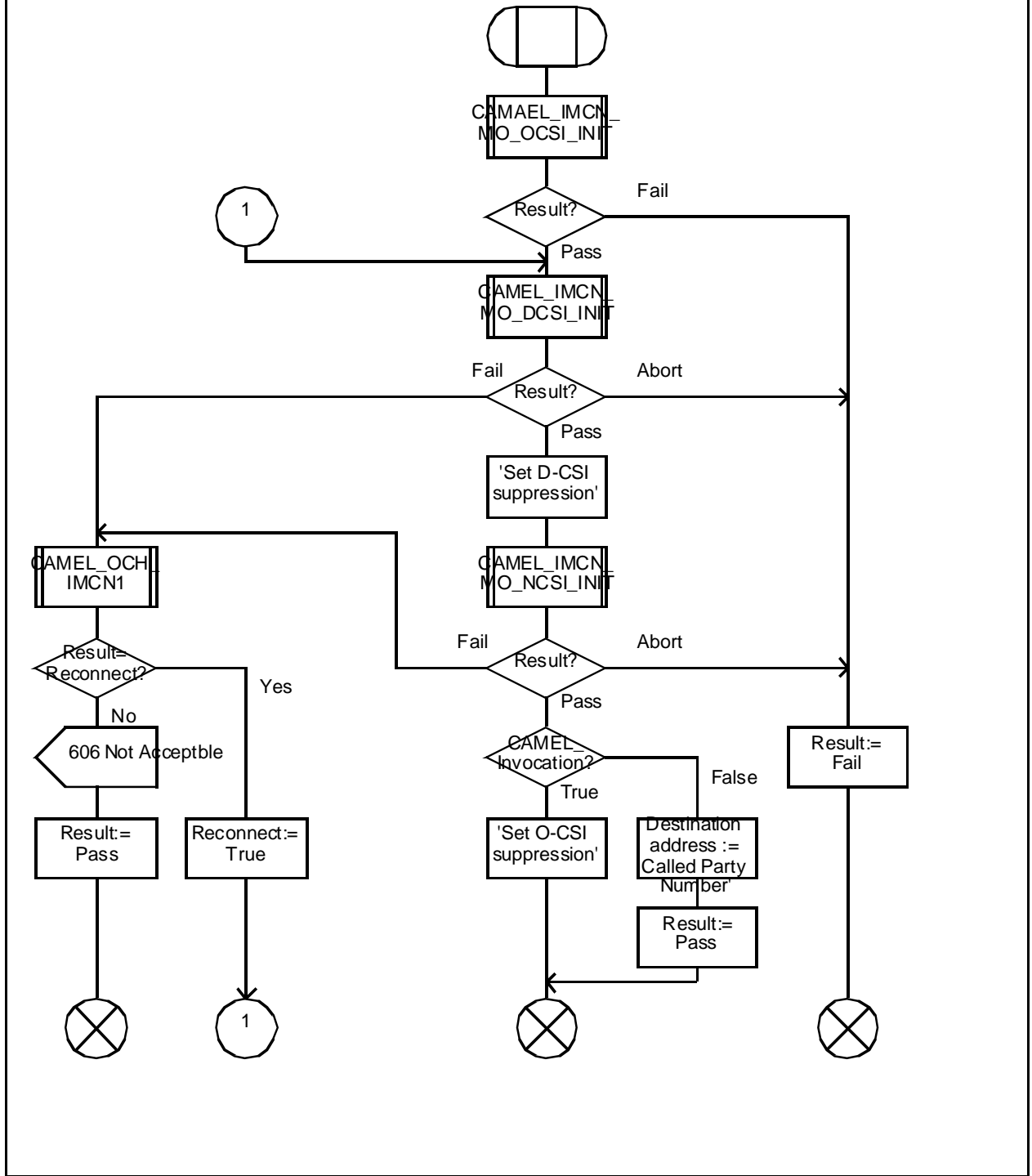
Figure 5.5a Procedure CAMEL_IMCN_MO_INVITE (sheet 1)

/* Procedure in the IM-SSF to perform CAMEL handling for an outgoing call INVITE request */

/* Signals to/from the right are to/from the imcnSSF; Signals to/from the left are to/from the MS */

/* Provisional_Response_Received is to indicate a Provisional SIP response code has been received from the callee; Final_Response_Received is to indicate a 2XX SIP response code has been received from the callee. */

O-CSI invocation?

No

Yes

Result:= pass

CAMEL_ Invocation := True

Allocate call reference number

Provisional_Respose_Received:= False

Final_Response_Received := False

Store original call parameters

Int_Invoke_imcnSSF (O-CSI)

Wait_for_ imcnSSF_ Invoked

Int_error

Int_imcnSSF_ Invoked

CANCEL

606 Not Acceptble

Int_DP_ Collected_ Info

CAMEL_IMCN_ MO_CANCEL

Result:= fail

Result:= fail

DP_ Collected_ Info
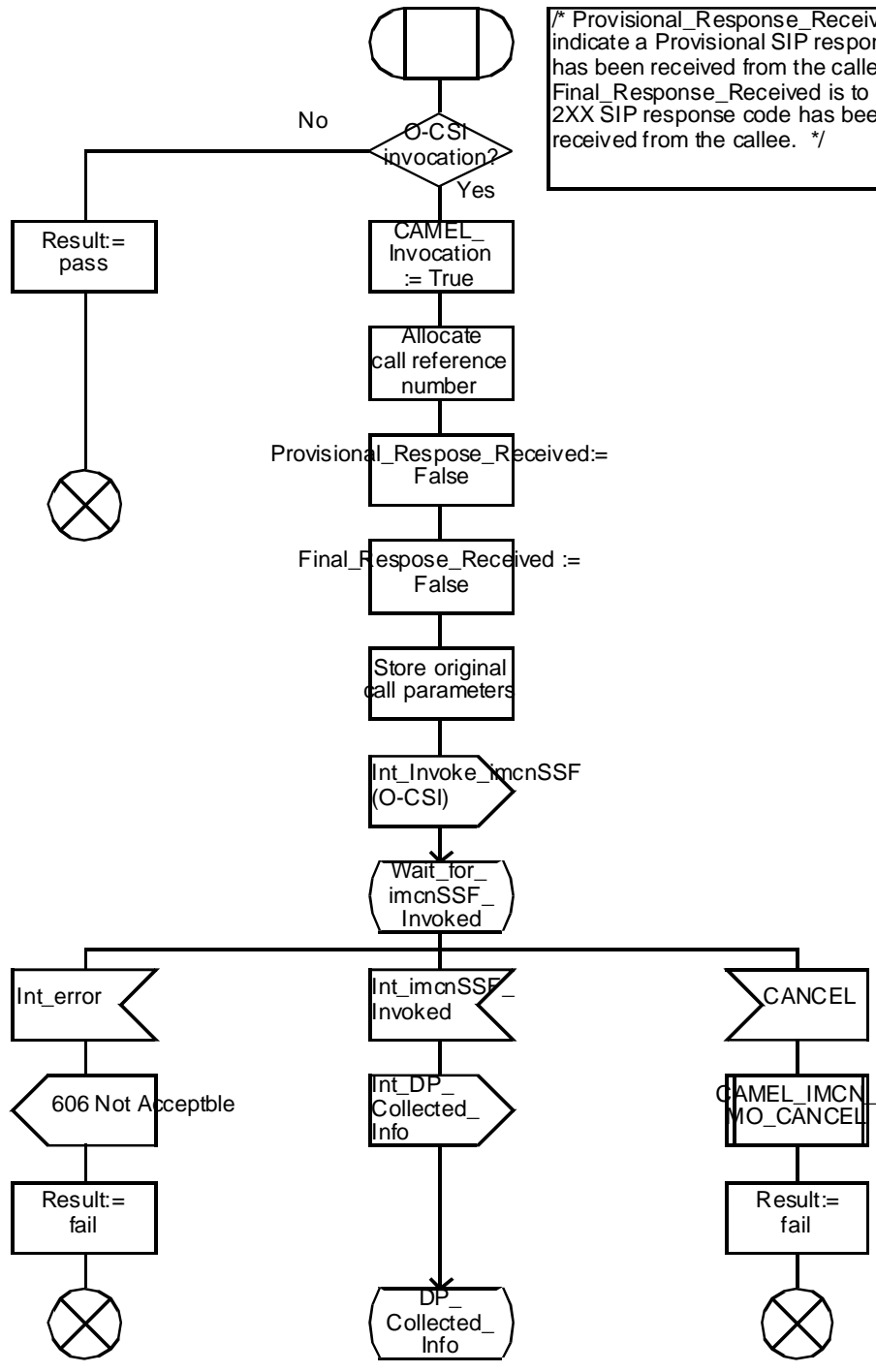
Figure 5.6a

Procedure CAMEL_IMCN_MO_OCSI_INIT

/* Procedure in the IM-SSF to perform
CAMEL handling for an outgoing
call INVITE request */

/* Signals to/from the left are
to/from the MS; signals to/from
the right are to/from the imcnSSF if
not otherwise stated. */

DP_
Collected
_Info

Int_Release_Call   Int_Error   Int_Continue_
                                        With_Argument   Int_Continue   Int_Connect

'Modify call
parameters with
received information'

'Modify call
parameters with
received information'

No   'Default call
            handling =
            continue call ?'   Yes

INVITE   To the destination
                S-CSCF

606 Not Acceptble

Result:=
Pass

Result:=
fail

Figure 5.6b

/* Procedure in the IM-SSF to perform
CAMEL handling for an outgoing
call INVITE request */

/* Signals to/from the right are to/from
the imcnSSF if not otherwise stated. */

DP_Collected_Info

Int_Establish_
Temporary_
Connection

Int_Connect_To_
Resource

CAMEL_OCH_ETC
FFS Required

CAMEL_OCH_CTR
FFS Required

Result=
fail?

No   Yes

Result:=
fail

DP_Collected_
_Info

⊗
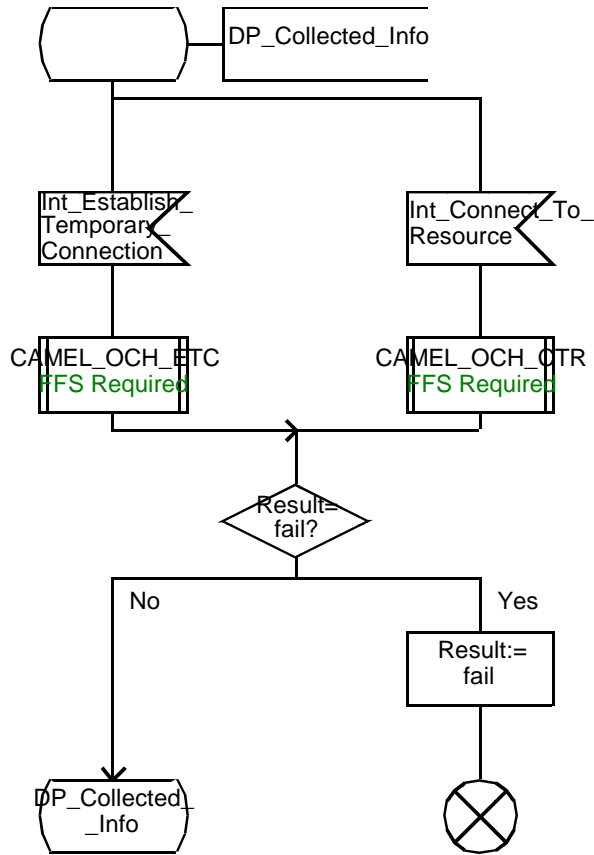
Figure 5.6c

/* Procedure in the IM-SSF to perform CAMEL handling for an outgoing call INVITE request */

/* Signals to/from the left are to/from the MS. */

DP_Collected_info

CANCEL

CAMEL_IMCN_MO_CANCEL

Result:= fail

Figure 5.6d:

/* Procedure in the IM-SSF to perform
CAMEL handling for a subscribed
Dialled Service */

/* Signals to/from the left are
to/from the MS; signals to/from the right are
to/from the imcnSSF. */

D-CSI
invocation?

No

Yes

Result=
Pass

CAMEL_
Invocation
:= True

Call Reference
Number stored?

Yes

No

Allocate Call
Reference Number

Store Original
Call Parameters

Int_Invoke_
imcnSSF
(D-CSI)

Wait_for_
imcnSSF_Invoked

Int_imcnSSF_
Invoked

CANCEL

Int_DP_
Analysed_
Info

CAMEL_IMCN_MO_CANCEL

DP_
Analysed_
Info

Result:=
Abort

Figure 5.7a

/* Procedure in the IM-SSF to perform
CAMEL handling for a subscribed
Dialled Service */

/* Signals to/from the left are
to/from the MS; signals to/from
the right are to/from the imcnSSF if
not otherwise stated. */

DP_
Analysed
_Info

Int_Release_Call | Int_Error | Int_Continue | Int_Continue | Int_Continue_
With_Argument | CANCEL

'Modify call
parameters with
received information'

CAMEL_IMCN_MO_CANCEL

No 'Default call
handling =
continue call ?'

Yes

606 Not Acceptble

Result:=
fail

Result:=
Pass

Result:=
Abort
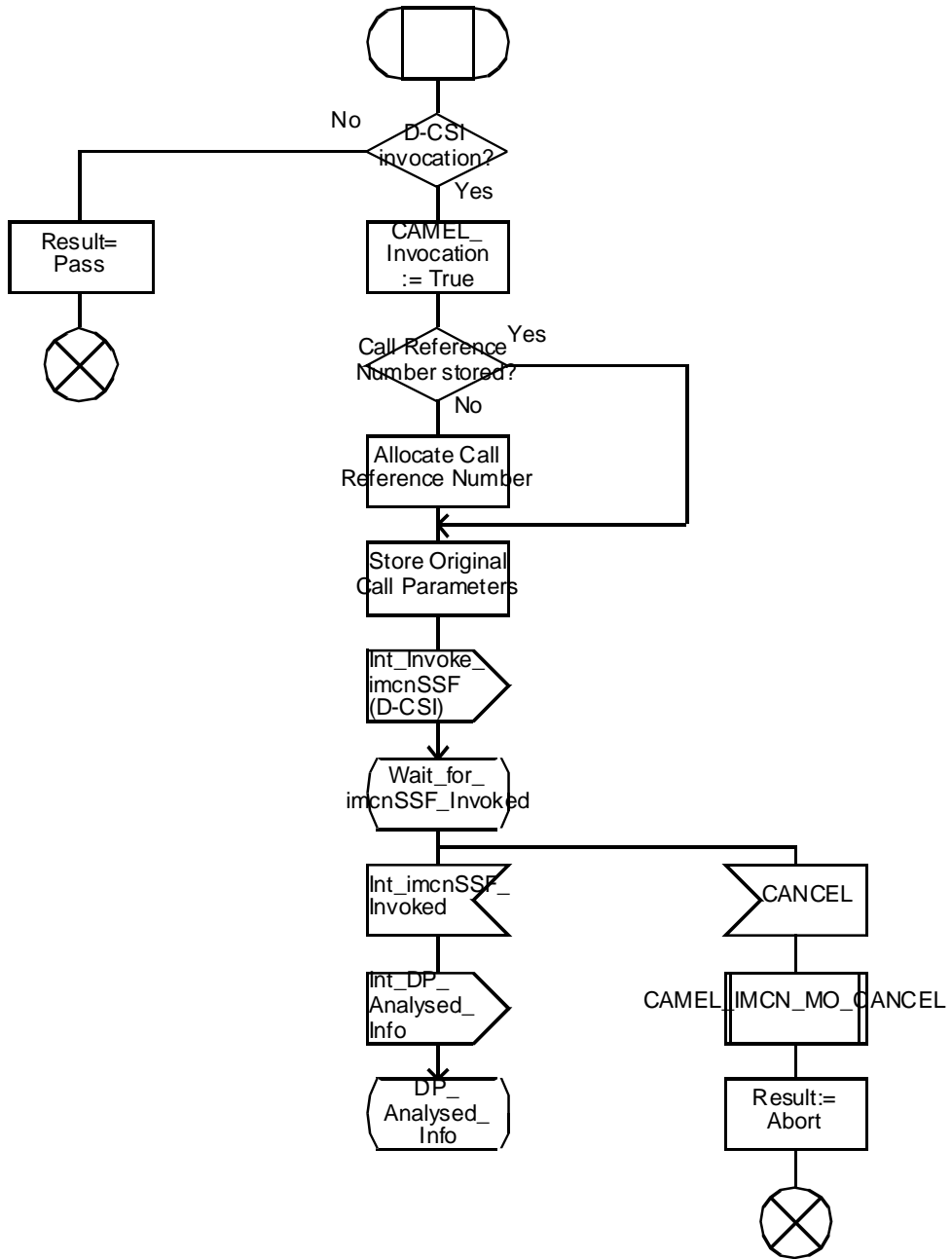
Figure 5.7b:

/* Procedure in the IM-SSF to perform
CAMEL handling for a subscribed
Dialled Service */

/* Signals to/from the right are to/from
the imcnSSF if not otherwise stated. */

DP_Analysed_Info

Int_Establish_
Temporary_
Connection

Int_Connect_To_
Resource

CAMEL_OCH_ETC
FFS Required

CAMEL_OCH_CTR
FFS Required

Result=
fail?

No   Yes

Result:=
fail

DP_Analysed_
_Info

⊗
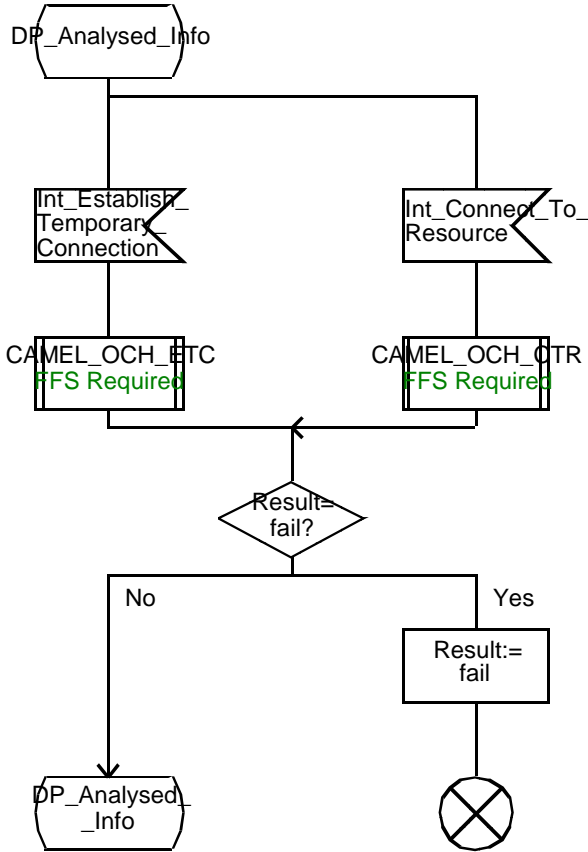
Figure 5.7c

/* Procedure in the IM-SSF to perform CAMEL handling for a network Dialled Service */

/* Signals to/from the left are to/from the MS; Signals to/from the right are to/from the imcnSSF. */

N-CSI invocation?

No — Result= Pass

Yes

CAMEL_ Invocation := True

Call Reference Number stored?

Yes

No

Allocate Call Reference Number

Store Original Call Parameters

Int_Invoke_ imcnSSF (N-CSI)

Wait_for_ imcnSSF_Invoked

Int_imcnSSF_ Invoked

CANCEL

Int_DP_ Analysed_ Info

CAMEL_IMCN_MO_CANCEL

DP_ Analysed_ Info

Result:= Abort
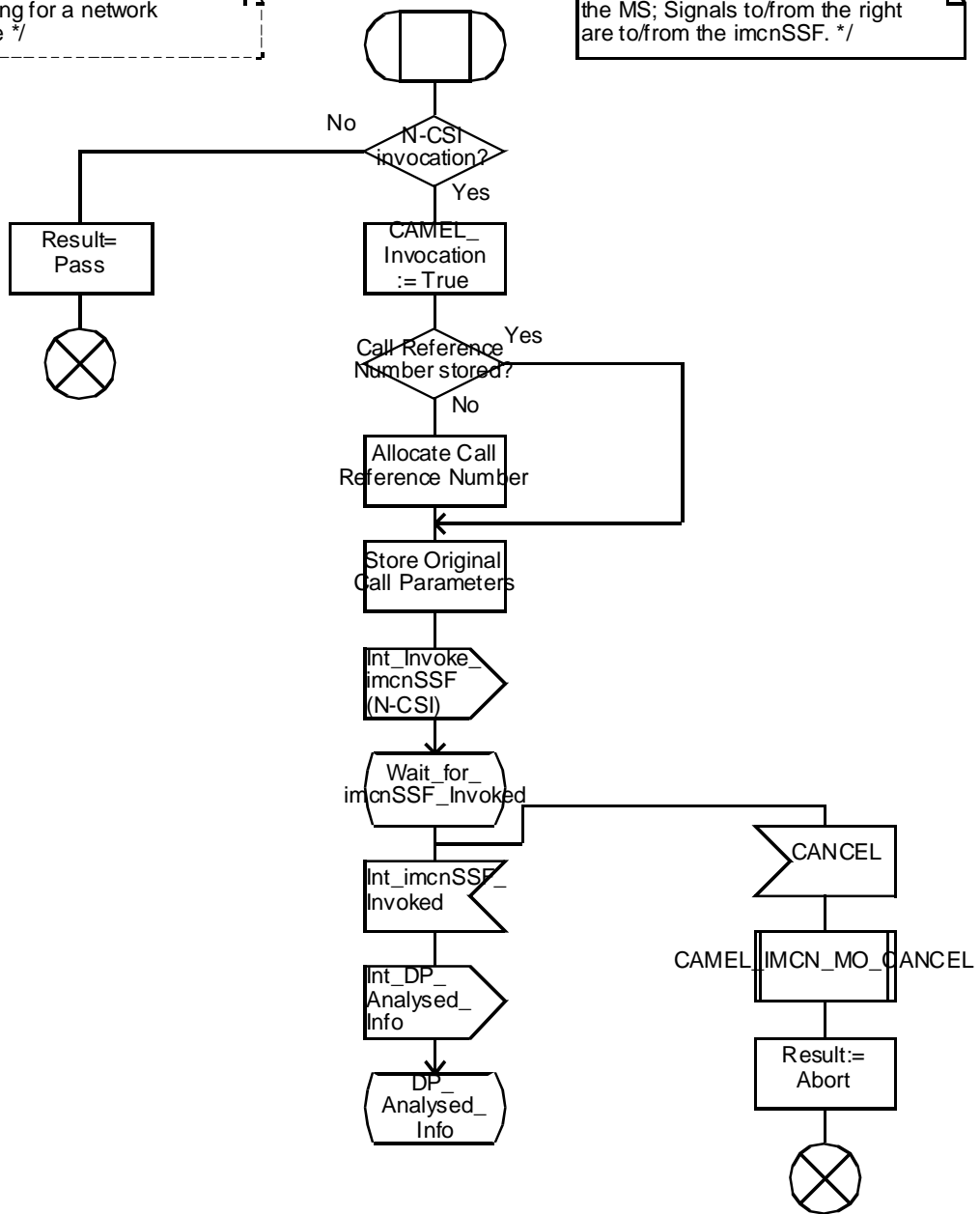
Figure 5.8a:

/* Procedure in the IM-SSF to perform
CAMEL handling for a network
Dialled Service */

/* Signals to/from the left are to/from
the MS; Signals to/from the right
are to/from the imcnSSF. */

DP_
Analysed_
Info

Int_Release_
Call

Int_Error

Int_Continue

Int_Connect

Int_Continue_
With
_Argument

CANCEL

'Default call
handling = continue
call ?'

Yes

No

'Modify call
parameters with
received information'

CAMEL_IMCN_MO_CANCEL

606 Not
Acceptble

Result:=
Pass

Result:=
Pass

Result:=
Abort

Result:=
Fail
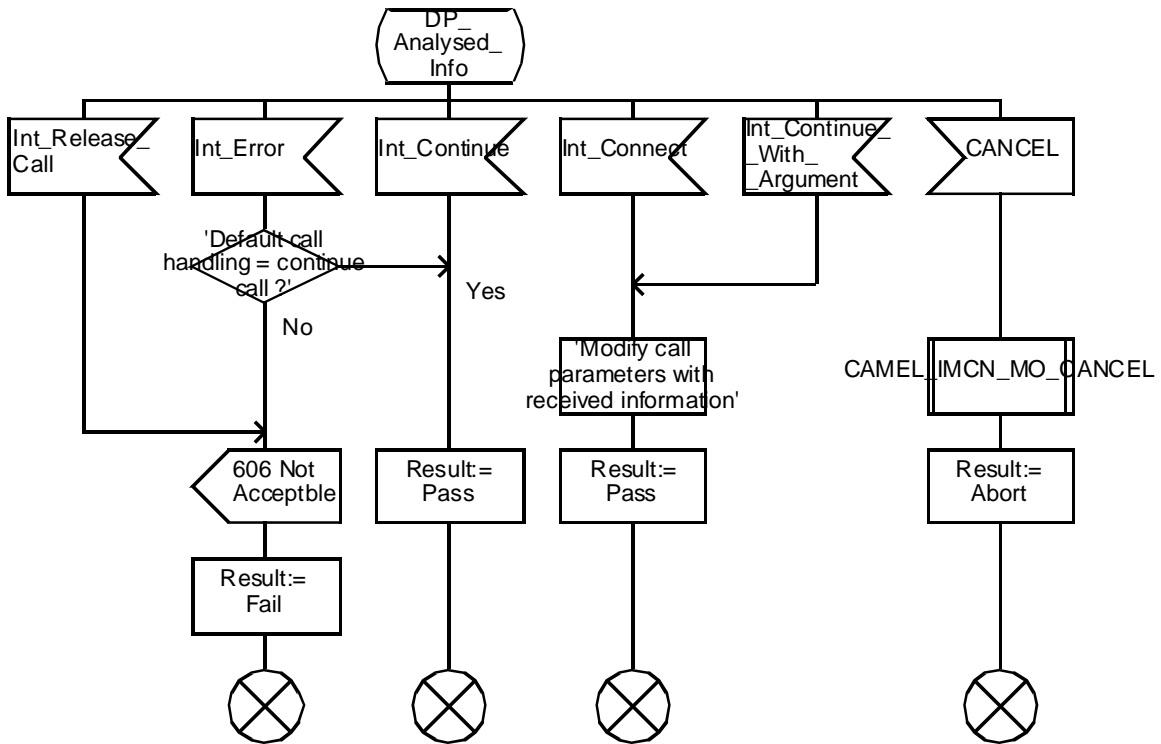
Figure 5.8b

/* Procedure in the IM-SSF to perform
CAMEL handling for a network
Dialled Service */

/* Signals to/from the right are to/from
the imcnSSF if not otherwise stated. */

DP_Analysed_Info

Int_Establish_
Temporary_
Connection

Int_Connect_To_
Resource

CAMEL_OCH_ETC
FFS Required

CAMEL_OCH_CTR
FFS Required

Result=
fail?

No   Yes

Result:=
fail

DP_Analysed_
_Info

⊗

Figure 5.8c:

procedure CAMEL_IMCN_MO_CANCEL   1(1)
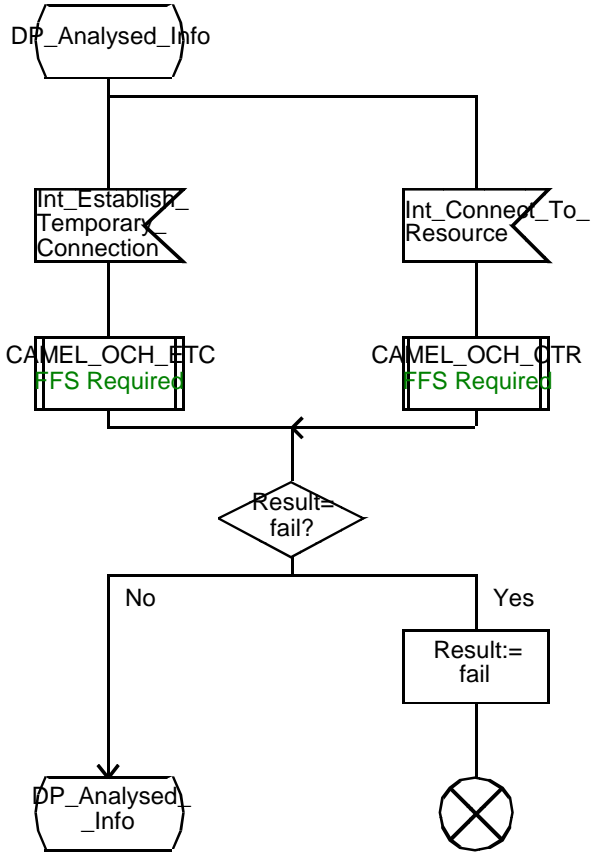
/* Procedure in IM-SSF to perform CAMEL handling for an outgoing call CANCEL request. */

/* Signals to/from the left are to/from the MS; Signals to/from the right are to/from the imcnSSF. */

Is CANCEL for a valid transaction?

No

Yes

Final_Response_Received=False

No

Yes

200 OK

Provisional_Response_Received =False

No

481 Call Leg/Transaction Does Not Exist

Yes

imcnSSF Invoked?

No

Yes

Int_DP_O_Abandon

DP_O_Abandon

Result:= Fail

Int_Continue

487 Request Terminated

CANCEL

To the Destination S-CSCF

200 OK

Result:= Pass

Figure 5.9

CR page 36

/* Procedure in the IM-SSF to handle an outgoing call on the BYE request from caller or callee*/

/* Signals to/from the right are to/from the imcnSSF if not otherwise stated. */

imcnSSF invoked?

No

Yes

BYE request is from caller

No

Yes

Int_DP_O_Disconnect /* legId = 1 */

Bye Request from Callee

DP_O_Disconnect_1

Int_Error

Int_Release_Call

Int_Continue

BYE

From destination S-CSCF

BYE

To destination S-CSCF

Int_DP_O_Disconnect /* legId = 2 */

200 OK

DP_O_Disconnect

Final_Respose_Received =False?

Int_Continue

Int_Error

Int_ReleaseCall

Yes

No

result:= normal_ handling

487 Request Terminated

200 OK

To destination S-CSCF

result:= CAMEL_ handling

⊗

⊗

Figure 5.10a

/* Procedure in the IM-SSF to handle an outgoing call on the BYE request from caller or callee*/

/* Signals to/from the left are to/from the MS; signals to/from the right are to/from the imcnSSF if not otherwise stated. */

Bye Request from Callee

Int_DP_ _O_Disconnect /* legId = 2 */

DP_ O_Disconnect_2

BYE

Int_DP_ O_Disconnect /* legId = 1 */

DP_ O_Disconnect

Int_Error   Int_Continue   Int_Release_Call

200 OK

Int_Continue

Int_Release_ _Call

Int_error

Int_Connect

BYE

Modify call parameters with received information

Final Response Received := False

Result:= reconnect

result:= CAMEL_ handling

200 OK

To the Destination S-CSCF

Figure 5.10b

/* Procedure in the IM-SSF to
handle an outgoing call on
the BYE request from caller or callee*/

Signals to/from the right are to/from
the imcnSSF if not otherwise stated.

DP_O_Disconnect_2

Int_Establish_
Temporary_
Connection

Int_Connect_To_
Resource

CAMEL_OCH_ETC
FFS Required

CAMEL_OCH_CTR
FFS Required

Result=
fail?

No

Yes

Result:=
release

DP_O_Disconnect_2

⊗
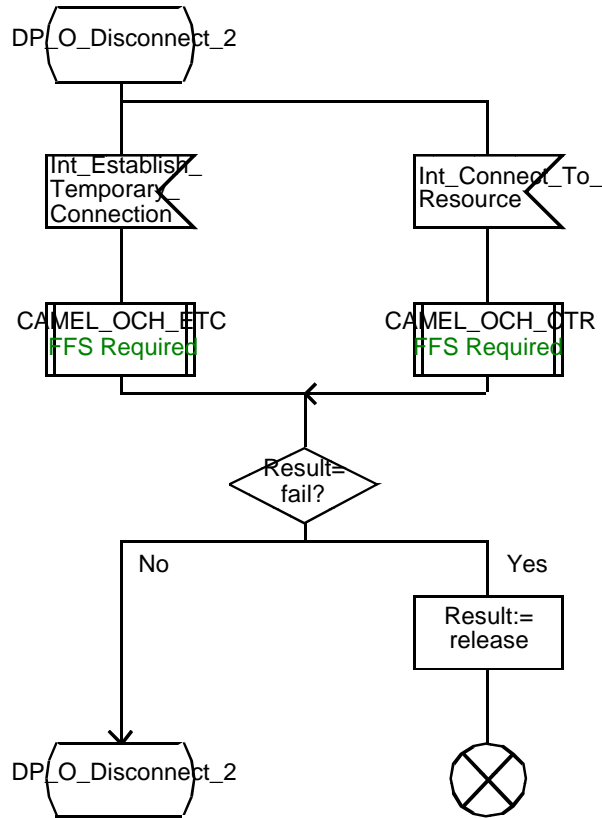
Figure 5.10c

/* Procedure in the IM-SSF to
handle an outgoing call on
the response code received*/

/* Signals to/from the right are to/from
destination S-CSCF; signals to/from the left
are to/from the MS if not otherwise stated. */

Reponse Code Class

1xx except
100

2xx

4xx except
401, 407,413,
420, 480
or 5xx
or 6xx except
600

600 Busy
Everywhere
or 486 Busy
 Here

480

TNRy
expired

ACK

ACK

BYE

1xx

CAMEL_IMCN
_MO_200OK

ACK

Result=Pass?   No

Release

Busy

No answer

TNRy

Yes

2xx

Provisional_Response_Received
= False?

No

Yes

CAMEL_Start_TNRy

Provisional_Response_Received :=
True

Result:=
Normal_Handling

Result:=
CAMEL_Handling

Figure 5.11a

/* Procedure in the IM-SSF to handle an outgoing call on the response code received*/

Signals to/from the right are to/from the imcnSSF if not otherwise stated.

Release

imcnSSF invoked?

No

Yes

Int_DP_Route_ _Select_ _Failure

DP_Route_ _Select_ _Failure

Int_Connect

Int_Continue

Int_Error

Int_Release_Call

Modify call parameters with received information

Result:= reconnect

Result:= continue
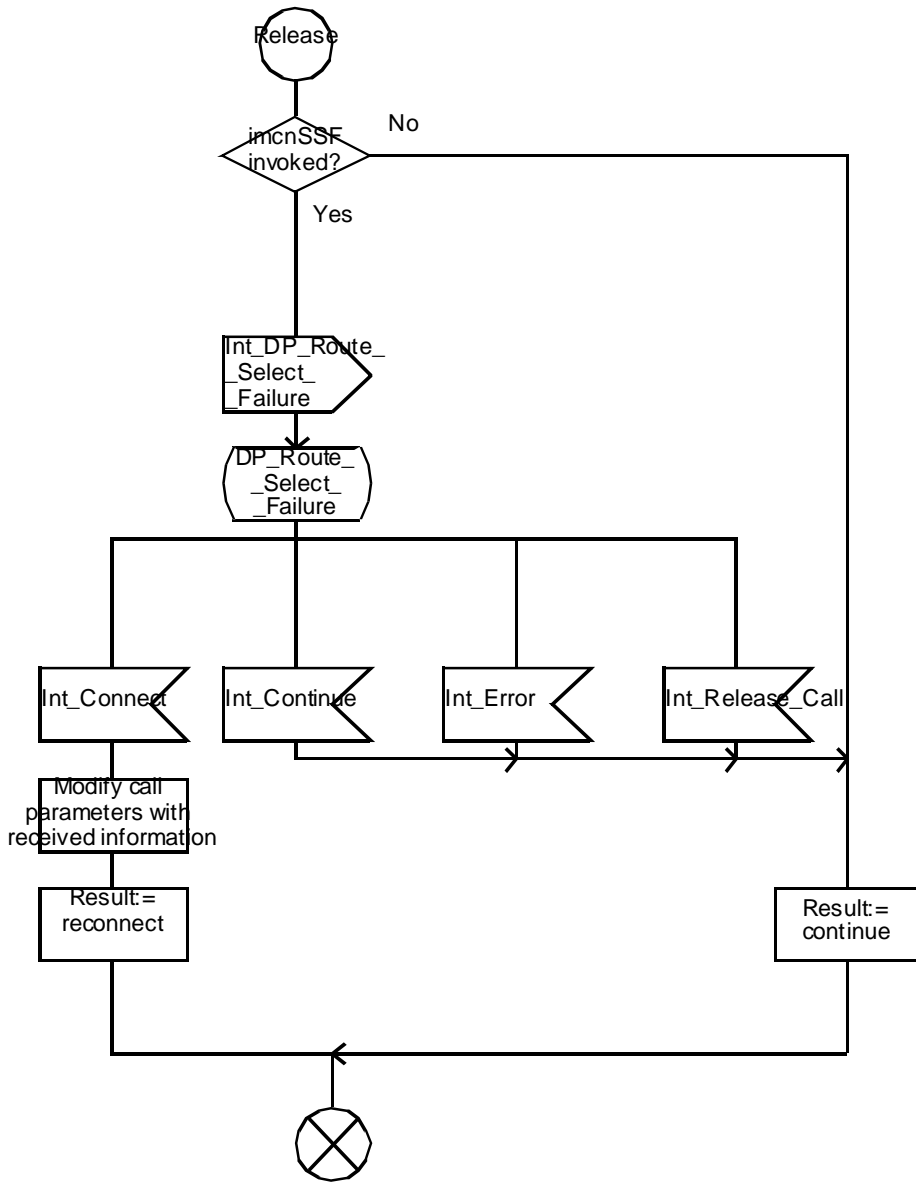
Figure 5.11b

/* Procedure in the IM-SSF to handle an outgoing call on the response code received*/

Signals to/from the right are to/from the imcnSSF if not otherwise stated.

Busy

imcnSSF invoked?

No

Yes

Int_DP_O_Busy

DP_O_Busy

Int_Connect

Modify call parameters with received information

Int_Continue

Int_Error

Int_Release_Call

Result:= reconnect

Result:= continue
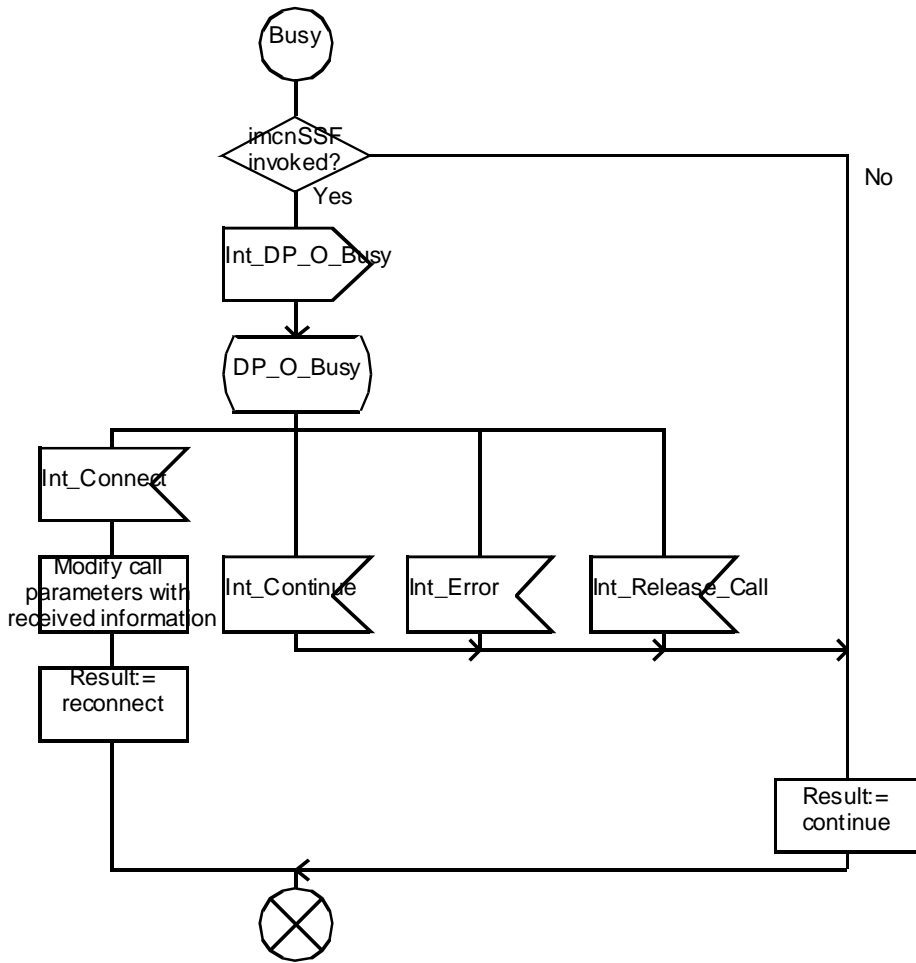
Figure 5.11c

/* Procedure in the IM-SSF to
handle an outgoing call on
the response code received*/

Signals to/from
the right are to/from the imcnSSF,
Signal to/from the left are to/from
the MS

No Answer

No   imcnSSF
            invoked?

Result:=
coninue

⊗

Yes

Int_DP_O_No_Answer

DP_O_No_Answer

Int_Connect

Int_Continue   Int_Error   Int_Release_Call

Modify call
parameters with
received information

Int_O_Exception

BYE   To the destination S-CSCF

6xx

Result:=
reconnect

Result:=
release

⊗
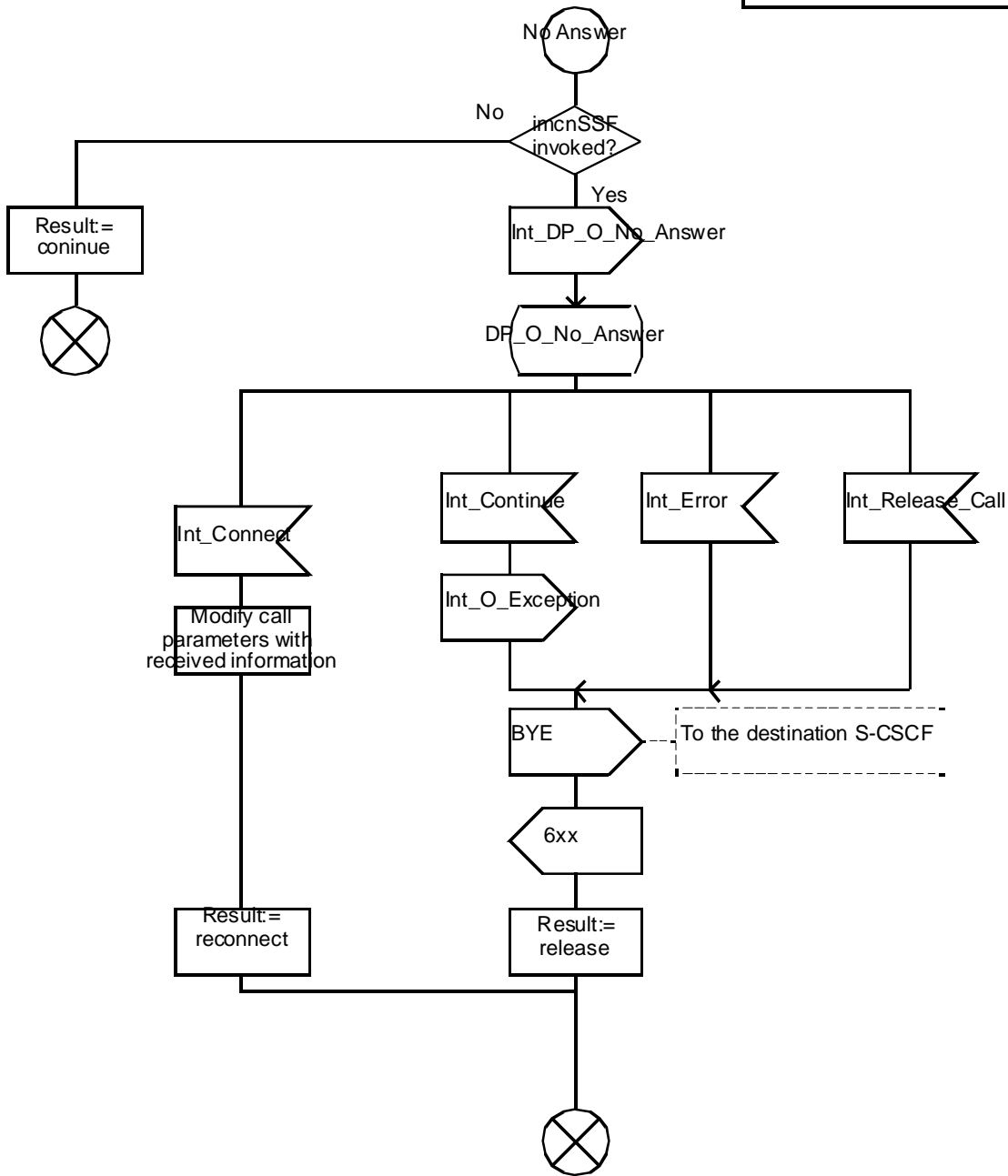
Figure 5.11d

/* Procedure in the IM-SSF to handle an outgoing call on the response code received*/

Signals to/from the right are to/from the imcnSSF, Signal to/from the left are to/from the MS

TNRy

imcnSSF invoked?

No

Result:= coninue

Yes

Int_DP_O_No_Answer

DP_O_No_Answer

Int_Connect

Int_Continue

Int_Error

Int_Release_Call

Modify call parameters with received information

Int_O_Exception

6xx

Result:= reconnect

Result:= release
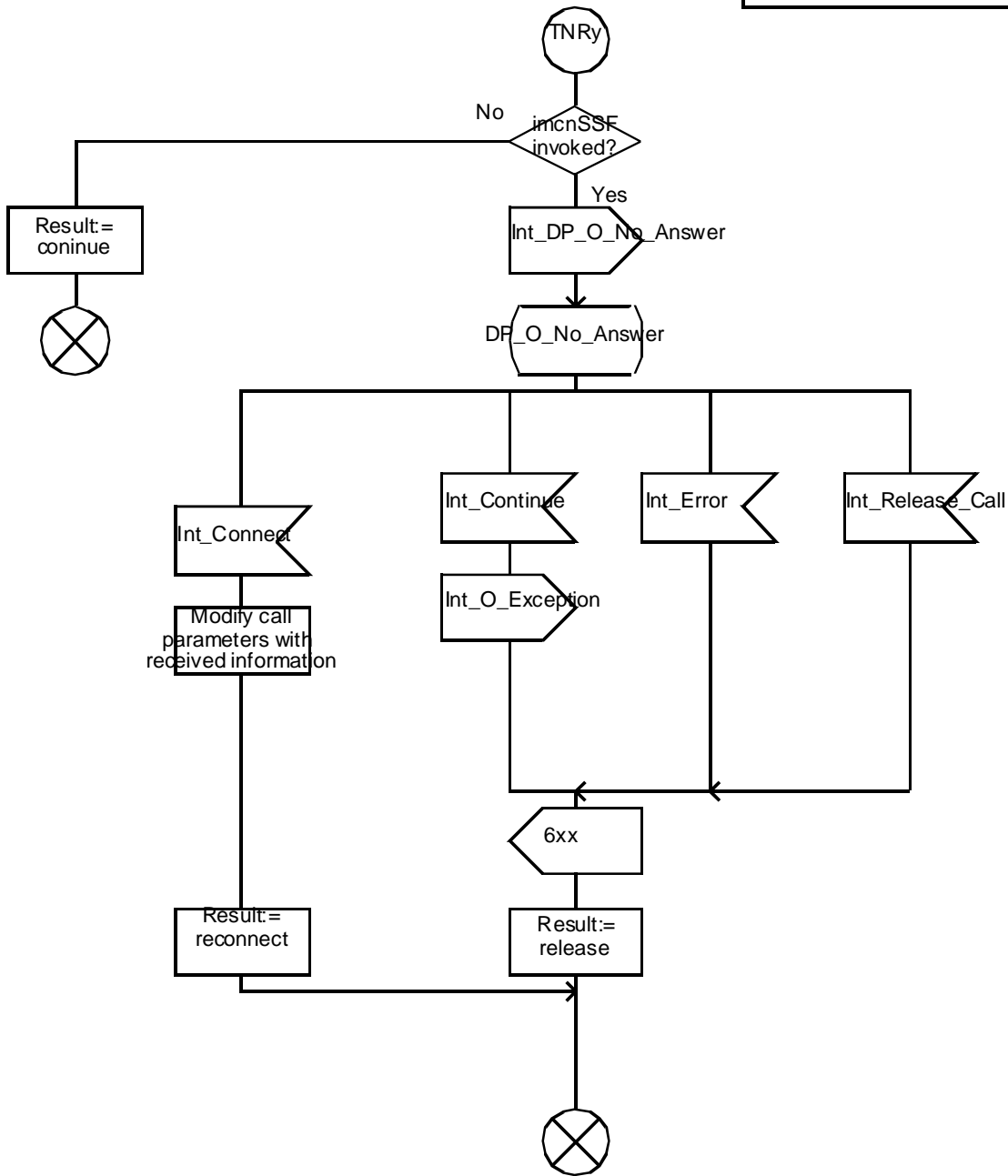
Figure 5.11e

/* Procedure in the IM-SSF to
handle an outgoing call on
the response code received*/

Signals to/from the left are
to/from the MS; signals to/from
the right are to/from the imcnSSF if
not otherwise stated.

DP_O_Busy
DP_Route_Select_Failure
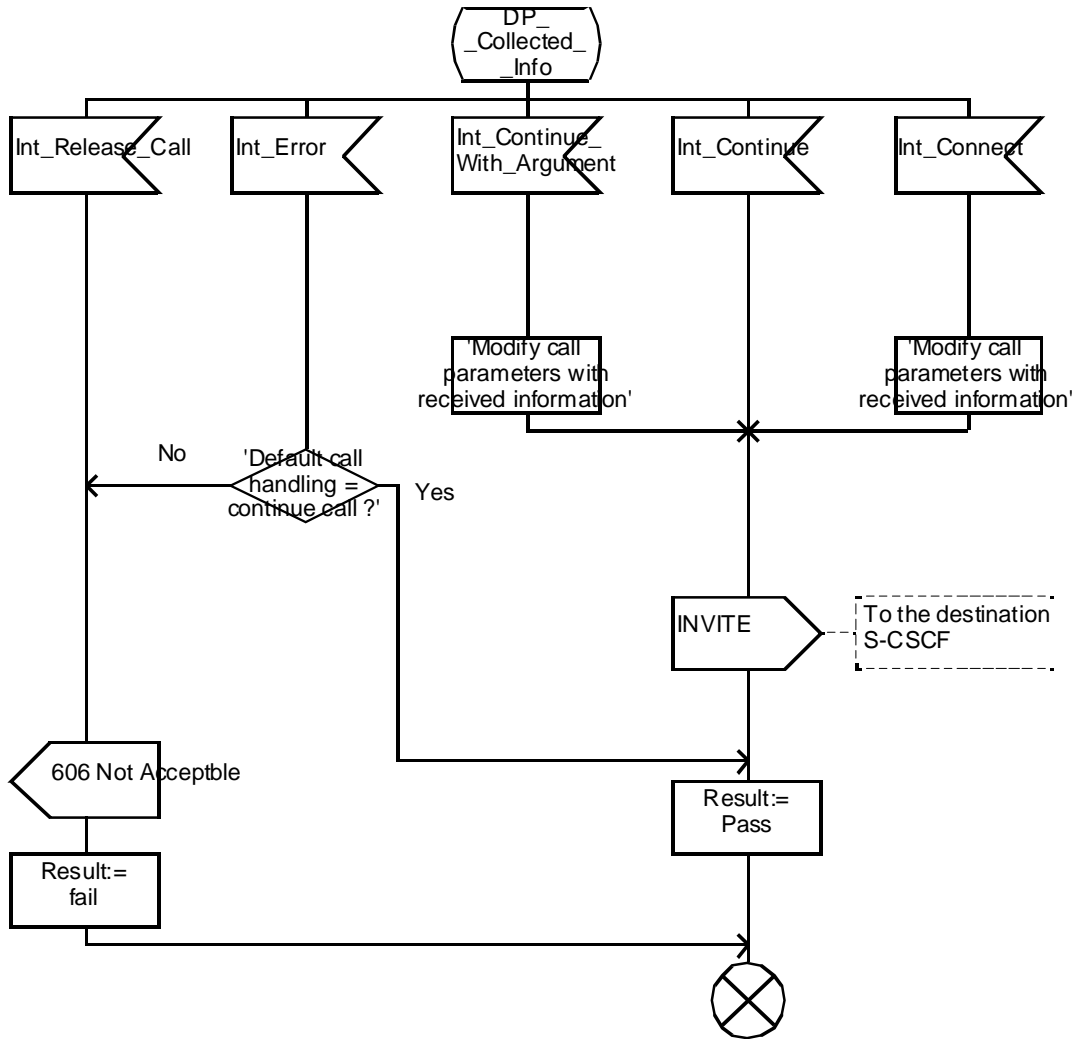DP_O_No_Answer

CANCEL

CAMEL_IMCN_MO_CANCEL

Result:=
fail
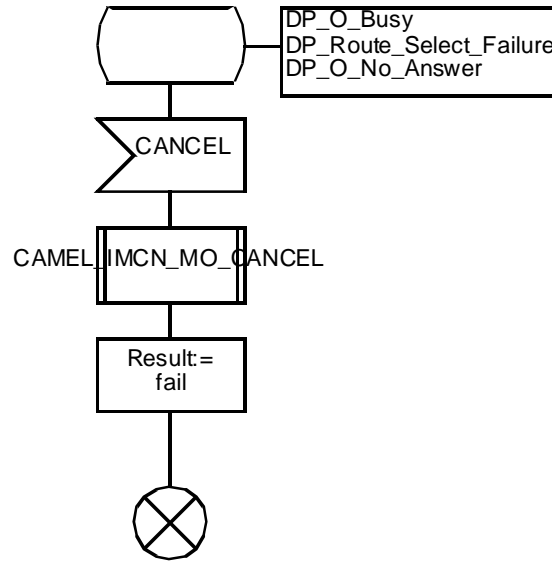
Figure 5.11f

/* Procedure in the IM-SSF to handle an outgoing call on the response code received*/

Signals to/from the right are to/from the imcnSSF if not otherwise stated.

DP_Route_Select__Failure
DP_O_Busy
DP_O_No_Answer

Int_Establish_
Temporary
Connection

Int_Connect_To_
Resource

CAMEL_OCH_ETC
FFS Required

CAMEL_OCH_CTR
FFS Required

Result=
fail?

No

Yes

Result:=
continue

-

Figure 5.11g

CR page 46
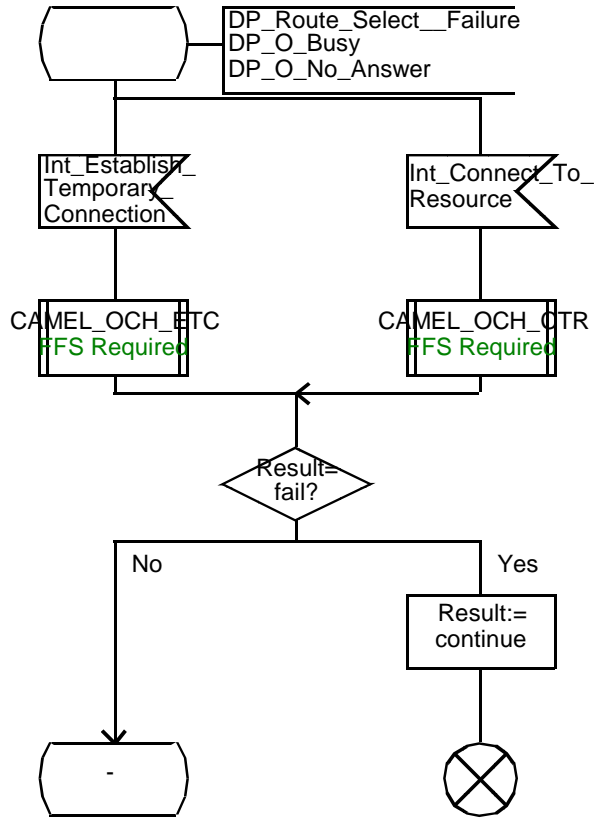
/* Procedure in the IM-SSF to handle an outgoing call on the 200 OK response */

/* Signals to/from the left are to/from the MS; signals to/from the right are to/from the destination imcnSSF if not otherwise stated. */

imcnSSF invoked?

No

Yes

Int_DP_O_Answer

Result:= pass

final_Respose_Received= True

DP_O_Answer

Int_Release

Int_Continue

606 Not Acceptble

BYE

To the destination S-CSCF

Result:= pass

Result:= fail
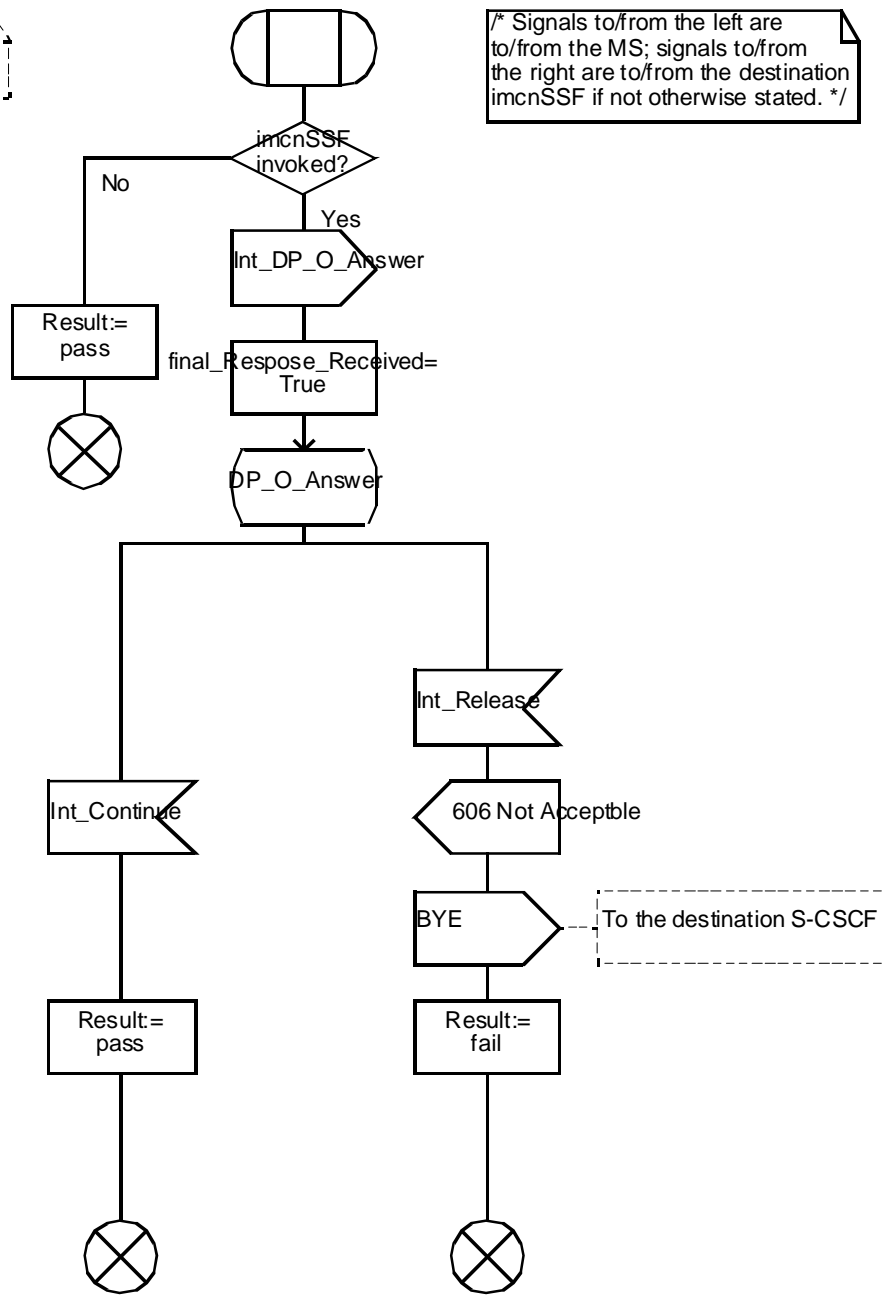
Figure 5.12a

/* Procedure in the IM-SSF to
handle an outgoing call on
the 200 OK response */

/* Signals to/from the left are
to/from the MS; signals to/from
the right are to/from the imcnSSF if
not otherwise stated. */

DP_O_Answer

Int_Error

No   Default call handling =
                      continue call ?

                      Yes

606 Not Acceptble   Result:=
                      Pass

BYE

Result:=
fail   To the destination S-CSCF
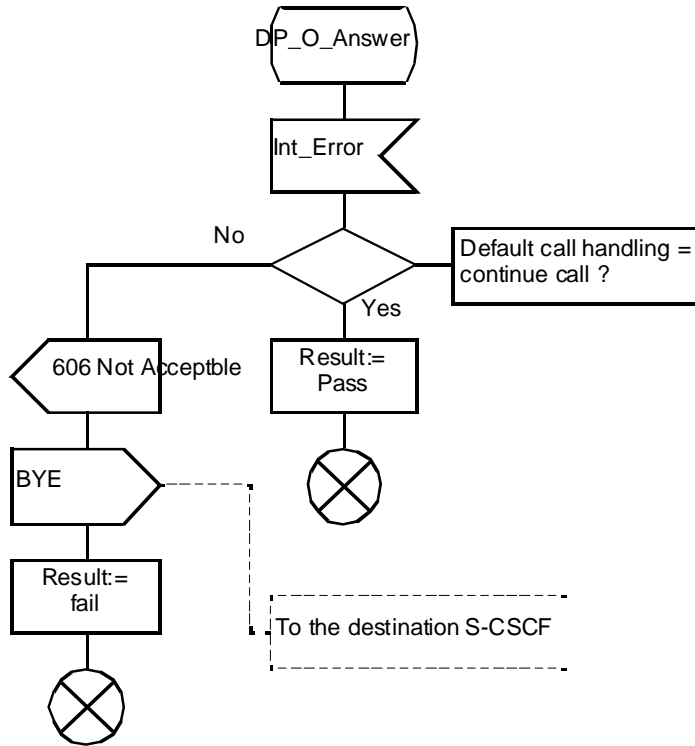
Figure 5.12b

/* Procedure in the IM-SSF to
handle an outgoing call on
the 200 OK response */

/* Signals to/from the left are
to/from the MS; signals to/from
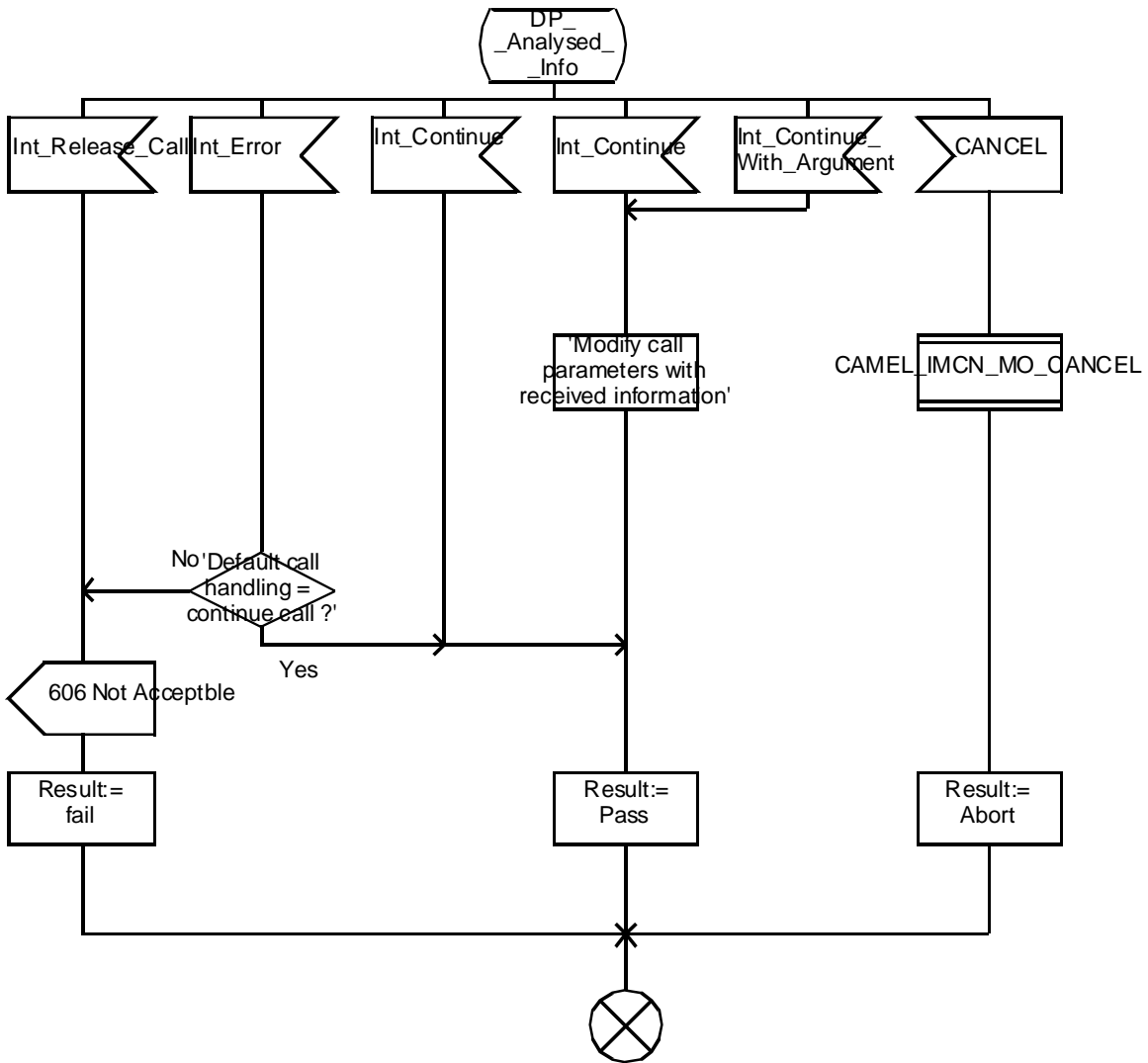the right are to/from the destination
S-CSCF if not otherwise stated. */

DP_O_Answer

BYE

CAMEL_IMCN_MO_BYE

Result:=
fail

⊗
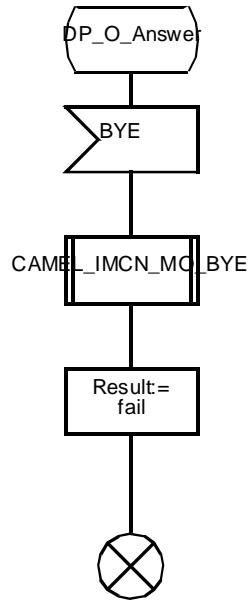
Figure 5.12c

/* Procedure in the IM-SSF in the case of CAMEL handling to connect a call at DP Busy, Route select failure. */

Signals to/from the right are to/from the imcnSSF if not otherwise stated.

imcnSSF invoked?

No

Yes

Int_DP_O_Busy

DP_O_Busy

Int_Connect

Int_Continue

Int_Error

Int_Release_Call

Modify call parameters with received information

Result:= reconnect

Result:= continue
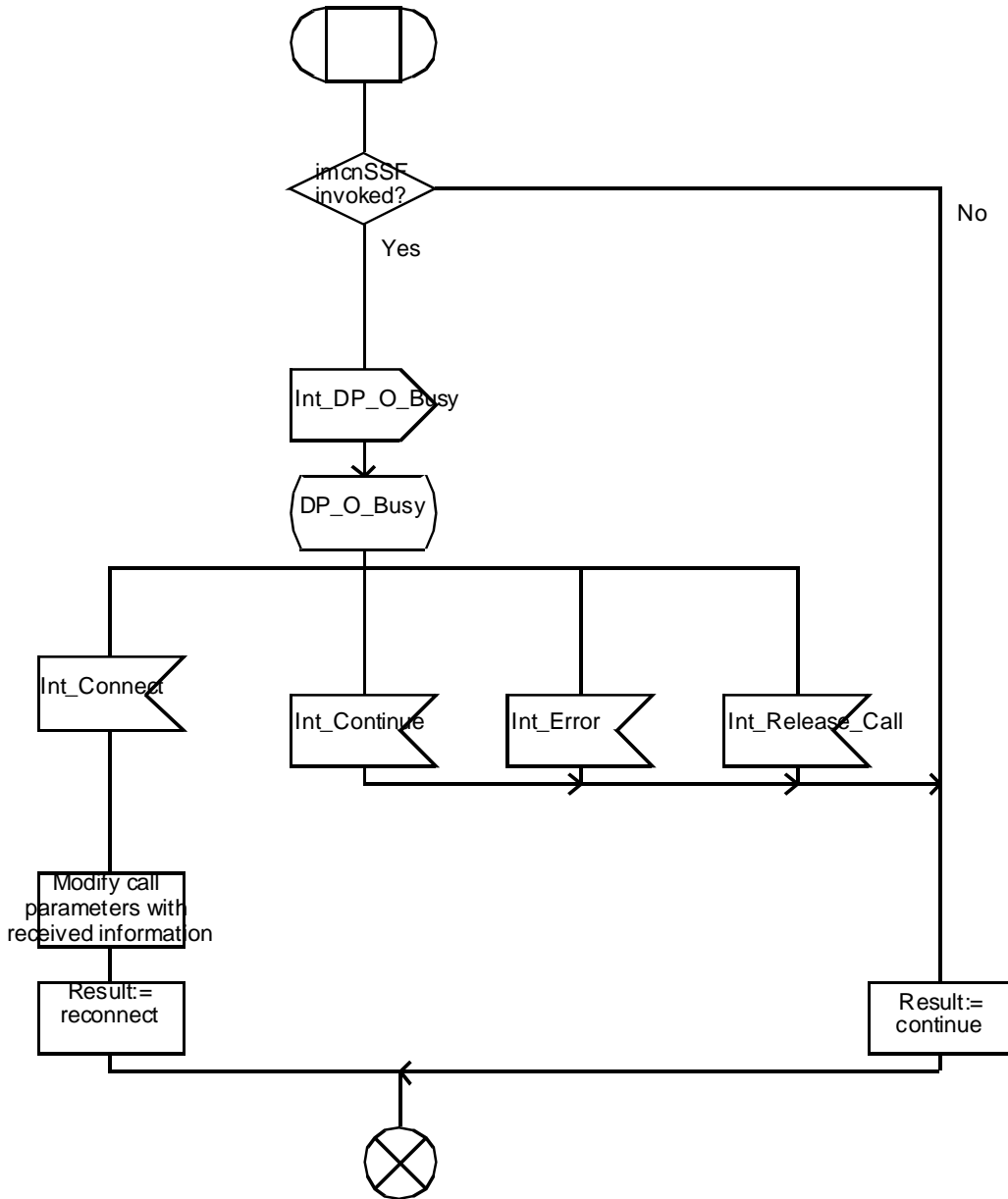
Figure 5.13a

/* Procedure in the IM-SSF in the case of CAMEL handling to connect a call at DP Busy, Route select failure. */

Signals to/from the left are to/from the MS; signals to/from the right are to/from the imcnSSF if not otherwise stated.

DP_O_Busy

CANCEL

CAMEL_IMCN_MO_CANCEL

Result:=
continue
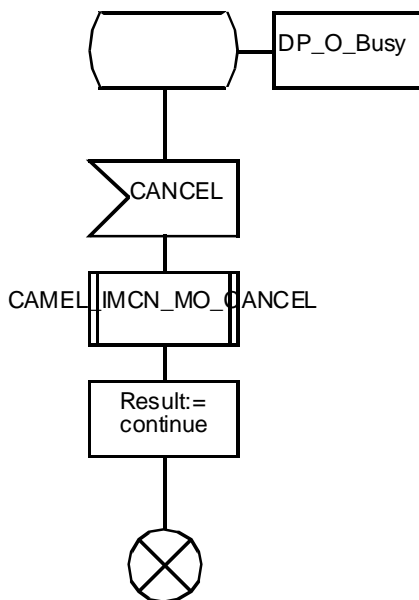
Figure 5.13b

/* Procedure in the IM-SSF in the
case of CAMEL handling to
connect a call at DP Busy,
Route select failure. */

Signals to/from the right are to/from
the imcnSSF if not otherwise stated.

DP_O_Busy

Int_Establish_
Temporary
Connection

Int_Connect_To_
Resource

CAMEL_OCH_ETC
FFS Required

CAMEL_OCH_CTR
FFS Required

Result=
fail?

No

Yes

Result:=
continue

-
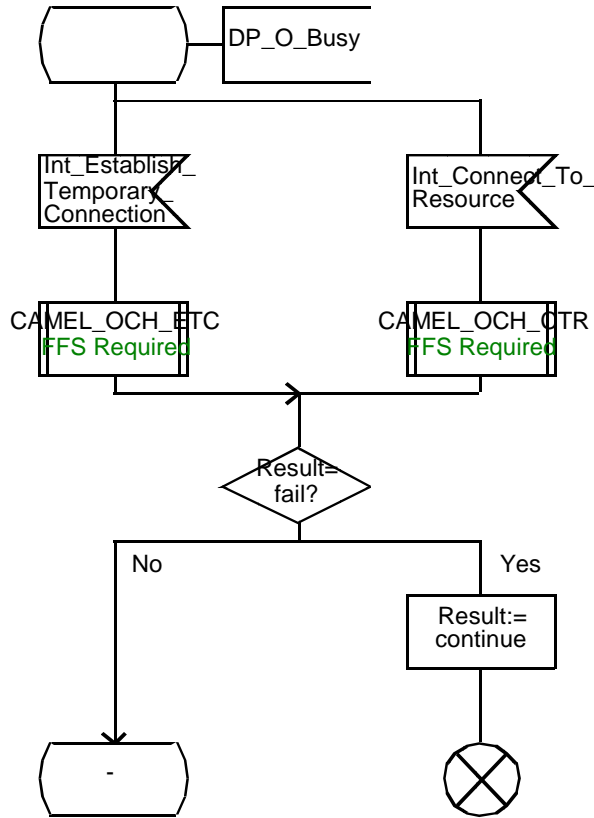
Figure 5.13c

5.1.3 Handling of Mobile Terminated Calls in the IM-SSF

The functional behaviour of the S-CSCF for handling terminating calls is specified in 3GPP TS 23.218 [5]. The procedures specific to CAMEL are specified in this subclause:

- Procedure CAMEL_IMCN_MT_INVITE;

- Procedure CAMEL_IMCN_MT_BYE;

- Procedure CAMEL_IMCN_MT_CANCEL

- Procedure CAMEL_IMCN_MT_Response_Code.

5.1.3.1 Actions of the IM-SSF on receipt of Int_Error

The IM-SSF checks the default Call Handling parameter in the relevant CSI.
If the default call handling is release, a BYE indication is sent to the originating CSCF. The IM-SSF then releases all resources and the invoked CAMEL procedure ends.

If the call handling is continue, the IM-SSF continues processing without CAMEL support.

5.1.3.2 Actions of the IM-SSF on receipt of Int_Release_Call

The IM-SSF BYE message is sent to the originating CSCF and resources are released.

5.1.3.3 Actions of the IM-SSF on receipt of Int_Continue_With_Argument

The IM-SSF shall replace the call parameters by the information received in the Int_Continue_With_Argument message. Call parameters that are not included in the Int_Continue_With_Argument_Message are unchanged.

5.1.3.4 Actions of the IM-SSF on receipt of Int_Connect

Editor's note : Text to be provided in future

/* Process in the IM-SSF
to perform CAMEL handling
for a terminating call request */

Signals to/from the left are to/from
the orginating S-CSCF;
signals to/from the right are to/from
the imcnSSF

Provisional_Response_Received := False

Final_Response_Received := False

Int_Invoke_imcnSSF
(T-CSI)

wait_for_
imcnSSF_Invoked

Int_imcnSF_
Invoked

CANCEL

CAMEL_IMCN_MT_CANCEL

Int_DP_Termination_
attempt_Autorized

Result:=
aborted

DP_Termination_
attempt_
Autorized

Figure 5.14a

/* Process in the IM-SSF
to perform CAMEL handling
for a terminating call request */

Signals to/from the left are to/from
the orginating S-CSCF;
signals to/from the right are to/from
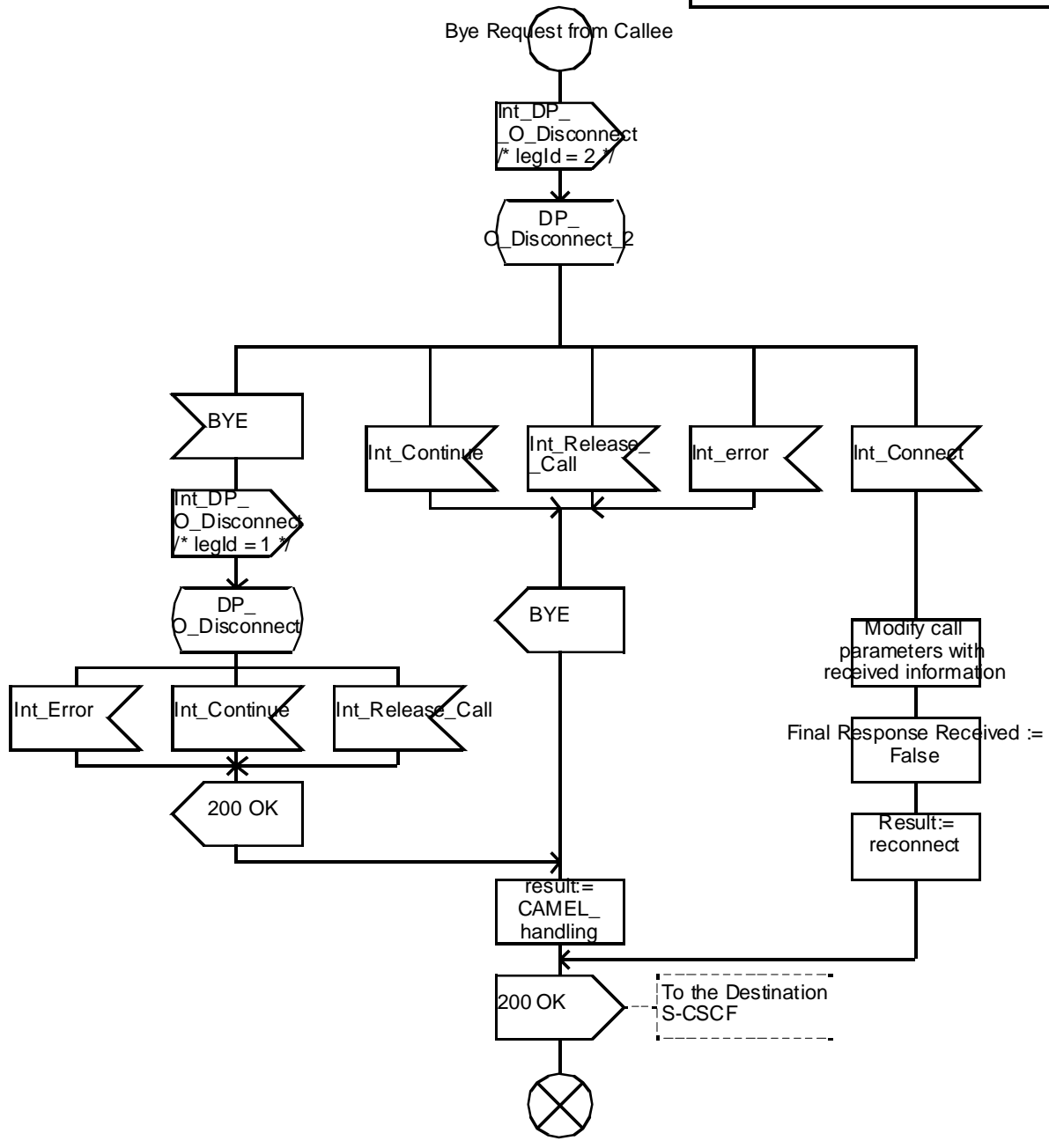the imcnSSF, if not otherwise stated.

DP_Termination_
Attempt
_Authorised

Int_Connect

Int_Continue_
With
_Argument

Int_Continue

Int_Error

Int_Release_Call

183 Session
Progress

'Modify call
parameters with
received information'

Yes

Default Call Handling =
Continue Call?

No

Modify call
parameters with
received information'

606 Not Acceptble

NVITE

To the destination
MS

Result := Fail

Result :=Pass

Figure 5.14b

/* Process in the IM-SSF
to perform CAMEL handling
for a terminating call request */

Signals to/from the left are to/from
the originating S-CSCF;
signals to/from the right are to/from
the imcnSSF;
if not otherwise stated.

DP_Termination_
Attempt_
Authorised

CANCEL

CAMEL_IMCN_MT_CANCEL
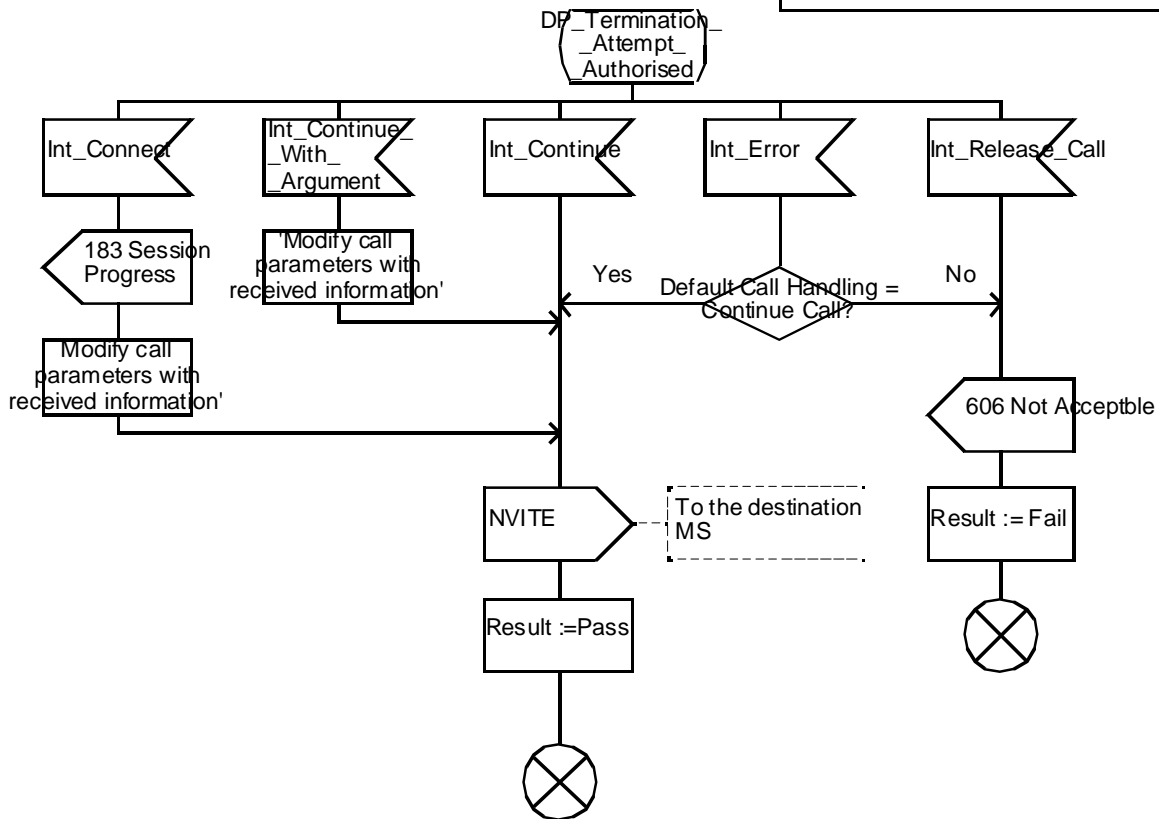
Result:=
aborted

Figure 5.14c

/* Process in the IM-SSF
to perform CAMEL handling
for a terminating call request */

Signals to/from the right are to/from
the imcnSSF.

DP_Termination_Attempt_Authorised

Int_Establish_
Temporary_
Connection

Int_Connect_To_
Resource

CAMEL_MT_ETC
FFS Required

CAMEL_MT_CTR
FFS Required

Result=
fail?

No   Yes

Result:=
fail

-

Figure 5.14d:

procedure CAMEL_IMCN_MT_CANCEL   1(1)
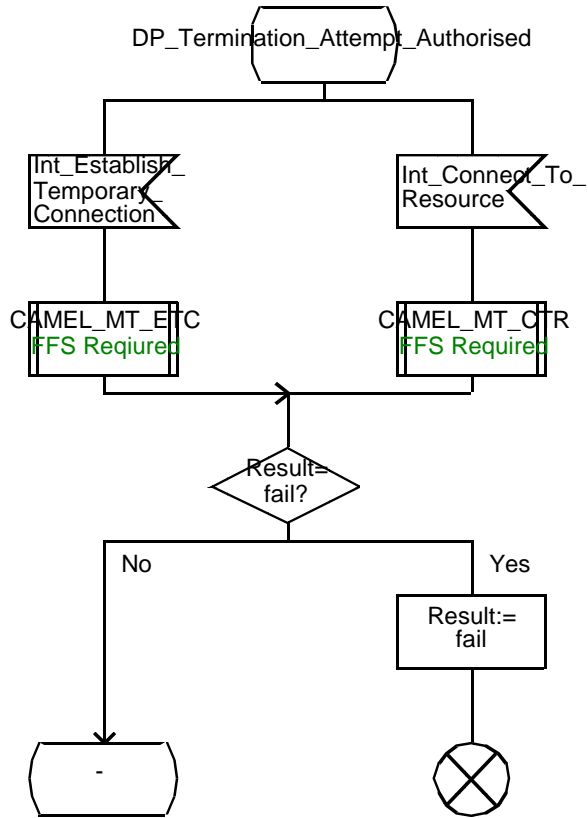
/* Procedure in IM-SSF to perform
CAMEL handling for an incoming
call CANCEL request. */

/*Signals to/from the left are
to/from the originating S-CSCF;
Signals to/from the right are to/from
the imcnSSF. */

Is CANCEL for
a valid transaction?   No

Yes

Final_Response_
Received=False

No   Yes

200 OK   No   Provisional_Response_Received   481 Call Leg/Transaction
                              =False   Does Not Exist

                                 Yes

                    No   imcnSSF
                           Invoked?

                                 Yes

                        Int_DP_O_Abandon

                         DP_O_Abandon

                         Int_Continue   Result:=
                                                          Fail

                         487 Request
                          Terminated

                    CANCEL   To the
                                        destination MS

                         200 OK

                         Result:=
                          Pass

                            ⊗

Figure 5.15

/* Procedure in the IM-SSF to perform CAMEL handling for BYE Request in a MT call*/

/* Signals to/from the left are to/from the originating S-CSCF;
Signals to/from the right are to/from the imcnSSF if not otherwise stated. */

imcnSSF invoked?
No
Yes

BYE request is from caller
No
Yes

Int_DP_ O_Disconnect /* legId = 1 */

Bye Request from Callee

DP_ O_Disconnect_1

Int_Error

Int_Release_Call

Int_Continue

BYE

From destination MS

BYE

To destination MS

Int_DP_ O_Disconnect /* legId = 2 */

200 OK

DP_O_Disconnect

Final_Respose_Received =False?
Yes
No

Int_Continue

Int_Error

Int_ReleaseCall

result:= normal_ handling

487 Request Terminated

200 OK

To destination MS

result:= CAMEL_ handling
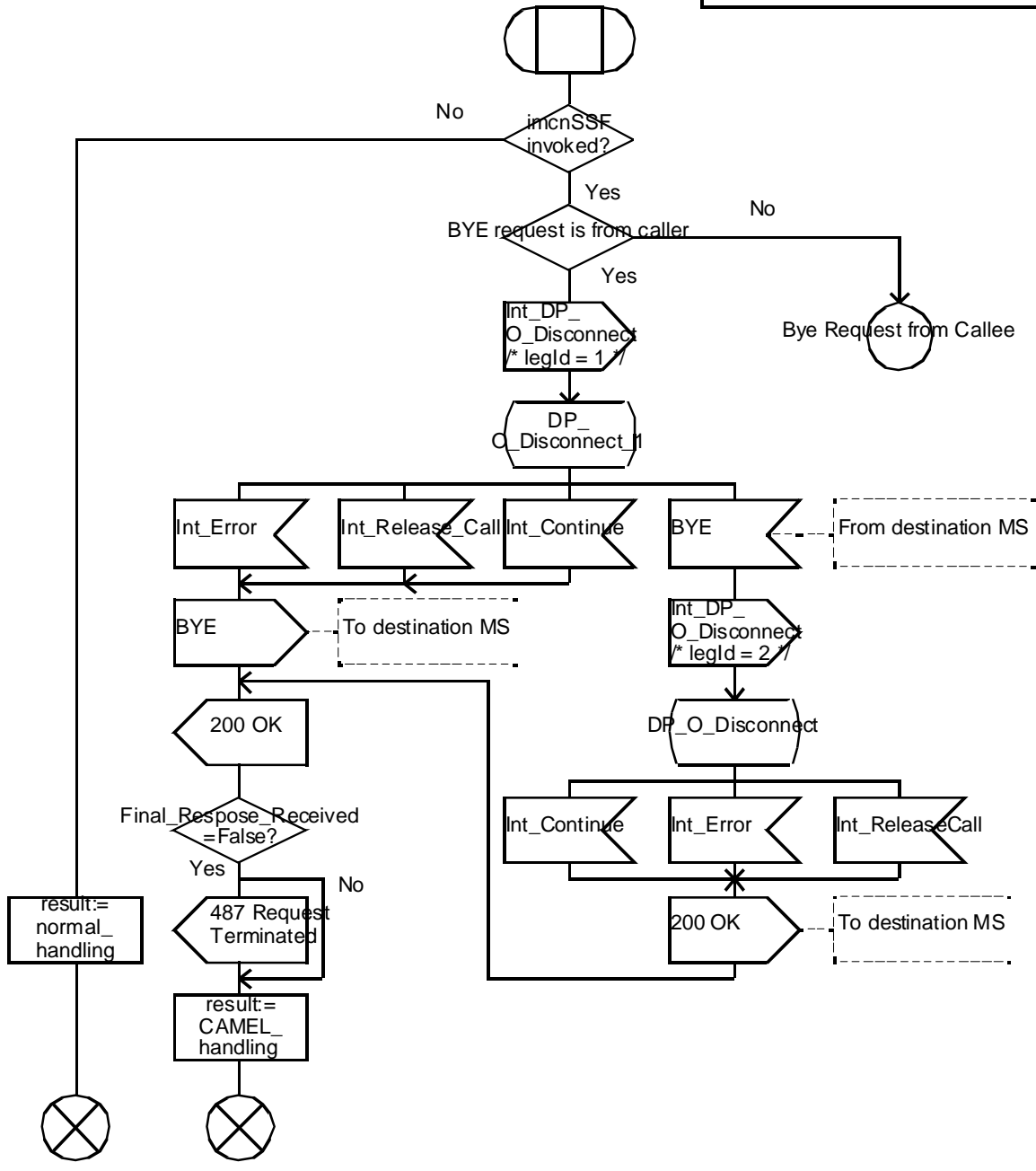
Figure 5.16a

/* Procedure in the IM-SSF to perform CAMEL handling for BYE Request in a MT call*/

/* Signals to/from the left are to/from the originating S-CSCF; signals to/from the right are to/from the imcnSSF if not otherwise stated. */

Bye Request from Callee

Int_DP_ _O_Disconnect /* legId = 2 */

DP_ O_Disconnect_2

BYE

Int_Continue

Int_Release_ _Call

Int_error

Int_Connect

Int_DP_ O_Disconnect /* legId = 1 */

DP_ O_Disconnect

BYE

Modify call parameters with received information

Int_Error

Int_Continue

Int_Release_Call

Final Response Received := False

200 OK

Result:= reconnect

result:= CAMEL_ handling

200 OK

To the Destination MS
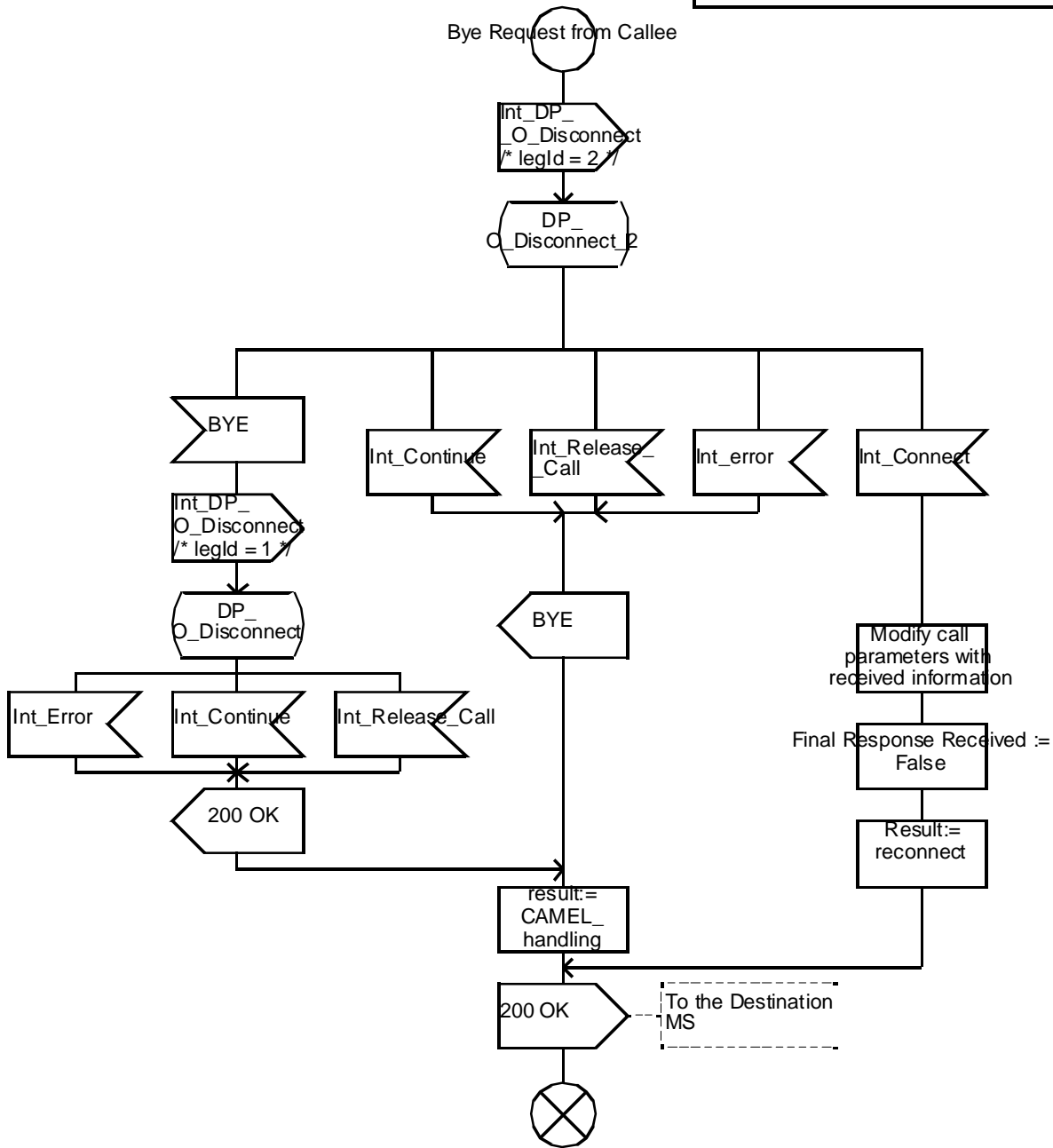
Figure 5.16b

/* Procedure in the IM-SSF to perform CAMEL handling for BYE Request in a MT call*/

Signals to/from the right are to/from the imcnSSF if not otherwise stated.

DP_O_Disconnect_2

Int_Establish_
Temporary_
Connection

Int_Connect_To_
Resource

CAMEL_MT_ETC
FFS required

CAMEL_MT_CTR
FFS required

Result=
fail?

No

Yes

Result:=
release

DP_O_Disconnect_2

⊗

Figure 5.16c

procedure CAMEL_IMCN_MT_ResponseCode   1(6)
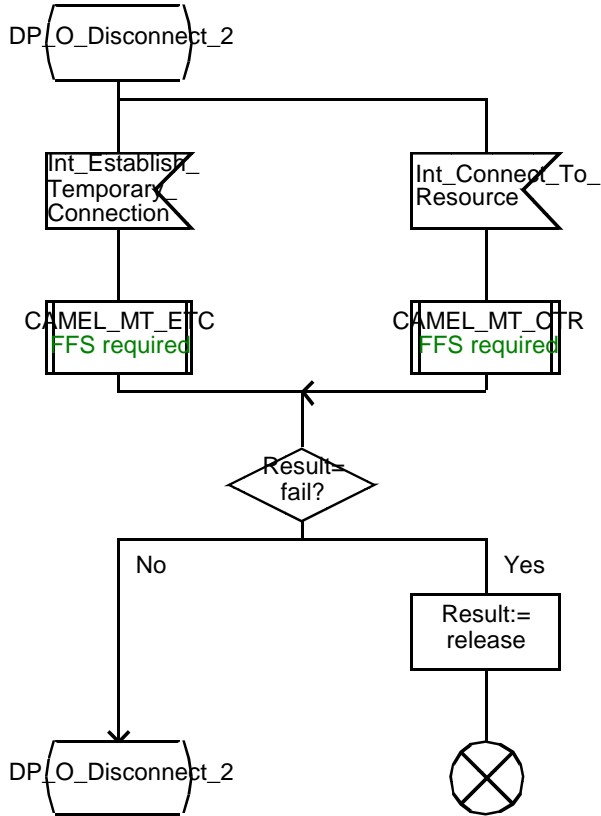
/* Procedure in the IM-SSF to
handle an incomeing call on
the response code received*/

/* Signals to/from the right are to/from
destination MS; signals to/from the left
are to/from the orignating S-CSCF if
not otherwise stated. */

Reponse Code Class

1xx except
100

2xx

4xx except
401, 407,413,
420, 480
or 5xx
or 6xx except
600

600 Busy
Everywhere
or 486 Busy
Here

480

TNRy
expired

ACK

BYE

1xx

CAMEL_IMCN
_MT_200OK

ACK

ACK

TNRy

Result=Pass?

No

Yes

No

Provisional_Response
Received
=False?

2xx

No answer

CAMEL_Start_TNRy

Busy

Provisional_Response_Received
:= True

Result:=
Normal_Handling

Result:=
CAMEL_Handling

Result ;= pass

Figure 5.17a

/* Procedure in the IM-SSF to
handle an incomeing call on
the response code received*/

Signals to/from
the right are to/from the imcnSSF if
not otherwise stated.

Busy

imcnSSF
invoked?

No

Yes

Int_DP_O_Busy

DP_O_Busy

Int_Connect

Int_Continue

Int_Error

Int_Release_Call

Modify call
parameters with
received information

Result:=
reconnect

Result:=
Fail
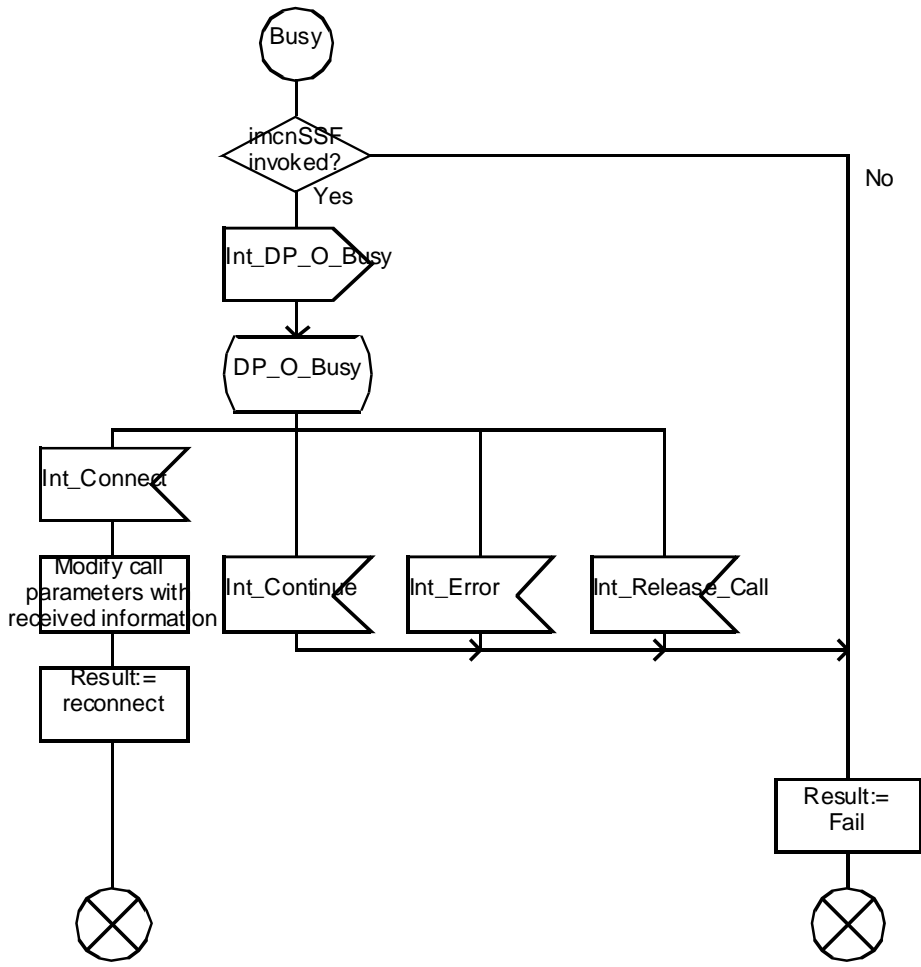
Figure 5.17b

/* Procedure in the IM-SSF to handle an incomeing call on the response code received*/

Signals to/from the right are to/from the imcnSSF, Signal to/from the left are to/from the originating S-CSCF.

No Answer

No   imcnSSF invoked?

Result:= coninue

Yes

Int_DP_O_No_Answer

DP_O_No_Answer

Int_Connect

Int_Continue   Int_Error   Int_Release_Call

Modify call parameters with received information

Int_O_Exception

BYE   To the destination MS

6xx???

Result:= reconnect

Result:= release
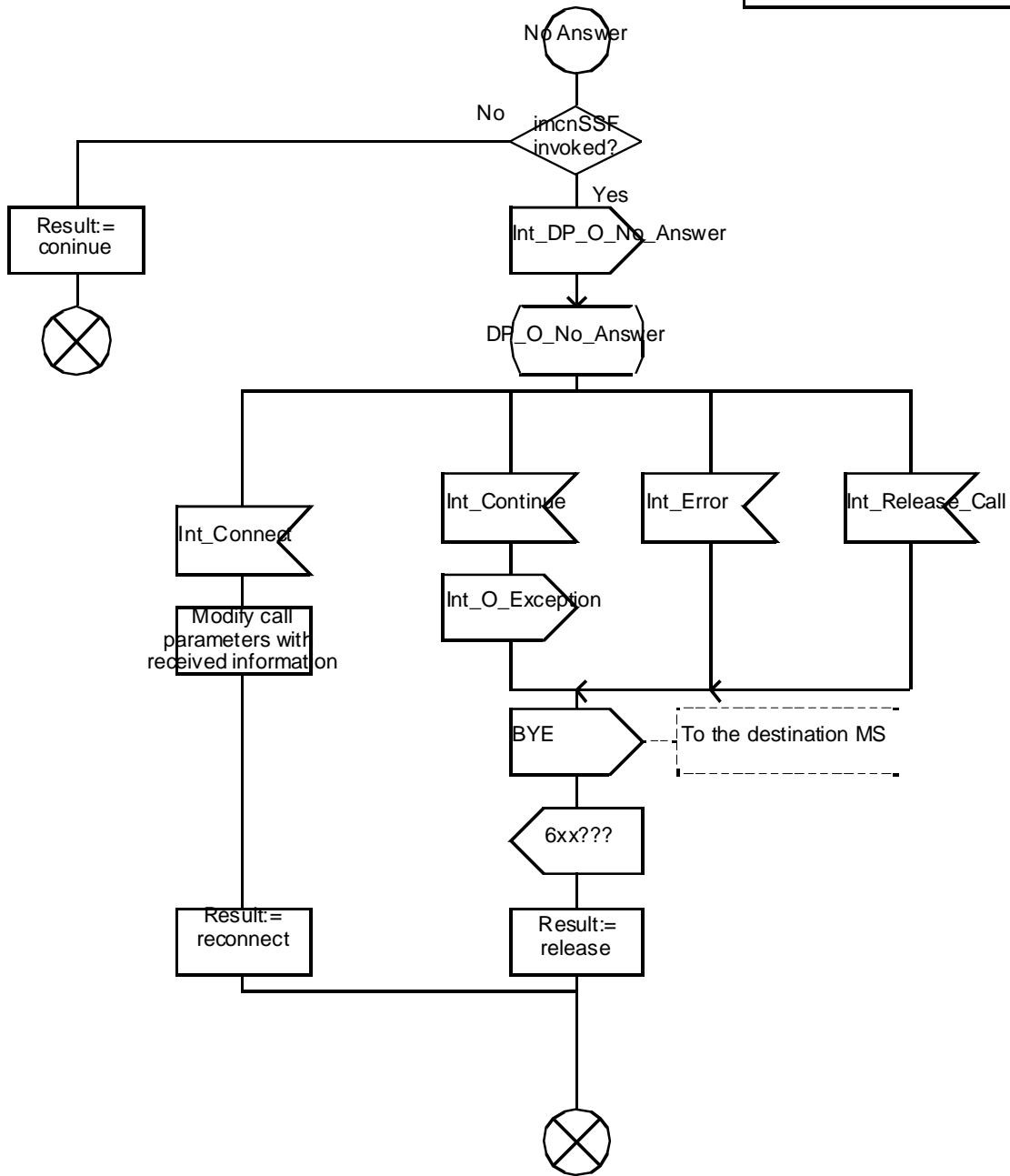
Figure 5.17c

/* Procedure in the IM-SSF to handle an incomeing call on the response code received*/

Signals to/from the right are to/from the imcnSSF, Signal to/from the left are to/from the originating S-CSCF.

TNRy

No ← imcnSSF invoked?

Yes

Result:= coninue

Int_DP_O_No_Answer

DP_O_No_Answer

Int_Connect

Int_Continue

Int_Error

Int_Release_Call

Modify call parameters with received information

Int_O_Exception

6xx

Result:= reconnect

Result:= release
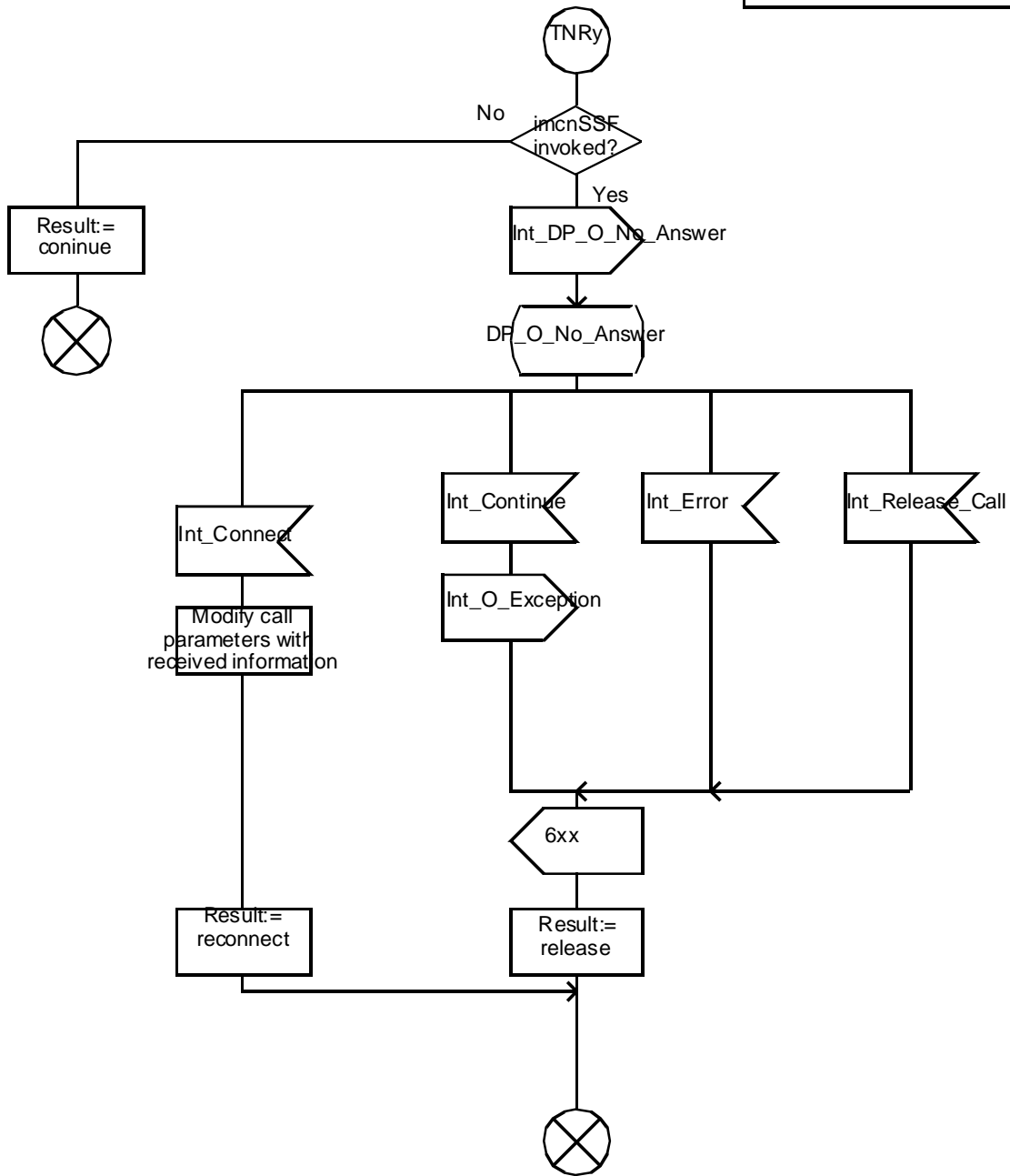
Figure 5.17d

/* Procedure in the IM-SSF to handle an incomeing call on the response code received*/

Signals to/from the left are to/from the originating S-CSCF; signals to/from the right are to/from the imcnSSF if not otherwise stated.

DP_O_Busy
DP_O_No_Answer

CANCEL

CAMEL_IMCN_MT_CANCEL

Result:=
fail

Figure 5.17e

/* Procedure in the IM-SSF to
handle an incomeing call on
the response code received*/

Signals to/from the right are to/from
the imcnSSF if not otherwise stated.

DP_O_Busy
DP_O_No_Answer

Int_Establish_
Temporary_
Connection

Int_Connect_To_
Resource

CAMEL_MT_ETC
FFS Required

CAMEL_MT_CTR
FFS Required

Result=
fail?

No

Yes

Result:=
continue

-

⊗

Figure 5.18f

CR page 67

/* Process in the IM-SSF
to handle an incoming
200 OK response */

/* Signals to/from the left are
to/from the originating S-CSCF;
signals to/from the right are to/from
the imcnSSF if not otherwise
stated. */

imcnSSF
invoked?

No

Yes

Int_DP_O_Answer

Result:=
pass

final_Respose_Received=
True

DP_O_Answer

Int_Continue

Int_Release

606 Not Acceptble

Result:=
pass

BYE

To the destination MS

Result:=
fail
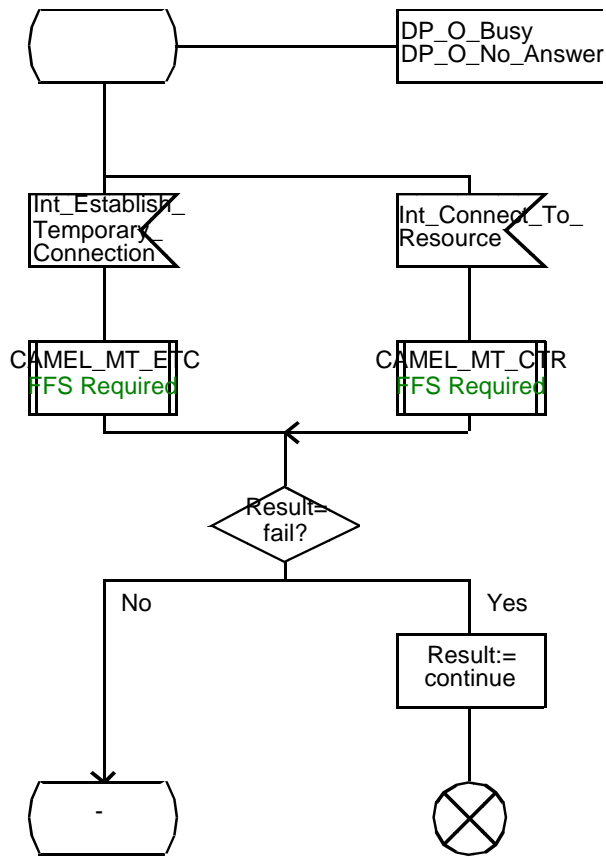
Figure 5.19a

/* Process in the IM-SSF
to handle an incoming
200 OK response */

/* Signals to/from the left are
to/from the originating S-CSCF,
signals to/from the right are
to/fromthe imcnSSF if
not otherwise stated. */

DP_O_Answer

Int_Error

No

Default call handling =
continue call ?

Yes

606 Not Acceptble

Result:=
Pass

BYE

Result:=
fail
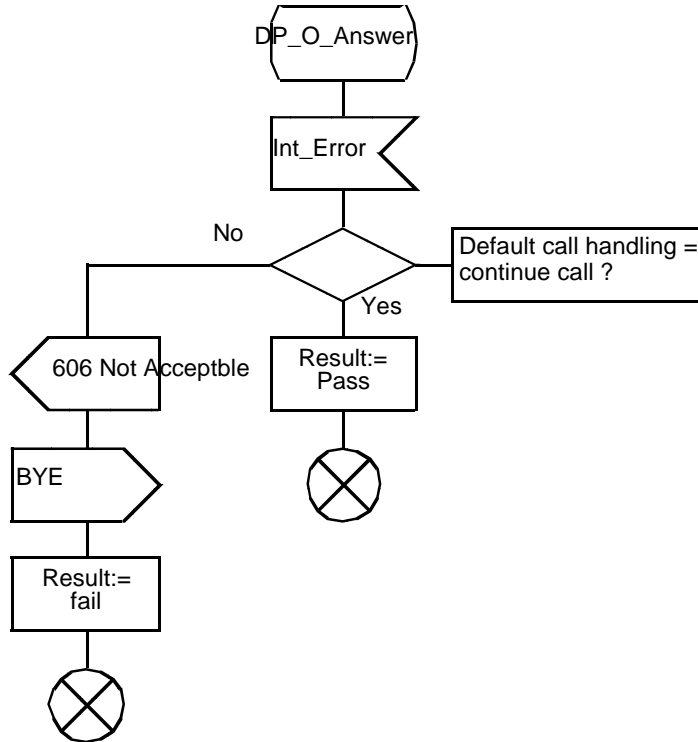
Figure 5.19b

/* Process in the IM-SSF
to handle an incoming call
200 OK response */

/* Signals to/from the left are
to/from the originating S-CSCF. */

DP_O_Answer

BYE

CAMEL_IMCN_MT_BYE

Result:=
fail

⊗
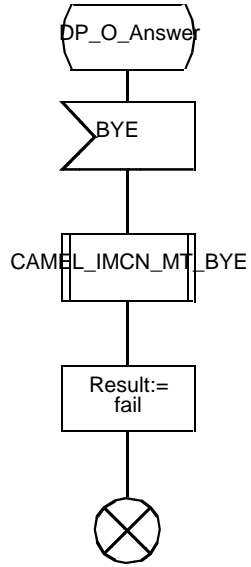
Figure 5.19c

Prodedure in IM-SSF to start
the timer TNRy

imcnSSF
invoked?

No

Yes

DP6 or
DP14 armed?

No

Yes

TNRy received?

No

Yes

Start TNRy
with received
time value

TNRy default
value available?

No

Yes

Start TNRy with
default value
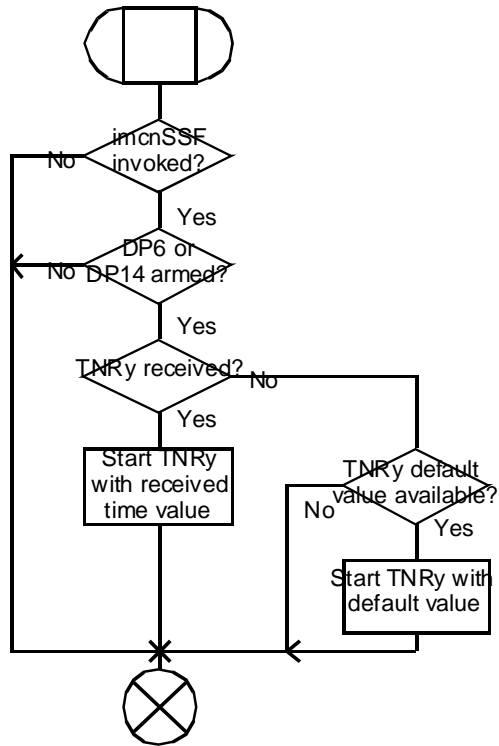
Figure 5.20a

Procedure in the IM-SSF
to stop the timer TNRy

imcnSSF
invoked? → No

Yes

TNRy
running? → No

Yes

Stop TNRy

⊗
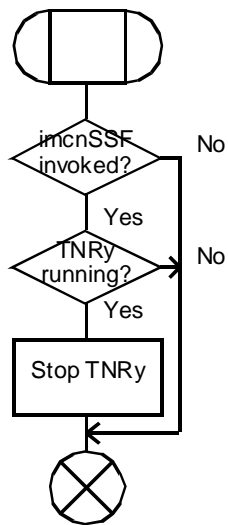
Figure 5.21a

5.1.4 Handling of call in the imcnSSF

Handling of mobile calls in the imcnSSF may involve the following process and procedures:
- imcnSSF;

- imcnCheck_Criteria;

- imcnConnect_To_Resource;

- imcnHandle_AC;

- imcnHandle_ACR;

- imcnHandle_CIR;

- imcnHandle_CIR_leg;

- imcnComplete_FCI_record;

- imcnComplete_all_FCI_records;

- imcnHandle_O_AcceptCall;

- imcnHandle_T_AcceptCall.

The detailed error handling for the process gsmSSF and the associated procedures is specified in 3GPP TS 29.078 ([8]).

5.1.4.1 Behaviour of the imcnSSF in the process imcnSSF

5.1.4.2 Process imcnSSF and procedures

/* Invocation of imcnSSF in MO,
MT call case. */

/* Timers used in the imcnSSF process:

Tssf: Application timer in the ssf.
Tcp: Timer for call period.
 This timer measures the duration of a call period.
Tsw: Timer for tariff switch.
 At the expiration of this timer, a new tariff switch shall be started.
Tw: Warning timer.
 At the expiration of this timer, a warning tone shall be played to the calling party.
DELTA: time, measured in the imcnSSF, elapsed between the time an
 ApplyChargingReport operation is send to the imcnSCF and an
 ApplyCharging operation is received from the imcnSCF.
Tccd: Control of call duration timer.
 This timer supervises if after sending of ACR a new AC is received.
 Tccd has a value range of 1 to 20 seconds.

Ranges for the default values for Tssf.
- non user interaction Tssf timer value: 1 second to 20 seconds
- user interaction Tssf timer value: 1 minute to 30 minutes
*/

/* TASK definition:
The sending of an Application_Begin signal opens a new relationship to the imcnSCF.
The sending of an Application_End or Abort signal terminates the relationship to the imcnSCF.
*/

/* Decision box definitions (1)

'armed TDPs for this CSI?'
It is questioned whether or not the ongoing call can encounter further TDPs which are
indicated in the current CSI.

'Call to be released?'
It is questioned whether or not the ongoing call will be released imediately after imcnSSF
has responded; that is the ongoing call will not send any signals furtheron to the imcnSSF.
NOTE: In this case the imcnSSF shall also go to idle.

*/

/* Decision box definitions (2)
Thefollowing decisions are used by procedures in CCF.

'imcnSSF invoked?'
Is the imcnSSF process in any state other than Idle?

*/

Figure 5.22 a

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the left are to/from the IM-SSF;
signals to/from the right are
to/from the imcnSCF. */

The received CSI states
whether DP Collected_Info
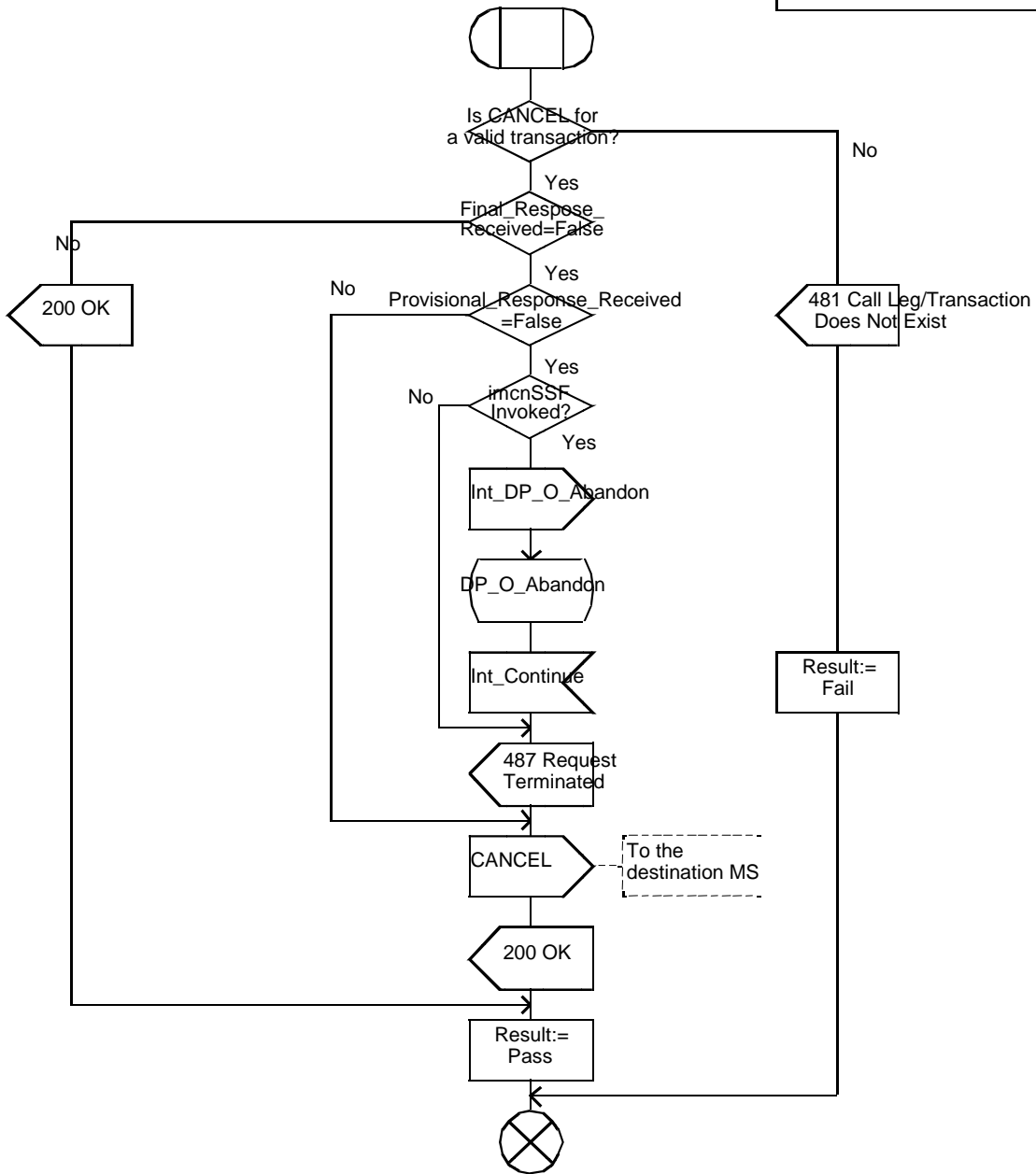or DP Analysed_Information
or DP Route_Select_Failure
or DP T_Busy
or DP T_No_Answer
or DP Terminating_Attempt_
Authorised shall be armed
as TDP.

Start_State

Idle

Idle

| Int_Invoke imcnSSF (O-CSI) | Int_Invoke imcnSSF (T-CSI) | Int_Invoke imcnSSF (VT-CSI) | Int_Invoke imcnSSF (D-CSI) | Int_Invoke imcnSSF (N-CSI) |

Arm DP

Int_O_Exception,
Int_T_Exception

Int_DP_O_Answer,
Int_DP_T_Answer,
Int_DP_O_Abandon,
Int_DP_T_Abandon,
Int_DP_Route_Select_Failure,
Int_DP_O_No_Answer,
Int_DP_T_No_Answer,
Int_DP_O_Busy,
Int_DP_T_Busy,
Int_DP_O_Disconnect,
Int_DP_T_Disconnect,
Int_DP_Analysed_Info

Int_imcnSSF
Invoked

Int_Continue

Wait_For_
_Request

Idle

Figure 5.22b

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

Int_DP_O_Abandon,
Int_DP_T_Abandon,
Int_DP_O_Disconnect,
Int_DP_T_Disconnect,
Int_DP_O_Answer,
Int_DP_T_Answer,
Int_DP_O_Busy,
Int_DP_O_No_Answer

Int_DP_Route_Select_Failure,
Int_DP_T_Busy,
Int_DP_T_No_Answer

Wait_For_
_Request

Int_T_Exception,
Int_O_Exception

Int_DP_
Terminating
Attempt
_Authorized

Int_DP_
Collected
_Information

Int_DP_
Analysed
_Information

'DP_
Terminating
Attempt
Authorized
armed?'

No

Check_Criteria_
_Unsuccessful

Check_Criteria_
_Collected_Info

Idle

Check_Criteria_
_Analysed_Info

Yes

Yes

Result=
pass?

Yes

Result=
pass?

No

Result=
pass?

Yes

No

No

Int_Continue

Int_Continue

Int_Continue

Check_Gap_
_Criteria

Idle

'armed TDPs
for this CSI?'

Idle

Result =
pass?

Yes

No

Yes

Wait_For_
_Request

Idle

Yes

2

Check_Gap_
_Criteria

Result =
pass?

No

Default Call Handling =
Continue Call?

Yes

No

Int_Continue

Apply Gap
treatment
if present

Yes

1

'armed TDPs
for this CSI?'

Int_ReleaseCall

Gap treatment depends on
the info received in the
Call Gap message (i.e.
tone/announce, cause, etc.)

Yes

No

Wait_For_
_Request

Idle

Figure 5.22c

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the left are to/from the IM-SSF;
signals to/from the right are
to/from the imcnSCF. */

① 1

'Set Tssf to default
non user interaction
Tssf timer interval
and restart Tssf'

Application_
Begin

'Set Control
Relationship'

CAP_InitialDP

ACR sent:=false
AC pending:=false
Outstanding requests = 1
Oustanding Call Information Report = 0

Waiting_for_
_Instructions

② 2

'Set Tssf to default
non user interaction
Tssf timer interval
and restart Tssf'

Application_
Begin

'Set Control
Relationship'

CAP_InitialDP

Waiting_for_
Instructions
for DS

Figure 5.22d

/* Invocation of imcnSSF in MO, MT call case. */

Waiting_for_
_Instructions

/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

CAP_Apply_
Charging

CAP_Reset_Timer

Internal

Timer expiry
Tssf

Handle_AC

Abort

Yes

No

Int_Error

Set Tssf to
CAP_Reset_Timer
time interval and
restart Tssf

Set Tssf to
CAP_Reset_Timer
time interval and
restart Tssf

Complete_all_
FCI_records

No

Waiting_For_
_Instructions

'Default call
handling = continue
call?'

'Not Waiting for first response after IDP
or first reset Timer'

Yes

No

'armed TDPs
for this CSI?'

Yes

Wait_For_
_Request

Idle

Figure 5.22e

Process imcnSSF

/* Invocation of imcnSSF in MO,
MT call case. */

Waiting_for_
_Instructions

/* Signals to/from the left are to/from the IM-SSF;
signals to/from the right are
to/from the imcnSCF. */

CAP_Continue

CAP_Continue_
WithArgument

CAP_Connect

DP_O_No_answer of leg2
DP_T_No_answer of leg2
DP_O_Busy of leg2
DP_T_Busy of leg2
DP_Route_Select_Failure of leg2
DP_O_Disconnect of leg2
DP_T_Disconnect of leg2

Stop Tssf

Stop Tssf

Stop Tssf

DP_O_Disconnect of leg1
DP_T_Disconnect of leg1

Leg 1 is available

No

Message was received due to
DP of Leg ID

Yes

Int_Connect

Int_Continue

ELSE

Complete_
FCI_record
(leg2)

Complete_
FCI_record
(leg1)

Int_Continue_
With
_Argument

DP was due to
Call Forwarding

Handle_CIR_
leg(leg2)

Message was received due to
DP of Leg ID

Yes

No

ELSE

DP_O_No_answer of leg2
DP_T_No_answer of leg2
DP_O_Busy of leg2
DP_T_Busy of leg2
DP_Route_Select_Failure of leg2
DP_O_Disconnect of leg2
DP_T_Disconnect of leg2

Handle_CIR_
leg(leg1)

Complete_
FCI_record
(leg2)

Yes

No

DP was due to
Call Forwarding

Current DP is
O_Disconnect or
T_Disconnect?

Int_Continue

Yes

No

Destination
Number
Modified?

Yes

Application_
End

No

Outstanding_
_Requests :=
Outstanding_
_Requests - 1

Handle_CIR_
leg(leg1)

Complete_all_
FCI_records

Outstanding_
_Requests > 0 ?

Outstanding_
_Requests :=0

No

Any remaining
armed EDP or
report pending?

Yes

'Call to be
released?'

Yes

Set Tssf to last
used time interval
and restart Tssf

Int_Continue

No

Yes

No

'armed TDPs
for this CSI?'

No

Waiting_For_
_Instructions

Any remaining
armed EDP-Rs?

'Set Monitor
Relationship'

Yes

Wait_For_
_Request

Idle

Yes

Monitoring

Figure 5.22f

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

Waiting_for_ _Instructions

CAP_Request_ _ReportBCSM_ _Event

CAP_ _ReleaseCall

Int_T_Exception, Int_O_Exception

Set Tssf to last used time interval and restart Tssf

AC pending?

False

True

AC pending?

False

True

Arming rules fulfilled?

CallActive := FALSE

CAP_Apply_ Charging_Report

No

Yes

Error Unexpected Data Value

Arm EDP and/or disarm EDP

CAP_Apply_ Charging_Report

Handle_CIR

Waiting_For_ _Instructions

Depending on the Monitoring parameter received for the indicated detection point. For DP O/T Disconnect a DP is only disarmed for the leg for which the event was received.

Handle_CIR

Complete_all_ FCI_records

Complete_all_ FCI_records

Abort

Application_ End

Int_Release Call

Stop Tssf

Idle

Figure 5.22g

/* Invocation of imcnSSF in MO, MT call case. */

Waiting_For_ _Instructions

/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

CAP_Establish Temporary Connection

Stop Tssf

Int_Establish Temporary Connection

Await_Temporary_ Connection_ Establishment

Int_Temporary_ Connection_ Established

AC pending?

No →

Yes

Start Tcp

Tw>0

No →

Yes

Start Tw

Set Tssf to user interaction timer value and restart Tssf

Waiting_For_ _End_Of_ Temporary_ Connection

CAP_Cancel_(All)

Disarm all EDPs

Cancel all reports

Int_ETC_Failed

Error ETC failed

Set Tssf to last used time interval and restart Tssf

Waiting_For_ Instructions

Figure 5.22h

/* Invocation of imcnSSF in MO,
MT call case. */

Waiting_for_
_Instructions

/* Signals to/from the left are to/from the IM-SSF;
signals to/from the right are
to/from the imcnSCF. */

CAP_ConnectTo
Resource

Stop Tssf

Connect_To_
Resource

result

pass

fail

Set Tssf to last
used time interval
and restart Tssf

AC pending?

No   Yes

Return appropriate
error to the
imcnSCF

Start Tcp

Waiting_For_
Instructions

Tw>0

No   Yes

Start Tw

Set Tssf to user
interaction timer
value and restart
Tssf

Waiting_For
_End_Of_
User_Interaction

Figure 5.22i

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the right are to/from the imcnSCF. */

Monitoring

CAP_Request_
Report_BCSM_
Event

Arming rules
fulfilled?

No

In state 'Monitoring', only
requests to disarm DPs or to
sent notifications are allowed

Yes

Error: Unexpected
Data Value

Arm DP
and/or
disarm DP

Any armed
EDP or report
pending

Yes

No

Monitoring

Complete_all_
FCI_records

Application_End

'armed TDPs
for this CSI?'

No

Yes

Wait_For_
_Request

Idle

Figure 5.22j

/* Invocation of imcnSSF in MO, MT call case. */

Waiting_for_Instructions,
Monitoring ,
Waiting_for_End_Of_Temporary_Connection,
Waiting_for_End_Of_User_Interaction,
Await_Temporary_Connection_Establishment

Int_DP_O_
_Disconnect
/* legID */

Int_DP_T_
_Disconnect
/* legID */

Int_DP_O_
_Abandon

Int_DP_T_
_Abandon

/* Signals to/from the left are to/from the IM-SSF;
signals to/from the right are to/from the imcnSCF. */

DP armed for legID?

No

Yes

CAP_Event
_Report_BCSM
(Notify & Continue)

DP armed
as EDP-R?

Yes

No

Perform implicit
disarming of DPs

Perform implicit
disarming of DPs

Handle_ACR

CallActive :=
FALSE

Perform implicit
disarming of DPs

Handle_ACR

Stop Tssf

Handle_CIR

Handle_CIR_
leg (legID)

Int_Continue

Stop Tssf

CAP_Event
_Report_BCSM
(Interrupted)

Handle_ACR

Int_Continue

CallActive :=
FALSE

Handle_CIR

Complete_all_
FCI_records

Set Tssf to default
non user interaction
timer value and
restart Tssf

Complete_all_
FCI_records

Application_
End

Outstanding_
_Requests :=
Outstanding_
_Requests + 1

Application_
End

Idle

Waiting_for_
Instructions

Idle

Figure 5.22k

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the left are to/from the IM-SSF;
signals to/from the right are
to/from the imcnSCF. */

Waiting_for_End_
_Of_Temporary_
Connection

CAP_Disconnect_
ForwardConnection

Int_TC_Released

CAP_Apply_
Charging

CAP_Reset_
_Timer

Tssf expired

Internal

Handle_ACR

Handle_ACR

Handle_AC

Set Tssf to
CAP_Reset_Timer
time interval and
restart Tssf

Abort

Int_Disconnect_
Forward_
Connection

Waiting_for_End_
_Of_Temporary_
Connection

Int_Disconnect_
Forward_Connection

Set Tssf to last
used time interval
and restart Tssf

CallActive :=
FALSE

TC_Release_
Pending

Int_TC_Released

Int_Error

Complete_all_
FCI_record

Waiting_For_
_Instructions

'Default call
handling = continue
call?'

No

Yes

'armed TDPs
for this CSI?'

No

Yes

Wait_For_
_Request

Idle

Figure 5.22 1

/* Invocation of imcnSSF in MO, MT call case. */

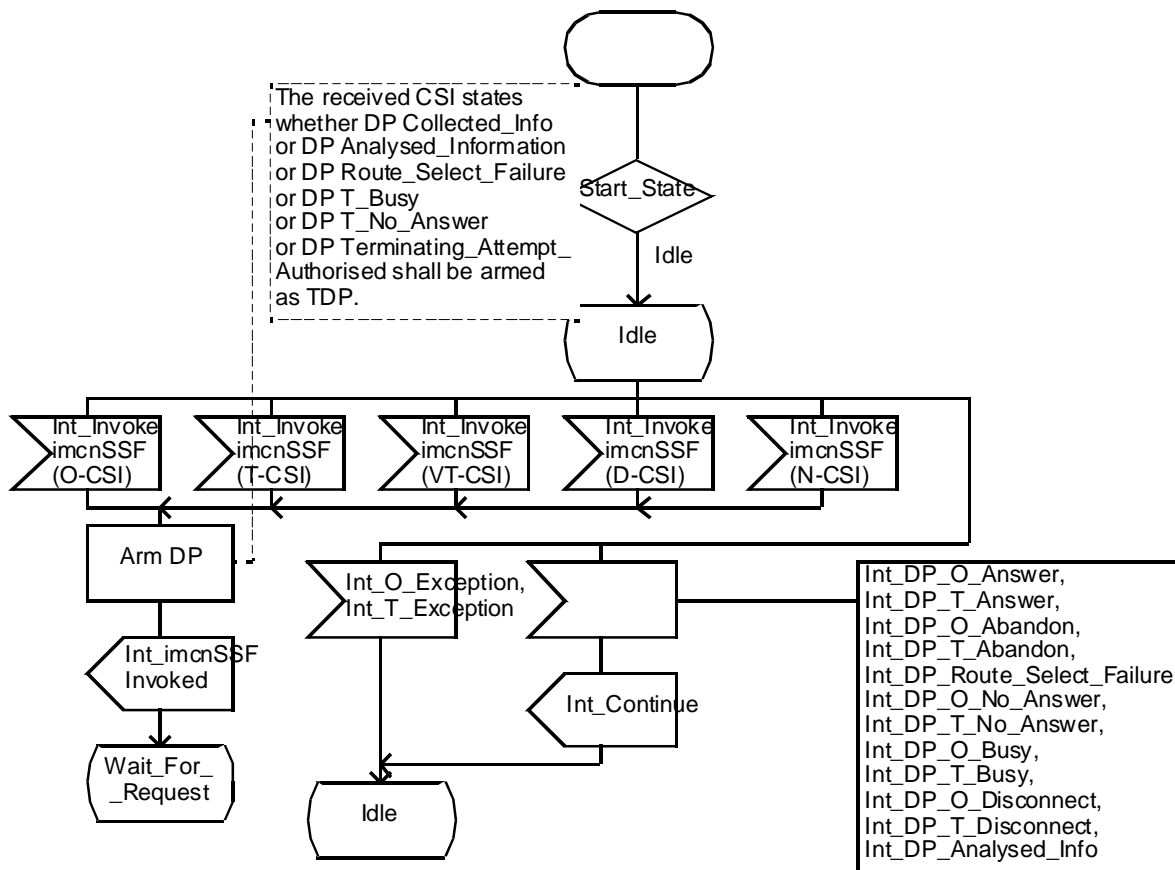/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

Waiting_for_End_Of_Temporary_Connection,
Waiting_for_End_Of_User_Interaction

Internal

Internal

Tw expired

Internal

Tsw expired

Tcp expired

Tccd expired

Int_Apply_
Warning_Tone

Internal

Release?

CAP_
Apply_Charging_
Report

Yes

This provokes the IM-SSF to play a tone to the party for whom the BCSM is operating

No

Handle_ACR

Int_Disconnect_
Forward_Connections

Set Tssf to last used time interval and restart Tssf

Handle_CIR

Start Tccd

Complete_all_
FCI_record

Stored e parameters?

Int_Release

Yes

No

Set stored e parameters as applicable

Stop Tssf

Send_e_
Parameters

Application_
End

Store curent value of Tcp

-

CallActive := TRUE

Idle

This provokes the IM-SSF to send e parameters to the calling party

No stored e-parameters exist after this setting

CallActive := FALSE;
'CallReleasedAtTcpExpiry' present;

Figure 5.22m

/* Invocation of imcnSSF in MO, MT call case. */

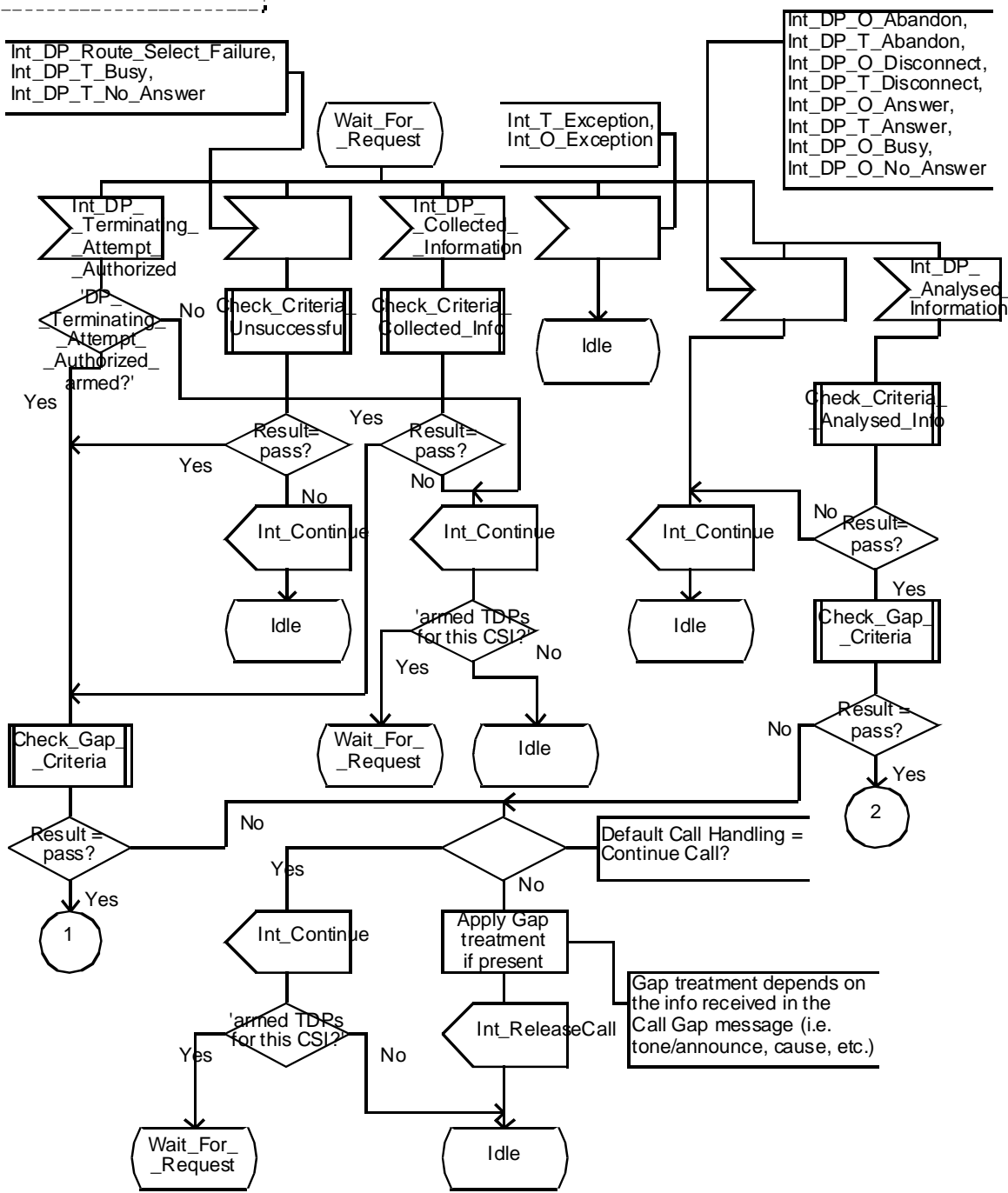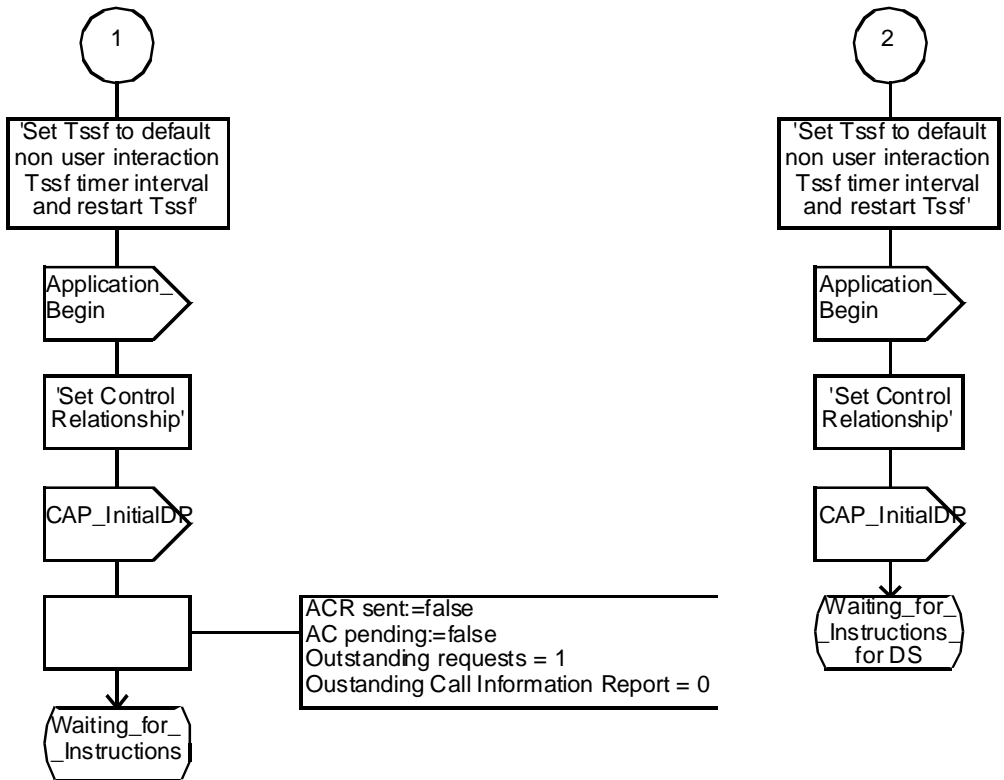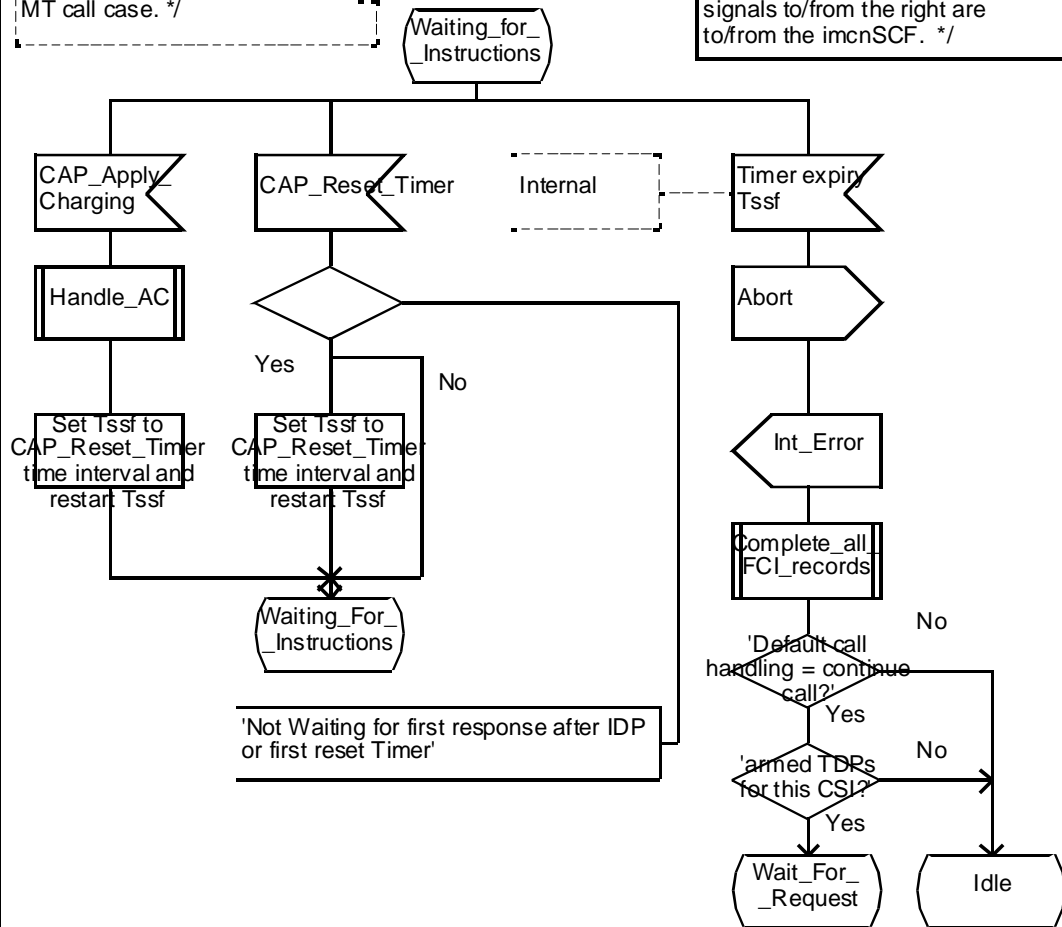/* Signals to/from the left are to/from the IM-SSF signals to/from the right are to/from the imcnSCF. */

Monitoring

Internal

Tw expired   Tsw expired   Tcp expired   Tccd expired

Int_Apply_Warning_Tone

Stored e parameters?   No

Release?

Set stored e parameters as applicable   Yes

Yes

'Any EDP or reports outstanding?'   No

CAP_Apply_Charging_Report

Answer sent to MS?   No

Yes   No

No stored e-parameters exist after this setting   CAP_Apply_Charging_Report

Complete_all_FCI_record   Handle_CIR

Handle_ACR   Application_End   Complete_all_FCI_record

Send_e_Parameters   Idle   Int_Release

Set Tssf to last used time interval and restart Tssf

Store curent value of Tcp   Start Tccd

-        Application_End

Idle

This provokes the IM-SSF to send e parameters to the calling party

CallActive := TRUE

This provokes the IM-SSF to play a tone to the party for whom the BCSM is operating
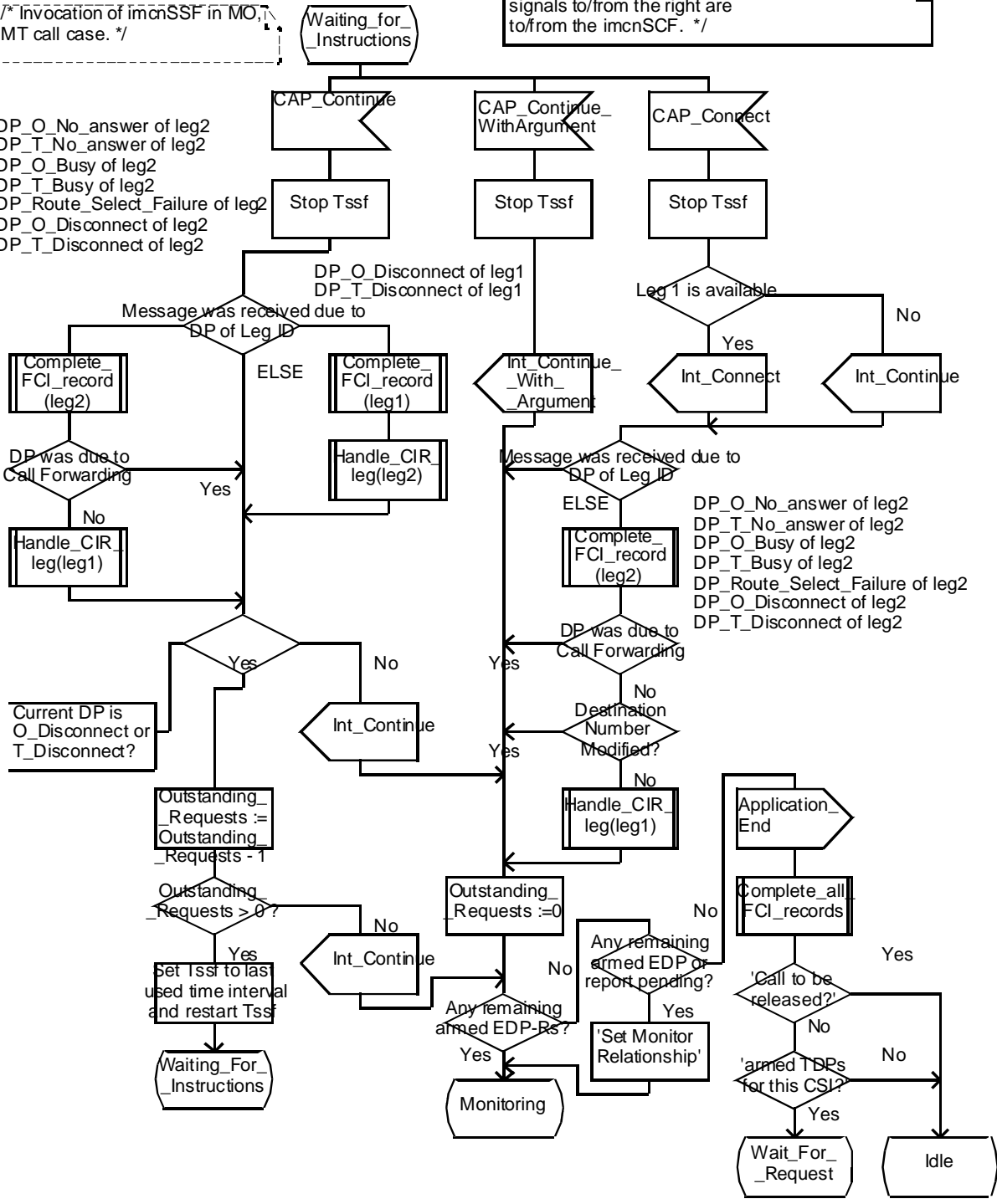
CallActive := FALSE; 'CallReleasedAtTcpExpiry' present

Figure 5.22n

/* Invocation of imcnSSF in MO, MT call case. */

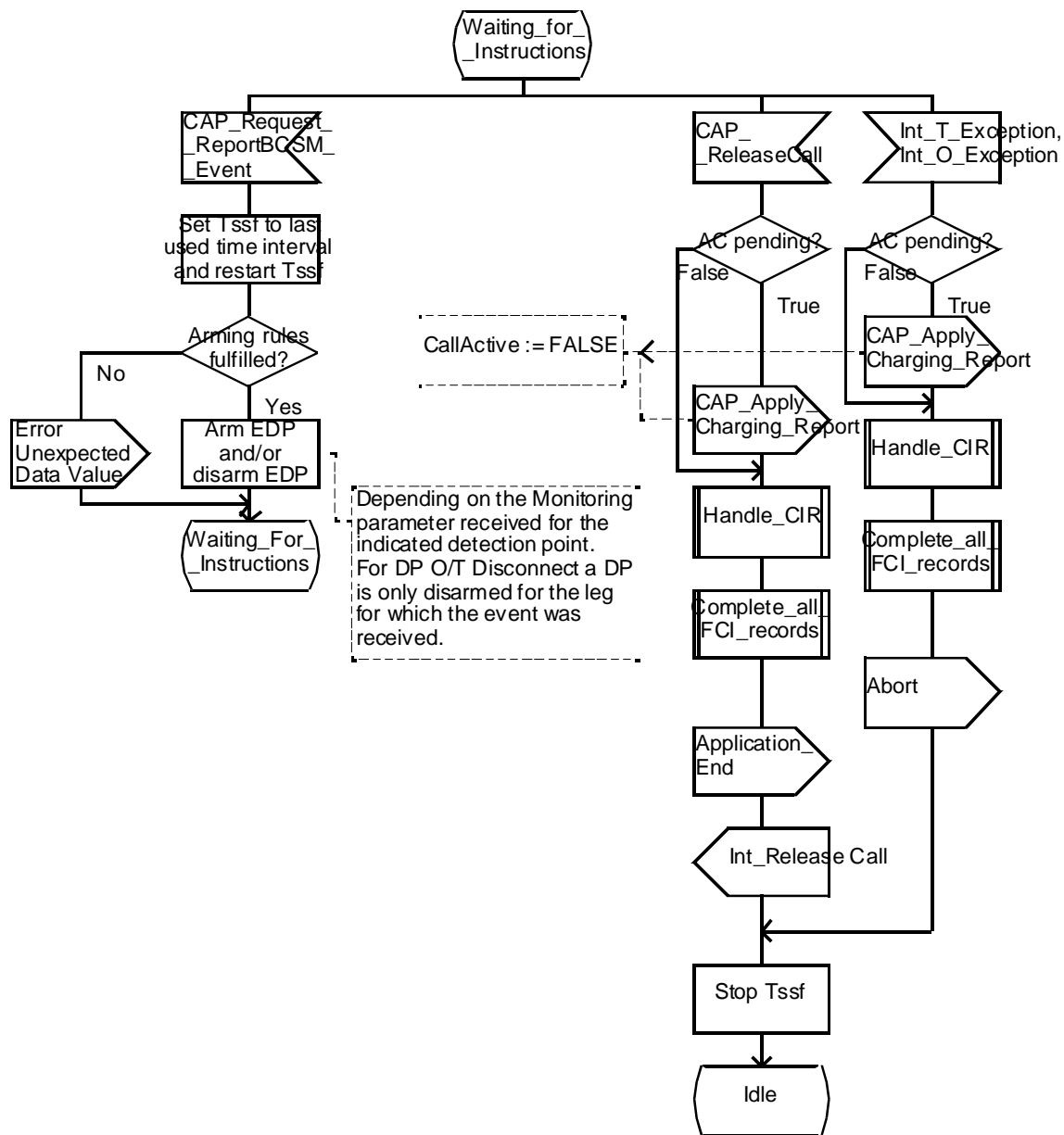/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

Waiting_for_End_
_Of_User_
_Interaction

CAP_Apply_
Charging

CAP_Disconnect_
ForwardConnection

Int_SRF_
_Released

CAP_Reset_
_Timer

CAP_Play_
_Announcement

CAP_Prompt &
Collect_User_
_Information

CAP_Cancel_
(Invoke_ID)

Handle_AC

Handle_ACR

Handle_ACR

CallActive :=
FALSE

Relay the operation
to the SRF

To SRF

Int_Disconnect_
Forward_Connection

Set Tssf to
CAP_Reset_Timer
time interval and
restart Tssf

Set Tssf to last
used time interval
and restart Tssf

Set Tssf to last
used time interval
and restart Tssf

Set Tssf to default
on user interaction
time interval and
restart Tssf

Set Tssf to default
on user interaction
time interval and
restart Tssf

Waiting_For_End_
Of_User_
_Interaction

Waiting_For_
_Instructions

Waiting_for_End_
_Of_User_
_Interaction

Figure 5.22o

CR page 88

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the left are to/from the process Generic_SRF; signals to/from the right are to/from the imcnSCF unless otherwise stated. */

Waiting_for_End_ _Of_User_ _Interaction

CAP_Cancelled_ _error

CAP_Cancel _Failed_error

From SRF

CAP_Prompt_& _Collect_User_ _Information_ _Result

From SRF

CAP_ _Specialised_ _Resource_ _Report

Relay the operation/ result/error to the imcnSCF

Internal

Timer expiry Tssf

Abort

Waiting_for_End_ _Of_User_ _Interaction

Int_Disconnect_ Forward_Connection

SRF_Release_ Pending

Int_SRF_Released

Int_Error

Complete_all_ FCI_record

'Default call handling = continue call?'

No

Yes

'armed TDPs for this CSI?'

No

Yes

Wait_For_ _Request

Idle

Figure 5.22p

/* Invocation of imcnSSF in MO, MT call case. */

Monitoring

/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

CAP_Cancel_(All)
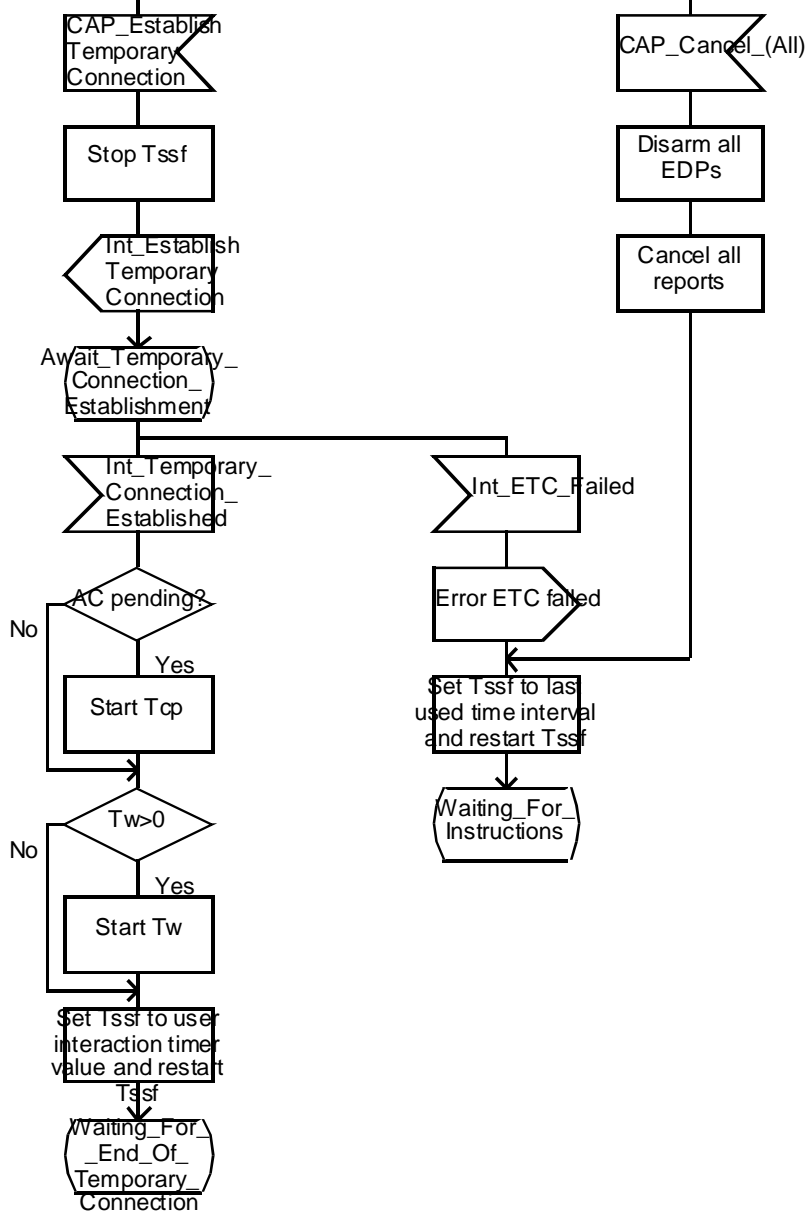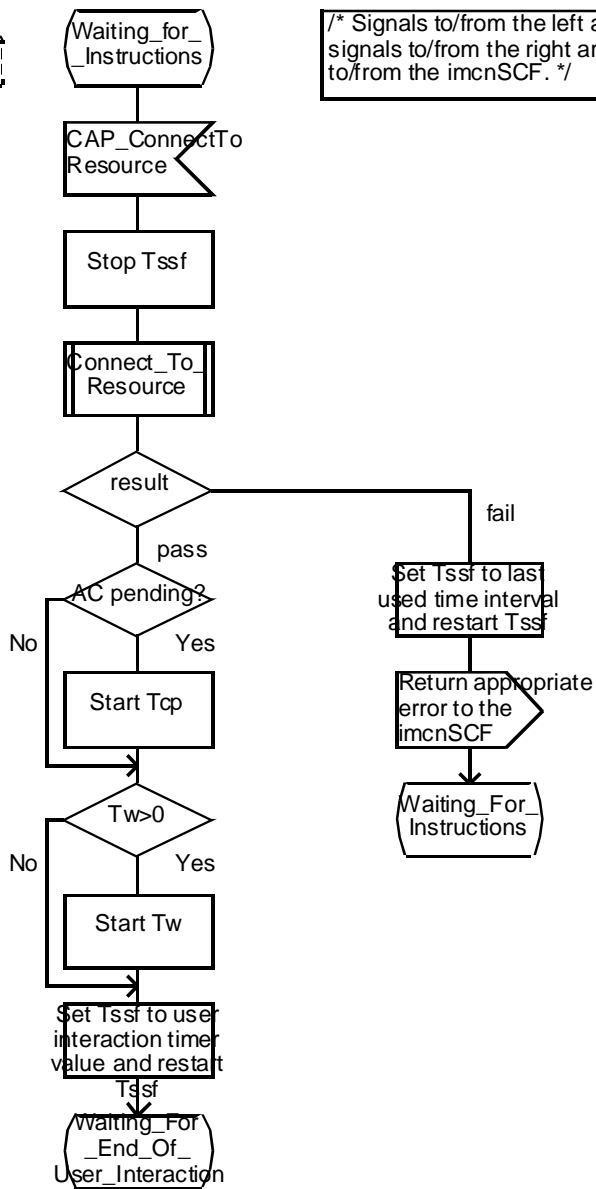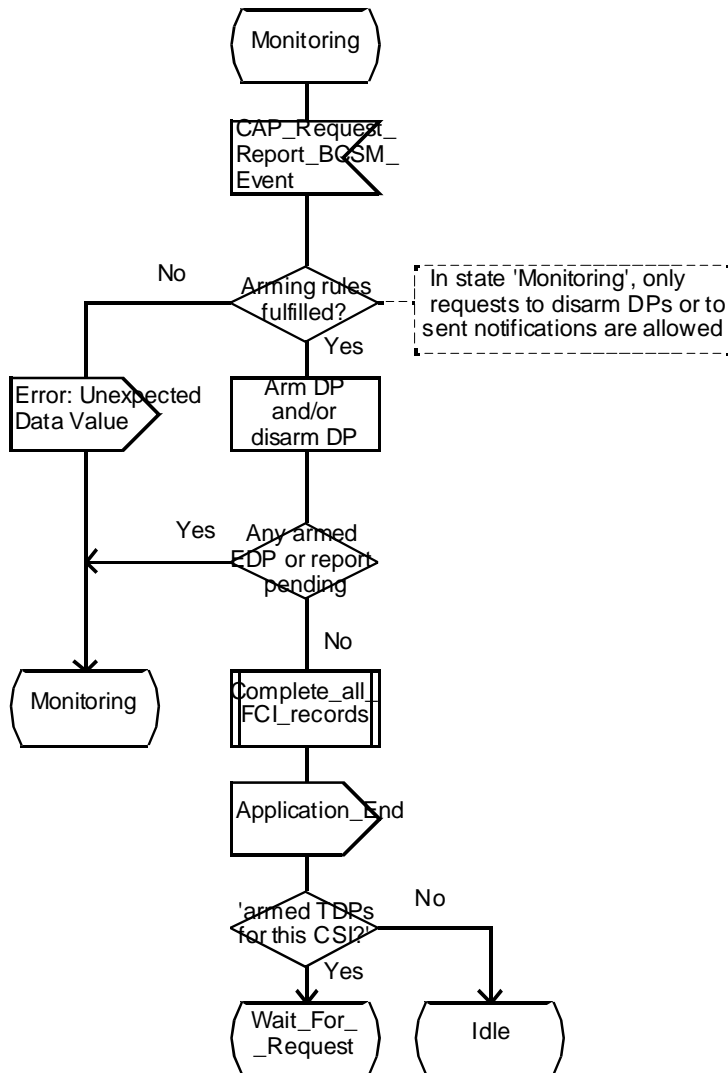
Int_DP_O_Answer

Int_DP_T_Answer

Disarm all EDPs

Handle_O_ Answer

Handle_T_ Answer

Cancel all reports

No

DP armed for legID

Yes

Perform implicit disarming of DPs.

DP armed as EDP-R?

No

CAP_Event _Report_BCSM (Notify & Continue)

Yes

For DP O/T Disconnect the DP is only disarmed for the leg for which the event was received.

Disarm this DP. Perform implicit disarming of DPs.

CAP_Event _Report_BCSM (Interrupted)

No

Disarm this DP. Perform implicit disarming of DPs.

Yes

Any remaining armed EDPs or outstanding report?

Outstanding_ Requests := 1

Application_ End

Int_Continue

Set Tssf to default non user interaction Tssf timer value and restart Tssf

Complete_all_ FCI_record

Monitoring

Waiting_For_ _Instructions

Int_Continue

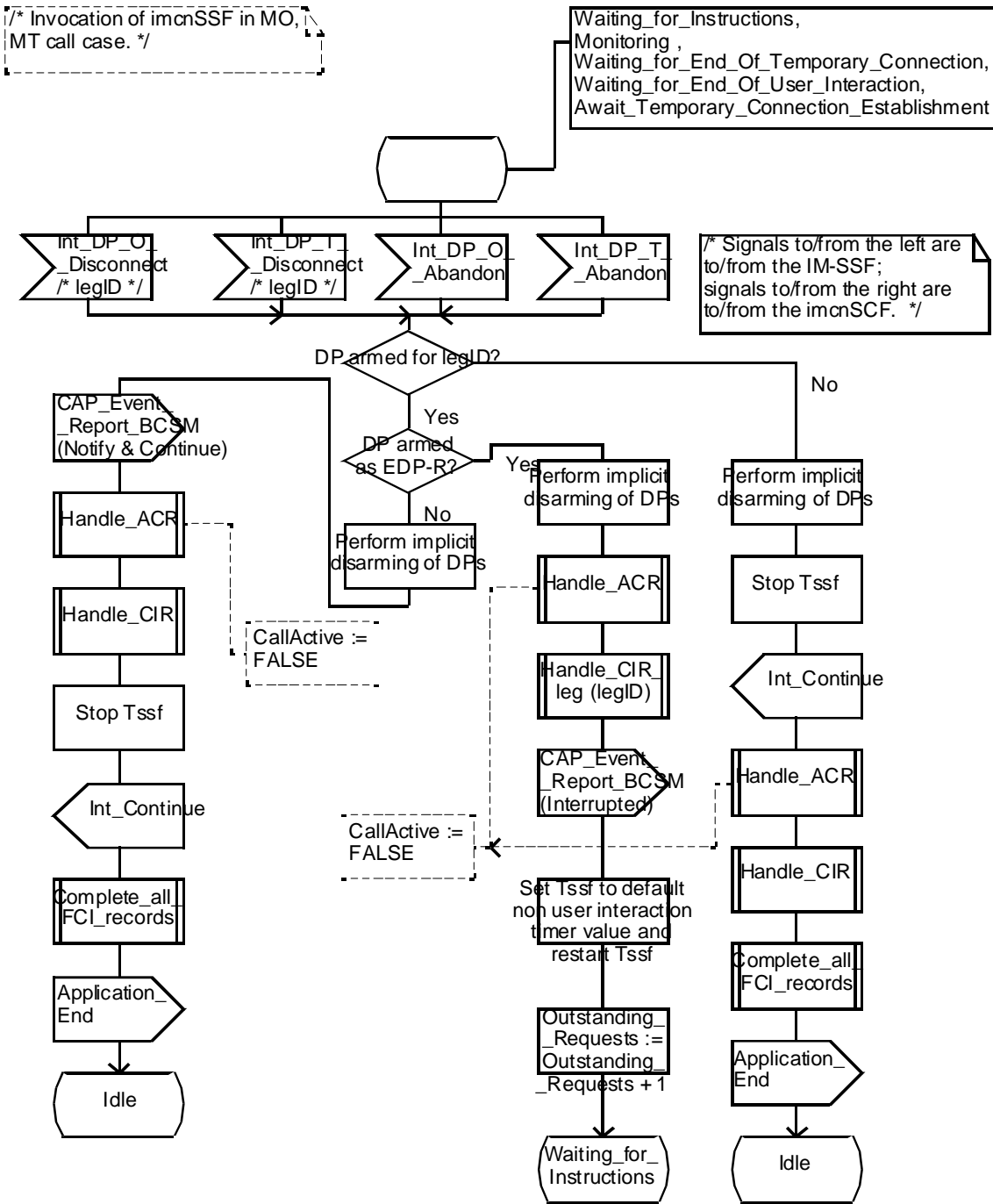'armed TDPs for this CSI?'

No

Yes

Wait_For_ _Request

Idle

Figure 5.22 q

/* Invocation of imcnSSF in MO, MT call case. */

Monitoring

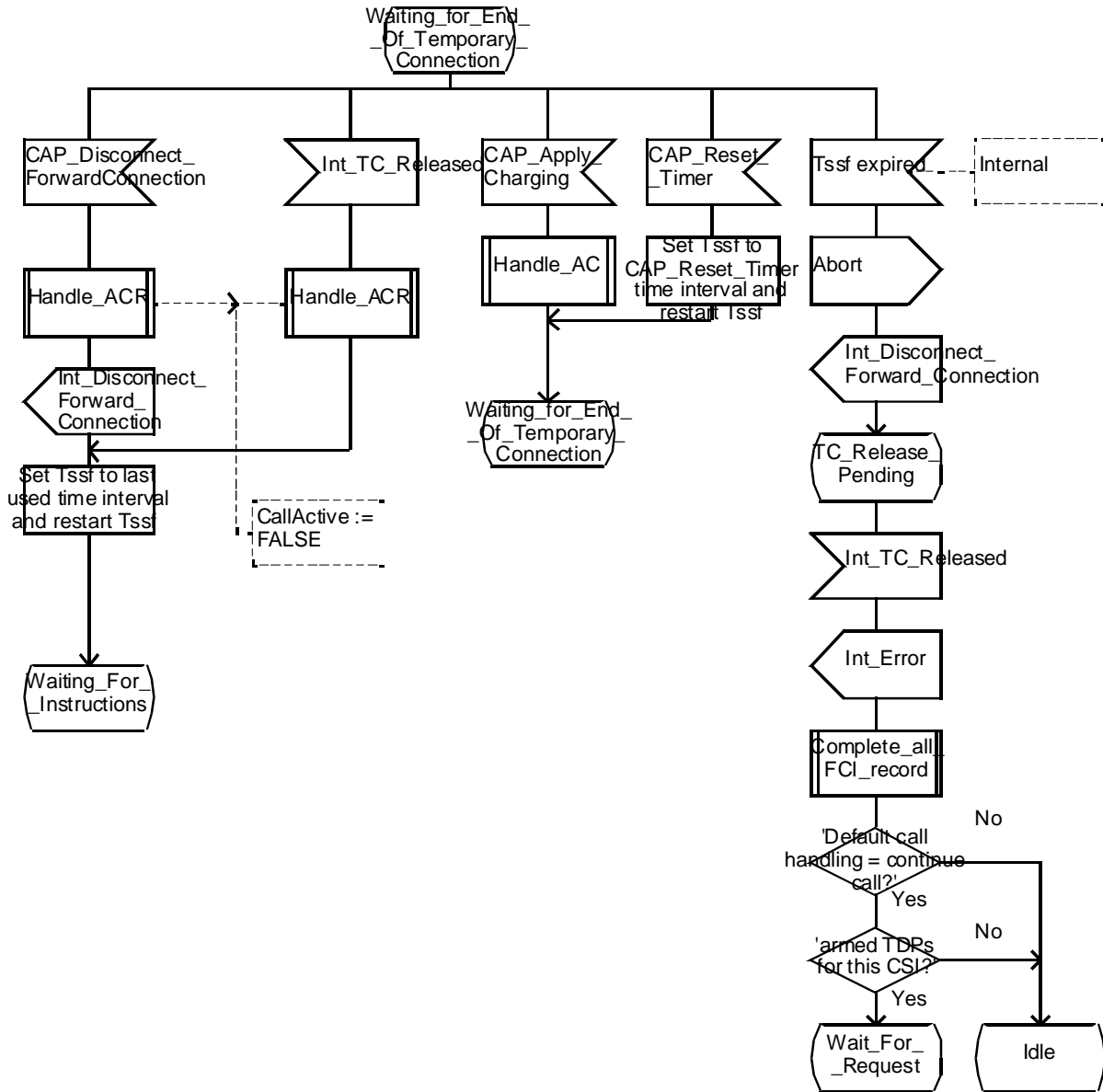/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

Int_DP_O_No_Answer,
Int_DP_T_No_Answer,
Int_DP_O_Busy,
Int_DP_T_Busy,
Int_DP_Route_Select_Failure

EDP type?

EDP_N

EDP_R

Not armed for LegID

CAP_Event_Report_BCSM
(Notify & Continue)

Handle_ACR

Handle_ACR

CallActive :=
FALSE

Stop Delta

Stop Delta

Perform implicit disarming of DPs.

Call Forwarding pending?

No

Yes

Handle_CIR

Handle_CIR_leg (leg2)

Handle_CIR_leg (leg2)

Any remaining armed EDPs or outstanding report?

No

Yes

CAP_Event_Report_BCSM
(Interrupted)

Complete_all_FCI_records

Complete_FCI_record (leg2)

Disarm this DP. Perform implicit disarming of DPs.

Application_End

Int_Continue

Outstanding_Requests := 1

Int_Continue

Monitoring

Set Tssf to default non user interaction Tssf timer value and restart Tssf

Idle

For DP O/T Disconnect the DP is only disarmed for the leg for which the event was received.

Waiting_For_Instructions

Figure 5.22r

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the left are to/from the IM-SSF;
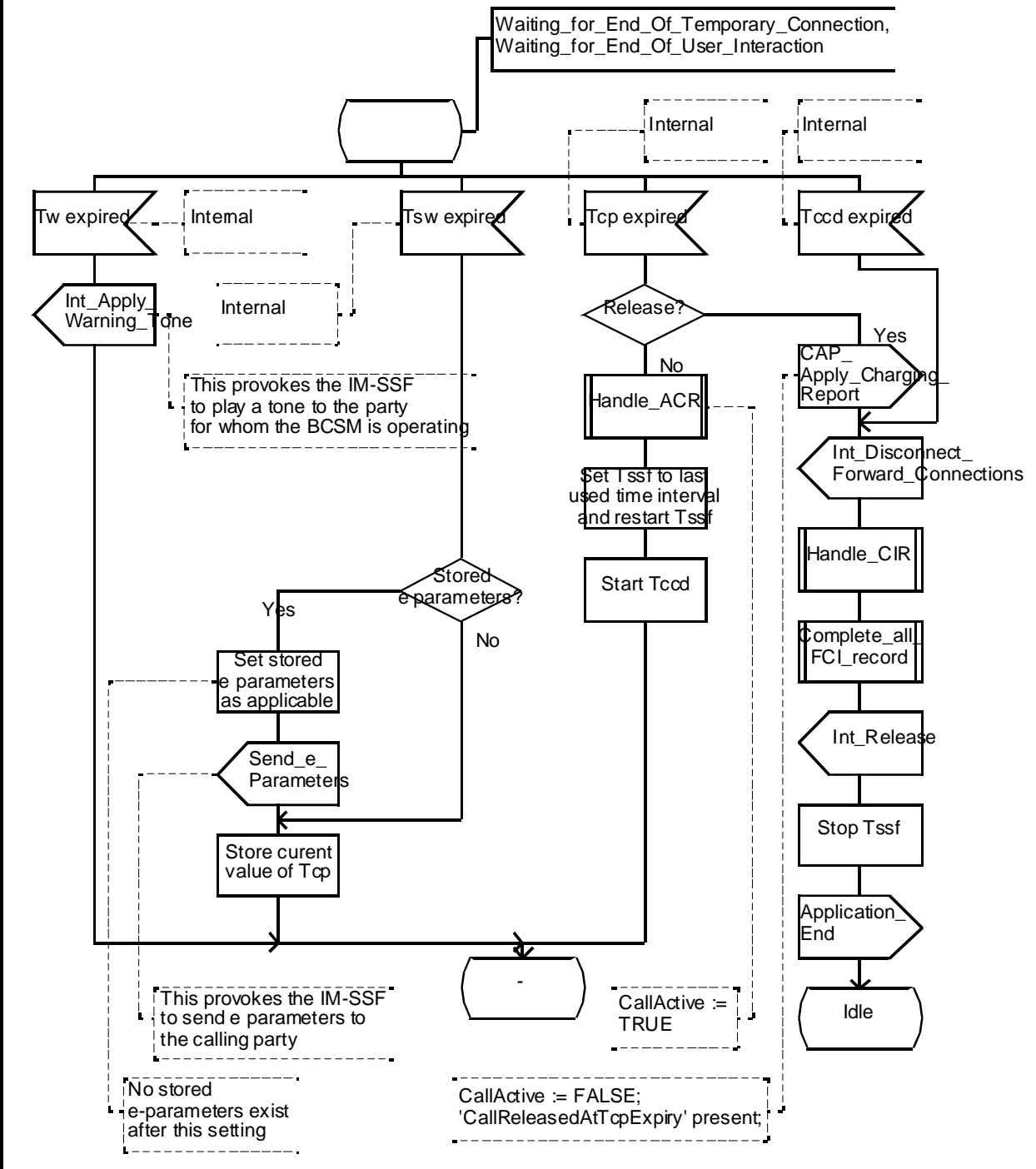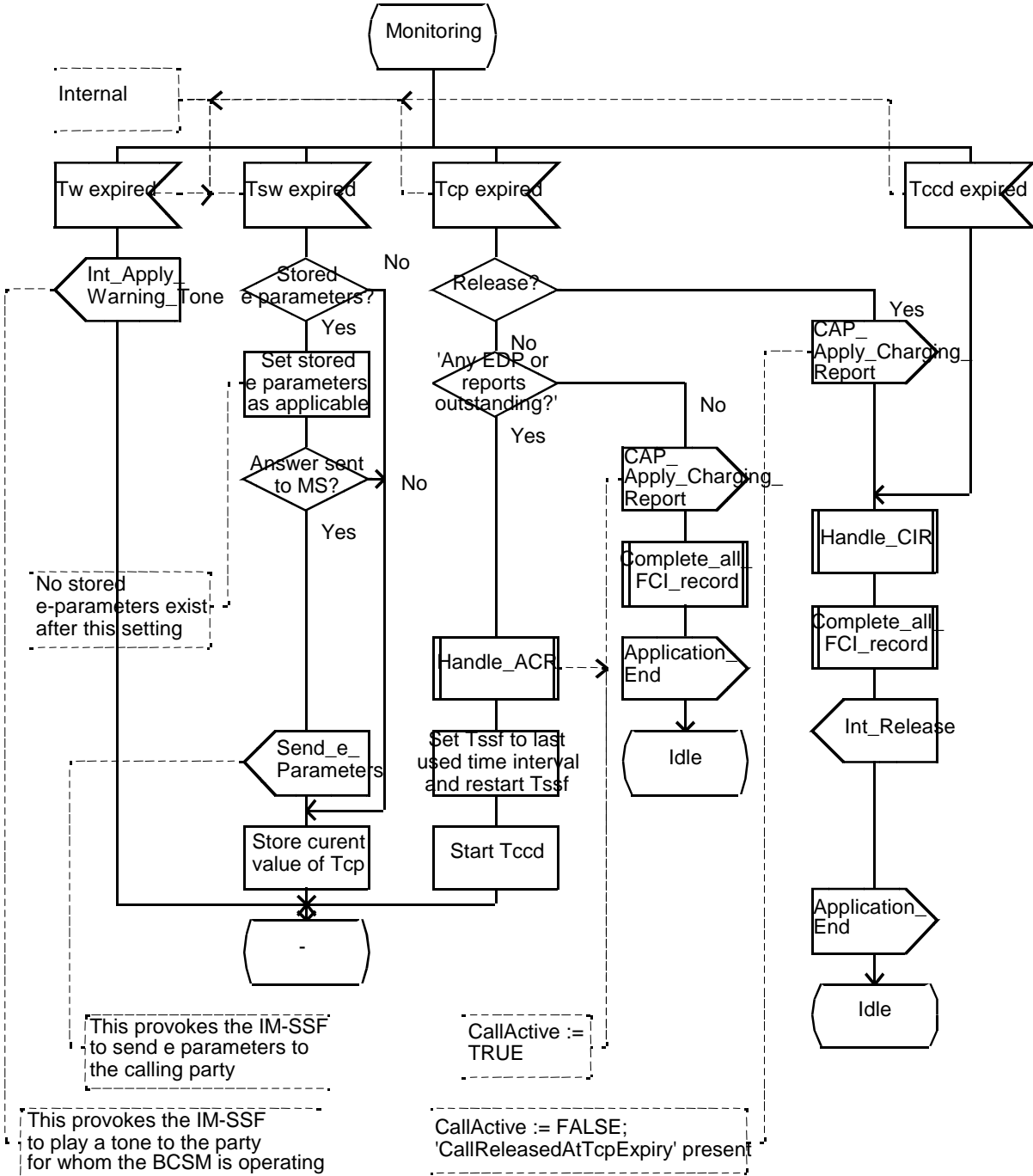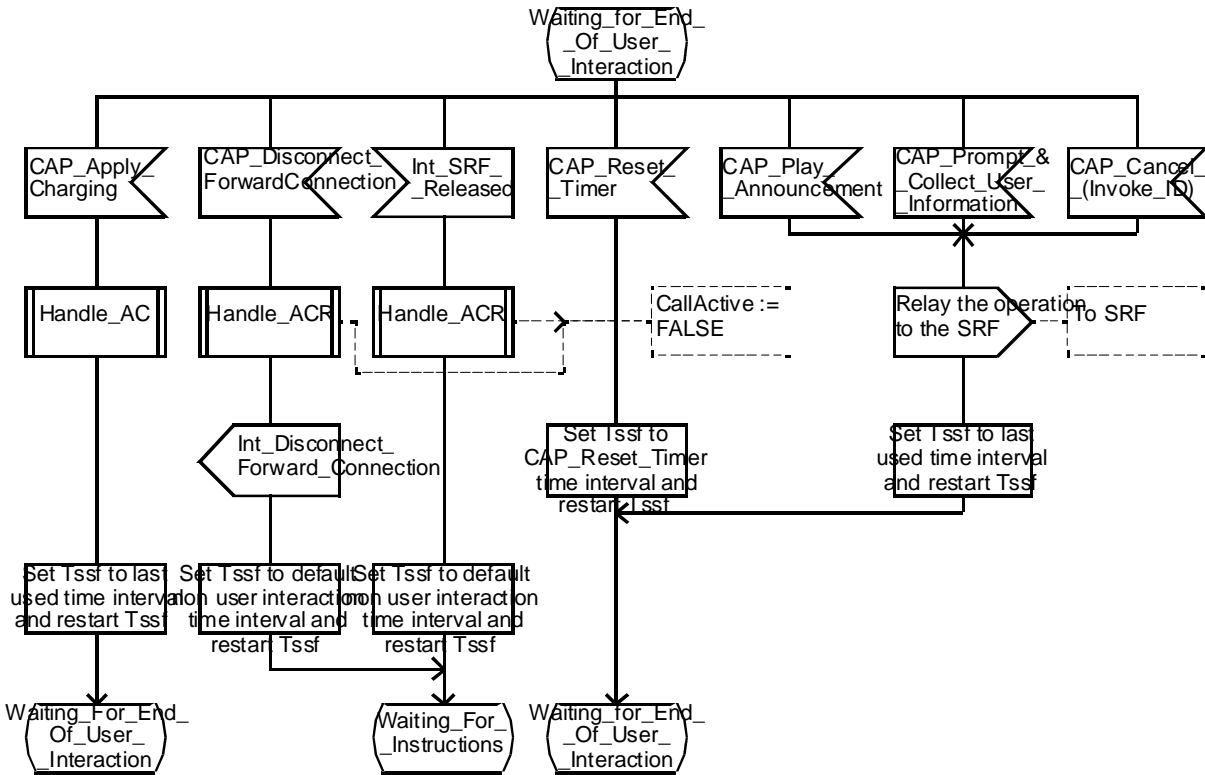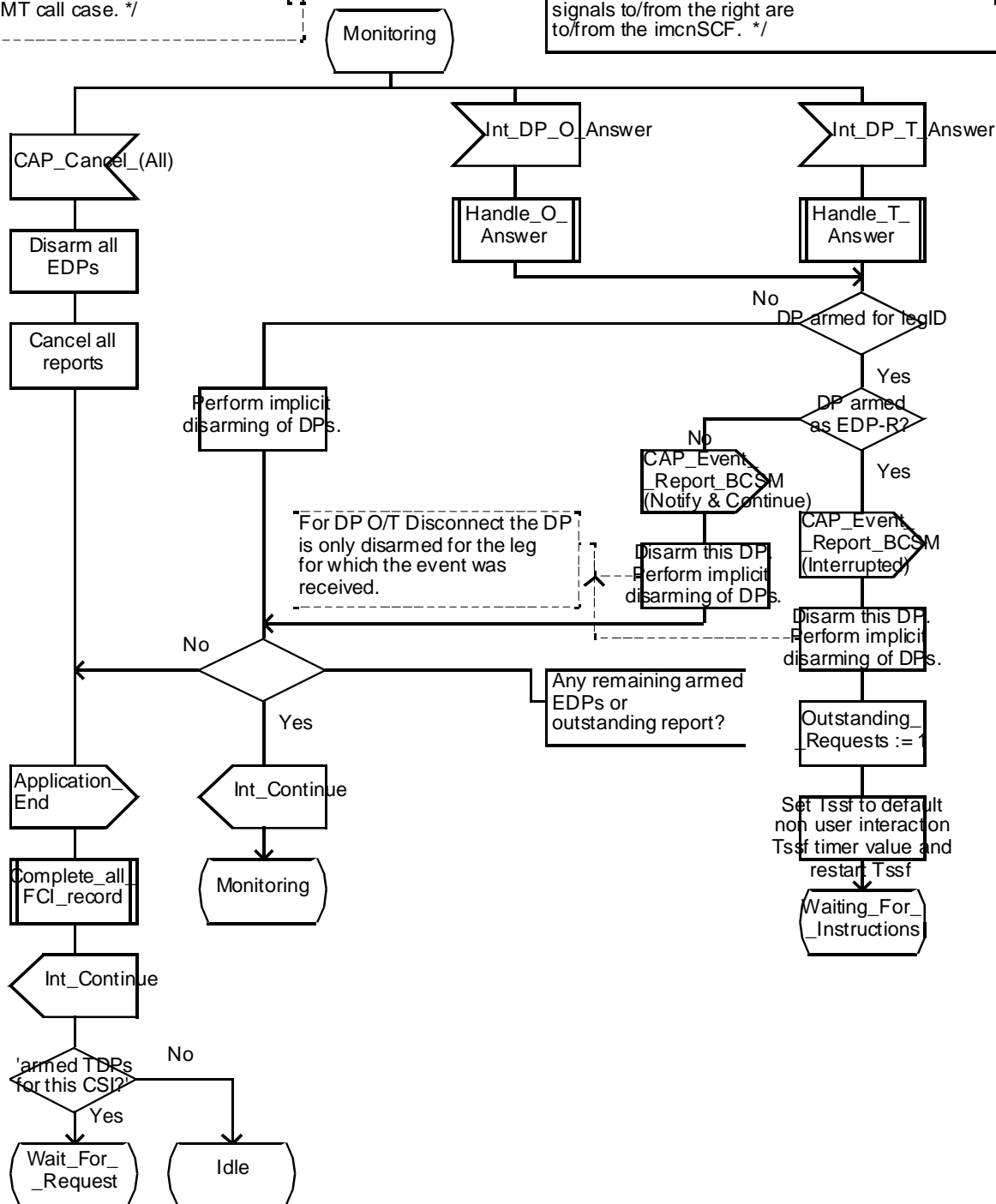signals to/from the right are
to/from the imcnSCF. */

Monitoring

CAP_
_ReleaseCall

Handling of CAP_Release_Call
is only specified in a control
relationship.
The imcnSCF shall not send a
CAP_Release_Call in a
monitor relationship

CAP_
Apply_Charging

Handle_AC

Monitoring

AC pending

True

CAP_
Apply_Charging_
Report

Int_O_Exception,
Int_T_Exception

Handle_CIR

False

AC pending

CallActive :=
FALSE

Complete_all
FCI_records

True

CAP_
Apply_Charging_
Report

Application_
End

False

Handle_CIR

Int_Release_Call

Complete_all
FCI_records

Idle

Abort

Idle

Figure 5.22s

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the right are to/from the imcnSCF. */

Waiting_For_Instructions,
Waiting_For_End_Of_Temporary_Connection,
Waiting_For_End_Of_User_Interaction

CAP_
Furnish_Charging_
Information

Set Tssf to last used time interval and restart Tssf

Non-completed CAMEL logical call record exists for this legID?

No

Yes

AppendFree FormatData in FCI?

Create CAMEL logical call record

"Append"

Not present, "Overwrite"

Append free format data to existing logical call record

Overwrite all CAMEL logical call record data with this FCI data

Write FCI data in CAMEL logical call record

-

Figure 5.22t

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the right are
to/from the imcnSCF. */

Monitoring

CAP_
Furnish_Charging_
Information

Non-completed CAMEL
logical call record
exists for this legID?

No

Yes

Create CAMEL logical
call record

AppendFree
FormatData in FCI?

"Append"

Not present,
"Overwrite"

Append free format
data to existing
logical call record

Overwrite all CAMEL
logical call record
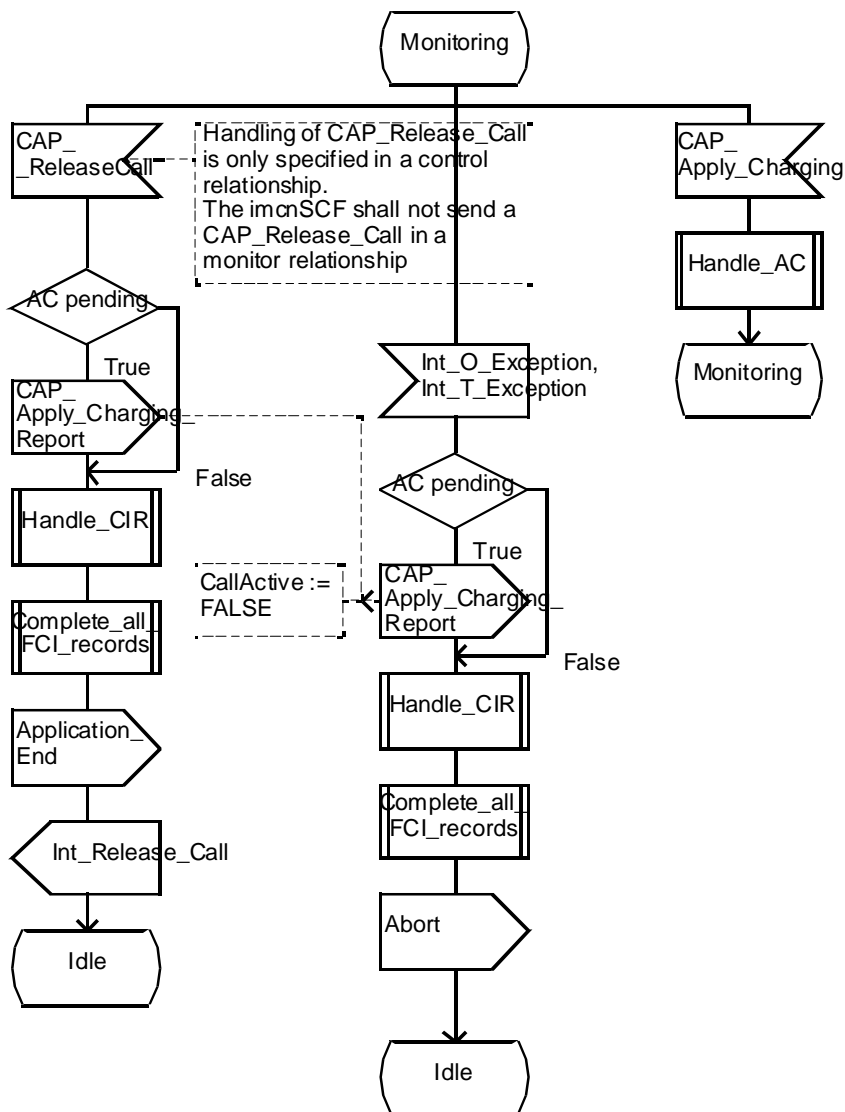data with this FCI data

Write FCI data
in CAMEL logical
call record

Monitoring

Figure 5.22u

/* Invocation of imcnSSF in MO, MT call case. */
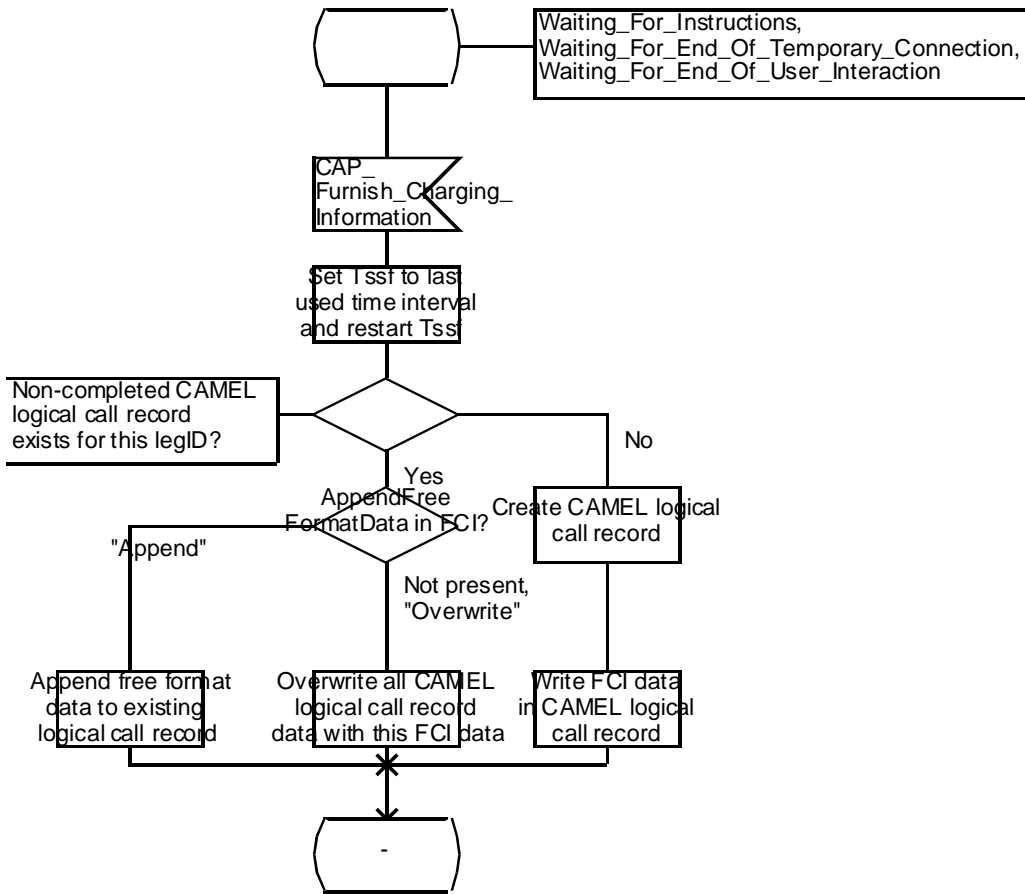
/* Signals to/from the right are to/from the imcnSCF. */

Waiting_For_Instructions,
Waiting_For_Instructions_for_DS,
Waiting_For_End_Of_User_Interaction,
Waiting_For_End_Of_Temporary_Connection

CAP_Send_Charging_Information

Set Tssf to last used time interval and restart Tssf

Handle_SCI ---- See section 4.5.6.3

-

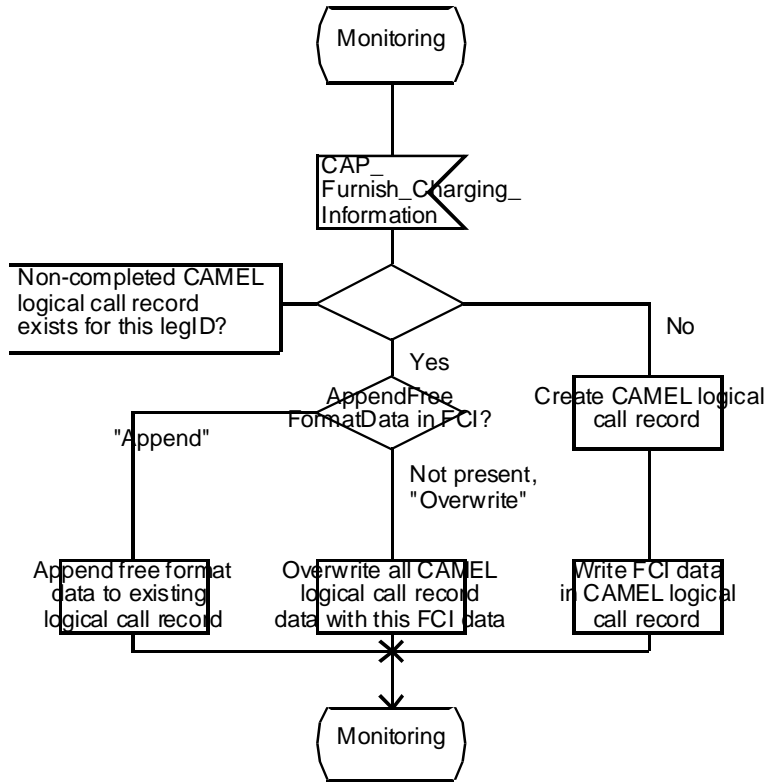Monitoring

CAP_Send_Charging_Information

Handle_SCI ---- See section 4.5.6.3

-

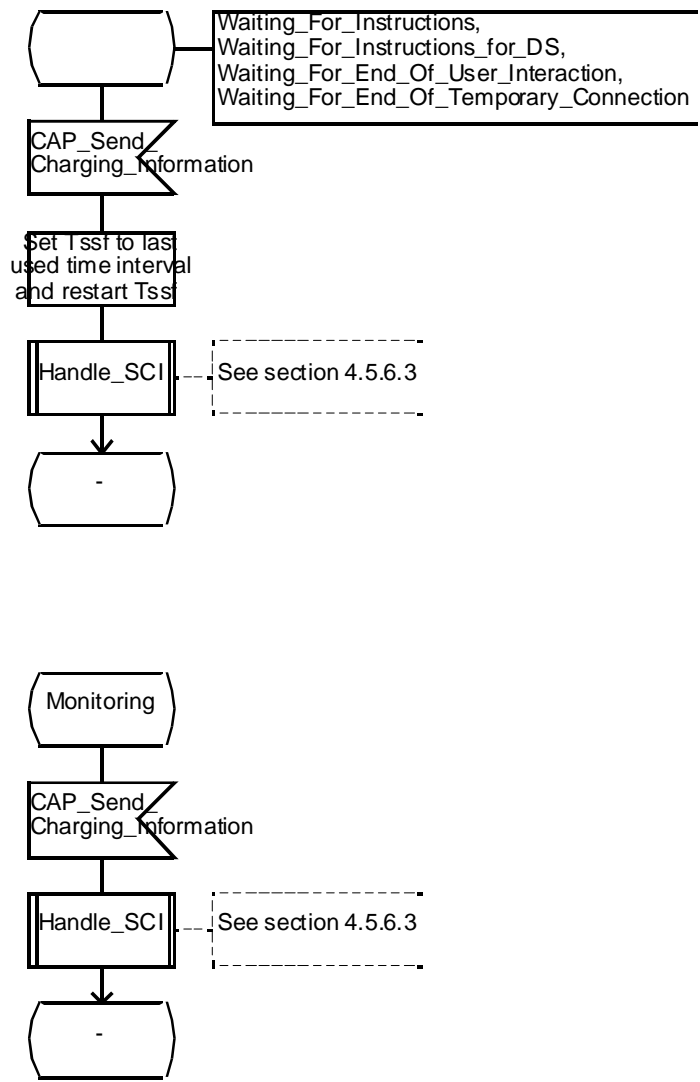Figure 5.22v

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the right are
to/from the imcnSCF. */

Waiting_For_Instructions

CAP_
Call_Information_Request

Set Tssf to last
used time interval
and restart Tssf

store request

| | Oustanding Call Information Report:=
Oustanding Call Information Report +1 |

Waiting_For_Instructions

Figure 5.22w

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the left are
to/from the IM-SSF. */

Monitoring

Int_DP_Analysed_
_Information

Int_Continue

Monitoring
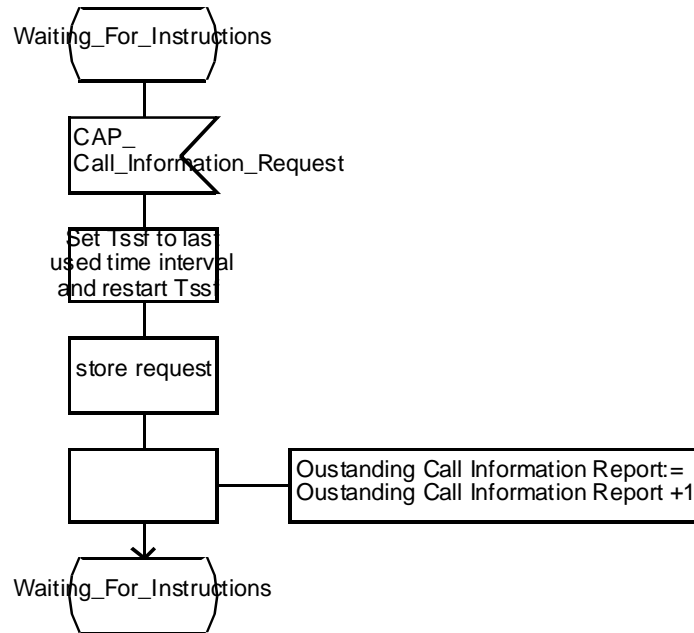
Figure 5.22x

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

Waiting_for_
Instructions
for DS

CAP_
Furnish_Charging_
Information

Set Tssf to last
used time interval
and restart Tssf

Yes

No

Create CAMEL logical
call record

Write FCI data
in CAMEL logical
call record

Overwrite CAMEL
logical call record
with FCI data

Waiting_for_
Instructions
for DS

Non-completed CAMEL
logical call record
exists for this legID?

CAP_Continue_
With
_Argument

Stop Tssf

Int_Continue_
With
_Argument

CAP_Continue

Stop Tssf

Int_Continue

CAP_Connect

Stop Tssf

Int_Connect

Application_
End

Complete_all_
FCI_Records

Idle

CAP_
_ReleaseCall

Stop Tssf

Int_Release Call
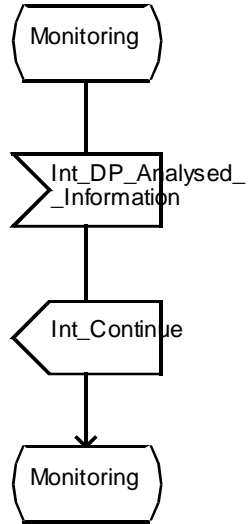
Figure 5.22y

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

Waiting_for_ _Instructions_ For DS

Internal

Timer expiry Tssf

Int_DP_O_ Abandon

Abort

Stop Tssf

Int_Error

Complete_all_ FCI_records

Complete_all_ FCI_records

Application_ End

Idle

Idle

Figure 5.22z

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the left are to/from the IM-SSF;
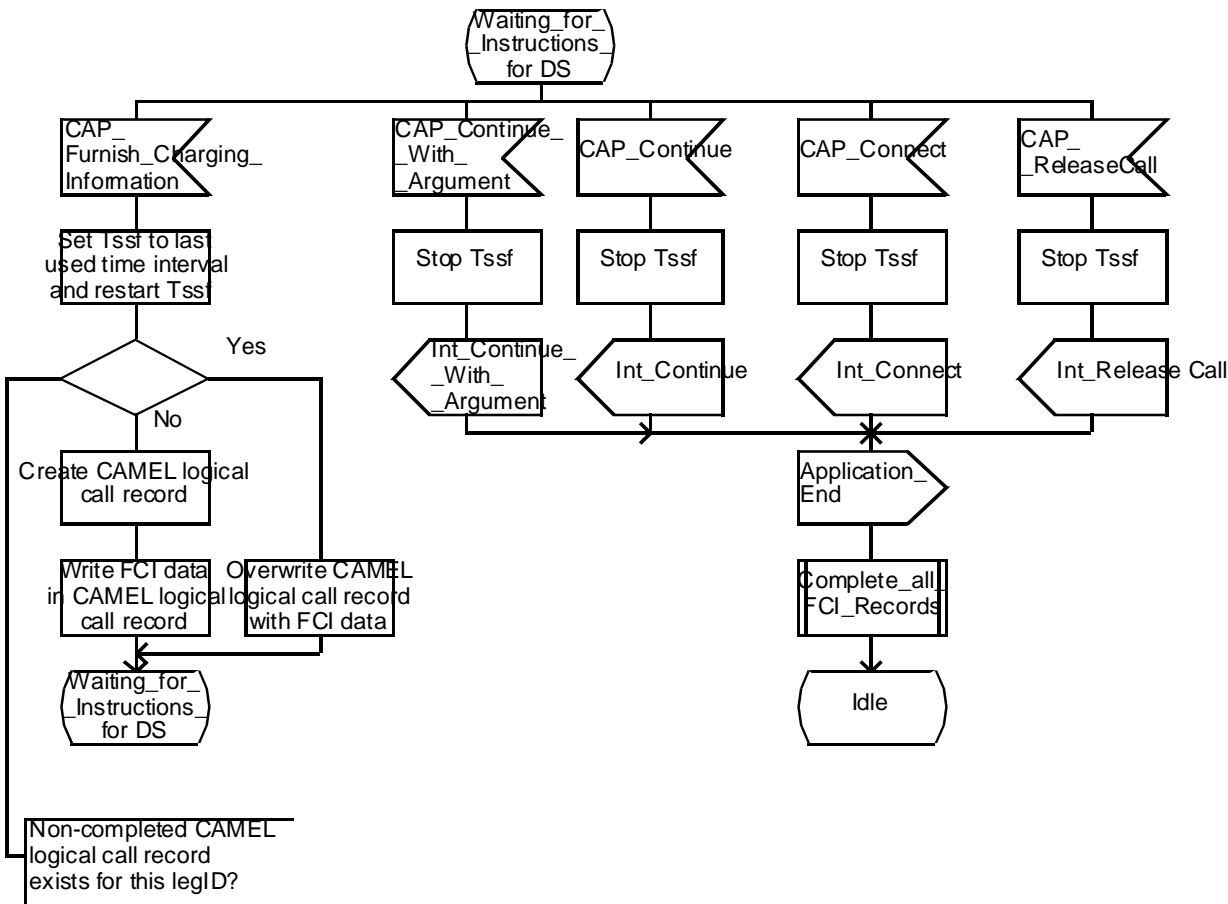signals to/from the right are
to/from the imcnSCF. */

Waiting_For_
Instructions
_For_DS

CAP_Establish
Temporary
Connection

Stop Tssf

Int_Establish
Temporary
Connection

Await_Temporary_
Connection_
Establishment_DS

Int_Temporary_
Connection_
Established

Int_ETC_Failed

Error ETC failed

Set Tssf to user
interaction timer
value and restart
Tssf

Set Tssf to last
used time interval
and restart Tssf

Waiting_For_
_End_Of_
Temporary_
Connection_For_DS

Waiting_For_
Instructions_For_DS

Figure 5.22aa

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the left are to/from the IM-SSF;
signals to/from the right are
to/from the imcnSCF. */

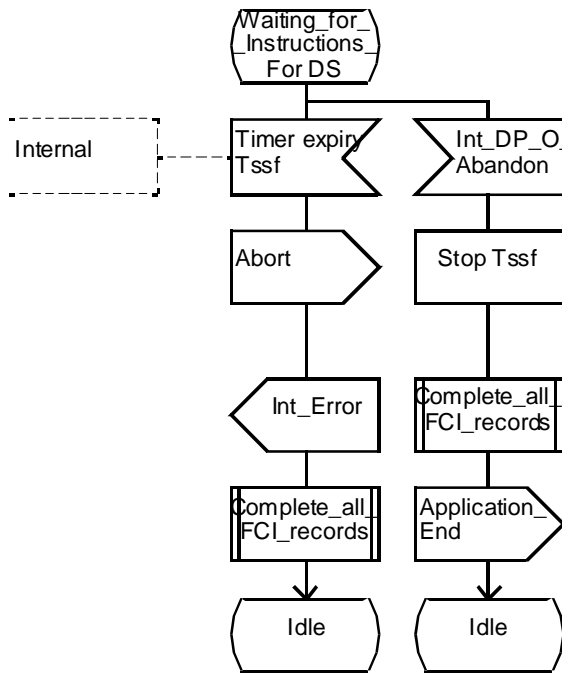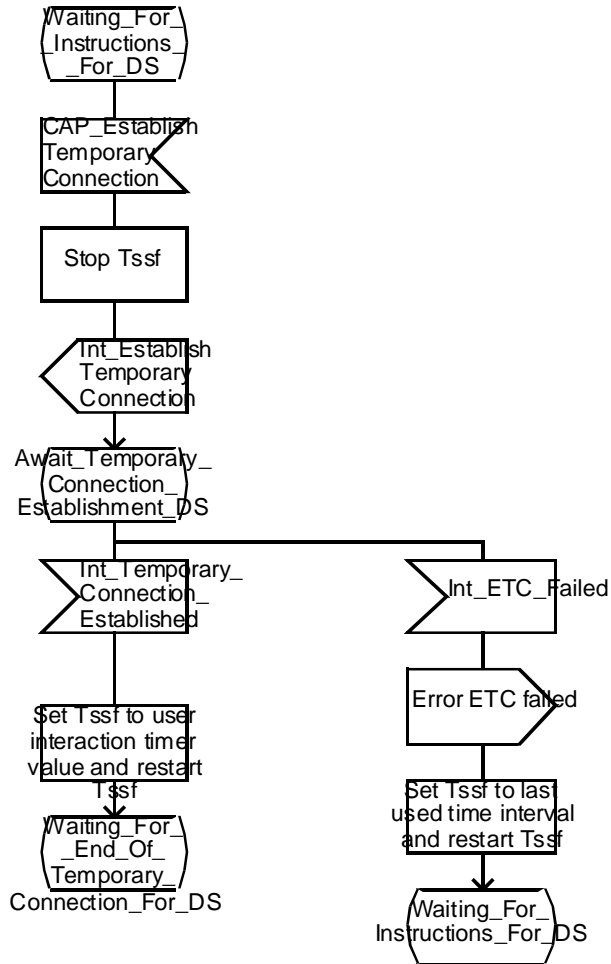Waiting_for_End_
_Of_Temporary_
Connection_For_DS

CAP_Disconnect_
ForwardConnection

Int_TC_Released

CAP_Reset_
_Timer

Tssf expired

Internal

Int_Disconnect_
Forward_
Connection

Set Tssf to
CAP_Reset_Timer
time interval and
restart Tssf

Abort

Set Tssf to last
used time interval
and restart Tssf

-

Int_Disconnect_
Forward_Connection

Waiting_For_
_Instructions_For_DS

TC_Release_
Pending_DS

Int_TC_Released

Int_Error

Complete_all_
FCI_record

Idle
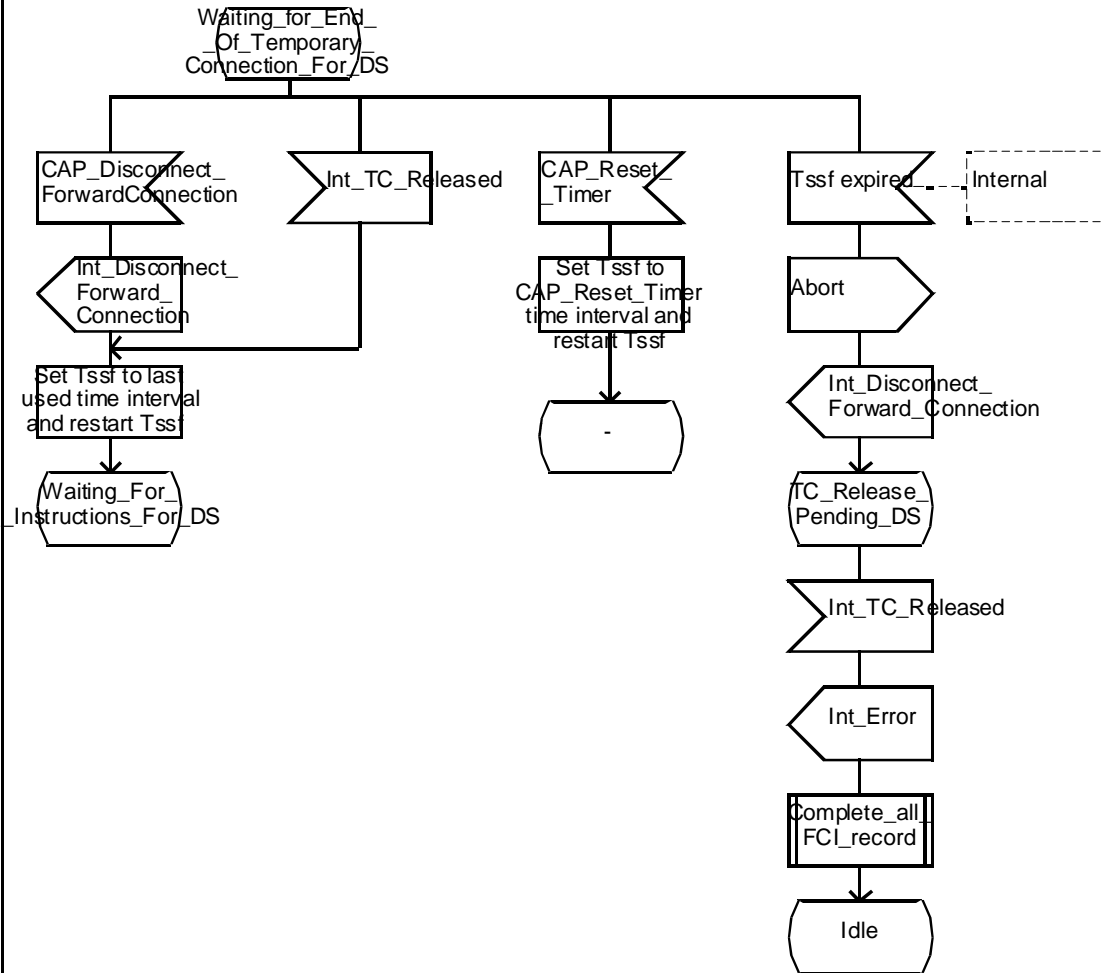
Figure 5.22bb

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

Waiting_for_ _Instructions_For_DS

CAP_ConnectTo Resource

Stop Tssf

Connect_To_ Resource

result

pass

Set Tssf to user interaction timer value and restart Tssf

Waiting_For_ _End_Of_ User_Interaction_For_DS

fail

Set Tssf to last used time interval and restart Tssf

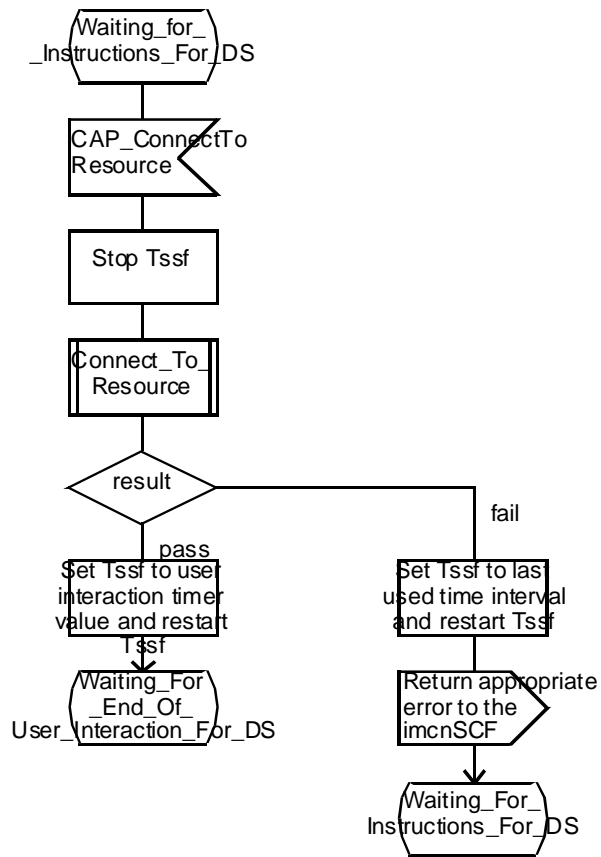Return appropriate error to the imcnSCF

Waiting_For_ Instructions_For_DS

Figure 5.22cc

/* Invocation of imcnSSF in MO,
MT call case. */

/* Signals to/from the left are
to/from the IM-SSF;
signals to/from the right are
to/from the imcnSCF. */

Waiting_for_End_Of_Temporary_Connection_For_DS,
Waiting_for_End_Of_User_Interaction_For_DS

Int_DP_O_
_Abandon

Stop Tssf

Complete_all_
FCI_records

Application_
End

Idle

Figure 5.22dd

Process imcnSSF

/* Invocation of imcnSSF in MO, MT call case. */

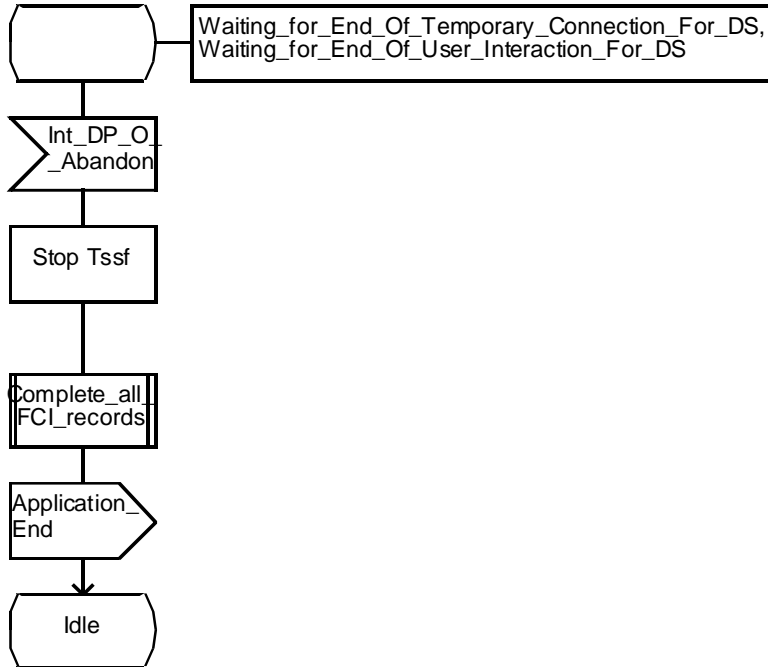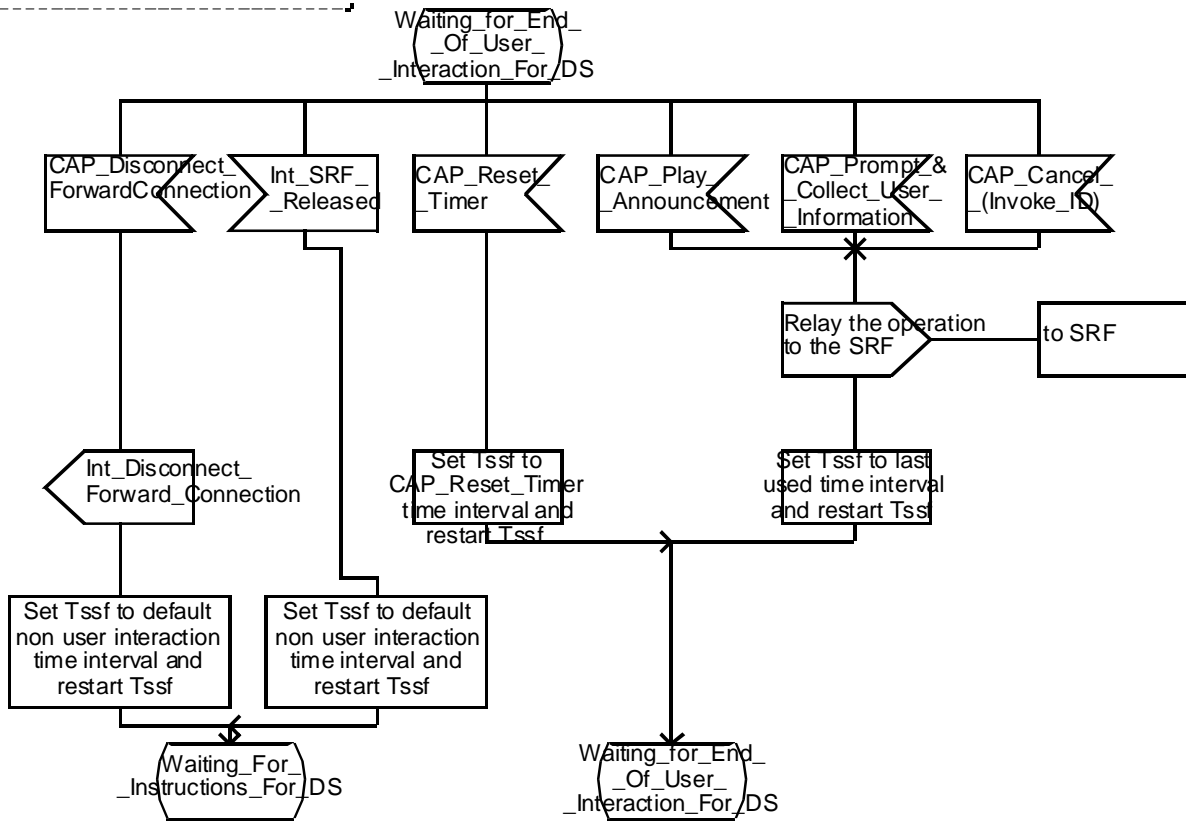/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

Waiting_for_End_ _Of_User_ _Interaction_For_DS

CAP_Disconnect_ ForwardConnection

Int_SRF_ _Released

CAP_Reset_ _Timer

CAP_Play_ _Announcement

CAP_Prompt_& _Collect_User_ _Information

CAP_Cancel_ _(Invoke_ID)

Relay the operation to the SRF

to SRF

Int_Disconnect_ Forward_Connection

Set Tssf to CAP_Reset_Timer time interval and restart Tssf

Set Tssf to last used time interval and restart Tssf

Set Tssf to default non user interaction time interval and restart Tssf

Set Tssf to default non user interaction time interval and restart Tssf

Waiting_For_ _Instructions_For_DS

Waiting_for_End_ _Of_User_ _Interaction_For_DS

Figure 5.22ee

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the left are to/from the process Generic_SRF; signals to/from the right are to/from the imcnSCF unless otherwise stated. */

from SRF

Waiting_for_End_ _Of_User_ _Interaction_For_DS

from SRF

Internal

CAP_Cancelled_ _error

CAP_Cancel_ _Failed_error

CAP_Prompt_&_ _Collect_User_ _Information_ _Result

CAP_ Specialised_ Resource_ Report

Timer expiry Tssf

Relay the operation/ result/error to the imcnSCF

Abort

Waiting_for_End_ _Of_User_ _Interaction_For_DS

Int_Disconnect_ Forward_Connection

SRF_Release_ Pending_DS

Int_SRF_Released

Int_Error

Complete_all_ FCI_record

Idle

Figure 5.22 ff

/* Invocation of imcnSSF in MO, MT call case. */

/* Signals to/from the left are to/from the IM-SSF; signals to/from the right are to/from the imcnSCF. */

* (Idle,
Wait_For_Request)

CAP_
_CallGap

Int_CallGap

to a new
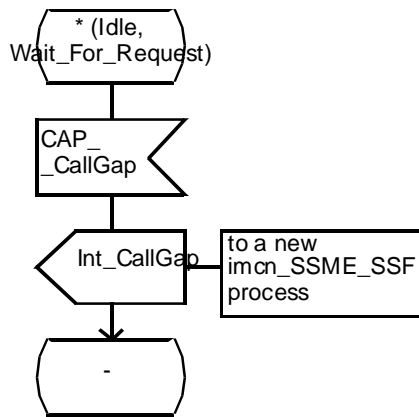imcn_SSME_SSF
process

-
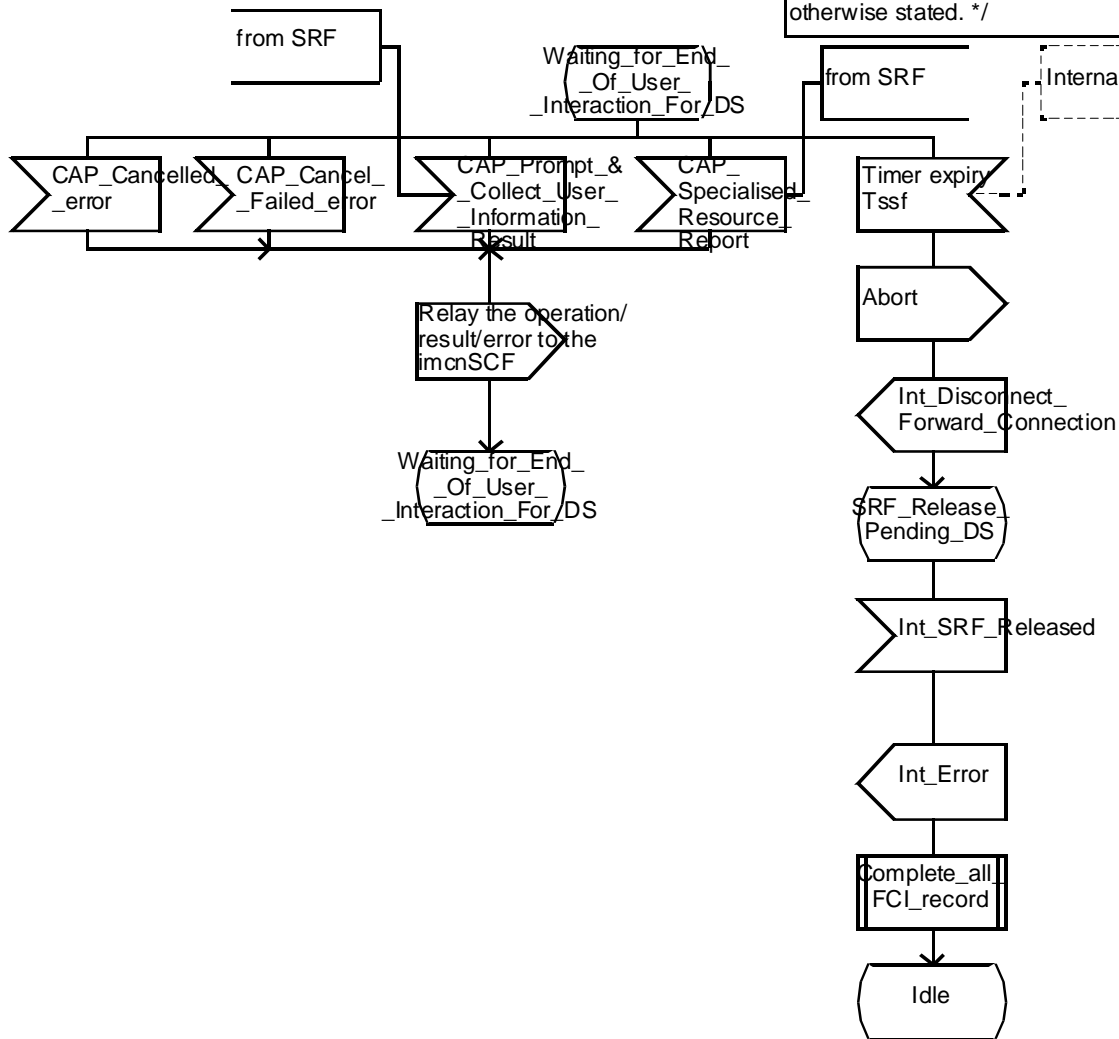
Figure 5.22gg

5.2 Description of information Flows

5.2.1 imcnSSF to gsmSCF information flows

Editor's Note : Place holder for the IF descriptions

5.2.2 gsmSCF to imcnSSF information flows

Editor's Note : Place holder for the IF descriptions

5.2.3 Optional (service logic dependant) gsmSCF to gsmSRF information flows

Editor's Note : Place holder for the IF descriptions

5.2.4 HSS to IM-SSF information flows

Editor's Note : Place holder for the IF descriptions