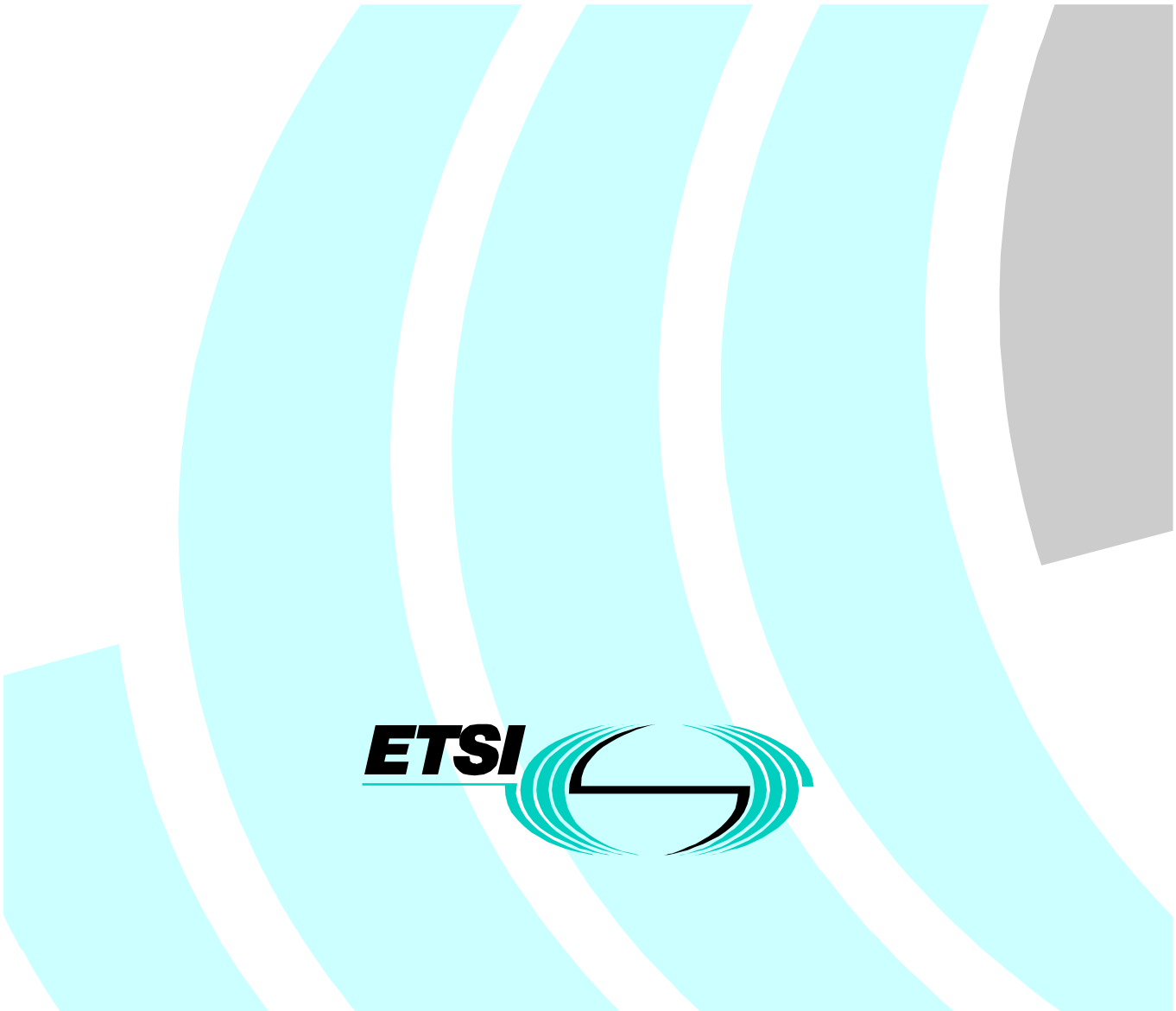
ETSI EN 300 392-12-8 V1.1.1 (2000-12)

European Standard (Telecommunications series)

Terrestrial Trunked radio (TETRA);
Voice plus Data (V + D);
Part 12: Supplementary services stage 3;
Sub-part 8: Area Selection (AS)



Reference
DEN/TETRA-03A-12-08

Keywords
TETRA, V+D, supplementary service, area select, data, radio, speech, stage 3

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Sous-Préfecture de Grasse (06) N° 7803/88

Contents

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Project Terrestrial Trunked Radio (TETRA).

The present document had been submitted to Public Enquiry as ETS 300 392-12-8. During the processing for Vote it was converted into an EN.

The present document is a multi-part standard and will consist of the following parts:

Part 1: "General network design";

Part 2: "Air Interface (AI)";

Part 3: "Interworking at the Inter-System Interface (ISI)";

Part 4: "Gateways basic operation";

Part 5: "Peripheral Equipment Interface (PEI)";

Part 6: "Line connected Station (LS)";

Part 7: "Security";

Part 9: "General requirements for supplementary services";

Part 10: "Supplementary services stage 1";

Part 11: "Supplementary services stage 2";

Part 12: "Supplementary services stage 3";

Part 13: "SDL Model of the Air Interface (AI)";

Part 14: "Protocol Implementation Conformance Statement (PICS) proforma specification".

National transposition dates	
Date of adoption of this EN:	1 December 2000
Date of latest announcement of this EN (doa):	31 March 2001
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 September 2001
Date of withdrawal of any conflicting National Standard (dow):	30 September 2001

1 Scope

The present document defines the stage 3 description of the Supplementary Service Area Selection (SS-AS) for the Terrestrial Trunked Radio (TETRA).

SS-AS enables the calling user to establish a call in restricting the area where the participating users in a group call or the connected user in an individual call may be located.

Man Machine interface and Charging clauses are outside the scope of the present document.

Supplementary service specifications are produced in three stages according to the method described in ITU-T Recommendation I.130 [1]. The stage 1 description specifies the service from the user's point of view (see ETS 300 392-10-11 [8]). The stage 2 description identifies the functional capabilities and the information flows needed to support the service as specified in its stage 1 description (see ETS 300 392-11-11 [9]). The present stage 3 description specifies the protocols at the air interface and at the various Inter-System Interfaces (ISI) to support SS-AS.

NOTE: According to ITU-T Recommendation I.130 [1], the stage 3 description of any telecommunication service addresses the network implementation aspects. Consequently it comprises two steps: the specifications of all protocols at the various reference points involved in any of the service procedures (notably the service operation) are the first step of the stage 3 description, and the specifications of the functions of the corresponding network entities are its second step.

The latter have not been provided since they can be derived from the specification of the functional entity actions in the stage 2 description.

The present document is applicable to Voice plus Data individual calls or group calls; more specifically to the following entities:

- the MS/LS of the calling user in an individual call or a group call;
- the originating Switching and Management Infrastructure (SwMI) in an individual call or a group call;
- the group home SwMI and the participating SwMIs for a group call;
- the terminating SwMI for an individual call; and
- optionally, the home SwMI of the group or of the MS/LSs involved, for managing the supplementary service.

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.

[1] ITU-T Recommendation I.130 (1993): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[2] ETSI EN 300 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

[3] ETSI ETS 300 392-3-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 1: General design".

[4] ETSI EN 300 392-3-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 2: Additional Network Feature Individual Call (ANF-ISIIC)".

[5] ETSI ETS 300 392-3-3: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 3: Additional Network Feature Group Call (ANF-ISIGC)".

[6] ETSI ETS 300 392-3-5: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 5: Additional Network Feature for Mobility Management (ANF-ISIMM)".

[7] ETSI EN 300 392-9: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 9: General requirements for supplementary services".

[8] ETSI ETS 300 392-10-8: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 8: Area selection".

[9] ETSI EN 300 392-11-8: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 8: Area Selection (AS)".

[10] ITU-T Recommendation Z.100: "CCITT Specification and Description Language (SDL)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions of EN 300 392-9 [7] shall apply with the following modification:

authorized user: identified user who is allowed to define selected areas and to interrogate the infrastructure about the existing defined selected areas

served user: user for whom the supplementary has been subscribed. That user can thus successfully invoke the supplementary service

served user SwMI: SwMI where the served user is currently registered. In a call (whether an individual or a group call), the served user SwMI is the originating SwMI

geographical definition: definition of an SS-AS area given by limits on a map. In practice, due to the difficulty to describe mathematically any area shape, only circles and rectangular areas are specified. See subclause 5.2.2.12

site definition: definition of an SS-AS area given as a list of base stations within one or more SwMI. Such list may be implicit, e.g. area defined as a whole home SwMI with no visited SwMI (i.e. no participating SwMI in the case of a group call, and no other terminating SwMI than such home SwMI in the case of an individual call). See subclause 5.2.2.12

SS-AS operation inhibition: calling user or important users are included into the call even in the case those are outside the selected area

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ANF-ISIGC	Additional Network Feature - Inter-System Interface Group Call
ANF-ISIIC	Additional Network Feature - Inter-System Interface Individual Call
ANF-ISIMM	Additional Network Feature - Inter-System Interface Mobility Management
ANF-ISISS	Additional Network Feature - Inter-System Interface Supplementary Service
AS	Area Selection
GTSI	Group TETRA Subscriber Identity
ISI	Inter-System Interface
ITSI	Individual TETRA Subscriber Identity
LS	Line Station
MS	Mobile Station

PDU	Protocol Data Unit
ROSE	Remote Operation Service Element
SDL	Specification Description Language
SS	Supplementary Service

NOTE: The abbreviation SS is only used when referring to a specific supplementary service.

SSI	Short Subscriber Identity
SwMI	Switching and Management Infrastructure

4 SS-AS service description

4.1 General

SS-AS enables the calling user to establish a call in restricting the area where the participating users in a group call or the connected user in an individual call may be located. The calling user invokes SS-AS in using a selected area number when he sets up the call. That number corresponds to a selected area the definition of which is known by the infrastructure (i.e. some SwMI on the call path).

After a group call has been established, as an option, SS-AS may continue to operate to restrict the area where the participating users may roam or migrate, thereby barring the call restoration attempt for that user.

This clause describes the SS-AS services offered by the Circuit Mode Control Entity (CMCE) at the Supplementary Services service access point (TNSS-SAP) of the TETRA voice plus data layer 3 service boundary in a TETRA Mobile Station (MS) or TETRA Line Station (LS). The SS-AS service access point is used in conformance testing as a normative boundary in MSs and LSs.

NOTE: As the present document only deals with the SS-AS all the service primitives has been shown without a TNSS-AS-prefix e.g. the TNSS-AS-DEFINE request is shortened into a DEFINE request.

4.2 SS-AS services offered over the TNSS-SAP

NOTE: As man-machine interface or user applications are outside the scope of the present document service primitives are used to define information exchange to and from the standardized part of the MS/LS. Those primitives may be only indirectly accessible.

The SS-AS service primitives at the served user MS/LS TNSS-SAP shall be:

- ASSIGN request;
- INVOKE request;
- INVOCATION FAILURE indication.

The SS-AS service primitives at the authorized user MS/LS TNSS-SAP shall be:

- DEFINE request;
- DEFINE ACK indication;
- INTERROGATE request;
- INTERROGATE ACK indication.

The served user should have the possibility to use the INTERROGATE primitives mentioned above, limited to its own ITSI and to GTSIs of groups of which he is a member.

4.2.1 ASSIGN indication

The ASSIGN indication primitive shall be sent over the served user TNSS-SAP by the MS/LS CMCE to the served user application to inform it about the definition of a selected area against the corresponding selected area number for either an ITSI allocated to that MS/LS or the GTSI of a group of which the served user is a member.

When supported (since it is optional), the assignment process shall support one selected area in a request. Optionally it may support a list of selected areas in a single request.

The ASSIGN indication primitive shall contain the SS-AS parameters listed in table 1.

Table 1: Parameters for the primitive ASSIGN indication

Parameter	Indication
Selected area number(s)	M (see note 1)
Selected area definition(s)	M (see note 2)
Acknowledgement requested from served user(s)	O
NOTE 1: It is optional to support more than one selected area number. NOTE 2: There shall be as many selected area definitions as there are selected area numbers.	

When an acknowledgement is requested from the served user, it shall be sent by the served user MS/LS without involving the user application (i.e. directly); hence there is no ASSIGN ACK request primitive.

4.2.2 DEFINE request

The DEFINE request primitive shall be sent over the authorized user TNSS-SAP by the authorized user application to the MS/LS CMCE to define a selected area against the corresponding selected area number for an individual subscriber or for a group.

When supported (since it is optional), the definition process shall support one selected area for one TETRA identity in a request. That TETRA identity may be either that of an individual subscriber or that of a group. Optionally the definition process may support a list of selected areas in a single request. Still optionally it may support a list and/or range of identities.

The DEFINE request primitive shall contain the SS-AS parameters listed in table 2.

Table 2: Parameters for the primitive DEFINE request

Parameter	Indication
Access priority	O
Defined TETRA identity/identities	M (see note 1)
Selected area number(s)	M (see note 2)
Selected area definition(s)	M (see note 3)
Assignment to served user(s) requested	O
Acknowledgement requested from served user(s)	C (see note 4)
NOTE 1: It is optional to support more than one defined TETRA identity. The same selected area number definitions given by the following parameters (in the primitive) shall then apply to the corresponding individual subscribers and/or groups. In addition those individual subscribers and/or groups shall then have the same home SwMI. NOTE 2: It is optional to support more than one selected area number. NOTE 3: There shall be as many selected area definitions as there are selected area numbers. NOTE 4: Such acknowledgement may be requested only together with the assignment to served user(s).	

4.2.3 DEFINE ACK indication

The DEFINE ACK indication primitive shall be sent over the authorized user TNSS-SAP by the MS/LS CMCE to the authorized user application to inform it of the result of a previous DEFINE request.

If the previous request has been addressed to a SwMI for more than one identity, that SwMI may send its corresponding response either in one single request which applies to all those identities or in multiple requests.

The DEFINE ACK indication primitive shall contain the SS-AS parameters listed in table 3.

Table 3: Parameters for the primitive DEFINE ACK indication

Parameter	Indication
Definition result	M (see note 1)
Defined TETRA identity/identities	M (see note 2)
Selected area number(s)	C (see notes 3 and 4)
NOTE 1: There shall be only one definition result per primitive if there are more than one defined TETRA identity or more than one selected area number. NOTE 2: It is optional to support more than one defined TETRA identity. NOTE 3: Conditional on the definition result being positive. NOTE 4: It is optional to support more than one selected area number.	

4.2.4 INTERROGATE request

The INTERROGATE request primitive shall be sent over the authorized user TNSS-SAP by the authorized user application to the MS/LS CMCE to know the definition of a selected area against the corresponding selected area number for an individual user or for a group.

When supported (since it is optional), the interrogation process shall support one TETRA identity in a request. That TETRA identity may be either that of an individual subscriber or that of a group. Optionally, the interrogation request may be limited to the definition of one or more selected area numbers.

The INTERROGATE request primitive shall contain the SS-AS parameters listed in table 4.

Table 4: Parameters for the primitive INTERROGATE request

Parameter	Request
Access priority	O
Interrogated TETRA identity	M
Interrogated selected area number/numbers	O (see note)
NOTE: May be present to limit the scope of the interrogation to the definition of one or more selected area numbers.	

4.2.5 INTERROGATE ACK indication

The INTERROGATE ACK indication primitive shall be sent over the authorized user TNSS-SAP by the MS/LS CMCE to the authorized user application to inform it about the result of a previous INTERROGATE request.

The SwMI interrogated may send its response either in one single request which gives the definition of all selected area numbers (for which the interrogation has been placed) or in multiple requests.

The INTERROGATE ACK indication primitive shall contain the SS-AS parameters listed in table 5.

Table 5: Parameters for the primitive INTERROGATE ACK indication

Parameter	Indication
Interrogation result	M (see note 1)
Interrogated TETRA identity	M
Selected area number(s)	M (see note 2)
Selected area definition(s)	M (see note 3)
Assignment to served user(s) requested	O
Acknowledgement requested from served user(s)	C (see note 4)
NOTE 1: There shall be only one interrogation result per primitive if there are more than one interrogated TETRA identity or more than one selected area number. NOTE 2: It is optional to support more than one selected area number. NOTE 3: There shall be as many selected area definitions as there are selected area numbers. NOTE 4: Such acknowledgement may have been requested only together with the assignment to served user(s).	

4.2.6 INVOKE request

The INVOKE request primitive shall be sent over the served user TNSS-SAP by the served user application to the MS/LS CMCE to invoke SS-AS.

It shall contain the SS-AS parameters listed in table 6.

Table 6: Parameters for the primitive INVOKE request

Parameter	Request
Selected area number	M
SwMI where the selected area number is defined	M (see note 2)
NOTE 1: There is no access priority parameter in table 6 since the access priority of that primitive is the same as that of the concurrent TNSS-SETUP request. NOTE 2: Addressing information parameter not a SS-AS parameter.	

4.2.7 INVOCATION FAILURE indication

The INVOCATION FAILURE indication primitive shall be sent over the served user TNSS-SAP by the MS/LS CMCE to the served user application to inform it about the failure of SS-AS invocation.

It shall contain the SS-AS parameter given in table 7.

Table 7: Parameter for the primitive INVOCATION FAILURE indication

Parameters	Indication
Invocation failure cause	M

4.3 Parameter description

Access priority:

low priority;

high priority;

emergency priority.

The default value for that parameter shall be low priority. The value emergency priority should not be used for that parameter in any primitive.

Acknowledgement requested from served user(s): acknowledgement of assignment of area number definitions to served user(s) requested from that(those) user(s).

Assignment to served user(s) requested: (air interface) downloading of area number definitions requested to be made to served user(s).

Definition result:

successful request;

unsuccessful request.

If the request has been unsuccessful, one of the following reasons shall be indicated:

rejected for any reason;

not an authorized user;

supplementary service not subscribed for the user addressed;

unknown TETRA identity;

type of definition not supported (see description of parameter selected area definition below for the meaning of "type of definition");

repetition of parameters not supported;

protocol problem.

Interrogation result:

successful request;

unsuccessful request.

If the INTERROGATE request has been unsuccessful, one of the following reasons shall be indicated:

rejected for any reason;

not an authorized user;

unknown TETRA identity;

repetition of parameters not supported;

protocol problem.

Invocation failure cause:

not subscribed;

not defined;

not supported.

The value corresponding to not subscribed is sent by the infrastructure when the calling user has invoked SS-AS while SS-AS has not been subscribed to for that user.

NOTE 1: Generally, that information will originate from the originating SwMI. There are two exceptions in the case of a group call:

- when that SwMI has not been attached to the group (i.e. no group member having attached to the group in that SwMI);
- when that SwMI does not support SS-AS.

In two exception cases above, the fact that SS-AS has not been subscribed for the group is known only in the group home SwMI.

The value corresponding to not defined is sent by the infrastructure to inform the calling user who has invoked SS-AS using a selected area number that that invocation has failed because that number is not defined.

NOTE 2: In the case of individual call, that information will originate from the originating SwMI else from the called user home SwMI. In the case of group call, that information will originate from the group controlling SwMI else from the originating SwMI.

The value corresponding to not supported is sent by the infrastructure to inform the calling user who has invoked SS-AS for an individual call in using a selected area number that that invocation has failed:

- in the case of an individual call, because the originating SwMI, else the called user home SwMI, or the terminating SwMI do not support SS-AS;
- in the case of a group call, because the group controlling SwMI or some participating SwMI, else the originating SwMI, do not support SS-AS.

NOTE 3: Each of the three above values being mutually exclusive of the two others, there is no need to repeat the parameter invocation failure cause in the INVOCATION FAILURE indication primitive.

Selected area definition:

geographical definition;

site definition.

Selected area number: any number from 1 to 15 (in the basic primitive) plus possible additional ones (through a extension mechanism defined in the protocol).

SwMI where the selected area number is defined:

the originating SwMI or the called user home SwMI, for an individual call; or

the originating SwMI or the group home SwMI, for a group call.

TETRA identity:

Short Number Address (SNA);

Short Subscriber Identity (SSI);

Short Subscriber Identity (SSI) + Address extension.

The Short Number Address (SNA) shall be valid only in requests.

5 Signalling protocol for the support of SS-AS

5.1 SS-AS operational requirements

5.1.1 Served user MS/LS

The served user MS/LS shall comply with the requirements in clause 14 of EN 300 392-2 [2] which apply to the tele- and bearer services which it supports. In addition, it shall comply with the call related requirements in clauses 7, 8 and 11 of EN 300 392-9 [7] which apply for receiving the INVOCATION FAILURE PDU and, optionally, for sending the INVOKE PDU (see tables 14 and 16 respectively for the definition of those PDUs).

If it supports the optional assignment procedure, the served user MS/LS shall comply with the call unrelated requirements in clauses 7, 8 and 11 of EN 300 392-9 [7] which apply for receiving the ASSIGN PDU and for sending the ASSIGN ACK PDU (see tables 8 and 9 respectively for the definition of those PDUs).

5.1.2 Served user SwMI

The served user SwMI shall support the served user MS/LS complying with the requirements for setting up individual calls set in clause 14 of EN 300 392-2 [2]. In addition, it shall comply:

- with the call related requirements in clauses 7 and 8 of EN 300 392-9 [7] which apply for sending the INVOCATION FAILURE PDU and, optionally, for receiving the INVOKE PDU addressed to it (see tables 14 and 16 respectively for the definition of those PDUs); and
- if the call is over the ISI:
  - with the corresponding ISI requirements, set in EN 300 392-3-2 [4]; and
  - with the call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for sending the INVOKE EXT PDU and, optionally, relaying the INVOKE PDU addressed by the served user MS/LS to the called user home SwMI and the INVOCATION FAILURE PDU addressed by the called user home SwMI or the terminating SwMI to the served user MS/LS (see tables 18, 16 and 14 respectively for the definition of those PDUs) - see note 1.

It shall also:

- support the served user MS/LS complying with the requirements for setting up group calls set in clause 14 of EN 300 392-2 [2]; and
- comply:
  - with the corresponding ISI requirements, set in ETS 300 392-3-3 [5]; and
  - with the call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for optionally, relaying the INVOKE PDU addressed by the served user MS/LS to the group home SwMI (see note 1 below) and the INVOCATION FAILURE PDU addressed by the group home SwMI or the group controlling SwMI to the served user MS/LS, or sending the INVOKE EXT PDU, the INVOCATION QUALIFIER PDU and the INVOKE CONFIRM PDU (see tables 16, 18, 15, 17 and 14 respectively for the definition of those PDUs).

NOTE 1: Actually no requirements in clause 8 of EN 300 392-9 [7] are necessary for the relaying of PDUs (i.e. the INVOKE PDU and the INVOCATION FAILURE PDU in the present case) through SwMIs.

NOTE 2: The above requirements of compliance with EN 300 392-2 [2] and EN 300 392-3-2 [4] guarantee the sending of notifications to the served user during individual calls.

Similarly the above requirements of compliance with EN 300 392-2 [2] and ETS 300 392-3-3 [5] guarantee the sending of notifications to the served user during group calls.

If it supports the optional assignment procedure, the served user SwMI shall comply with the call unrelated requirements in clauses 7, 8 and 11 of EN 300 392-9 [7] which apply for sending the ASSIGN PDU and for receiving the ASSIGN ACK PDU (see tables 8 and 9 respectively for the definition of those PDUs).

5.1.3 Called user home SwMI

If the call is over the ISI, the called user home SwMI shall comply with the corresponding ISI requirements set in EN 300 392-3-2 [4]. It shall also comply with the call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for receiving the INVOKE EXT PDU, else the INVOKE PDU, and for sending the INVOKE EXT PDU (see tables 18 and 16 respectively for the definition of those PDUs).

5.1.4 Group home SwMI

If the served user MS/LS is registered in the group home SwMI, that SwMI shall support that MS/LS complying with the requirements for setting up a group call set in clause 14 of EN 300 392-2 [2]. That SwMI shall also comply with the call related requirements in clauses 7 to 11 of EN 300 392-9 [7] which apply for receiving the INVOKE PDU and for sending the INVOCATION FAILURE PDU (see tables 16 and 14 respectively for the definition of those PDUs).

In addition still if the served user MS/LS is registered in the group home SwMI and if there are participating SwMIs or if the group is linked (i.e. the group home SwMI is not the group controlling SwMI for calls to the group), the group home SwMI shall also comply:

- with the ISI requirements necessary to support group calls, set in ETS 300 392-3-3 [5]; and
- with the call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for sending the INVOKE EXT PDU (see 16 for the definition of that PDU).

If the served user MS/LS is not registered in the group home SwMI, that SwMI shall comply with the ISI requirements necessary to support group calls, set in ETS 300 392-3-3 [5]. It shall also comply with the call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for receiving the INVOKE PDU or the INVOCATION QUALIFIER PDU, else the INVOKE EXT PDU and for sending the INVOKE EXT PDU and the INVOCATION FAILURE PDU (see tables 16, 15, 18 and 14 respectively for the definition of those PDUs). In addition still if the served user MS/LS is not registered in the group home SwMI and if the group is not linked (i.e. the group home SwMI is also the group controlling SwMI for calls to the group), the group home SwMI shall also comply the call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for receiving the INVOKE CONFIRM PDU (see table 17 for the definition of that PDU).

See also subclause 5.1.10 for the relevant call unrelated requirements applicable to the group home SwMI.

5.1.5 Group controlling SwMI

If the group controlling SwMI is different from the group home SwMI (i.e. the group is linked), it shall:

- comply with the ISI requirements necessary to support group calls, set in ETS 300 392-3-3 [5];
- comply with the call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for receiving the INVOKE EXT PDU and the INVOKE CONFIRM PDU and sending the INVOCATION FAILURE PDU (see tables 18, 17 and 14 respectively for the definition of those PDUs); and
- depending on whether the served user MS/LS is registered in the group controlling SwMI or not:
  - if the served user MS/LS is registered in the group controlling SwMI, support that MS/LS complying with the requirements for setting up a group call set in clause 14 of EN 300 392-2 [2];
  - if the served user MS/LS is not registered in the group controlling SwMI, comply with the call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for sending the INVOKE CONFIRM PDU (see table 17 for the definition of that PDU).

5.1.6 Participating SwMI

Every participating SwMI shall comply with the ISI requirements set in ETS 300 392-3-3 [5]. It shall also comply with the relevant call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for receiving the INVOKE EXT PDU and sending the INVOCATION QUALIFIER PDU or the INVOCATION FAILURE PDU (see tables 18, 15 and 14 respectively for the definition of those PDUs).

5.1.7 New participating SwMI

Every new participating SwMI shall comply with the ISI requirements set in ETS 300 392-3-3 [5]. It shall also comply with the relevant call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for receiving the INVOKE EXT PDU and sending the INVOCATION QUALIFIER PDU or the INVOCATION FAILURE PDU (see tables 18, 15 and 14 respectively for the definition of those PDUs).

5.1.8 Terminating SwMI

If different from the called user home SwMI, the terminating SwMI shall comply with the corresponding ISI requirements set in EN 300 392-3-2 [4]. It shall also comply with the relevant call related requirements in clauses 8 to 11 of EN 300 392-9 [7] which apply for receiving the INVOKE EXT PDU and sending INVOCATION FAILURE PDU (see tables 18 and 14 respectively for the definition of those PDUs).

5.1.9 Authorized user MS/LS

If it supports the following optional procedures, the authorized user MS/LS shall comply with the call unrelated requirements in clauses 7, 8 and 11 of EN 300 392-9 [7]:

- for the definition procedure, those which apply for sending the DEFINE PDU and for receiving the DEFINE ACK PDU (see tables 10 and 11 respectively for the definition of those PDUs);

- for the interrogation procedure, those which apply for sending the INTERROGATE PDU and for receiving the INTERROGATE ACK PDU (see tables 12 and 13 respectively for the definition of those PDUs).

5.1.10 Authorized user SwMI

That SwMI shall support the authorized user MS/LS complying with subclause 5.1.9.

If the authorized user SwMI is different from the home SwMI of the managed user/group, it shall comply with the call unrelated requirements in clauses 9 to 11 of EN 300 392-9 [7] for the exchange of the DEFINE, DEFINE ACK, INTERROGATE and INTERROGATE ACK PDUs between the authorized user MS/LS and the home SwMI of the managed user/group.

See subclause 5.1.11 for the applicable requirements if the authorized user SwMI coincides with the home SwMI of the managed user/group SwMI.

5.1.11 Served user/group home SwMI

If the served user/group home SwMI supports the optional definition procedure, it shall comply with the following call unrelated requirements in EN 300 392-9 [7] which apply for receiving the DEFINE PDU and for sending the DEFINE ACK PDU (see tables 10 and 11 respectively for the definition of those PDUs):

- if it coincides with the authorized user SwMI (i.e. the authorized user MS/LS is registered in the managed user/group home SwMI), the relevant call unrelated requirements in clauses 7, 8 and 11;

- if it is different from the authorized user SwMI, the relevant call unrelated requirements in clauses 8 to 11.

The same requirement shall apply for the managed user/group home SwMI if it supports the optional interrogation procedure (for receiving the INTERROGATE PDU and for sending the INTERROGATE ACK PDU - see tables 12 and 13 respectively for the definition of those PDUs).

5.2 Coding requirements

The information contained in the following description tables corresponds to the following keys:

Length: length of the information element or sub-element in bits

Type: element type (1,2,3) described in annex E of EN 300 392-2 [2]

C/O/M: conditional/optional/mandatory information in the PDU

Remark: comment or reference to note(s)

5.2.1 SS-AS PDUs

5.2.1.1 ASSIGN PDU

ASSIGN PDU may be sent:

- to the served user MS/LS in the SwMI where that user is registered, so that that MS/LS may store the definitions corresponding to selected area numbers made for that user; or
- to the MS/LSs of the group members registered in a SwMI so that such MS/LSs may store the definitions corresponding to selected area numbers made for that group.

NOTE: Clearly the ASSIGN PDU will be sent to the LSs of group members only in the group home SwMI.

ASSIGN PDU shall contain the SS-AS information elements listed in table 8.

Table 8: ASSIGN PDU contents

Information element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	ASSIGN
Range type for selected area number(s)	4	1	M	
Selected area number	8	1	M	see note 1
Selected area definition length indicator	9	1	M	see notes 1 and 2
Selected area definition	variable	1	C	see note 3
Acknowledgement requested	1	1	M	
NOTE 1: This information element shall be considered as part of a set which shall be repeated as defined by the range type for selected area number/numbers. NOTE 2 This information element shall take the value 0 when the previous definition of the selected area number to which it is associated is being deleted by the present PDU. NOTE 3: The presence and length in bits of the information element selected area definition shall be as defined by the information element selected area definition length indicator.				

5.2.1.2 ASSIGN ACK PDU

ASSIGN ACK PDU is sent by the served user MS/LS or by the MS/LSs of group members as an acknowledgement of reception of a previous ASSIGN PDU.

NOTE: Clearly the ASSIGN ACK PDU will be sent by the LSs of group members only in the group home SwMI.

ASSIGN ACK PDU shall contain the SS-AS information elements listed in table 9.

Table 9: ASSIGN ACK PDU contents

Information element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	ASSIGN ACK
Assignment result	1	1	M	

5.2.1.3 DEFINE PDU

DEFINE PDU may be sent by the authorized user to the home SwMI of the served user or of a group.

The authorized user expects at least one DEFINE ACK PDU as a confirmation.

DEFINE PDU shall contain the SS-AS information elements listed in table 10, where the inclusion of at least one address is mandatory (as part of the optional DEFINE PDU), but that of the list or range of addresses is optional.

Table 10: DEFINE PDU contents

Information element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	DEFINE
Range type for defined served user(s)/group(s)	4	1	M	
Address type of defined served user/group	2	1	M	see note 1
Defined served user/group short number	8	1	C	see notes 1 and 2
Defined served user/group SSI	24	1	C	see notes 1 and 2
Defined served user/group extension	24	1	C	see notes 1 and 2
Range type for selected area number(s)	4	1	M	
Selected area number	8	1	M	see note 3
Selected area definition length indicator	9	1	M	see notes 3 and 4
Selected area definition	variable	1	C	see notes 3 and 5
Assignment requested	1	1	M	see note 6
Acknowledgement requested	1	1	C	see note 7

NOTE 1: This information element shall be considered as part of a set which shall be repeated as defined by the range type for defined identity (identities).
NOTE 2: Shall be selected as defined by the information element address type of defined user/group.
NOTE 3: This information element shall be considered as part of a set which shall be repeated as defined by the range type for selected area number(s).
NOTE 4 This information element shall take the value 0 when the previous definition of the selected area number to which it is associated is being deleted by the present PDU.
NOTE 5: The presence and length in bits of the information element selected area definition shall be as defined by the information element selected area definition length indicator.
NOTE 6: If the information elements related to the defined served user/group and/or the selected area number one are repeated, the information element assignment requested shall apply to all the corresponding served users and/or selected area numbers in the present PDU.
NOTE 7: Shall be conditional on the value of the information element assignment requested being equal to 1.

NOTE: In practice, there will be no need to indicate the identity of the defined served user using its ITSI (i.e. by complementing its SSI with its MNI) in the DEFINE PDU, since that PDU will always be sent to the home SwMI of the defined individual subscriber. The same will apply for the GTSI of the defined group.

5.2.1.4 DEFINE ACK PDU

DEFINE ACK PDU may be sent by the home SwMI of the individual subscribers or groups for which SS-AS definition has been previously requested (by a DEFINE PDU).

In case a DEFINE PDU was sent for more than one individual subscriber or group (i.e. it included either a list or a range of identities), subclause 8.3.2 of EN 300 392-9 [7] shall apply to the corresponding DEFINE ACK PDU.

DEFINE ACK PDU shall contain the SS-AS information elements listed in table 11.

Table 11: DEFINE ACK PDU contents

Information element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	DEFINE ACK
Range type for defined served user(s)/group(s)	4	1	M	
Address type of defined served user/group	2	1	M	see note 1
Defined served user/group SSI	24	1	C	see notes 1 and 2
Defined served user/group extension	24	1	C	see notes 1 and 2
Multiple served users/groups mask present	1	1	M	
Multiple served users/groups mask	variable	1	C	see note 3
Definition result	1	1	M	
Range type for selected area number(s)	4	1	M	
Selected area number	8	1	C	see note 4
Multiple selected area numbers mask present	1	1	M	
Multiple selected area numbers mask	variable	1	C	see note 5
Definition failure cause	3	1	C	see note 6
NOTE 1: This information element shall be considered as part of a set which shall be repeated as defined by the range type for defined party/parties.				
NOTE 2: According to subclause 8.4.1 of EN 300 392-9 [7], the information element address type of defined served user/group shall indicate that the information element defined served user/group extension shall be present whenever the MNI of the authorized user is different from that of the defined individual subscriber or group.				
NOTE 3: Shall be conditional on the value of the information element multiple served users/groups mask present being equal to 1.				
NOTE 4: This information element shall be repeated as defined by the range type for selected area number(s).				
NOTE 5: Shall be conditional on the value of the information element multiple selected area numbers mask present being equal to 1.				
NOTE 6: Shall be conditional on the value of the information element definition result being equal to 0.				

5.2.1.5 INTERROGATE PDU

INTERROGATE PDU may be sent by the authorized user to the home SwMI of the served user or of a group.

The authorized user expects at least one INTERROGATE ACK PDU as a confirmation.

INTERROGATE PDU shall contain the SS-AS information elements listed in table 12.

Table 12: INTERROGATE PDU contents

Information element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	INTERROGATE
Address type of interrogated served user/group	2	1	M	
Interrogated served user/group short number	8	1	C	see note 1
Interrogated served user/group SSI	24	1	C	see note 1
Interrogated served user/group extension	24	1	C	see note 1
Range type for selected area number(s)	4	1	M	
Selected area number	8	1	C	see note 2
NOTE 1: Shall be selected as defined by the information element address type of interrogated identity.				
NOTE 2: This information element shall be repeated as defined by the range type for selected area number(s).				

5.2.1.6 INTERROGATE ACK PDU

INTERROGATE ACK PDU is sent by the home SwMI of the party/parties on which a SS-AS interrogation has been previously made (by an INTERROGATE PDU).

INTERROGATE ACK PDU shall contain the SS-AS information elements listed in table 13.

In case an INTERROGATE PDU was sent to know the definitions of more than one selected area number, subclause 8.3.2 of EN 300 392-9 [7] shall apply to the corresponding INTERROGATE ACK PDU.

Table 13: INTERROGATE ACK PDU contents

Information element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	INTERROGATE ACK
Address type of interrogated served user/group	2	1	M	see note 1
Interrogated served user/group SSI	24	1	C	
Interrogated served user/group extension	24	1	C	see note 1
Interrogation result	1	1	M	
Range type for selected area number(s)	4	1	M	
Selected area number	8	1	M	see notes 2 and 3
Multiple selected area numbers mask present	1	1	M	
Multiple selected area numbers mask	variable	1	C	see note 3
Selected area definition length indicator	9	1	M	see notes 4, 5 and 6
Selected area definition	variable	1	C	see note 4, 5 and 7
Assignment requested	1	1	C	see note 8
Acknowledgement requested	1	1	C	see note 9
Interrogation failure cause	3	1	C	see note 10

NOTE 1: According to subclause 8.4.1 of EN 300 392-9 [7], the information element address type of interrogated served user/group shall indicate that the information element interrogated served user/group extension shall be present whenever the MNI of the authorized user is different from that of the interrogated individual subscriber or a group.

NOTE 2: This information element shall be repeated as defined by the range type for selected area number(s): either
- individually if the value of the information element multiple selected area numbers mask present is equal to 1; or
- as part of a set together the information elements selected area length indicator and selected area definition (see note 5 below).

NOTE 3: Shall be conditional on the value of the information element multiple selected area number mask present being equal to 1.

NOTE 4: Shall be conditional on the value of the information element interrogation result element value being equal to 1.

NOTE 5: If present and if the value of the information element multiple selected area numbers mask present is equal to 1, this information element shall be repeated as part of a set as defined by the information element range type for selected area number(s) modified by the information element multiple selected area numbers mask. If this information element is present and if the value of the information element multiple selected area numbers mask present is equal to 0, note 2 shall apply.

NOTE 6 If present, this information element shall take the value 0 when the selected area number to which it is associated is not defined.

NOTE 7: When that information element is present, its length in bits shall be as defined by the information element selected area definition length indicator.

NOTE 8: Shall be conditional on the value of the information element interrogation result being equal to 1. If the information element selected area number is repeated, the information element assignment requested shall apply to all the corresponding selected area numbers for which the present PDU applies (i.e. list of range of selected area numbers, possibly screened by the multiple short numbers mask).

NOTE 9: Shall be conditional on the value of the information element assignment requested being equal to 1.

NOTE 10: Shall be conditional on the value of the information element interrogation result being equal to 0.

5.2.1.7 INVOCATION FAILURE PDU

INVOCATION FAILURE PDU is sent by the originating SwMI to the calling user when his SS-AS invocation has failed to give him the reason. It may originate from another SwMI (e.g. the called user homer SwMI or the group home SwMI).

NOTE: See subclauses 5.4.1.1 and 5.4.2.1 for the use of that PDU.

INVOCATION FAILURE PDU shall contain the SS-AS information elements listed in table 14.

Table 14: INVOCATION FAILURE PDU contents

Information element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	INVOCATION FAILURE
Invocation failure cause	4	1	M	

5.2.1.8 INVOCATION QUALIFIER PDU

INVOCATION QUALIFIER PDU is sent to the group controlling SwMI:

- by the originating SwMI as a substitute for the INVOKE PDU or INVOKE EXT PDU (i.e. in the case where the SS-AS invocation procedure does not provide for the sending of either of those two PDUs) in the case where it cannot inhibit SS-AS operation for the calling user (which would result in the calling user not being able to participate in the call if he is outside the invoked selected area) nor for any user participating in the group call after that call has been established, including the calling user (which would result in that user being excluded from the call if he roams or migrates outside the invoked selected area in the originating SwMI);

- by each participating SwMI in the case where it cannot inhibit SS-AS operation for any user participating in the group call after that call has been established (which would result in that user being excluded from the call if he roams or migrates outside the invoked selected area that participating SwMI).

NOTE: See subclauses 5.4.2.1, 5.4.4.1 and 5.4.5.1 for the use of that PDU.

INVOCATION QUALIFIER PDU shall contain the SS-AS information elements listed in table 15.

Table 15: INVOCATION QUALIFIER PDU contents

Information element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	INVOCATION QUALIFIER

5.2.1.9 INVOKE PDU

INVOKE PDU may be sent by the served user to indicate a selected area number with a definition different from those for the values 1 to 15 of the information element area selection in the U-SETUP PDU (see table 86 of EN 300 392-2 [2]). The value of that information element shall then be set to the binary value 0000_2.

NOTE: See subclauses 5.4.1.1, 5.4.2.1, 5.4.4.1 and 5.4.5.1 for the use of that PDU.

INVOKE PDU shall contain the SS-AS information elements listed in table 16.

Table 16: INVOKE PDU contents

Information element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	INVOKE
Selected area number	8	1	M	
SS-AS inhibition (requested/) supported	1	1	M	see note
NOTE: The value of this information element shall be irrelevant when the INVOKE PDU is sent: - over the air interface; or - over the ISI for an individual call; and shall be set to "0" in those cases.				

5.2.1.10 INVOKE CONFIRM PDU

INVOKE CONFIRM PDU is sent by the originating SwMI to the group controlling SwMI in response to the INVOKE EXT PDU to inform the group controlling SwMI that the calling user is within the invoked selected area when the originating SwMI has informed the group controlling SwMI (in an earlier PDU, e.g. INVOCATION QUALIFIER PDU) that it does not support SS-AS inhibition for the calling user SwMI as a positive response to the INVOKE EXT PDU.

NOTE: See subclauses 5.4.2.1 and 5.4.5.1 for the use of that PDU.

INVOKE CONFIRM PDU shall contain the SS-AS information elements listed in table 17.

Table 17: INVOKE CONFIRM PDU contents

Information element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	INVOKE CONFIRM

5.2.1.11 INVOKE EXT PDU

INVOKE EXT PDU is sent between SwMIs to convey the SS-AS invocation with the definition corresponding to the selected area number invoked by the calling user (e.g. at set-up time by the called user home SwMI to the terminating SwMI in the case of an individual call and when the calling user is not a member of the called group to the controlling SwMI in the case of a group call, or by the controlling SwMI to a participating SwMI in the case of a group call).

NOTE: See subclauses 5.4.2.1, 5.4.3.1, 5.4.4.1, 5.4.5.1, 5.4.6.1, 5.4.7.1 and 5.4.8.1 for the use of that PDU.

INVOKE EXT PDU shall contain the SS-AS information elements listed in table 18.

Table 18: INVOKE EXT PDU contents

Information element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Defined in EN 300 392-9 [7]
AS PDU type	5	1	M	INVOKE EXT
Selected area number	8	1	M	
Selected area definition length indicator	9	1	M	see note 1
Selected area definition	variable	1	C	see note 2
SS-AS inhibition requested/supported	1	1	M	
NOTE 1: The selected area definition length indicator may have value “0" to indicate that no area definition is included. NOTE 2: The length in bits of that information element shall be as defined by the information element selected area length indicator.				

5.2.2 TETRA PDU information element and sub-element coding

5.2.2.1 Acknowledgement requested

The information element acknowledgement requested shall indicate whether the area selection number definition is to be or has been downloaded to the served user MS/LS, as defined in table 19.

Table 19: Acknowledgement requested information element contents

Information element	Length	Value	Remark
Acknowledgement requested	1	0	Acknowledgement not requested from served user
		1	Acknowledgement requested from served user

5.2.2.2 Address type of served user/group

The information element address type of served user/group shall indicate if the type of address which follows in the PDU is a (SS-SNA) short number address, a SSI or a full ITSI, as defined in table 12 of EN 300 392-9 [7].

NOTE: A single information element address type of served user has been defined in the standard for the sake of simplicity. However the definition of some PDUs, in subclause 5.2.1, is such that some values of that information element will not be used in those PDUs (e.g. the value 0 in all ACK PDUs, since no information element served user short number address has been included in any of those PDUs).

5.2.2.3 Area selection

The information element area selection is an information element of the basic call U-SETUP PDU (at the air interface). EN 300 392-2 [2] defines that its length is 4 bits. The meaning of the corresponding values shall be as defined in table 20.

NOTE 1: The same information element area selection has been included in the ANF-ISIGC-ORIGINATING SETUP PDU (see ETS 300 392-3-3 [5]) so that SS-AS may be invoked for a group even if the originating SwMI does not support it.

Table 20: Area selection information element content

Information element	Length	Value	Remark
Area selection	4	0000_2	SS-AS not defined (invoked) using this information element
		0001_2	SS-AS invoked with selected area number 1
		0010_2	SS-AS invoked with selected area number 2
		0011_2	SS-AS invoked with selected area number 3
		0100_2	SS-AS invoked with selected area number 4
		0101_2	SS-AS invoked with selected area number 5
		0110_2	SS-AS invoked with selected area number 6
		0111_2	SS-AS invoked with selected area number 7
		1000_2	SS-AS invoked with selected area number 8
		1001_2	SS-AS invoked with selected area number 9
		1010_2	SS-AS invoked with selected area number 10
		1011_2	SS-AS invoked with selected area number 11
		1100_2	SS-AS invoked with selected area number 12
		1101_2	SS-AS invoked with selected area number 13
		1110_2	SS-AS invoked with selected area number 14
		1111_2	SS-AS invoked with selected area number 15, note
NOTE: Default meaning for this value is: "All areas in this SwMI".			

The definitions of each of the selected area numbers 1 to 15 shall be identical to that corresponding to the information element selected area number with the same value (see subclause 5.2.2.15):

- for the calling user (i.e. the served user) in the originating SwMI;
- for the group called in the group home SwMI.

NOTE 2: In other words, provided SS-AS and the optional INVOKE PDU are supported by the SwMIs concerned, the calling user will get the same SS-AS operation when setting up a call in sending the U-SETUP PDU:

- with the value X, between 1 and 15, of the information element area selection in that (basic call) PDU; or
- with the value 0 of the information element area selection in that (basic call) PDU and in including in that PDU the INVOKE PDU with same value X of the information element selected area number, in addressing it:
  - to the originating SwMI if the call is an individual call; or

- to the group home SwMI if the call is a group call.

5.2.2.4 Assignment requested

The information element assignment requested may be included in the DEFINE PDU, in the SS-AS profile information element or in the INTERROGATE ACK PDU (see tables 10, 36 and 13 respectively). When included in the DEFINE PDU or in the SS-AS profile information element, it shall indicate that the short number definition is to be downloaded to the served user MS/LS. When included in the INTERROGATE ACK PDU it shall indicate that such downloading has been requested earlier (e.g. in the DEFINE PDU).

It shall be encoded as defined in table 21.

Table 21: Assignment requested information element content

Information element	Length	Value	Remark
Assignment requested	1	0	Assignment to served user not requested
		1	Assignment to served user requested

5.2.2.5 Assignment result

The information element assignment result shall indicate whether the previous request for assignment has been successful or unsuccessful as defined in table 22.

Table 22: Assignment result information element content

Information element	Length	Value	Remark
Assignment result	1	0	Assignment unsuccessful
		1	Assignment successful

5.2.2.6 Definition failure cause

See table 20 of EN 300 392-9 [7].

5.2.2.7 Definition result

The information element definition result shall indicate whether the previous request for definition has been successful or unsuccessful as defined in table 23.

Table 23: Definition result information element content

Information element	Length	Value	Remark
Definition result	1	0	Definition unsuccessful
		1	Definition successful

5.2.2.8 Interrogation failure cause

See table 20 of EN 300 392-9 [7].

5.2.2.9 Interrogation result

The information element interrogation result shall indicate whether the previous request for interrogation has been successful or unsuccessful as defined in table 24.

Table 24: Interrogation result information element content

Information element	Length	Value	Remark
Interrogation result	1	0	Interrogation unsuccessful
		1	Interrogation successful

5.2.2.10 Invocation failure cause

The information element invocation failure cause shall indicate why SS-AS invocation has failed as defined in table 25.

Table 25:Invocation failure cause information element contents

Information element	Length	Value	Remark
Invocation failure cause	4	0000_2	SS-AS not subscribed for served user/group
		0001_2	Invoked selected area number not defined
		0010_2	SS-AS not supported by called user/group home SwMI
		0011_2	SS-AS option not supported by called user/group home SwMI
		0100_2	SS-AS not supported by terminating SwMI
		0101_2	SS-AS not supported by group controlling SwMI (group linking)
		0110_2	SS-AS not supported by critical participating SwMI(s)
		0111_2	SS-AS not supported by participating SwMI(s) non-critical
		1000_2	SS-AS not supported by originating SwMI - critical failure
		1001_2	SS-AS not supported by originating SwMI - non-critical failure
		1010_2	Type of definition not supported by terminating SwMI
		1011_2	Type of definition not supported by group controlling SwMI
		$>1011_2$	Reserved

5.2.2.11 Multiple selected area numbers / multiple served users/groups mask and multiple selected area numbers / multiple served users/groups mask present

See subclause 8.3.2 of EN 300 392-9 [7].

5.2.2.12 Range type for selected area number(s) / for served user(s)/group(s)

The generic definition of the information element range type (followed by the indication of the use of the specific range type) in subclause 8.3.1 of EN 300 392-9 [7] applies, with the restriction that due to the way that information element is used in the present document, its value shall never be equal to 0. It indicates whether the set of information elements which follow the information element range type in the PDU definition is present only once in the PDU received or if it is repeated (as a list or as a range).

5.2.2.13 Selected area definition

5.2.2.13.1 General on area definition

The information element selected area definition shall define the area corresponding to a given value of the information element selected area number for a served user or for a group, else for the called user in the case of an individual call.

NOTE: The definition of the selected area used for SS-AS operation depends on the type of call (individual or group) and on the SwMI which fetches that definition against the invoked selected area number as defined by the addressing of the INVOKE PDU:

- in the case of the basic SS-AS invocation for an individual call, that definition is that for the served user in the originating SwMI;
- in the case of the extended SS-AS invocation for an individual call, that definition is that for the called user in the called user home SwMI;
- in the case of the basic SS-AS invocation for a group call, that definition is that for the group called (in the group home SwMI);
- in the case of the extended SS-AS invocation for a group call, that definition is that for the served user in the originating SwMI.

The definition of a selected area may be made by sites or on geographical basis as follows:

- site definition as a list of sites, each site corresponding to one or more base stations. Each site shall then be defined by an identifier specific to the SwMI where the selected:
  - site identifier, which identifies one or more base stations;
  - area is defined by a list of **n** site identifiers;
  - **n** can be variable up to a predefined maximum for the selected area;
- geographical definition by a circle, by the following means:
  - geometrical area form: circle;
  - co-ordinates type: circle centre, radius;
  - resolution for circle centre: about 1 km;
  - resolution for radius length: 1 km;
  - maximum radius defined: 500 km;
- geographical definition by a rectangle, by the following means:
  - geometrical area form: line;
  - co-ordinates type: end of lines;
  - resolution for end of line: about 1 km.

The information element selected area definition shall be encoded using sub-elements as defined in table 26.

Table 26: Selected area definition information element contents

Information sub-element	Length	Type	C/O/M	Remark
Area type	3	1	M	
Area type specific definition	variable	1	C	Note
NOTE: This information element contents shall depend on the value of the area type information element.				

5.2.2.13.2 Area type

The information sub-element area type shall be encoded as defined in table 27.

Table 27: Area type information element contents

Information sub-element	Length	Value	Remark
Area type	3	000_2	Area by site list
		001_2	Area by circle
		010_2	Area by line
		011_2	Area by rectangular
		100_2	Registered cell
		101_2	Registered location area
		110_2	Area defined by SwMI
		111_2	All areas in the SwMI (note)
NOTE: This area type is needed only if the SwMI applies as the default area a smaller area than all areas in the SwMI, when the served user set the area selection information element in the U-SETUP PDU to value "area not defined using this information element", refer to EN 300 392-2 [2] subclause 14.8.1.			

5.2.2.13.3 Area by circle

The information sub-element area by circle shall be encoded as defined in table 28.

Table 28: Area by circle information element contents

Information sub-element	Length	Type	C/O/M	Remark
Latitude direction	1	1	M	
Latitude degrees	7	1	M	
Latitude minutes	6	1	M	
Latitude half minutes	1	1	M	
Longitude direction	1	1	M	
Longitude degrees	8	1	M	
Longitude minutes	6	1	M	
Longitude half minutes	1	1	M	
Circle radius	9	1	M	see note
NOTE: The radius shall be given in kilometres.				

5.2.2.13.4 Area by line

The information sub-element area by line information element shall be encoded as defined in table 29.

Table 29: Area by line or rectangular information element contents

Information sub-element	Length	Type	C/O/M	Remark
Latitude direction of end one	1	1	M	
Latitude degrees of end one	7	1	M	
Latitude minutes of end one	6	1	M	
Latitude half minutes of end one	1	1	M	
Longitude direction of end one	1	1	M	
Longitude degrees of end one	8	1	M	
Longitude minutes of end one	6	1	M	
Longitude half minutes of end one	1	1	M	
Latitude direction of end two	1	1	M	
Latitude degrees of end two	7	1	M	
Latitude minutes of end two	6	1	M	
Latitude half minutes of end two	1	1	M	
Longitude direction of end two	1	1	M	
Longitude degrees of end two	8	1	M	
Longitude minutes of end two	6	1	M	
Longitude half minutes of end two	1	1	M	
NOTE: In the case of area by rectangular the end one and the end two define the opposite corners of the rectangular area.				

5.2.2.13.5 Area by rectangular

The information sub-element area by rectangular information element shall be encoded as defined in table 29. The values of the "end one" define coordinates of one corner of the area bounded by north, east, south and west lines and the values of the "end two" define coordinates of the opposite corner of the area.

5.2.2.13.6 Area by site list

The information sub-element area by site list shall be encoded as defined in table 30.

Table 30: Area by site list information element contents

Information element	Length	Value	Remark
Number of site numbers	5		
Site number	13		see notes 1 and 2
NOTE 1: This information element shall be repeated as defined by the number of site numbers information element. The maximum number of sites in one list shall be limited to 38 due to the PDU encoding restrictions. In addition each SwMI may set another smaller limit. NOTE 2: The site number may refer to one or more base station sites or area definitions defined in the SwMI. The site numbers are SwMI specific.			

5.2.2.13.7 Area defined by SwMI

The information sub-sub-element area defined by SwMI shall indicate that the area is defined by a predefined procedure which takes into account the current location of the served user. This definition could be used when the area is a set of location areas next to the current location.

5.2.2.13.8 Latitude direction

The information sub-sub-element latitude direction shall be used in the definitions of the information sub-elements area by line or by circle as defined in table 31.

Table 31: Latitude direction information element content

Information element	Length	Value	Remark
Latitude direction	1	0	North
		1	South

5.2.2.13.9 Longitude direction

The information sub-sub-element longitude direction information element shall be shall be used in the definitions of the information sub-elements area by line or by circle as defined in table 32.

Table 32: Longitude direction information element content

Information element	Length	Value	Remark
Longitude direction	1	0	West
		1	East

5.2.2.13.10 Registered cell

The information element registered cell shall define that the current registered cell is the defined area. This area definition is dynamic and shall move with the served user.

5.2.2.13.11 Registered location area

The information element registered location area shall define that the current location area is the defined area. This are definition is dynamic and shall move with the served user and with the location area as defined by mobility management signalling, refer to clause 16.

5.2.2.14 Selected area definition length indicator

The information element selected area definition length indicator shall be associated to every information element selected area number to indicate: either

- when its value is zero, that the corresponding selected area number is not defined; or
- when its value is different from zero, the length of its associated information element selected area number.

NOTE: Actually, except when its value is equal to zero, the selected area definition length indicator is not an information element per se, but it is needed according to the PDU encoding rules defined in subclause 14.7 of EN 300 392-2 [2], for encoding the selected area number (the length of which is variable) as "a type 1 element".

5.2.2.15 Selected area number

The information element selected area number may be used to invoke SS-AS (i.e. when the served user sets up a call). If the adequate conditions are met (e.g. SS-AS subscribed for served user or group, corresponding selected area having been defined), the SS-AS operation procedure shall then take place in using the selected area defined against that selected area number.

The information element selected area number shall be encoded as defined in table 33.

Table 33: Selected area number information element contents

Information element	Length	Value	Remark
Selected area number	8	00000000_2	reserved
		00000001_2	see note 1
		..etc.	..etc.
		00001111_2	see note 1
		$>00001111_2$	area number N, note 2
NOTE 1: The meaning of these (binary) values is the same as the meaning of the area selection information element (binary) values as defined in clause 5.2.2.3, table 20. NOTE 2: N, the number of the selected area, shall be equal to the value of the selected area number.			

5.2.2.16 Served user/group extension

The information element served user/group extension shall indicate the extended part of the TSI (i.e. the MNI) of the served user or group, as defined in table 11 of EN 300 392-9 [7].

5.2.2.17 Served user/group short number address

The information element served user/group shall indicate the SS-SNA short number defined for the authorized user for the served user or group, as defined in table 9 of EN 300 392-9 [7].

5.2.2.18 Served user/group SSI

The information element served user/group SSI shall indicate the Short Subscriber Identity (SSI) address of the served user or group, as defined in table 10 of EN 300 392-9 [7].

5.2.2.19 SS-AS inhibition requested/supported

When included by the originating SwMI in either the INVOKE EXT PDU or the INVOKE PDU at the establishment of a group call the information element SS-AS inhibition requested/supported shall indicate whether or not the originating SwMI would support the request from the group controlling SwMI to connect the calling user if he is outside the invoked selected area (and that SS-AS operation continue being inhibited for the calling user when that user roams or when an important user already participating in the call migrates into that SwMI outside the invoked selected area).

When included in the INVOKE EXT PDU sent by the group controlling SwMI to the originating SwMI at the establishment of a group call, the information element SS-AS inhibition requested/supported shall indicate whether or not the group controlling wants that the group call be established when the calling user is outside the invoked selected area and that SS-AS operation continue being inhibited for the calling user when that user roams or when an important user already participating in the call migrates into that SwMI outside the invoked selected area.

When included in the INVOKE EXT PDU sent by the group controlling SwMI to a participating SwMI, the information element SS-AS inhibition requested/supported shall indicate whether or not the group controlling wants that the group call be restored for important users already participating in the call when they roam in that SwMI or migrate into it outside the invoked selected area. The calling user should then be considered as one such important user when he migrates.

The information element SS-AS inhibition requested/supported shall be encoded as defined in table 34.

Table 34: SS-AS inhibition for requested/supported information element content

Information element	Length	Value	Remark
SS-AS inhibition requested/supported	1	0	SS-AS inhibition for calling/important participating user not requested/not supported
		1	SS-AS inhibition for calling/important participating user requested/supported

5.2.2.20 AS PDU type

The information element AS PDU type shall indicate the type of the AS PDU, as defined in table 35.

Table 35: AS PDU type information element content

Information element	Length	Value	Remark
AS PDU type	5	00000_2	See EN 300 392-9 [7]
		00001_2	See EN 300 392-9 [7]
		00010_2	See EN 300 392-9 [7]
		00011_2	See EN 300 392-9 [7]
		00100_2	See EN 300 392-9 [7]
		00101_2	ASSIGN
		00110_2	ASSIGN ACK
		00111_2	DEFINE
		01000_2	DEFINE ACK
		01001_2	INTERROGATE
		01010_2	INTERROGATE ACK
		01011_2	INVOCATION QUALIFIER
		01100_2	INVOKE
		01101_2	INVOKE CONFIRM
		01110_2	INVOKE EXT
		01111_2	INVOKE FAILURE
		$>01111_2$	Reserved

5.2.3 Coding requirements over the ISI

5.2.3.1 SS-AS profile

AS-ISI-PROFILE is actually an ANF-ISIMM information sub-element, part of the information element SS-migration profile (original) sent for SS-AS sent by the home SwMI to the served user SwMI when that user migrates or when SS-AS definition is changed, in the ANF-ISIMM PDU SS-PROFILE UPDATE (see ETS 300 392-3-5 [6]).

AS-ISI-PROFILE shall contain the SS-AS information elements listed in table 36 as information sub-elements.

Table 36: AS-ISI-PROFILE information sub-element content

Information sub-element	Length	Type	C/O/M	Remark
Range type for selected area number(s)	4	1	M	see note 1
Selected area number	8	1	M	see note 2
Selected area definition length indicator	9	1	M	see notes 2 and 3
Selected area definition	variable	1	C	see notes 3 and 4
Assignment requested	1	1	M	see note 5
Acknowledgement requested	1	1	C	see note 6
NOTE 1: The value of that information sub-element shall always be different from 0; the support of a value of that information element larger than 1 is optional. NOTE 2: This information sub-element shall be considered as part of a set which shall be repeated as defined by the range type for selected area number(s). NOTE 3: The value of that information sub-element shall be equal to the value 0 when the previous definition of the selected area number to which it is associated is being deleted by the present ANF-ISIMM profile information sub-element (i.e. AS-ISI-PROFILE). NOTE 4: The presence and length in bits of the information element selected area definition shall be as defined by the information element selected area definition length indicator. NOTE 5: If the information sub-element short number is repeated, the information sub-element assignment requested shall apply to all the corresponding selected area numbers in the present ANF-ISIMM profile information element. NOTE 6: Shall be conditional on the value of the information sub-element assignment requested being equal to 1.				

NOTE: In the above table there is no need to specify that it is related to SS-AS nor the identity of the user to whom the profile information element specified applies because:

- the information element SS-type will be added (with the value corresponding to SS-AS) to the AS-ISI-PROFILE sub-element in the ANF-ISIMM information element SS-migration profile (original);
- the ANF-ISIMM SS-PROFILE UPDATE PDU which carries that information element already includes the (migrating) served user identity.

5.2.3.2 SS-AS profile ACK information element

Like SS-AS profile, SS-AS profile ACK is an ANF-ISIMM information element, sent by the visited SwMI of an individual subscriber to his home SwMI as part of the SS profile ACK information (see ETS 300 392-3-5 [6]). It shall simply be an acknowledgement of the corresponding SS-AS profile.

SS-AS profile ACK shall contain information sub-elements as defined in table 37.

Table 37: SS-AS profile ACK information element contents

Information sub-element	Length	Type	C/O/M	Value	Remark
Result of profile exchange	1	1	M		
Supported area definitions	8	1	C		see note
NOTE: This information element shall be present only when the result of profile exchange indicates "unsuccessful".					

5.2.3.3 SS-AS profile information elements

5.2.3.3.1 General on SS-AS profile information elements

In addition to the information elements defined in clause 5.2.2 profile exchange shall use information elements as defined in clauses 5.2.3.3.2 to 5.2.3.3.4

5.2.3.3.2 Void

5.2.3.3.3 Result of profile exchange

The information element result of profile exchange shall indicate whether the previous SS-AS profile exchange has been successful or unsuccessful as defined in table 38.

Table 38: Result of profile exchange information element contents

Information element	Length	Value	Remark
Result of profile exchange	1	0	Profile exchange unsuccessful
		1	Profile exchange successful

5.2.3.3.4 Supported area definitions

The information element supported area definitions shall indicate which area definitions are supported and which are not as defined in table 39.

Table 39: Supported area definitions information element contents

Information sub-element	Length	Value	Remark
Supported area definitions	8	$0000000x_2$	Area by site list supported
		$000000x0_2$	Area by circle supported
		$00000x00_2$	Area by line supported
		$0000x000_2$	Reserved supported
		..etc.	..etc.
		$x0000000_2$	Reserved
NOTE: The x shall be set to "1" when the definition type is supported. The reserved values shall be set to "0" to indicate not supported. The binary addition of all supported area definitions values shall be set as the value of the information element.			

5.2.3.4 Additional coding requirements over the ISI

The following shall apply for the PSS1 facility information element carrying an APDU of the ROSE operation used by ANF-ISISS for SS-AS PDUs:

- both the sourceEntity and destinationEntity data elements in the Network Facility Extension of this PSS1 facility information element shall contain the value endPINX;

NOTE 1: The preceding indented paragraph applies even when the INVOKE PDU is carried over the ISI. This is so because the other end of the signalling connection used by the originating SwMI to establish the call changes during the establishment of that call:

- in the case of a group call, it is first the group home SwMI, to which the INVOKE PDU may be sent. In the case of group linking it will then be the controlling SwMI, but the INVOKE PDU will never be sent to the latter;

- in the case of an individual call, it is the called user home SwMI, to which the INVOKE PDU may be sent. In the case where the called user has migrated, it will then be the terminating SwMI, but the INVOKE PDU will never be sent to the latter;

- no interpretation APDU shall be included in this PSS1 facility information element.

NOTE 2: As required by subclause 10.3 of EN 300 392-9 [7], each SS-AS PDU sent by the authorized user (i.e. for definition/interrogation) will include the ITSI of this authorized user as indication of the source of these PDUs when they are extended over the ISI, by invoking ANF-ISISS.

Similarly as required by subclause 10.3 of EN 300 392-9 [7], the corresponding SS-AS ACK PDUs sent to the authorized user will include the ITSI of this user as their destination.

5.3 SS-AS state definition

5.3.1 States at the served user MS/LS

Two types of state definitions have been identified:

- one for SS-AS invocation and operation;
- the other for SS-AS assignment.

5.3.1.1 States for invocation and operation

The following conceptual states have been identified in the served user SwMI for writing the procedures for SS-AS invocation and operation:

- idle;
- basic_SS_AS_invoked;
- extended_SS_AS_invoked;
- AS_waiting_for_location_change;
- AS_location_change.

5.3.1.2 State for assignment

Only one conceptual state has been identified in the served user SwMI for writing the procedures for SS-AS assignment: idle.

5.3.2 States at the served user SwMI

Two types of state definitions have been identified:

- one for SS-AS invocation and operation;
- the other for SS-AS assignment.

5.3.2.1 States for invocation and operation

The following conceptual states have been identified in the served user SwMI for writing the procedures for SS-AS invocation and operation:

- idle;
- individual_call_basic_AS_invoked;
- individual_call_extended_AS_invoked;
- individual_call_extended_AS_invoked_in_terminating_SwMI;

- group_call_basic_AS_invoked;
- group_call_extended_AS_invoked;
- call_established_with_AS_operating_for_calling_user.

5.3.2.2 State for assignment

Only one conceptual state has been identified in the served user SwMI for writing the procedures for SS-AS assignment: idle.

5.3.3 States at the called user home SwMI

Only one conceptual state has been identified in the called user home SwMI for writing the SS-AS procedures (i.e. for operation): idle.

5.3.4 States at the group home SwMI

Two types of state definitions have been identified:

- one for SS-AS operation;
- the other for SS-AS definition or interrogation.

5.3.4.1 States for operation

The following conceptual states have been identified in the group home SwMI for writing the procedures to for SS-AS operation:

- idle;
- call_established_with_AS_inhibited_for calling_user;
- waiting_for_originating_SwMI_response;
- call_established_with_AS_operating_for all_users;
- waiting_for_migrating_user_call_restoration.

5.3.4.2 State for definition or interrogation

Only one conceptual state has been identified in the group home SwMI for writing the procedures for SS-AS definition and interrogation: idle.

5.3.5 States at the group controlling SwMI

To be defined.

5.3.6 States at a participating SwMI

The following conceptual states have been identified in a participating SwMI for writing the procedures to for SS-AS operation:

- idle;
- SS_AS_inhibition_requested_for important_user_roaming_or_migrating;
- SS_AS_inhibited_for_important_user_roaming_or_migrating;
- call_established_with__AS_operating_for_all_users.

5.3.7 States at a new participating SwMI

The following conceptual states have been identified a new participating SwMI for writing the procedures to for SS-AS operation:

- idle;
- SS_AS_inhibited_for_important_user_roaming_or_migrating;
- SS_AS_operating_for_all_users.

5.3.8 States at the terminating SwMI

Only one conceptual state has been identified in the terminating SwMI for writing the SS-AS procedures (i.e. for operation): idle.

5.3.9 State at the authorized user MS/LS

Only one conceptual state has been identified in the authorized user MS/LS for writing the SS-AS procedures (i.e. for definition or interrogation): idle.

5.3.10 State at the authorized user SwMI

Only one conceptual state has been identified in the authorized user SwMI for writing the SS-AS procedures: idle.

5.3.11 State at the served user home SwMI

Only one conceptual state has been identified in the served user home SwMI for writing the SS-AS procedures: idle.

5.4 SS-AS signalling procedures

Examples of message sequences are shown in annex A.

5.4.1 Actions at the served user MS/LS

The SDL representation of procedures at the calling user MS/LS is shown in clause B.1.

5.4.1.1 Normal procedures

5.4.1.1.1 Invocation and operation

NOTE 1: Throughout subclause 5.4.1.1.1, the term calling user has been used instead of served user for specifying the normal invocation and operation procedures (as this was judged more clear).

When the calling user has invoked SS-AS, the information element area selection (see table 89 of EN 300 392-2 [2]) in the corresponding U-SETUP PDU (see table 86 of EN 300 392-2 [2]) shall have a value different from 0. If the binary value of the information element area selection is equal to 0000_2, the INVOKE PDU, defined in table 16, may be included in that U-SETUP PDU. If that binary value is between 0001_2 and 1111_2, INVOKE PDU shall be included in that U-SETUP PDU.

NOTE 2: When the information element area selection is equal to 0000_2 and there is no INVOKE PDU in the U-SETUP PDU then the user indicates that he is not selected any specific area. The SwMI may still apply a default area selection.

If present, the INVOKE PDU shall be addressed to the following SwMIs:

- for a group call, generally to the group controlling SwMI, possibly to the originating SwMI;

- for an individual call, generally to the originating SwMI, possibly to the called user home SwMI.

The addressing of the INVOKE PDU shall be done in allocating the value corresponding to the destination SwMI defined above to the routeing information sub-element in the facility information element which carries such PDU (see table 2 of EN 300 392-9 [7].

NOTE 3: The area selection information element in the U-SETUP PDU is always addressed to the originating SwMI independently of the call type.

For a group call, if the group controlling supports SS-AS, the calling user may either:

- receive the D-RELEASE PDU with the disconnect cause "SS-specific disconnection" and may receive notification "call rejected due to SS-AS" if the calling user has invoked SS-AS and is outside the invoked selected area and SS-AS operation inhibition for the calling user is not supported; or

- the call is set up without an SS-AS in the whole or part of the originating SwMI, refer to subclause 5.4.1.2.1. The reasons, such as the cost of the call, to choose disconnection or continuation are outside the scope of the present document.

Once SS-AS has been invoked, the procedures defined for the air interface basic call shall apply for the establishment of the call (see subclauses 14.5.1.1 and 14.5.2.1 of EN 300 392-2 [2]).

NOTE 4: The preceding paragraph means that:

- if the call for which SS-AS has been invoked is successfully established, the calling user will simply receive the D-CONNECT PDU;

- if that call fails because of the successful operation of SS-AS, the calling user will receive the D-RELEASE PDU with the disconnect cause: SS-specific disconnection (see table 106 of EN 300 392-2 [2]) and may receive notification indication: "call rejected due to SS-AS" (see table 3 of EN 300 392-9 [7]).

If a participant of a group call roams outside the invoked selected area within the SwMI where he is registered and if that SwMI optionally continues to operate SS-AS during the call, that user shall not be able to successfully restore the call. Independently whether he is the call owner at that time, he shall then receive the D-RELEASE PDU with the disconnect cause "SS-specific disconnection" and may receive notification indication “call rejected due to SS-AS". The same shall apply if the participant of a group call migrates into another SwMI outside the invoked selected area and if that new SwMI continues to operate SS-AS during the call.

NOTE 5: When the disconnected user roams or migrated back to the area where the call is active he may follow later entry signalling or send U-SETUP PDU in order to rejoin the call.

NOTE 6: When a user of a group call roams outside the invoked selected area and the SwMIs continue to operate SS-AS during the call, then the call restoration acceptance may be different to the calling user or to other important users than to the other participants of the call. In other words the inhibition of SS-AS may be applied only to the calling and important users during the call.

NOTE 7: If the originating SwMI does not support SS-AS it will pass the area selection information element and the INVOKE PDU without any action to the called user/group SwMI.

5.4.1.1.2 Assignment

The served user MS/LS may support the assignment procedure. That procedure consists in:

- receiving the ASSIGN PDU sent by the served user SwMI;

- acknowledging it in sending the ASSIGN ACK PDU if such acknowledgement has been requested in the ASSIGN PDU, with PDU priority 1.

5.4.1.2 Exceptional procedures

5.4.1.2.1 Invocation

NOTE 1: Throughout subclause 5.4.1.2.1, the term calling user has been used instead of served user for specifying the exceptional invocation procedures (as this was judged more clear).

The following shall apply when the calling user has invoked SS-AS and when that invocation fails for one of the four following reasons:

- the supplementary service has not been subscribed for him in the case of individual call or for the group in the case of group call;
- he has invoked SS-AS in using a value of the information element area selection in the U-SETUP PDU or of the information element selected area number in the INVOKE PDU which is not defined;
- SS-AS is not supported by a SwMI (on the call path) which plays an essential role in SS-AS operation;
- the optional INVOKE PDU has been sent over the ISI to a SwMI (on the call path) which does not support such PDU, or the INVOKE EXT PDU has been sent to a SwMI (on the call path) which plays an essential role in SS-AS operation and which does not support the type of selected area definition used in that PDU (i.e. in the case of an individual call: the called user home SwMI or the terminating SwMI; in the case of a group call: the group home SwMI, the group controlling SwMI or some participating SwMIs);
- SS-AS inhibition for the calling user is not supported.

When the originating SwMI detects or is informed about one of the invocation failure cases, the calling user's MS/LS shall receive the notification indicator information element with a value corresponding to SS-AS invocation failure together with the INVOCATION FAILURE PDU with the information element failure cause giving the reason, at the latest within the D-CONNECT PDU: the above mentioned notification indicator information element and INVOCATION FAILURE PDU could also be sent in a basic call PDU (the D-ALERT PDU in the case of an individual call, else the D-CALL PROCEEDING PDU) or independently (i.e. in the D-INFO PDU).

NOTE 2: The originating SwMI will never detect or be informed about more than one of the four failure reasons mentioned above (see subclause 5.4.2.2). Thus there is no need to provide the possibility of more than one such reason in any INVOCATION FAILURE PDU.

NOTE 3: According to subclause 5.4.2.2, the role (i.e. home SwMI, terminating SwMI or participating SwMI) of that other SwMI which does not support SS-AS will be given in the INVOCATION FAILURE PDU.

In the case of a group call for which SS-AS has been invoked, if the group controlling SwMI has informed the originating SwMI that a participating SwMI with no essential role in SS-AS operation does not support SS-AS, the calling user's MS/LS may receive the INVOCATION FAILURE PDU with the failure cause: SS-AS not supported by participating SwMI(s) non-critical (see note 4 of subclause 5.4.4.2). Similarly, if the group controlling SwMI has informed the originating SwMI that a participating SwMI with no essential role in SS-AS operation does not support the type of selected area definition used in the INVOKE EXT PDU which it has received, the calling user's MS/LS may receive the INVOCATION FAILURE PDU with the failure cause: type of selected area definition used not supported by participating SwMI(s) non-critical (see also note 4 of subclause 5.4.5.2). No notification indicator information element with a value corresponding to SS-AS invocation failure shall be received by the calling user's MS/LS in such a case (see subclause 5.4.2.2).

NOTE 4: In addition, if the calling user has invoked SS-AS in sending the INVOKE PDU addressed to a SwMI (be it the originating SwMI, the group home SwMI or the called user home SwMI) which does not support that supplementary service, it will result in the originating SwMI sending the reject SS PDU as defined in subclause 11.2.1 of EN 300 392-9 [7], with the value of the information element SS type defined for SS-AS in table 5 of EN 300 392-9 [7], and the value of the information element SS-PDU type equal to 0 (see subclause 8.2 of EN 300 392-9 [7]).

Similarly if the calling user has invoked SS-AS in sending an INVOKE PDU addressed to a SwMI which supports that supplementary service but not the INVOKE PDU, it will result in the originating SwMI sending the reject SS PDU specified in subclause 11.2.1 of EN 300 392-9 [7], with the value of the information element SS type defined for SS-AS in table 5 of EN 300 392-9 [7], and the value of the information element SS-PDU type equal to the value 1 (see table 6 of EN 300 392-9 [7]).

A similar provision will apply if the SS-AS invocation failure results from a problem (having been detected) in the ISI SS-AS protocol, the only difference being that the value of the information element SS-PDU type will be equal to 2 (see subclause 8.2 of EN 300 392-9 [7]).

5.4.1.2.2 Assignment

No exceptional assignment procedures apply at the served user MS/LS.

5.4.2 Actions at the served user SwMI

The SDL representation of procedures at the served user SwMI is shown in clause B.2.

5.4.2.1 Normal procedures

5.4.2.1.1 Operation

NOTE: Throughout subclause 5.4.2.1.1, the term calling user has been used instead of served user for specifying the normal invocation and operation procedures (as this was judged more clear).

5.4.2.1.1.1 Invocation handling

When the originating SwMI has received a U-SETUP PDU (see table 86 of EN 300 392-2 [2]) with a value of the information element area selection (see table 89 of EN 300 392-2 [2]) different from 0000_2, the originating SwMI shall identify that the calling user has invoked SS-AS.

If the binary value of the information element area selection is equal to 0000_2, the originating SwMI may receive an INVOKE PDU, defined in table 16, included in the U-SETUP PDU. If the INVOKE PDU is present the originating SwMI shall identify that the calling user has invoked SS-AS

NOTE: Since node actions are not to be described as part of the protocol, it should be reminded that, according to EN 300 392-11-8 [9], on SS-AS stage 2 description, when the originating SwMI has received a U-SETUP PDU with a value of the information element area selection different from 0000_2, that SwMI will first check whether SS-AS has been subscribed:

- for the calling user, in the case:
  - of an individual call; or
  - of a group call when the served user has invoked SS-AS in using a selected area defined in the originating SwMI, against his ITSI (by using the INVOKE PDU and addressing it to that SwMI);
- for the group in the case of a group call when the served user has invoked SS-AS in using a selected area defined in the group home SwMI (this will be the general case), except when the originating SwMI is not attached to the group (i.e. it has not received the group basic migration profile - through ANF-ISIMM, see ETS 300 392-3-5 [6]). If the originating SwMI is not attached to the group, only the group home SwMI will be able to check whether or not SS-AS has been subscribed for the group.

The case where the result of that check is negative is addressed in subclause 5.4.2.2. The case where it is positive and the specific case mentioned above are addressed in what follows (either in the present note or in the rest of subclause 5.4.2.1).

If the call is an individual call and the value of the information element area selection in the U-SETUP PDU received is between 0001_2 and 1111_2, the originating SwMI will determine the definition of the selected area corresponding to the value against the calling user (for individual calls). The same will apply for an individual call or a group call if the value of the information element area selection in the U-SETUP PDU received is equal to 0000_2 and the accompanying INVOKE PDU is addressed to the originating SwMI.

If the call is an individual call, when the definition of the selected area is such that it is completely within the originating SwMI, the establishment of the individual call will be attempted only in the selected area (within the originating SwMI) hence no ANF-ISIIC SETUP PDU will exist.

5.4.2.1.1.2 Individual call

For an individual call, if the originating SwMI has decided to invoke ANF-ISIIC (i.e. the call is to be routed over the ISI), if it has successfully checked that SS-AS has been subscribed for the calling user, it shall also invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the corresponding INVOKE EXT PDU, defined in table 18, to the called user home SwMI together with the ANF-ISIIC-SETUP PDU when the binary value of the information element area selection received in the U-SETUP PDU is: either

- between 0001_2 and 1111_2; or

- equal to 0000_2, if the INVOKE PDU received in the U-SETUP PDU had been addressed to the originating SwMI and if that SwMI has successfully determined the definition of the selected area invoked using that INVOKE PDU.

Still if that binary value (of the information element area selection received in the U-SETUP PDU) is equal to 0000_2 but if the INVOKE PDU received in the U-SETUP PDU had been addressed to the called user home SwMI, the originating SwMI shall send that INVOKE PDU, defined in table 16, to the called user home SwMI (through ANF-ISISS - see clause 10 of EN 300 392-9 [7]) together with the ANF-ISIIC-SETUP PDU. In such a case, if the invoked ANF-ISIIC is operated by re-routeing or if the terminating SwMI happens to coincide with the originating SwMI, the originating SwMI shall receive the corresponding INVOKE EXT PDU, defined in table 18, sent by the called user home SwMI together with the ANF-ISIIC-FORWARD PDU (see subclause 6.5.1.2 of EN 300 392-3-2 [4]).

If the invoked ANF-ISIIC is operated by re-routeing, the originating SwMI shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the INVOKE EXT PDU to the terminating SwMI together with the ANF-ISIIC-SETUP PDU. That INVOKE EXT PDU shall be: either

- that already sent to the called user home SwMI (together with the ANF-ISIIC-SETUP PDU); or

- that received from the called user home SwMI in the ANF-ISIIC-FORWARD PDU, in response to the INVOKE PDU.

5.4.2.1.1.3 Group call

For a group call, if the originating SwMI does not coincide with the group home SwMI and if it has either successfully checked that SS-AS has been subscribed for the group or been unable to do it (see note in subclause 5.4.2.1.1), it shall give the value of the information element area selection in the U-SETUP PDU received to the same information element (area selection) in the ANF-ISIGC-ORIGINATING SETUP PDU sent to the group home SwMI. In addition, depending on that value, the following shall apply:

- if that value is between 0001_2 and 1111_2 and if the originating SwMI cannot inhibit SS-AS operation for the calling user (which would result in the calling user not being able to participate in the call if he is outside the invoked selected area), the originating SwMI shall indicate it to the group home SwMI in invoking ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the INVOCATION QUALIFIER PDU, defined in table 15, together with that ANF-ISIGC-ORIGINATING SETUP PDU;

- if that binary value is equal to 0000_2 and if the INVOKE PDU received in the U-SETUP PDU had been addressed to the group home SwMI, the originating SwMI shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send that INVOKE PDU, defined in table 16, to the group home SwMI together with the ANF-ISIGC-ORIGINATING SETUP PDU;

- still if that binary value is equal to 0000_2 but if the INVOKE PDU received in the U-SETUP PDU had been addressed to the originating SwMI, in the case where that SwMI has successfully determined the definition of the selected area invoked using that INVOKE PDU, that SwMI shall send the corresponding INVOKE EXT PDU, defined in table 18, to the group home SwMI together with the ANF-ISIGC-ORIGINATING SETUP PDU.

If the group home SwMI does not coincide with the group controlling SwMI (case of group linking) the originating SwMI shall receive from the group home SwMI the INVOKE EXT PDU giving the definition of the invoked selected area number through ANF-ISISS together with the ANF-ISIGC-REROUTE SETUP PDU, except if the originating SwMI had send the INVOKE EXT PDU to the group home SwMI (through ANF-ISISS) together with the ANF-ISIGC-ORIGINATING SETUP PDU. If the originating SwMI does not coincide with the group controlling SwMI, it shall then:

- give the binary value 0000_2 to the information element area selection in the ANF-ISIGC-ORIGINATING SETUP PDU sent to the group controlling SwMI;

- invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the INVOKE EXT PDU received from the group home SwMI to that group controlling SwMI together with the ANF-ISIGC-ORIGINATING SETUP PDU (i.e. in the same PSS1 SETUP message).

If the originating SwMI coincides with the group controlling SwMI, see subclause 5.4.5.1 for the establishment of the group call to the participating SwMIs.

If the originating SwMI has indicated to the group controlling SwMI that it cannot inhibit SS-AS operation for the calling user (which would result in the calling user not being able to participate in the call if he is outside the invoked selected area), in sending the INVOCATION QUALIFIER PDU, defined in table 15, or in the INVOKE or INVOKE EXT PDU sent, the following shall then apply:

- if no group member other than possibly the calling user (in the case where that user would be a group member) is attached to the group in the originating SwMI, that SwMI may receive an INVOKE EXT PDU from the group controlling SwMI through ANF-ISISS in a PSS1 FACILITY to allow it to determine whether or not the calling user is within the invoked selected area;

- if at least one group member other than possibly the calling user (in the case where that user would be a group member) is attached to the group in the originating SwMI, that SwMI may receive the INVOKE EXT PDU as a participating SwMI (see subclause 5.4.6) through ANF-ISISS, i.e. no specific INVOKE EXT PDU shall then be sent to the originating SwMI to determine whether or not the calling user is within the invoked selected area;

NOTE: See subclause 5.4.5.1 for the case where the originating SwMI is completely outside the selected area.

- then if the originating SwMI determines that the calling user is not within the invoked selected area, it shall send the ANF-ISIGC-DISCONNECT PDU to the group controlling SwMI with the disconnect cause "SS-specific disconnection";

- if the originating SwMI determines that the calling user is within the invoked selected area, it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the INVOKE CONFIRM PDU, defined in table 17, to the group controlling SwMI in a PSS1 FACILITY.

5.4.2.1.1.4 Follow up

If the originating SwMI receives the ANF-ISIGC-RELEASE PDU from the group controlling SwMI or the ANF-ISIIC-RELEASE PDU, it shall send the D-RELEASE PDU to the calling user's MS/LS with the disconnect cause received in the ANF-ISIGC-RELEASE PDU or ANF-ISIIC-RELEASE PDU.

NOTE 1: In the case of group call, if the call clearing is because of SS-AS operation, according to subclause 5.4.5.1, such disconnect cause will be calling user outside area selected or called user/group outside area selected. In the case of individual call, if the call clearing is because of SS-AS operation, according to subclause 5.4.3.1, such disconnect cause will only be called user/group outside area selected.

NOTE 2: If the group controlling SwMI decides to establish the call, the normal procedure defined in subclause 6.5.1 of ETS 300-392-3-3 [5] will apply, i.e. the originating SwMI will receive the ANF-ISIGC-CONNECT PDU from the group controlling SwMI, and will then send the D-CONNECT PDU to the calling user's MS/LS.

If the calling user of a group call roams outside the invoked selected area within the originating SwMI, the same procedure as for any other user participating in the call and roaming or migrating in a participating SwMI shall apply (see subclause 5.4.6.1).

5.4.2.1.2 Assignment

The served user SwMI may support the assignment procedure. That procedure is triggered by receiving the ANF-ISIMM SS PROFILE UPDATE with the information element AS-migration profile (original) (see ETS 300 392-3-5 [6]) defining selected area number(s) (for the served user SwMI or for groups of which the served user is a member) and requesting that such definition(s) be assigned to the served user MS/LS. If the served user SwMI supports that procedure, it shall then:

- send the ASSIGN PDU to the served user MS/LS. The value of the information element assignment requested shall be set to 1 (see table 21) if the information element AS-migration profile (original) had also requested that the short number assignment be acknowledged;

NOTE: Generally the ASSIGN PDU will be individually addressed to the served user MS/LS. However if the same PDU is to be sent to all the members of a group attached to that group in the served user SwMI, the ASSIGN PDU will be addressed to that group.

- if such acknowledgement has been requested in the ASSIGN PDU, the served user shall wait to receive waiting the ASSIGN ACK PDU from the served user MS/LS.

5.4.2.2 Exceptional procedures

5.4.2.2.1 Operation

NOTE 1: Throughout subclause 5.4.2.2.1, the term calling user has been used instead of served user for specifying the normal invocation and operation procedures (as this was judged more clear).

NOTE 2: Since node actions are not to be described as part of the protocol, it should be reminded that, according to ETS 300 392-11-08 [9], on SS-AS stage 2 description, the originating SwMI will proceed with the call set-up in ignoring any SS-AS invocation failure in the various cases considered below.

5.4.2.2.1.1 Local detection of non-subscription

If the originating SwMI has received a U-SETUP PDU with a value of the information element area selection different from 0000_2, and if it identifies that SS-AS has not been subscribed for the calling user in the case of an individual call or for the group in the case of a group call, it shall inform the calling user's MS/LS about it in sending to it the INVOCATION FAILURE PDU with the failure cause: "not subscribed" and set the value of the information element area selection to 0000_2 and reject any area selection related facility information element. The call shall proceed without area selection.

NOTE 1: If the originating SwMI does not support SS-AS then it will not apply area selection within it and will pass all the area selection information in the U-SETUP PDU over ISI to the called user or group home SwMI.

NOTE 2: In the group call case the originating SwMI checks the subscription against the group identity and if the calling user is attached to that group the area selection is applicable independently whether the calling user has an individual area selection subscription or not. If the calling user is not attached to the group either beeing a member of that group or not, then the area selection invocation is forwarded to the group controlling SwMI only if the calling user has an individual SS-AS subscription.

5.4.2.2.1.2 Local detection of missing definition

If the originating SwMI has received a U-SETUP PDU for an individual call with a binary value of the information element area selection between 0001_2 and 1111_2, if it has not identified that SS-AS has not been subscribed for the calling user and if that binary value is not defined in the originating SwMI against that user (for individual calls), that SwMI shall send to the calling user's MS/LS a D-INFO PDU including the INVOCATION FAILURE PDU with the failure cause: "not defined".

The same shall hold for either a group call or an individual call if the originating SwMI has not identified that SS-AS has not been subscribed for the calling user and if the originating SwMI has received a U-SETUP PDU with a binary value of the information element area selection in the U-SETUP PDU equal to 0000_2 with an INVOKE PDU addressed to it and the value of the selected area number in that INVOKE PDU is not defined in that SwMI.

5.4.2.2.1.3 Reception of ROSE Return Error APDU (over the ISI)

5.4.2.2.1.3.1 Individual call

If in response to the ANF-ISISS ROSE Invoke APDU used to send the INVOKE PDU to the called user home SwMI, the originating SwMI receives a ROSE Return Error APDU with the error value requestNotSupported identifying that the other SwMI either does not support SS-AS or simply does not support the optional INVOKE PDU, it shall send to the calling user's MS/LS the INVOCATION FAILURE PDU with the failure cause: SS-AS not supported by called user (/group) home SwMI or SS-AS option not supported by called user (/group) home SwMI depending on the information which it has received in the ROSE Return Error APDU.

NOTE 1: There is no need to give the identity of the called user home SwMI, i.e. MNI of the called user home SwMI, since such identity is already known by the calling user's MS/LS (which has used it to set-up the call).

If in response to the ANF-ISISS ROSE Invoke APDU used to send the INVOKE EXT PDU to the called user home SwMI, the originating SwMI receives a ROSE Return Error APDU with the error value requestNotSupported identifying that the other SwMI does not support SS-AS, the following shall apply:

- if the terminating SwMI coincides with the called user home SwMI (i.e. the called user has not migrated), the originating SwMI shall send to the calling user's MS/LS the INVOCATION FAILURE PDU with the failure cause: (SS-AS) not supported by called user (/group) home SwMI. The same requirement shall apply if the terminating SwMI does not coincide with the called user home SwMI and the invoked ANF-ISIIC is operated by forward switching;

- if the terminating SwMI does not coincide with the called user home SwMI (i.e. the called user has migrated) and the invoked ANF-ISIIC is operated by re-routeing, the originating SwMI shall simply ignore the ROSE Return Error APDU and send the INVOKE EXT PDU to the terminating SwMI together with the ANF-ISIIC-SETUP PDU.

If the terminating SwMI does not coincide with the called user home SwMI (i.e. the called user has migrated), if the invoked ANF-ISIIC is operated by re-routeing and if, in response to the ANF-ISISS ROSE Invoke APDU used to send the INVOKE EXT PDU to the terminating SwMI, the originating SwMI receives a ROSE Return Error APDU with the error value requestNotSupported identifying that the other SwMI does not support SS-AS, the originating SwMI shall send to the calling user's MS/LS the INVOCATION FAILURE PDU with the failure cause: SS-AS not supported by terminating SwMI.

NOTE 2: It has not been judged advisable to give to the calling user the identity of the terminating SwMI (i.e. its MNI) which does not support SS-AS, since that information is not really useful to that user, and the identification of the SwMI where the called user is currently registered might be confidential in some cases.

NOTE 3: The originating SwMI will not send the INVOKE EXT PDU to the terminating SwMI if the called user home SwMI has informed it that the terminating SwMI does not support SS-AS (see subclause 5.4.2.2.1.4.1).

5.4.2.2.1.3.2 Group call

If in response to the ANF-ISISS ROSE Invoke APDU used to send the INVOKE PDU to the group home SwMI, the originating SwMI receives a ROSE Return Error APDU with the error value requestNotSupported identifying that the other SwMI either does not support SS-AS or simply does not support the optional INVOKE PDU, it shall send to the calling user's MS/LS the INVOCATION FAILURE PDU with the failure cause: SS-AS not supported by called user (/group) home SwMI or SS-AS option not supported by (called user/) group home SwMI depending on the information which it has received in the ROSE Return Error APDU.

NOTE 1: There is no need to give the identity of the group home SwMI, i.e. MNI of the group home SwMI, since such identity is already known by the calling user's MS/LS (which has used it to set-up the call).

If the group home SwMI is different from the group controlling SwMI, the following shall apply if in response to the ANF-ISISS ROSE Invoke APDU used to send the INVOKE EXT PDU, the originating SwMI receives a ROSE Return Error APDU with the error value requestNotSupported:

- if the INVOKE EXT PDU had been sent to the group home SwMI (that PDU is then optional) and if the error value requestNotSupported identifies that the group home SwMI does not support SS-AS or that optional INVOKE EXT PDU, the originating SwMI shall simply ignore that information and send the INVOKE EXT PDU to the group controlling SwMI together with the ANF-ISIGC-ORIGINATING SETUP PDU.

NOTE 2: The originating SwMI will identify that the group controlling SwMI is different from the group home SwMI when it receives the ANF-ISIGC-REROUTE SETUP PDU (see subclause 6.5.1.2 of ETS 300 392-3-3 [5].

- if the INVOKE EXT PDU had been sent to the group controlling SwMI and if the error value requestNotSupported identifies that the group controlling SwMI does not support SS-AS, the originating SwMI shall send to the calling user's MS/LS the INVOCATION FAILURE PDU with the failure cause: (SS-AS) not supported by group controlling SwMI.

5.4.2.2.1.4 Reception of the INVOCATION FAILURE PDU (over the ISI)

5.4.2.2.1.4.1 Individual call

In the case of an individual call, the originating SwMI may receive from the called user home SwMI through ANF-ISISS the INVOCATION FAILURE PDU with the failure cause being:

- "type of definition not supported by terminating SwMI" referring to the invoked selected area if the originating SwMI has sent the INVOKE EXT PDU to the called user home SwMI; or

- SS-AS not supported by terminating SwMI.

NOTE 1: See note 2 in subclause 5.4.2.2.3.1.

Then, if the invoked ANF-ISIIC is operated by re-routeing, the originating SwMI shall not send the INVOKE EXT PDU to the terminating SwMI (together with the ANF-ISIIC-SETUP PDU).

Still, if the invoked ANF-ISIIC is operated by re-routeing, the originating SwMI may receive from the terminating SwMI through ANF-ISISS the INVOCATION FAILURE PDU with the failure cause: "type of definition not supported by terminating SwMI" referring to the invoked selected area.

NOTE 2: The sending by the terminating SwMI of the INVOCATION FAILURE PDU with the failure cause just mentioned (i.e. type of definition of invoked selected area not supported by the group home/ terminating SwMI) will happen only in the case where the called user home SwMI has not yet been informed about that situation through ANF-ISIMM (see note 2 in subclause 5.4.5.2).

The originating SwMI shall relay the INVOCATION FAILURE PDU received from the called user home SwMI or from the terminating SwMI to the calling user's MS/LS.

5.4.2.2.1.4.2 Group call

If the originating SwMI has received a U-SETUP PDU for a group call with a binary value of the information element area selection between 0001_2 and 1111_2 and if the group home SwMI, or the group controlling SwMI in the case where they are different (case of group linking), has sent to the originating SwMI the INVOCATION FAILURE PDU (see subclauses 5.4.4.2 and 5.4.5.2), the originating SwMI shall relay that INVOCATION FAILURE PDU to the calling user's MS/LS.

NOTE 1: The possible failure causes indicated in the INVOCATION FAILURE PDU will then be: "SS-AS not subscribed for the served user/group", "invoked selected area number not defined", not supported by group controlling SwMI (group linking)" (only if that SwMI is different from the group home SwMI), else by some participating SwMI(s) or by the originating SwMI. It could also be "type of definition not supported by group controlling SwMI" in the case where the group controlling SwMI does not coincide with the group home SwMI (because it is only in such a case that the originating SwMI will send the INVOKE EXT PDU - while the binary value of the information element area selection in the U-SETUP PDU had been between 0001_2 and 1111_2).

The same shall apply if the originating SwMI has received a U-SETUP PDU for a group call with a binary value of the information element area selection equal to 0000_2 and if the group home SwMI, or the group controlling SwMI in the case where they are different (case of group linking), has sent to the originating SwMI the INVOCATION FAILURE PDU (see subclauses 5.4.4.2 and 5.4.5.2).

NOTE 2: The possible failure causes indicated in the INVOCATION FAILURE PDU will then be the same ones mentioned in note 2 and in addition the following ones, both only in the case where the INVOKE PDU sent by the calling user in his U-SETUP PDU has been addressed to the originating SwMI and where the group home SwMI coincides with the group controlling SwMI:

- SS-AS option not supported by (called user/) group home SwMI;
- type of definition not supported by terminating SwMI;
- type of definition not supported by group controlling SwMI.

5.4.2.2.1.5 General requirement for sending the INVOCATION FAILURE PDU to the calling user's MS/LS

The following shall apply for all the provisions above specifying the sending of the INVOCATION FAILURE PDU to the calling user's MS/LS: the originating SwMI shall send such PDU at the latest within the D-CONNECT PDU.

NOTE: It would be preferable that the originating SwMI send the INVOCATION FAILURE PDU earlier, i.e. in a basic call PDU (the D-ALERT PDU in the case of an individual call, else the D-CALL PROCEEDING PDU) or independently (i.e. in the D-INFO PDU).

5.4.2.2.1.6 Additional sending of notification

Except in the case where the group controlling SwMI has sent the INVOCATION FAILURE PDU with the failure cause: SS-AS not supported by participating SwMI(s) non-critical, the originating SwMI shall send the notification indicator information element with the value corresponding to SS-AS invocation failure together with the INVOCATION FAILURE PDU (in the D-CALL PROCEEDING PDU, D-ALERT PDU, D-INFO PDU or D-CONNECT PDU).

NOTE: In addition to the above, if the calling user has invoked SS-AS and the originating SwMI does not support that supplementary service, see note 4 at the end of subclause 5.4.1.2.1.

5.4.2.2.2 Assignment

If the served user SwMI has sent the ASSIGN PDU to the served user MS/LS with the value of the information element assignment requested set to 1 (see table 21) and if it has not received the corresponding ASSIGN ACK PDU from that MS/LS after a certain time, it may decide to resend the ASSIGN PDU.

The same may hold if the D-FACILITY PDU which carries the ASSIGN PDU has not been acknowledged by the air interface layer 2 (see clause 20 of EN 300 392-2 [2]).

5.4.3 Actions at the called user home SwMI

The SDL representation of procedures at the called user home SwMI is shown in clause B.5.

5.4.3.1 Normal operation procedures

If the called user home SwMI coincides with the originating SwMI, the provisions of subclause 5.4.2 which apply for an individual call shall apply to that SwMI.

If the called user home SwMI is different from the originating SwMI, it shall identify that SS-AS has been invoked when it receives either the INVOKE PDU, defined in table 16, or the INVOKE EXT PDU, defined in table 18, sent through ANF-ISISS together with the ANF-ISIIC-SETUP PDU.

NOTE: Since node actions are not to be described as part of the protocol, it should be reminded that, according to EN 300 392-11-8 [9], on SS-AS stage 2 description, when the called user home SwMI has received an ANF-ISIIC-SETUP PDU with the INVOKE PDU, it will first determine the definition corresponding to the selected area number in the INVOKE PDU (against the called user). No such determination will be necessary when the called user home SwMI has received an ANF-ISIIC-SETUP PDU with the INVOKE EXT PDU, since that PDU gives it. The called user home SwMI will then check first whether the called user has migrated (or if he is registered in his home SwMI) second whether the corresponding invoked selected area definition covers the SwMI where the called user is currently registered. Depending on the result:

- if the called user is registered in his home SwMI, depending on whether the called user is located within the invoked selected area or outside, that SwMI will establish the call or clear it (see provision below);
- if the called user has migrated and if the terminating SwMI lies completely outside the invoked selected area, the called user home SwMI will clear the call (see provision below);
- if the called user has migrated and if only part of the terminating SwMI lies within the invoked selected area, the called user home SwMI will continue the call establishment towards the terminating SwMI according to the ANF-ISIIC procedures in invoking SS-AS in the terminating SwMI in giving to that SwMI a definition of the invoked selected area appropriate to it (see provision below).

The called user home SwMI will stop operating SS-AS after the call has been successfully established.

If the called user home SwMI has determined that the called user is located outside the invoked selected area (whether within that SwMI or within a terminating SwMI which lies completely outside the invoked selected area), it shall send the ANF-ISIIC-DISCONNECT PDU to the originating SwMI with the disconnect cause: called user (/group) outside area selected (see *updated* table 57 of EN 300 392-3-2 [4]).

If the called user home SwMI has determined that the called user has migrated and that only part of the terminating SwMI lies within the invoked selected area, it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the INVOKE EXT PDU, defined in table 18, to the terminating SwMI. The called user home SwMI shall define the invoked selected area in that INVOKE EXT PDU in a manner appropriate to the terminating SwMI. Depending on how the PISN call associated to the invoked ANF-ISIIC is established (see subclause 6.5.1.2 of EN 300 392-3-2 [4]), that sending shall be together with the ANF-ISIIC-SETUP PDU:

- directly to the terminating SwMI if the ISI call is forward switched; or
- to the originating SwMI if the ISI call is re-routed to the terminating SwMI

5.4.3.2 Exceptional operation procedures

If the called user home SwMI has received the ANF-ISIIC-SETUP PDU from the originating SwMI with the INVOKE PDU addressed to it through ANF-ISISS and if the value of the selected area number in that INVOKE PDU is not defined (in that SwMI), it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send to the originating SwMI the INVOCATION FAILURE PDU, defined in table 14, with the failure cause: not defined.

If the called user home SwMI has received the ANF-ISIIC-SETUP PDU from the originating SwMI with the INVOKE EXT PDU (through ANF-ISISS) and if it has been informed that the terminating SwMI does not support SS-AS (see note 1), it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send to the originating SwMI the INVOCATION FAILURE PDU with the failure cause: (SS-AS) not supported by terminating SwMI (see note 3). If the invoked ANF-ISIIC is operated by forward switching, the called user home SwMI shall then not send the INVOKE EXT PDU to the terminating SwMI (together with the ANF-ISIIC-ORIGINATING SETUP PDU). The same shall apply if the called user home SwMI has received an ANF-ISIIC-SETUP PDU from the originating SwMI with the INVOKE PDU (through ANF-ISISS) and if the value of the selected area number in that INVOKE PDU is defined (in that SwMI), with the additional requirement that in such a case, the called user home SwMI shall not send the INVOKE EXT PDU to the originating SwMI if the invoked ANF-ISIIC is operated by re-routeing.

NOTE 1: The called user home SwMI will know whether the terminating SwMI supports or not SS-AS by ANF-ISIMM migration service (see ETS 300 392-3-5 [6]) or by some input from the SwMI operator outside the scope of standardization.

Similarly, if the called user home SwMI has received an ANF-ISIIC-SETUP PDU from the originating SwMI with the INVOKE EXT PDU (through ANF-ISISS) and if either it is the terminating SwMI or it has been informed (by ANF-ISIMM or by some input from the SwMI operator outside the scope of standardization) that the terminating SwMI does not support the type of definition of the invoked selected area used in that INVOKE EXT PDU, the called user home SwMI shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send to the originating SwMI the INVOCATION FAILURE PDU with the failure cause: type of definition of invoked selected area not supported by the (group home/) terminating SwMI (see note 3). If the invoked ANF-ISIIC is operated by forward switching, the called user home SwMI shall then not send the INVOKE EXT PDU to the terminating SwMI (together with the ANF-ISIIC-SETUP PDU).

NOTE 2: According to the specification of the ANF-ISIMM protocol for the migration service, the called user home SwMI may not know immediately which types of definition of the invoked selected area the terminating SwMI supports - in case the home SwMI decides to send the ANF-ISIMM PROFILE UPDATE PDU after having accepted the migration request from the user and that user is called in-between (see ETS 300 392-3-5 [6]).

NOTE 3: It has not been judged advisable to give to the calling user the identity of the terminating SwMI (i.e. its MNI) which does not support SS-AS or some type of selected area definition, since that information is not really useful to that user, and the identification of the SwMI where the called user is currently registered might be confidential in some cases.

NOTE 4: According to subclause 11.1.2 of EN 300 392-9 [7], if the called user home SwMI has received the ANF-ISISS ROSE Invoke APDU carrying the INVOKE EXT PDU and if it does not support SS-AS, it will send back a ROSE Return Error APDU with the error value requestNotSupported identifying that it does not support SS-AS.

Similarly, if the called user home SwMI has received the optional INVOKE PDU from the originating SwMI and if it does not support either SS-AS or simply that optional INVOKE PDU, it will inform the originating SwMI about that in sending back a ROSE Return Error APDU with the error value requestNotSupported identifying the situation.

Each of the above Return Error APDU with the error value requestNotSupported identifying the situation will allow the originating SwMI to inform the calling user about the SS-AS invocation failure (see subclause 5.4.2.2).

The following shall apply for all the provisions above specifying the sending of the INVOCATION FAILURE PDU: the called user home SwMI shall send such PDU:

- together with the ANF-ISIIC-FORWARD PDU if the invoked ANF-ISIIC is operated by re-routeing;
- at the latest together with the ANF-ISIIC-CONNECT PDU, if the invoked ANF-ISIIC is operated by forward switching (see note 5).

NOTE 5: It would be preferable to send the INVOCATION FAILURE PDU earlier, i.e. together with the ANF-ISIIC-ALERT PDU or with the ANF-ISIIC-INFO PDU.

5.4.4 Actions at the group home SwMI

If the calling user is registered in the group home SwMI, the provisions of subclause 5.4.2 which apply for a group call shall apply to that SwMI.

The SDL representation of procedures at the group home SwMI is shown in clause B.4.

5.4.4.1 Normal procedures

5.4.4.1.1 Operation

If the group home SwMI is different from the originating SwMI (i.e. the calling user is registered in a SwMI different from the group home SwMI), it shall identify that the calling user has invoked SS-AS when it receives an ANF-ISIGC-ORIGINATING SETUP PDU with a value of the information element area selection different from 0000_2.

If the binary value of that information element (area selection) is equal to 0000_2, the group home SwMI may receive through ANF-ISISS the INVOKE PDU, defined in table 16, else the INVOKE EXT PDU, defined in table 18, sent together with the ANF-ISIGC-ORIGINATING SETUP PDU.

If the binary value of that information element (area selection) is between 0001_2 and 1111_2 the group home SwMI may receive through ANF-ISISS the INVOCATION QUALIFIER PDU, defined in table 15, together with the ANF-ISIGC-ORIGINATING SETUP PDU (in the case where the originating SwMI cannot inhibit SS-AS operation for the calling user).

NOTE: Since node actions are not to be described as part of the protocol, it should be reminded that, according to EN 300 392-11-8 [9], on SS-AS stage 2 description, when the group home SwMI has received the ANF-ISIGC-ORIGINATING SETUP PDU with a value of the information element area selection different from 0000_2 with the INVOKE PDU (but without the INVOKE EXT PDU), it will check whether SS-AS has been subscribed for the group when the originating SwMI is not attached to the group (see note in subclause 5.4.2.1.1 for the other cases).

The case where the result of that check is negative is addressed in subclause 5.4.4.2. The case where it is positive is addressed in what follows.

If the group home SwMI has found that SS-AS has been subscribed for the group and if the binary value of the information element area selection is between 0001_2 and 1111_2, the group home SwMI will determine the definition of the selected area corresponding to that value. Similarly, still if the checking of SS-AS subscription for the group has been successful, if the group home SwMI has received the INVOKE PDU, it will determine the definition of the selected area corresponding to the selected area number in that INVOKE PDU.

The definition of the selected area corresponding to the invoked SS-AS will thus:

- correspond to a value of the information element area selection between 0001_2 and 1111_2;
- correspond to the selected area number in the received INVOKE PDU; or
- be given directly by the received INVOKE EXT PDU.

The group home SwMI will then determine how the originating SwMI lies compared to the invoked selected area, and will act as follows depending on the result:

- if either the whole or only part of the originating SwMI is inside the invoked selected area, the group home SwMI will continue the call establishment;
- if the originating SwMI is completely outside the invoked selected area, the group home SwMI should continue the call establishment. It may also clear the call attempt (see provision below).

If the group home SwMI has determined that the originating SwMI is completely outside the invoked selected area, it may clear the call attempt in sending the ANF-ISIGC-RELEASE PDU with the disconnect cause: calling user outside area selected.

If the group home SwMI coincides with the group controlling SwMI, the provisions of subclause 5.4.5.1 shall apply to the group home SwMI in addition to the above provisions.

If the group home SwMI does not coincide with the group controlling SwMI, it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the INVOKE EXT PDU, defined in table 18, to the originating SwMI together with the ANF-ISIGC-REROUTE SETUP PDU. That INVOKE EXT PDU shall include:

- the definition of the invoked selected determined either by the group home SwMI, else by the originating SwMI (as a result of SS-AS invocation by the calling user in using the INVOKE PDU and addressing it to the originating SwMI);
- possibly the information that the originating SwMI cannot inhibit SS-AS operation for the calling user at the establishment of the call, if it has been received by the group home SwMI (from the originating SwMI) in the INVOCATION QUALIFIER PDU or the INVOKE PDU, else in the INVOKE EXT PDU).

5.4.4.1.2 Definition or interrogation

See subclause 5.4.11.1.

5.4.4.2 Exceptional procedures

5.4.4.2.1 Operation

If the group home SwMI is different from the originating SwMI (i.e. the calling user is registered in a SwMI different from the group home SwMI) the following exceptional procedures shall apply to the group home SwMI for SS-AS operation.

NOTE 1: Since node actions are not to be described as part of the protocol, it should be reminded that, according to EN 300 392-11-8 [9], on SS-AS stage 2 description, the group home SwMI will proceed with the call set-up in ignoring any SS-AS invocation failure in the various cases considered below.

If the group home SwMI has received an ANF-ISIGC-ORIGINATING SETUP PDU with a value of the information element area selection different from 0000_2, and if it identifies that SS-AS has not been subscribed for the group, it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send to the originating SwMI the INVOCATION FAILURE PDU with the failure cause: "AS-SS not subscribed for served user/group".

If the group home SwMI has received an ANF-ISIGC-ORIGINATING SETUP PDU with a binary value of the information element area selection between 0001_2 and 1111_2, if it has identified that SS-AS has been subscribed for the group and if that value is not defined in that SwMI, it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send to the originating SwMI the INVOCATION FAILURE PDU with the failure cause: "invoked selected area number not defined". The same shall hold if the group home SwMI has received an INVOKE PDU (from the originating SwMI, through ANF-ISISS), if it has identified that SS-AS has been subscribed for the group and if the value of the selected area number in that INVOKE PDU is not defined in that SwMI.

If the group home SwMI has received the INVOKE EXT PDU (from the originating SwMI, through ANF-ISISS), if it coincides with the group controlling SwMI and if it does not support the type of definition of the invoked selected area in that INVOKE EXT PDU, it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send to the originating SwMI the INVOCATION FAILURE PDU with the failure cause: "type of definition not supported by group controlling SwMI".

NOTE 2: In addition to the above, according ETS 300 392-3-3 [5], if the group home SwMI has received an ANF-ISIGC-ORIGINATING SETUP PDU with a binary value of the information element area selection between 0001_2 and 1111_2 (i.e. with no accompanying INVOKE or INVOKE EXT PDU) and if it does not support SS-AS, it will send the notification indicator information element with the value corresponding to "SS-AS not invoked/supported". NOTE 3:According to subclause 11.1.2 of EN 300 392-9 [7], if the group home SwMI has received the ANF-ISISS ROSE Invoke APDU carrying the INVOKE PDU and if it does not support either SS-AS or simply that optional INVOKE PDU, it will send back a ROSE Return Error APDU with the error value requestNotSupported identifying that it does not support either SS-AS or the INVOKE PDU. This will allow the originating SwMI to inform the calling user about the SS-AS invocation failure (see subclause 5.4.2.2).

Similarly, if the group home SwMI has received the optional INVOKE EXT PDU from the originating SwMI and if it does not support either SS-AS or simply that optional INVOKE EXT PDU, it will inform the originating SwMI about that in sending back a ROSE Return Error APDU with the error value requestNotSupported identifying the situation. However, the originating SwMI will take that information into account only if the group home SwMI coincides with the group controlling SwMI (see subclause 5.4.2.2). Otherwise it will simply ignore it and send that INVOKE EXT PDU to the group controlling SwMI together with the ANF-ISIGC-ORIGINATING SETUP PDU.

If the group home SwMI coincides with the group controlling SwMI, the provisions of subclause 5.4.5.2 shall apply to the group home SwMI in addition to the above provisions.

If the group home SwMI does not coincide with the group controlling SwMI and if, after it has invoked ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the INVOKE EXT PDU, defined in table 18, to the originating SwMI (together with the ANF-ISIGC-REROUTE SETUP PDU), it receives back a ROSE Return Error APDU with the error value requestNotSupported identifying that the originating SwMI does not support SS-AS, else a ROSE Reject APDU indicating that the originating SwMI does not support any supplementary service, it shall invoke ANF-ISISS to address the INVOCATION FAILURE PDU with the failure cause: "SS-AS not supported by originating SwMI - critical failure" to the calling user MS/LS.

Whether the group home decides to let the establishment of the call continue (with SS-AS invocation having thus failed - since the originating SwMI will not be able to extend to the group controlling SwMI the INVOKE EXT PDU which it has received from the group home SwMI) or not is outside the scope of standardization. If it decides to clear the call attempt, it shall send the ANF-ISIGC-RELEASE PDU to the originating SwMI with the disconnect cause: SS-AS invocation failure.

5.4.4.2.2 Definition or interrogation

See subclause 5.4.11.2.

5.4.5 Actions at the group controlling SwMI

If the calling user is registered in group controlling SwMI, the provisions of subclause 5.4.2 which apply for a group call shall apply to that SwMI.

The SDL representation of procedures at the group controlling SwMI is shown in clause B.5.

5.4.5.1 Normal operation procedures

If the group controlling SwMI does not coincide with the group home SwMI, it shall receive through ANF-ISISS the INVOKE EXT PDU, defined in table 18, sent by the originating SwMI together with the ANF-ISIGC-ORIGINATING SETUP PDU.

NOTE 1: Since node actions are not to be described as part of the protocol, it should be reminded that, according to EN 300 392-11-8 [9], on SS-AS stage 2 description, when the group controlling SwMI has received the INVOKE EXT PDU together with ANF-ISIGC-ORIGINATING SETUP PDU, it will determine how the originating SwMI lies compared to the invoked selected area, and will act as follows depending on the result:

- if the whole of the originating SwMI is inside the invoked selected area, the group controlling SwMI will continue the call establishment;
- if the originating SwMI is completely outside the invoked selected area, the group controlling SwMI should ensure that the call establishment continues in connecting the calling user. If it cannot ensure that it will clear the call attempt (see provision below);

- if only part of the originating SwMI is within the invoked selected area, the group controlling SwMI will continue the call establishment if it has not received from the originating SwMI the information that the originating SwMI cannot inhibit SS-AS operation for the calling user at the establishment of the call: this will happen if the originating SwMI actually cannot inhibit SS-AS operation for the calling user. It may also happen if the group controlling SwMI coincides with the group home SwMI and if the originating SwMI does not support SS-AS (thereby the originating SwMI has just been able to relay in the ANF-ISIGC-ORIGINATING SETUP PDU the value of the information element area selection received in the U-SETUP PDU, possibly together with the INVOKE PDU if that PDU had been addressed to the group home SwMI, sent in invoking ANF-ISISS). The case where the group controlling SwMI has received the information that the originating SwMI cannot inhibit SS-AS operation for the calling user at the establishment of the call (in the INVOKE EXT PDU) is addressed in a provision below.

If the group controlling SwMI has determined that the originating SwMI is completely outside the invoked selected area and if it has decided that the call establishment should continue in connecting the calling user, it shall send the following PDUs to the originating SwMI depending on whether or not it has received the information that the originating SwMI supports the inhibition of SS-AS operation for the calling user (i.e. in the INVOKE PDU or the INVOKE EXT PDU):

- the INVOKE EXT PDU with the value of information element SS-AS inhibition requested(/supported) corresponding to SS-AS inhibition for calling user requested (see table 34) and the value of information sub-element area type (in the information element selected area definition) corresponding to all areas in SwMI (see table 27), if it knows that the originating SwMI supports the inhibition of SS-AS operation for the calling user. That PDU should be sent together with the ANF-ISIGC-SETUP INITIATE PDU. At the latest it shall be sent together with the ANF-ISIGC-CONNECT PDU;

- only the ANF-ISIGC-CONNECT PDU (i.e. with no prior or accompanying INVOKE EXT PDU nor prior ANF-ISIGC-SETUP INITIATE PDU) addressed only to the calling user, if it knows that the originating SwMI does not support the inhibition of SS-AS operation for the calling user.

NOTE 2: The latter indented paragraph means that the group controlling decides that SS-AS shall not operate in the originating SwMI, even if group members other than possibly the calling user (in the case where that user would be a group member) are attached to the group in that SwMI.

If the group controlling SwMI has determined that the originating SwMI is completely outside the invoked selected area and if it has decided to clear the call attempt because of that it shall send the ANF-ISIGC-RELEASE PDU with the disconnect cause: "SS-specific disconnection" and may use notification information element value: "call rejected due to SS-AS".

If the group controlling SwMI has determined that only part of the originating SwMI is within the invoked selected area and that no group member other than possibly the calling user (in the case where that user would be a group member) is attached to the group in the originating SwMI, and if it has received the information that the originating SwMI cannot inhibit SS-AS operation for the calling user, it may invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the INVOKE EXT PDU in a PSS1 FACILITY to the originating SwMI to allow it to determine whether or not the calling user is within the invoked selected area and to proceed with the call when the user is within the area. The group controlling SwMI shall define the invoked selected area in that INVOKE EXT PDU in a manner appropriate to the originating SwMI. It shall then expect from the originating SwMI either the INVOKE CONFIRM PDU, defined in table 17, received through ANF-ISISS in a PSS1 FACILITY or the ANF-ISIGC-REJECT PDU with reject cause "call rejected by the originating/participating SwMI" or "calling user outside area selected"
(see table 74 of ETS 300 392-3-3 [5]).

NOTE 3: If the group controlling SwMI has determined that only part of the originating SwMI is within the invoked selected area and that at least one group member other than possibly the calling user (in the case where that user would be a group member) is attached to the group in the originating SwMI, and if it has received the information from the originating SwMI that that SwMI cannot inhibit SS-AS operation for the calling user, it will treat the originating SwMI as a participating SwMI, i.e. no specific INVOKE EXT PDU will be sent to the originating SwMI to determine whether or not the calling user is within the invoked selected area. The originating SwMI will determine that in using the INVOKE EXT PDU which it receives as a participating SwMI.

If the group controlling SwMI then receives from the originating SwMI the ANF-ISI-REJECT PDU with reason "call rejected by the originating/participating SwMI" or "calling user outside area selected", it shall relay that disconnect cause:

- if it had already sent the D-SETUP PDU, in the D-RELEASE PDU with the disconnection cause "SS-specific disconnection" sent to the group members already connected in that SwMI and may add notification value "call rejected due to SS-AS";

- in the ANF-ISIGC-RELEASE PDU with disconnect cause "SS-specific disconnection" to each participating SwMI to which it had previously sent the ANF-ISIGC-SETUP PDU and may add notification value "call rejected due to SS-AS".

When the group controlling SwMI has decided to send the D-SETUP PDU as specified in clause 14.5.2.1 of EN 300 392-2 [2], it shall not send it outside the invoked selected area.

When the group controlling SwMI has determined that the definition of the invoked selected area is such that there are some participating SwMIs which support SS-AS and of which only part is within that area, it shall send an INVOKE EXT PDU to each of those participating SwMIs together with the corresponding ANF-ISIGC-SETUP PDU. In each such INVOKE EXT PDU, the group controlling SwMI shall:

- indicate whether or not it has decided that users (already participating in the call) roaming or migrating outside the invoked selected area will be excluded from the call;

- define the invoked selected area in a manner appropriate to the participating SwMI to which it is sent.

The group controlling SwMI shall not send the ANF-ISIGC-SETUP PDU to the participating SwMIs which are completely outside the invoked selected area. Actually such SwMIs shall not be considered as participating SwMIs for the establishment of the call.

NOTE 4: The normal procedure specified for the group controlling SwMI in ETS 300 392-3-3 [5], on ANF-ISIGC, will apply for the establishment of the group call in the participating SwMIs which are completely inside the invoked selected area or which do not support SS-AS (i.e. the ANF-ISIGC-SETUP PDU will be sent to those participating SwMIs with no accompanying INVOKE EXT PDU).

After the group controlling has sent the D-SETUP PDU to the group members registered in that SwMI and not outside the invoked selected area and the ANF-ISIGC-SETUP PDUs to participating SwMIs as specified above, it may decide that the group call cannot be established (or continue), e.g. because there are too many important participating users outside the invoked area. It shall then send:

- the D-RELEASE PDU with the disconnect cause: "SS-specific disconnection" (see table 106 of EN 300 392-2 [2]) and may add notification indicator value "call rejected due to SS-AS";

- the ANF-ISIGC-RELEASE PDU with the disconnect cause "SS-specific disconnection"to each participating SwMI to which it had previously sent the ANF-ISIGC-SETUP PDU and may add notification indicator value "call rejected due to SS-AS".

NOTE 5: If the group controlling SwMI decides to establish the call, the normal procedure defined in subclause 5.1 of ETS 300-392-3-3 [5] will apply, i.e. the group controlling SwMI will send the ANF-ISIGC-CONNECT PDU to the originating SwMI.

Upon migration and group call restoration to a new participating SwMI only part of which lies within the invoked selected area the group controlling SwMI shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send the INVOKE EXT PDU together with the ANF-ISIGC-CALL RESTORE PREPARE PDU. In that INVOKE EXT PDU:

- the value of the information element SS-AS inhibition requested (/supported) shall indicate whether or not the group controlling SwMI wants to inhibit SS-AS operation for the call restoration of the calling user or of important users if they request to restore their call outside the invoked selected area; and

- the information elements defining the invoked selected area shall then be appropriate to that new participating SwMI.

NOTE 6: If the group controlling SwMI has determined that the whole of the new participating SwMI lies within the invoked selected area, there is no need for it to invoke SS-AS operation in that new participating SwMI.

selected if the group controlling SwMI has decided that the calling user or another important user migrating or roaming outside the invoked selected area will be excluded from the call, its action when such a user migrates will depend on whether the new participating SwMI is completely outside the invoked selected area or if part of it lies within the invoked selected area:

- if the new participating SwMI is completely outside the invoked selected area, the group controlling SwMI will not send the ANF-ISIGC-CALL RESTORE PREPARE PDU to that new participating SwMI. The same will apply if the important user (already participating in the call) migrates into a SwMI attached to the group but which is completely outside the invoked selected area (hence it has not been considered as a participating SwMI at set-up time);

- if only part of the new participating SwMI lies within the invoked selected area, the group controlling SwMI will first check whether the new participating SwMI supports SS-AS (the group controlling SwMI knows it through the ANF-ISIMM group attachment service). If yes, it will send the ANF-ISIGC-CALL RESTORATION PDU with the INVOKE EXT PDU to the new participating SwMI as stated above.

Still if the group controlling SwMI has decided that the calling user or another important user migrating or roaming outside the invoked selected area will be excluded from the call, when such user roams within a participating SwMI, the group controlling SwMI will send the ANF-ISIGC-CALL RESTORE INFO PDU or not depending on whether that participating SwMI is completely outside the invoked selected area or not:

- if that participating SwMI lies wholly or only partly within the invoked selected area, the group controlling SwMI will send the ANF-ISIGC-CALL RESTORE INFO PDU (with no INVOKE EXT PDU because that participating SwMI has already received it previously, either at set-up time or when created as a new participating SwMI because of migration of a user already participating in the call;

- that participating SwMI is completely outside the invoked selected area, the group controlling SwMI will not send any ANF-ISIGC PDU nor any SS-AS one.

The SwMI where that user is roaming or has migrated shall send to the group controlling SwMI the ANF-ISIGC-FAILED CALL RESTORATION PDU with the failure cause: call restoration failure of important user due to SS-AS (see table 55 of ETS 300 392-3-3 [5]) when the roaming or migrating user already participating in the call is an important user and when the SwMI where that user is roaming or has migrated has rejected the call restoration attempt of that user because he is outside the invoked selected area (in that SwMI). If instead of being an important user, the user is the call owner, the group controlling SwMI shall receive the ANF-ISIGC-FAILED CALL RESTORATION PDU with the failure cause: call restoration failure of call owner due to SS-AS.

NOTE 7: The SwMI where the important user or the call owner may migrate is either a new participating SwMI or an existing one.

If the group controlling SwMI then decides to clear the call because of the call restoration failure mentioned above, it shall send:

- the D-RELEASE PDU with the disconnect cause: calling user outside area selected if the roaming or migrating user was the calling user or the disconnect cause: (called user/) group outside area selected, otherwise (see table 106 of EN 300 392-2 [2]);

- the ANF-ISIGC-RELEASE PDU with the same disconnect cause (see table 55 of ETS 300 392-3-3 [5]) to each existing participating SwMI and to the originating SwMI if it was not considered as a participating SwMI (i.e. if it had not been attached to the group).

5.4.5.2 Exceptional operation procedures

If the group controlling SwMI is different from the originating SwMI (i.e. the calling user is registered in a SwMI different from the group controlling SwMI) the following exceptional procedures shall apply to the group controlling SwMI for SS-AS operation.

NOTE 1: Since node actions are not to be described as part of the protocol, it should be reminded that, according to EN 300 392-11-8 [9], on SS-AS stage 2 description, the group controlling SwMI will proceed with the call set-up in ignoring any SS-AS invocation failure in the various cases considered below.

If the group controlling SwMI has received the INVOKE EXT PDU, defined in table 18, (from the originating SwMI, through ANF-ISISS), while being different from the group home SwMI (and supporting SS-AS) and if it does not support the type of definition of the invoked selected area in that INVOKE EXT PDU, it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send to the originating SwMI the INVOCATION FAILURE PDU with the failure cause: type of definition of invoked selected area number not supported by group controlling SwMI.

NOTE 2: According to subclause 11.1.2 of EN 300 392-9 [7], when the group controlling SwMI has received the ANF-ISISS ROSE Invoke APDU carrying the INVOKE EXT PDU and when it does not support SS-AS, it will send back a ROSE Return Error APDU with the error value requestNotSupported identifying that it does not support SS-AS. This will allow the originating SwMI to inform the calling user about the SS-AS invocation failure (see subclause 5.4.2.2).

After the group controlling SwMI has received the ANF-ISIGC-ORIGINATING SETUP PDU with a binary value of the information element area selection different from 0 (i.e. carrying any type of SS-AS invocation, whether or not it coincides with the group home SwMI), it may happen that it identifies that one or more participating SwMIs do not support SS-AS.

NOTE 3: As part of the group attachment procedure defined in ANF-ISIMM (see ETS 300 392-3-5 [6]), the group controlling SwMI will know:

- whether each participating SwMI supports SS-AS or not;
- if yes, the type of definition of the selected area that it supports.

In the above case, the group controlling SwMI shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send to the originating SwMI the INVOCATION FAILURE PDU with the failure cause: either

- (SS-AS) not supported by participating SwMI(s) non-critical, if this situation results simply in the fact that SS-AS is not operated in those SwMIs but is operated elsewhere (notably in the group controlling SwMI); or
- (SS-AS) not supported by critical participating SwMI(s), if this situation results in the group controlling SwMI deciding to simply abort SS-AS invocation everywhere (including in itself).

NOTE 4: No provision or recommendation has been made in the latter case to inform the calling user (through the originating SwMI) about the identities of such SwMIs (critical or not for SS-AS operation), because such information does not seem of any use to both the calling user and the originating SwMI.

When the group controlling SwMI coincides with the group home SwMI, if it receives a ROSE Return Error APDU with the error value requestNotSupported identifying that the originating SwMI does not support SS-AS, else a ROSE Reject APDU indicating that the originating SwMI does not support any supplementary service, after it has sent has sent the INVOKE EXT PDU to the originating SwMI, it shall invoke ANF-ISISS to address the INVOCATION FAILURE PDU with the failure cause: "SS-AS not supported by originating SwMI - non-critical failure" to the calling user MS/LS. It shall also send to that MS/LS the notification indicator information element with the value corresponding to SS-AS invocation failure: either

- in the ANF-ISIGC-RELEASE PDU if it decides to clear the call attempt; or
- in the ANF-ISIGC-INFO PDU if it decides to let the establishment of the call continue (with SS-AS not operating in the originating SwMI).

NOTE 5: Whether the group controlling SwMI decides to let the establishment of the call continue or not in that situation is outside the scope of standardization.

NOTE 6: See end of subclause 5.4.4.2.1 for the case where the group home SwMI receives the same ROSE Return Error or Reject APDU after it has sent has sent the INVOKE EXT PDU when it does not coincide with the group controlling SwMI.

5.4.6 Actions at a participating SwMI

The SDL representation of procedures at a participating SwMI is shown in clause B.6.

5.4.6.1 Normal operation procedures

Each participating SwMI shall identify that SS-AS has been invoked when it receives the INVOKE EXT PDU, defined in table 18, sent (through ANF-ISISS) by the group controlling SwMI together with the ANF-ISIGC-SETUP INITIATE PDU.

NOTE: Since node actions are not to be described as part of the protocol, it should be reminded that, according to EN 300 392-11-8 [9], on SS-AS stage 2 description, when a participating SwMI has received the ANF-ISIGC-SETUP INITIATE PDU with the INVOKE EXT PDU, it will establish the group call in sending the D-SETUP PDU only in the invoked selected area.

If the participating SwMI supports call restoration, it will store the command received in the INVOKE EXT PDU to restore or not restore the call for users already participating in the call and roaming outside the invoked selected area in that SwMI or migrating into it (see provision below).

Any participating SwMI supporting call restoration and having received from the group controlling SwMI the instruction not to allow call restoration outside the invoked selected area should send the D-RELEASE PDU to that user with the disconnect cause: call restoration failure due to SS-AS (see *updated* table 106 of EN 300 392-2 [2]), when a user attempts to restore the (group) call (therefore he was already participating in the call) outside the invoked selected area.

In addition the participating SwMI shall send the ANF-ISIGC-FAILED CALL RESTORATION PDU to the group controlling SwMI with the failure cause: call restoration failure of important user due to SS-AS (see table 53 of ETS 300 392-3-3 [5]) if that user is an important user, or the failure cause: call restoration failure of call owner due to SS-AS if he is the call owner (see table 55 of ETS 300 392-3-3 [5]).

5.4.6.2 Exceptional operation procedures

Since the group controlling SwMI will know through ANF-ISIMM whether each participating SwMI supports SS-AS or not and if yes which type(s) of definition of the selected area it supports, there are no exceptional operation procedures for participating SwMIs.

NOTE: If exceptionally, the group controlling SwMI had sent an INVOKE EXT PDU to a participating SwMI which does not support SS-AS, according to subclause 11.1.2 of EN 300 392-9 [7], the participating SwMI will send back a ROSE Return Error APDU with the error value requestNotSupported identifying that it does not support SS-AS in response to the ANF-ISISS ROSE Invoke APDU carrying the INVOKE EXT PDU which it had received.

5.4.7 Actions at a new participating SwMI

The SDL representation of procedures at a new participating SwMI is shown in clause B.7.

5.4.7.1 Normal operation procedures

NOTE: Reminder: a new participating SwMI is a SwMI which is attached to the group only after the group call has been established (e.g. because of migration of a user already participating in the call.

Each new participating SwMI shall identify that SS-AS has been invoked when it receives the INVOKE EXT PDU, defined in table 18, sent (through ANF-ISISS) by the group controlling SwMI together with the ANF-ISIGC-CALL RESTORE PREPARE PDU.

The procedures for the acceptance or rejection of the call restoration request sent by the migrating user shall then be as defined in subclause 5.4.6.1.

5.4.7.2 Exceptional operation procedures

See subclause 5.4.6.2.

5.4.8 Actions at the terminating SwMI

The SDL representation of procedures at the terminating SwMI is shown in clause B.8.

5.4.8.1 Normal operation procedures

If the terminating SwMI coincides with the called user home SwMI, the provisions of subclause 5.4.3 shall apply to that SwMI.

If the terminating SwMI is different from the called user home SwMI and from the originating SwMI, it shall identify that SS-AS has been invoked when it receives the INVOKE EXT PDU, defined in table 18, sent (through ANF-ISISS) together with the ANF-ISIIC-SETUP PDU:

- by the called user home SwMI, in the case where the invoked ANF-ISIIC is operated by forward switching; or
- by the originating SwMI, in the case where the invoked ANF-ISIIC is operated by re-routeing.

NOTE: Since node actions are not to be described as part of the protocol, it should be reminded that, according to EN 300 392-11-8 [9], on SS-AS stage 2 description, when the terminating SwMI has received the ANF-ISIIC-SETUP PDU with the INVOKE EXT PDU, it will establish the individual call only if the called user is located in the invoked selected area.

The procedures defined for ANF-ISIIC will then apply for the establishment of the call.

If the terminating SwMI is different from the called user home SwMI but coincides with the originating SwMI, it shall identify that SS-AS has been invoked when it receives the INVOKE EXT PDU, defined in table 18, sent (through ANF-ISISS) by the called user home SwMI together with the ANF-ISIIC-FORWARD PDU.

If the terminating SwMI has determined that the called user is located outside the invoked selected area (within that SwMI), it shall send the ANF-ISIIC-RELEASE PDU to the originating SwMI with the disconnect cause: called user (/group) outside area selected (see table 57 of EN 300 392-3-2 [4]).

5.4.8.2 Exceptional operation procedures

If the terminating SwMI has received the INVOKE EXT PDU (through ANF-ISISS) and if it does not support the type of definition of the invoked selected area used in that INVOKE EXT PDU, it shall invoke ANF-ISISS (see clause 10 of EN 300 392-9 [7]) to send to the originating SwMI the INVOCATION FAILURE PDU with the failure cause: type of definition of invoked selected area not supported by terminating SwMI (see note 2).

NOTE 1: The above case will happen only when the called user home SwMI does not know which types of definition of the invoked selected area the terminating SwMI supports (see note 2 in subclause 5.4.3.2).

NOTE 2: It has not been judged advisable to give to the calling user the identity of the terminating SwMI (i.e. its MNI) which does not support some type of selected area definition, since that information is not really useful to that user, and the identification of the SwMI where the called user is currently registered might be confidential in some cases.

The terminating SwMI shall send the INVOCATION FAILURE PDU at the latest together with the ANF-ISIIC-CONNECT PDU.

NOTE 3: It would be preferable to send the INVOCATION FAILURE PDU earlier, i.e. together with the ANF-ISIIC-ALERT PDU or with the ANF-ISIIC-INFO PDU.

NOTE 4: Since the called user home SwMI will know through ANF-ISIMM whether the terminating SwMI supports SS-AS or not, according to the procedure defined subclause 5.4.3.2, the terminating SwMI will not receive the INVOKE EXT PDU if it does not support SS-AS.

If exceptionally, this happens, according to subclause 11.1.2 of EN 300 392-9 [7], the terminating SwMI (not supporting SS-AS) will send back a ROSE Return Error APDU with the error value requestNotSupported identifying that it does not support SS-AS in response to the ANF-ISISS ROSE Invoke APDU carrying the INVOKE EXT PDU which it had received. This means that:

- if the INVOKE EXT PDU had been sent by the called user home SwMI (because the invoked ANF-ISIIC is operated by forward switching and because it originated from that SwMI), the ROSE Return Error APDU will be sent back to the called user home SwMI. That SwMI will then have to create the corresponding INVOCATION FAILURE PDU and send it to the originating SwMI;

- if the INVOKE EXT PDU had been sent by the originating SwMI (because it originated from that SwMI or because of re-routeing - or both), it will be up to the originating SwMI to create the corresponding INVOCATION FAILURE PDU.

In both cases, the originating SwMI will have to send that INVOCATION FAILURE PDU to the calling user's MS/LS, together with the notification indicator information element with a value corresponding to SS-AS invocation failure (see subclause 5.4.2.2).

5.4.9 Actions at authorized user MS/LS

The SDL representation of procedures at the authorized user MS/LS is shown in clause B.9.

5.4.9.1 Normal procedures

If it support those options, the authorized user MS/LS shall send the DEFINE PDU or the INTERROGATE PDU in the U-FACILITY PDU in filling in the appropriate value for the routeing information element and possibly the MNI information element of that U-FACILITY PDU (see table 4 of EN 300 392-9 [7]).

NOTE: If the home SwMI of the managed user or group is different from the authorized user home SwMI and, if the authorized user has migrated, from the authorized user SwMI (i.e. SwMI where that user is currently registered), the value of the routeing information element will correspond to: other SwMI, and that of the MNI information element will be equal will correspond to the MNI of the home of the managed user or group,

Consequently in accordance with subclause 8.4.1 of EN 300 392-9 [7], identities included in DEFINE or INTERROGATE PDUs may be indicated using only their SSIs.

Such identities may also be specified using SS-SNA, provided that:

- SS-SNA is supported by the authorized user SwMI; and
- SNA values have been defined against such identities for the authorized user.

The authorized user MS/LS shall then receive the DEFINE ACK PDU or the INTERROGATE ACK PDU in the D-FACILITY PDU.

In accordance with subclause 8.4.1 of EN 300 392-9 [7], the authorized user MS/LS shall complement any identities indicated using only their SSIs which have been included in any received DEFINE ACK or INTERROGATE ACK PDU.

5.4.9.2 Exceptional procedures

Subclause 11.2 of EN 300 392-9 [7] shall apply for the exceptional procedures at the authorized user MS/LS. In addition, that MS/LS should recognize the failure causes referred to in subclauses 5.2.2.16 and 5.2.2.18, used in the DEFINE ACK and INTERROGATE ACK PDUs, respectively.

NOTE: Such failure causes correspond to the case where the corresponding PDU is supported by the served user home SwMI but cannot be given a positive response.

5.4.10 Actions at the authorized user SwMI

No specific procedures apply for the authorized user SwMI when that SwMI is different from the served user/group home SwMI, beyond those specified in subclause 5.1.10.

NOTE: The SDL representation of procedures corresponding to the latter subclause at the authorized user SwMI is shown in clause B.10.

See subclauses 5.4.11.1.1 and 5.4.11.2.1 when the authorized user SwMI coincides with the served user/group home SwMI.

5.4.11 Actions at the served user/group home SwMI

The SDL representation of procedures at the supplementary service control entity at the served user/group home SwMI is shown in clauses B.10 and B.11.

5.4.11.1 Normal procedures

5.4.11.1.1 Case where the served user/group home SwMI coincides with the authorized user SwMI

The served user/group home SwMI shall:

- receive from the authorized user MS/LS the U-FACILITY PDU containing the DEFINE PDU or the INTERROGATE PDU;
- once it has determined the corresponding DEFINE ACK or INTERROGATE ACK PDU, it shall send it to the authorized user MS/LS. If that SwMI is also the authorized user home SwMI, in accordance with subclause 8.4.1 of EN 300 392-9 [7], it may then indicate identities in those PDUs using only their SSIs.

5.4.11.1.2 Case where the served user/group home SwMI is different from the authorized user SwMI

If it supports those options, the supplementary service control entity at the served user/group home SwMI shall:

- extract the DEFINE or INTERROGATE PDU(s) in the received ANF-ISISS ROSE Invoke APDUs specified in clause 10 of EN 300 392-9 [7];
- process those PDUs. Notably, in accordance with subclause 8.4.1 of EN 300 392-9 [7], the SwMI shall then complement any identities indicated using only their SSIs which have been included in such PDU(s). If the response to an DEFINE or INTERROGATE PDU is positive, the SwMI shall generate the corresponding DEFINE ACK or INTERROGATE ACK PDU, respectively. If the authorized user is registered in his home SwMI (i.e. the authorized user SwMI is the authorized user home SwMI), in accordance with subclause 8.4.1 of EN 300 392-9 [7], the served user/group home SwMI may then indicate identities in those PDU using only their SSIs;
- send such ACK PDU(s) according to subclause 9.2 of EN 300 392-9 [7]. Notably the identity of the authorized user will be added to the DEFINE ACK or INTERROGATE ACK PDU(s) as its (their) final destination in the corresponding ANF-ISISS PDU (see table 25 of EN 300 392-9 [7]).

5.4.11.2 Exceptional procedures

If the SwMI supports the DEFINE PDU and/or the INTERROGATE PDU but cannot give a positive response in the corresponding ACK PDU, it shall include in that ACK PDU the appropriate failure cause as defined in:

- subclause 5.2.2.16, for the DEFINE ACK PDU; and
- subclause 5.2.2.18 for the INTERROGATE ACK PDU.

In addition, clause 11 of EN 300 392-9 [7] shall apply (requirement already provided in subclause 5.1.11).

NOTE: The latter statement means that:

- when the served user/group home SwMI coincides with the authorized user SwMI, subclause 11.2.1 of EN 300 392-9 [7] will apply, taking into account the fact that the support of each of the two PDUs: DEFINE and INTERROGATE, is optional for SS-AS. The information defined in that subclause 11.2.1 of EN 300 392-9 [7] will be sent to the authorized user MS/LS in a D-FACILITY PDU. Such D-FACILITY PDU will be individually addressed;

- when the served user/group home SwMI is different from the authorized user SwMI, subclause 11.1 of EN 300 392-9 [7] will apply, taking into account the fact that the support of each of the two PDUs: DEFINE and INTERROGATE, is optional for SS-AS.

5.5 SS-AS impact of interworking with other networks

5.5.1 SS-AS impact of interworking with other TETRA networks

The impact of interworking with other TETRA networks has already been taken into account in the preceding clauses except for the exchange of SS-AS information after the served user has migrated. The latter is addressed in subclause 5.6.2.2.

5.5.2 SS-AS impact of interworking with external networks

In the case of interworking with PSTN, ISDN or PISN, it is an implementation matter for the corresponding TETRA gateway whether or not to operate SS-AS for the called external user (whether in a group call or in an individual call).

NOTE: For external calling users, specific transportation mechanisms may be used to allow such users to invoke SS-AS through PSTN, ISDN or PISN. However, since SS-AS has not been standardized for PSTN, ISDN or PISN such transportation mechanisms are proprietary, and thus outside the scope of standardization.

5.6 Protocol interactions between SS-AS and other supplementary services and ANFs

The interactions between SS-AS on one hand and ANF-ISIIC and ANF-ISIGC on the other hand have been taken into account in subclause 5.4 (actually they form the basis of that subclause).

No protocol interactions with any other supplementary service have been identified.

NOTE: Simultaneous conveyance of APDUs for SS-AS and another supplementary service or ANF in the same message, each in accordance with the requirements of its respective stage 3 description standard, does not, on its own, constitute a protocol interaction. The same holds when such PDUs are conveyed by the ANF-ISISS ROSE Invoke APDU, else by the same PSS1 FACILITY message.

This leaves the protocol interactions with ANF-ISIMM and ANF-ISISD.

5.6.1 Interactions with ISI Mobility Management (ANF-ISIMM)

5.6.1.1 Migration of individual subscriber

When an individual subscriber migrates to a visited SwMI, the following exchange of information shall be ensured, through ANF-ISIMM (see ETS 300 392-3-5 [6]):

- the information element basic migration profile (original) in the ANF-ISIMM-PROFILE PDU sent with the value of the profile type information element corresponding to individual subscriber shall indicate that SS-AS has been subscribed for the migrating user;

- the visited SwMI shall inform the home SwMI whether or not it supports SS-AS as originating SwMI in the ANF-ISIMM-PROFILE RESPONSE PDU sent back: either

- in setting the value of the information element basic migration profile info to 0 (i.e. profile accepted as received); or

- if it has set the value of the information element basic migration profile info to 1 (i.e. profile not accepted as received), in indicating in the information element basic migration profile (temporary) in that PDU whether or not it supports SS-AS as originating SwMI;

- unless the home SwMI has received earlier the information that the visited SwMI does not support SS-AS as originating SwMI (in the ANF-ISIMM-PROFILE RESPONSE PDU), when it sends the ANF-ISIMM-SS-PROFILE UPDATE PDU to the visited SwMI, it shall include in that PDU the information sub-element AS-ISI-PROFILE defined in table 36 in the information element SS-migration profile (original) with the value of the information sub-element SS-type corresponding to SS-AS. The value of the accompanying information sub-element profile status shall then correspond to profile replacement. No information about SS-AS definitions for groups of which the individual subscriber is a member shall be transferred as part of the migration service for that subscriber;

- if it supports SS-AS as originating SwMI, the visited SwMI shall respond to the ANF-ISIMM-SS-PROFILE UPDATE PDU including the information on SS-AS mentioned above in sending back the ANF-ISIMM-SS-PROFILE UPDATE RESPONSE PDU to the visited SwMI. That PDU shall contain the information sub-element SS-ISI-PROFILE defined in table 37 in the information element SS-migration profile (temporary) with the value of the information sub-element SS-type corresponding to SS-AS. The value of the accompanying information sub-element SS-profile response status shall correspond either to original SS-migration profile accepted as received (for SS-AS) or creation of the SS-migration profile failed. When it receives the latter value of the information sub-element SS-profile response status, the home SwMI shall interpret it as meaning that the visited SwMI does not support the type(s) of definition of SS-AS selected numbers used in the information sub-element SS-ISI-PROFILE sent in the information element SS-migration profile (original) with the value of the information sub-element SS-type corresponding to SS-AS in ANF-ISIMM-SS-PROFILE UPDATE PDU mentioned above.

5.6.1.2 SS-AS definition updates for individual subscriber

After the migration procedure specified for SS-AS in subclause 5.6.1.1 has taken place for an individual subscriber, i.e. the home SwMI knows that the visited SwMI supports SS-AS and has transferred the definitions of selected area numbers allocated to that subscriber, it may happen that updates are made to some of those definitions or that new definitions are made.

In such a case, when the home SwMI decides to transfer those updates, it shall do so in sending the ANF-ISIMM-SS-PROFILE UPDATE PDU including the information sub-element AS-ISI-PROFILE defined in table XX in the information element SS-migration profile (original) with the value of the information sub-element SS-type corresponding to SS-AS. The value of the accompanying information sub-element profile status shall correspond to update.

5.6.1.3 Group attachment

When a participating SwMI is attached to a group, the home SwMI of that group may identify whether or not it supports SS-AS operation during group calls (as participating SwMI) in the same manner as it identifies that the visited SwMI of a (migrating) individual subscriber supports SS-AS (as originating SwMI) i.e. by the following exchange of information, through ANF-ISIMM (see ETS 300 392-3-5 [6]):

- the information element basic migration profile (original) in the ANF-ISIMM-PROFILE PDU sent with the value of the profile type information element corresponding to the group shall indicate that SS-AS has been subscribed for the group;

- the participating SwMI shall inform the group home SwMI whether or not it supports SS-AS operation during group calls (as participating SwMI) in the ANF-ISIMM-PROFILE RESPONSE PDU sent back: either

  - in setting the value of the information element basic migration profile info to 0 (i.e. profile accepted as received); or

  - if it has set the value of the information element basic migration profile info to 1 (i.e. profile not accepted as received), in indicating in the information element basic migration profile (temporary) in that PDU whether or not it supports SS-AS as originating SwMI *I*.

5.6.1.4 Group linking

When a group is linked, the SwMI named linking controlling SwMI in ETS 300 392-3-5 [6] (which is the SwMI called group controlling SwMI in the present ETS) and the linked SwMIsshall apply area selection signalling to all SwMIs where there are members of the linked group.

5.6.2 Interactions with ISI Short Data Service (ANF-ISISD)

For further study.

5.7 SS-AS parameter values (timers)

There shall be no timers for the SS-AS procedures.

Annex A (informative): Examples of message sequences

Some typical message flows for SS-AS are presented in stage 2, refer to EN 300 392-11-8 [9], clause 5.4.

Annex B (informative): Specification and Description Language (SDL) representation of procedures

The diagrams in this annex use the Specification and Description Language defined in ITU-T Recommendation Z.100 [10].

The diagrams for MS/LSs and SwMIs represent the behaviour of SS-AS supplementary service control entities at those MS/LSs and SwMIs, respectively.

For SS-AS protocol at the air interface (or line station interface), in accordance with the protocol model described in clause 14 of EN 300 392-2 [2], the supplementary service control entity at a MS/LS uses the services of the (air/line station interface):

- basic call control, for SS-AS invocation and operation procedures;
- U-FACILITY and D-FACILITY PDUs, for SS-AS assignment, definition and/or interrogation procedures.

The same applies for the supplementary service control entity at the SwMI where the MS/LS subscriber is registered for the corresponding SS-AS protocol at the air/line station interface.

For SS-AS ISI protocols, in accordance with the protocol model described in clause 8 of ETS 300 392-3-1 [3], the supplementary service control entity (at a SwMI) uses, via the co-ordination function, the services of ANF-ISISS and in addition, for call related procedures, of ANF-ISIIC for individual call and of ANF-ISIGC for group call.

The basic call actions associated with the sending and receiving of the air/line station interface PDUs specified in EN 300 392-2 [2] are deemed to occur. The same applies with the sending and receiving of the ANF-ISIIC PDUs specified in EN 300 392-3-2 [4] and of the ANF-ISIGC PDUs specified in ETS 300 392-3-3 [5].

The suffix PDU has been omitted after the PDU names (e.g. INTERROGATE or INVOKE).

The basic call PDUs at the air interface or at the ISI which do not carry any SS-AS information have not been shown on the figures.

B.1 SDL representation of SS-AS at the served user MS/LS

Figure B.1 shows the behaviour of a SS-AS supplementary service control entity within the served user MS/LS.

Input signals from the right represent air interface PDUs received from the served user SwMI.

Output signals to the right represent air interface PDUs sent to the served user SwMI.

Input signals from the left represent primitives from the served user application.

Output signals to the left represent primitives to the served user application.

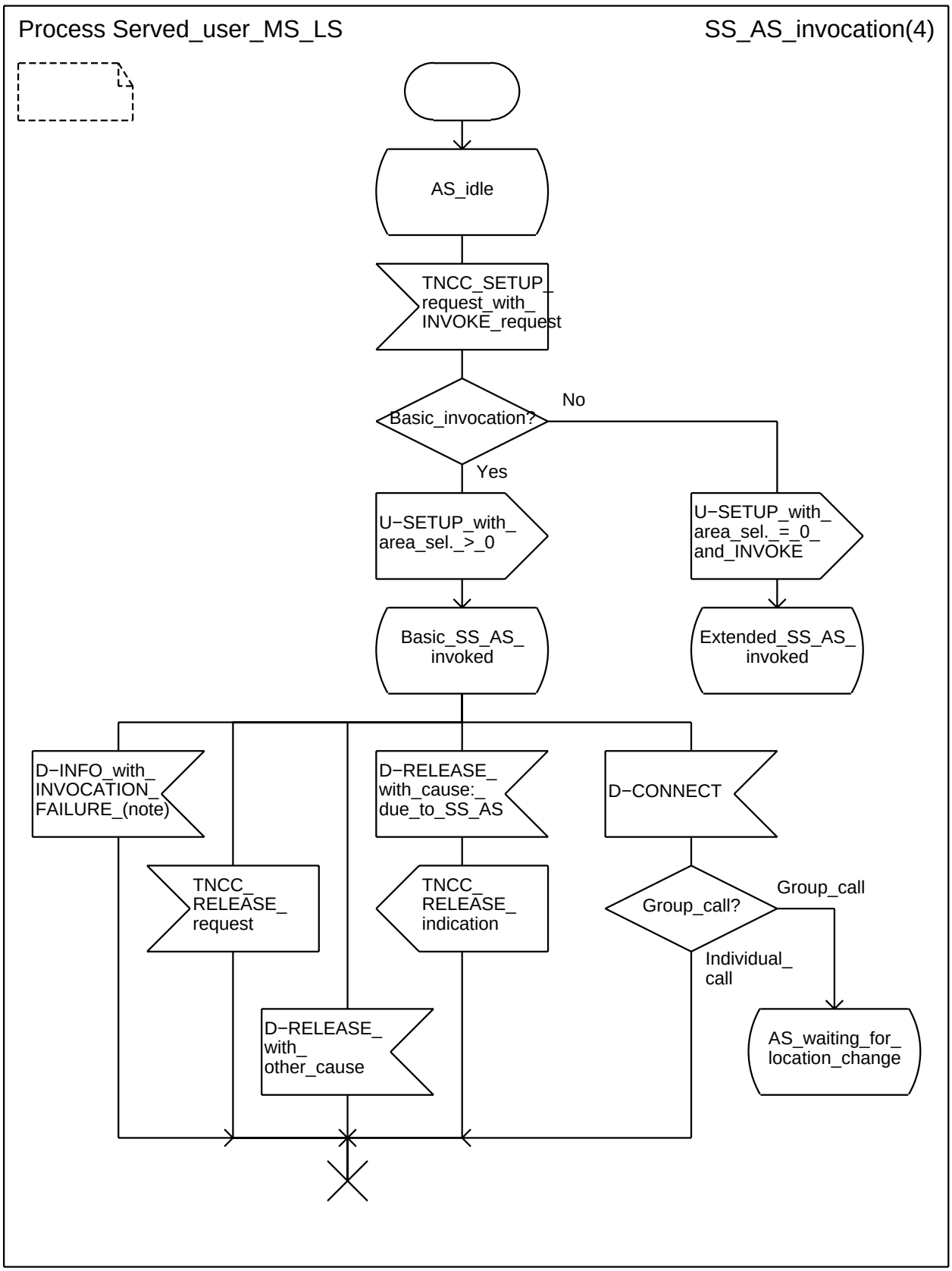


Figure B.1 (sheet 1 of 4): Served user MS/LS SDL - Invocation

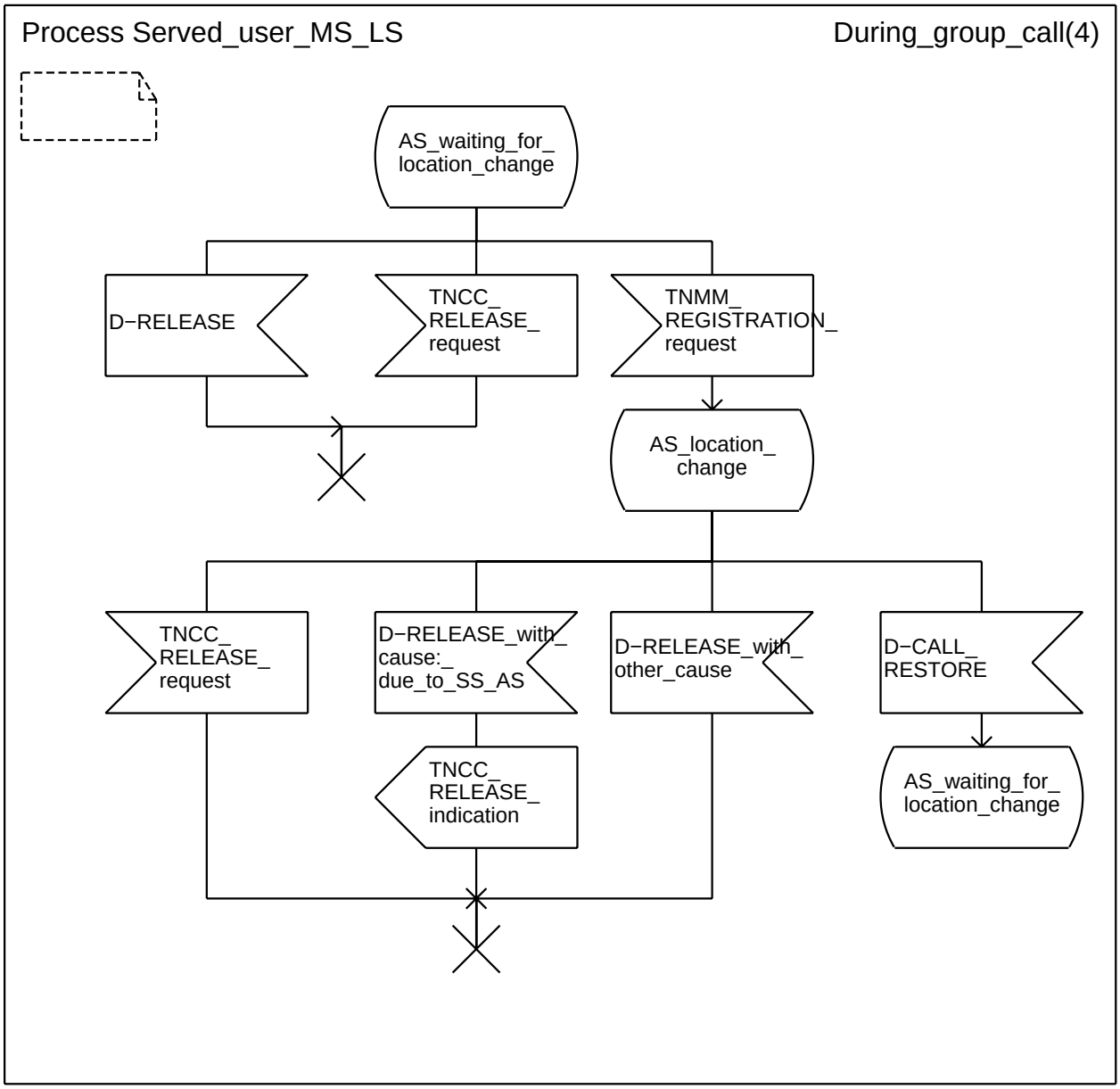


Figure B.1 (sheet 2 of 4): Served user MS/LS SDL

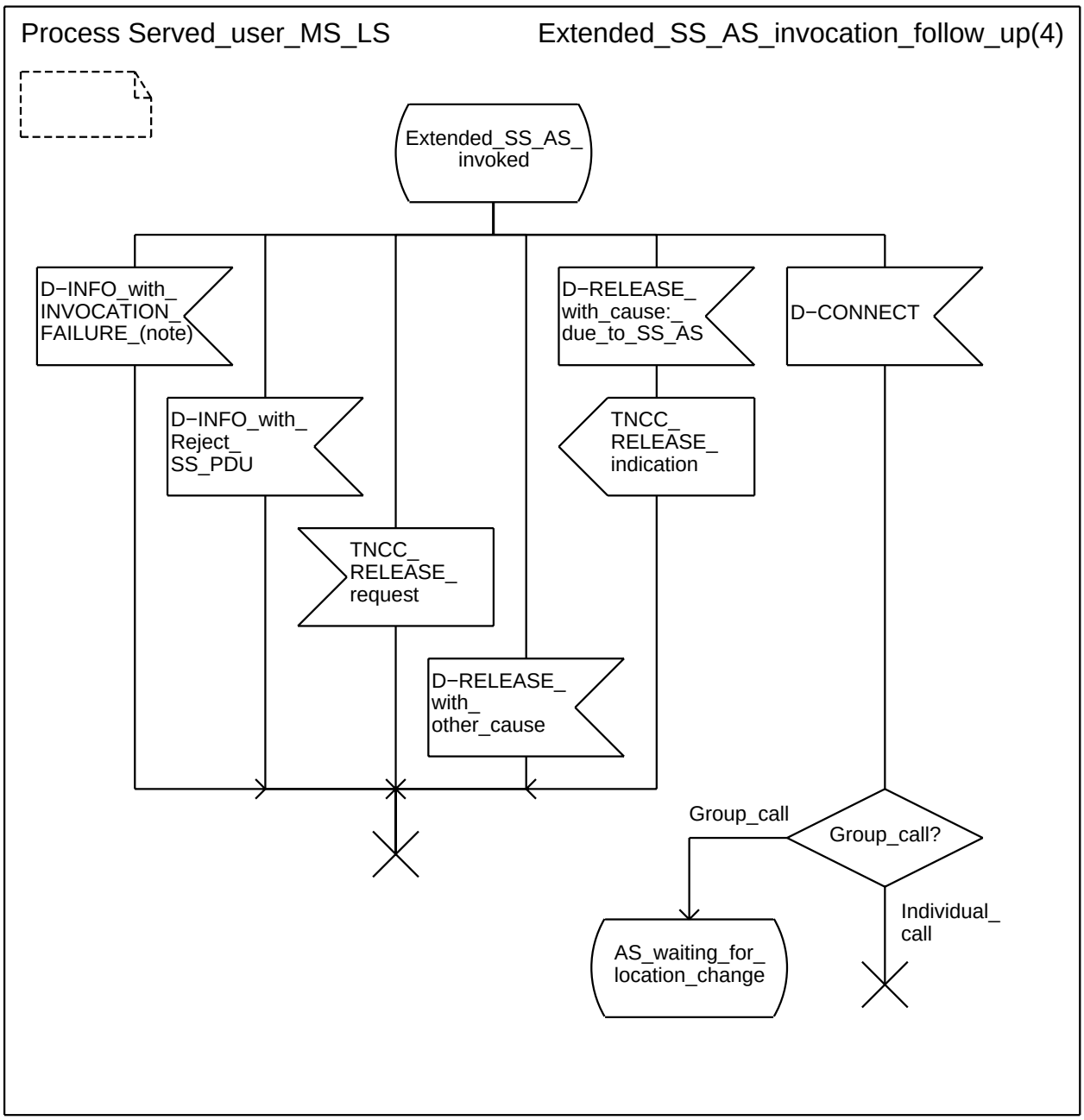


Figure B.1 (sheet 3 of 4): Served user MS/LS SDL - Group call operation

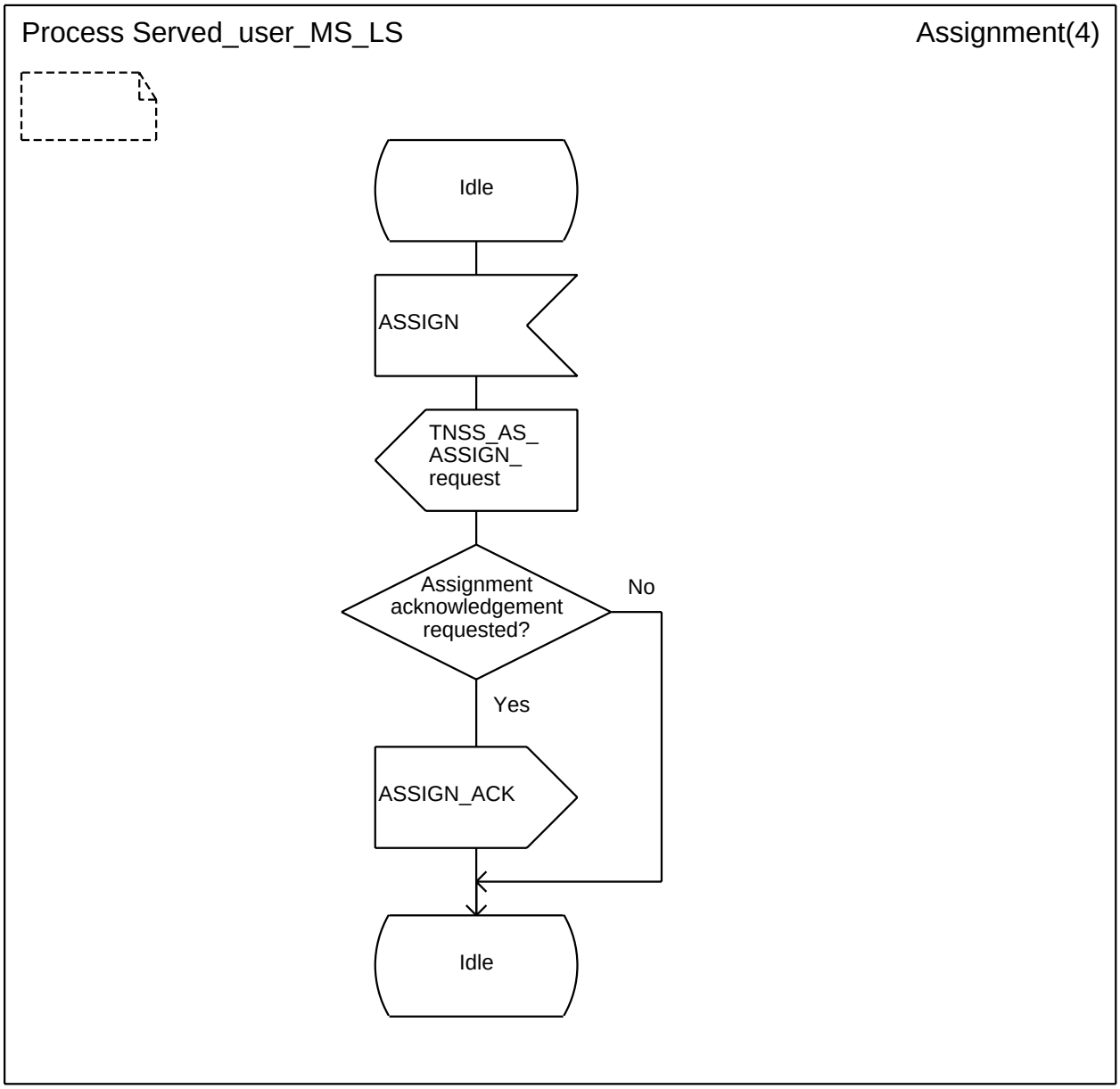


Figure B.1 (sheet 4 of 4): Served user MS/LS SDL - Assignment

B.2 SDL representation of SS-AS at the served user SwMI

Figure B.2 shows the behaviour of a SS-AS supplementary service control entity within the served user SwMI.

Input signals from the right on sheets 2 to 10 represent PDUs received:

- in the case of an individual call, from the called user home SwMI or, if different, from the terminating SwMI;
- in the case of a group call, from the group home SwMI, or, if different (i.e. case of group linking or of call diversion) from the group controlling SwMI.

The input signal from the right on sheet 11 represents the primitive informing the served user SwMI about new selected area definitions for the served user is received from its mobility management entity, via ANF-ISIMM.

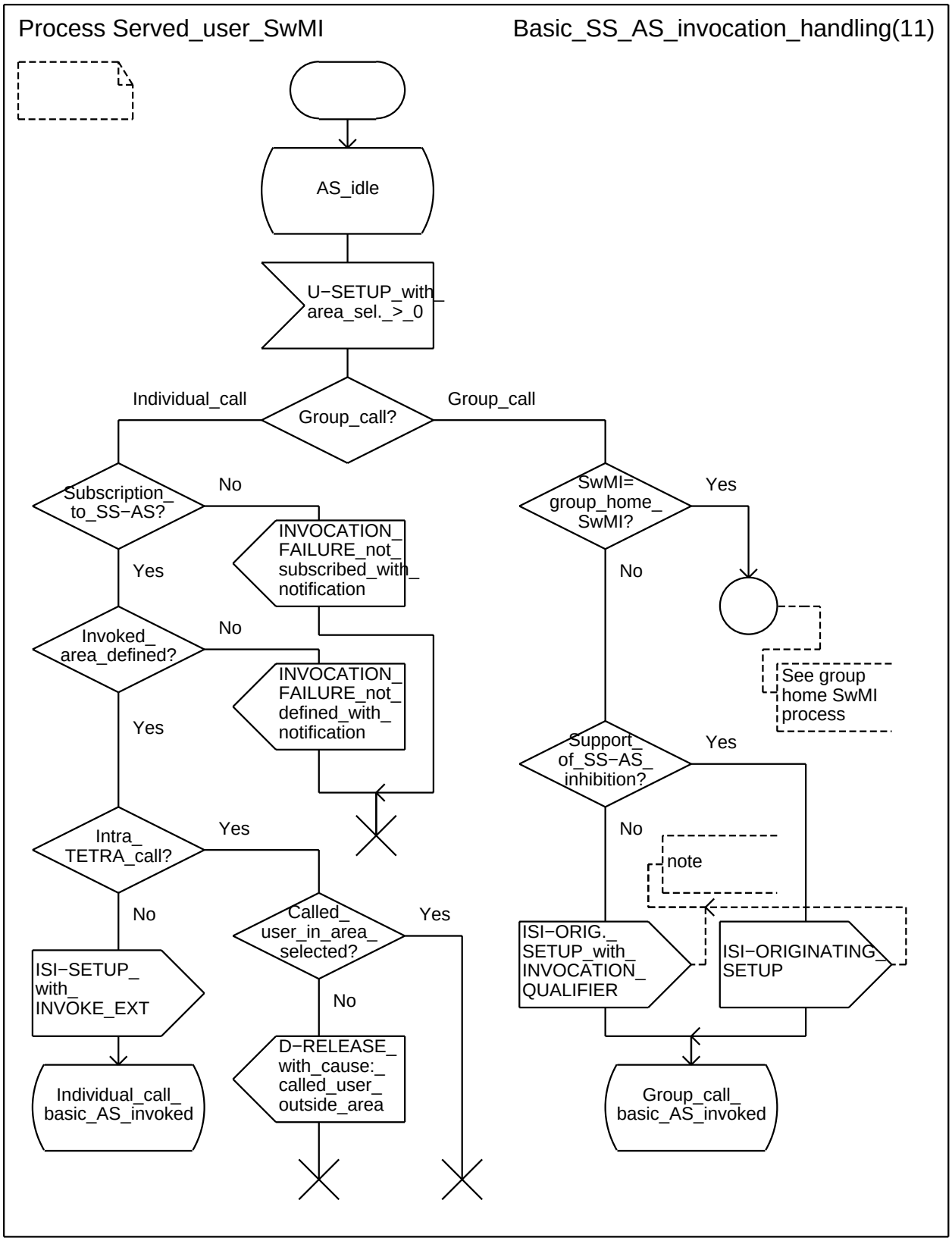
Output signals to the right represent PDUs sent:

- in the case of an individual call, to the called user home SwMI, except on sheet 8, where the ANF-ISIIC-SETUP PDU is sent to the terminating SwMI;
- in the case of a group call, to the group home SwMI, or, if different (i.e. case of group linking or of call diversion) to the group controlling SwMI.

Input signals from the left represent PDUs received from the served user MS/LS, except for the Time-out signal on sheet 11, which corresponds to the expiry of the assignment timer.

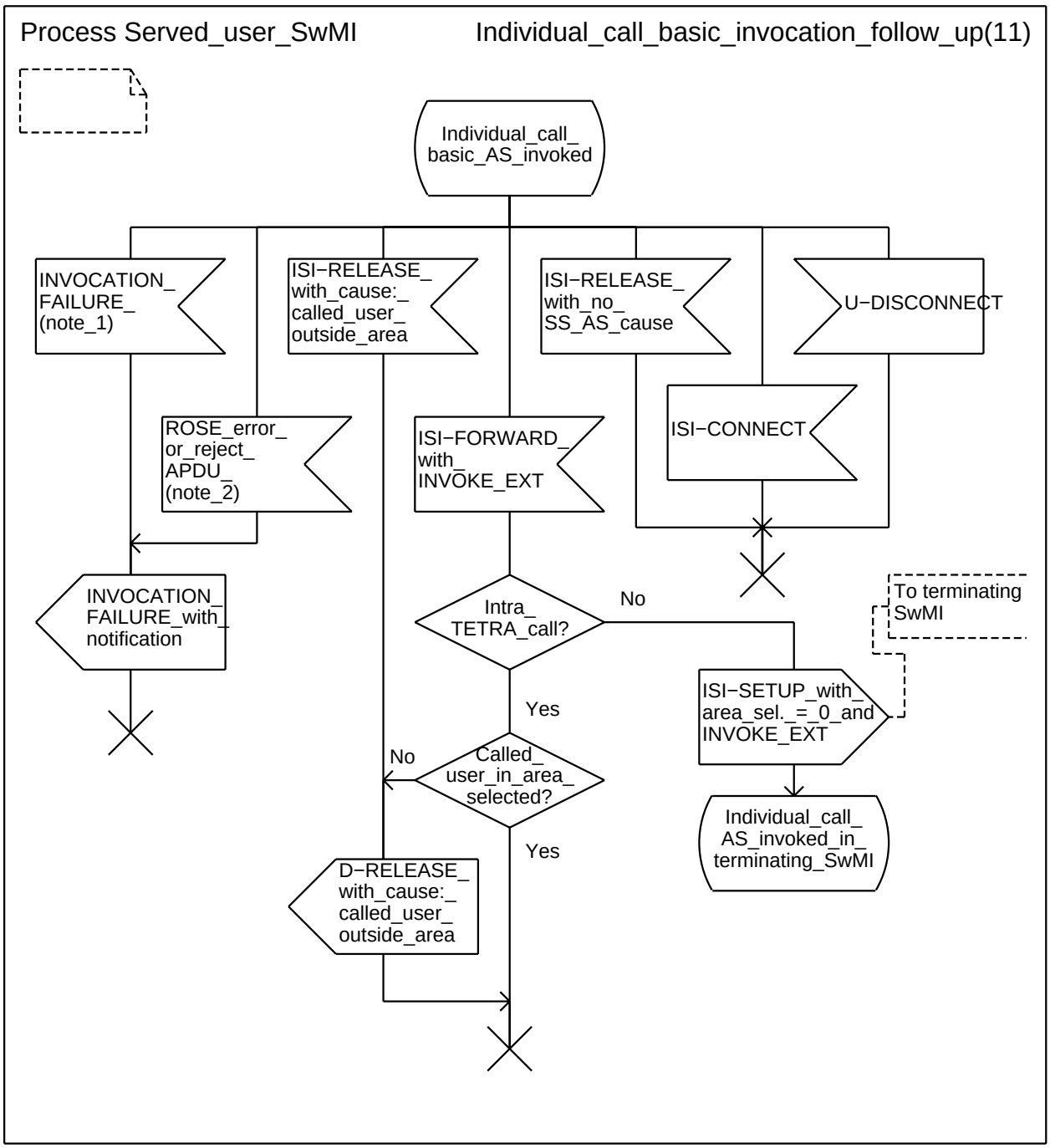
Output signals to the left represent PDUs sent to the served user MS/LS.

NOTE: Disconnection/release causes "called_user_outside_area", "AS_call_restoration_failure", "due_to_SS_AS" are encoded in the air interface protocol as a disconnect cause "SS-specific disconnection" and the D-RELEASE PDU may contain notification indication "call rejected due to SS-AS".



NOTE: The value of the information element area selection in the ANF-ISIGC ORIGINATING SETUP PDU is identical to that in the U-SETUP PDU received from the calling user MS/LS.

Figure B.2 (sheet 1 of 11): Served user SwMI SDL - Basic invocation handling



NOTE 1: The failure cause in the INVOCATION FAILURE PDU received in that state can only be related to the terminating SwMI, i.e. either SS-AS or type of definition not supported.

NOTE 2: If the called user home SwMI does not support the INVOKE EXT PDU (sent by the originating SwMI) this means that it does not support SS-AS. Hence it will never send the ROSE Return Error APDU indicating that it supports SS-AS but not that specific PDU. Therefore, in that state, the ROSE Return Error APDU received from the called user home SwMI can only mean that that SwMI does not support SS-AS.

Figure B.2 (sheet 2 of 11): Served user SwMI SDL - Individual call operation with basic invocation

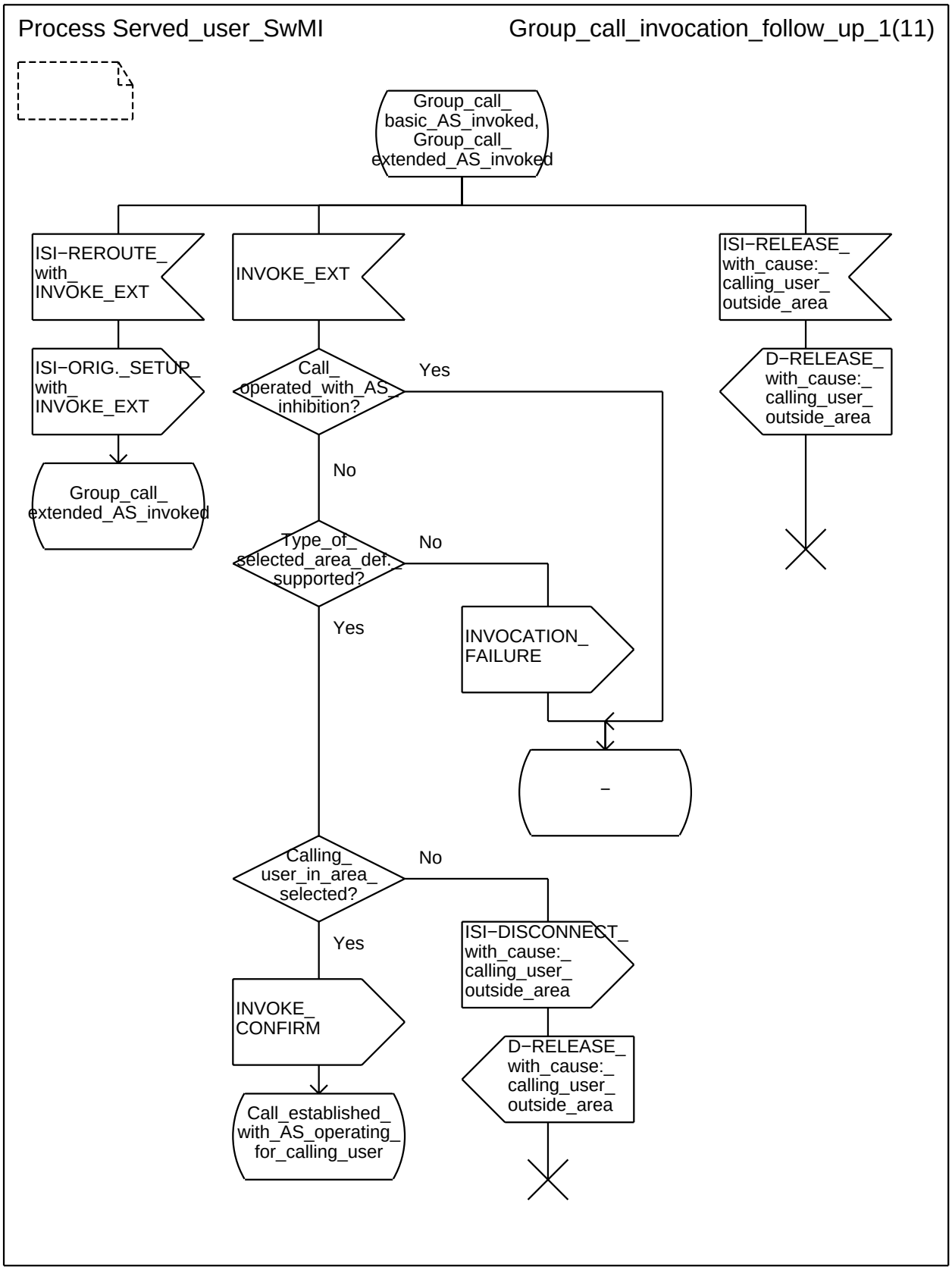


Figure B.2 (sheet 3 of 11): Served user SwMI SDL - Group call basic invocation follow up

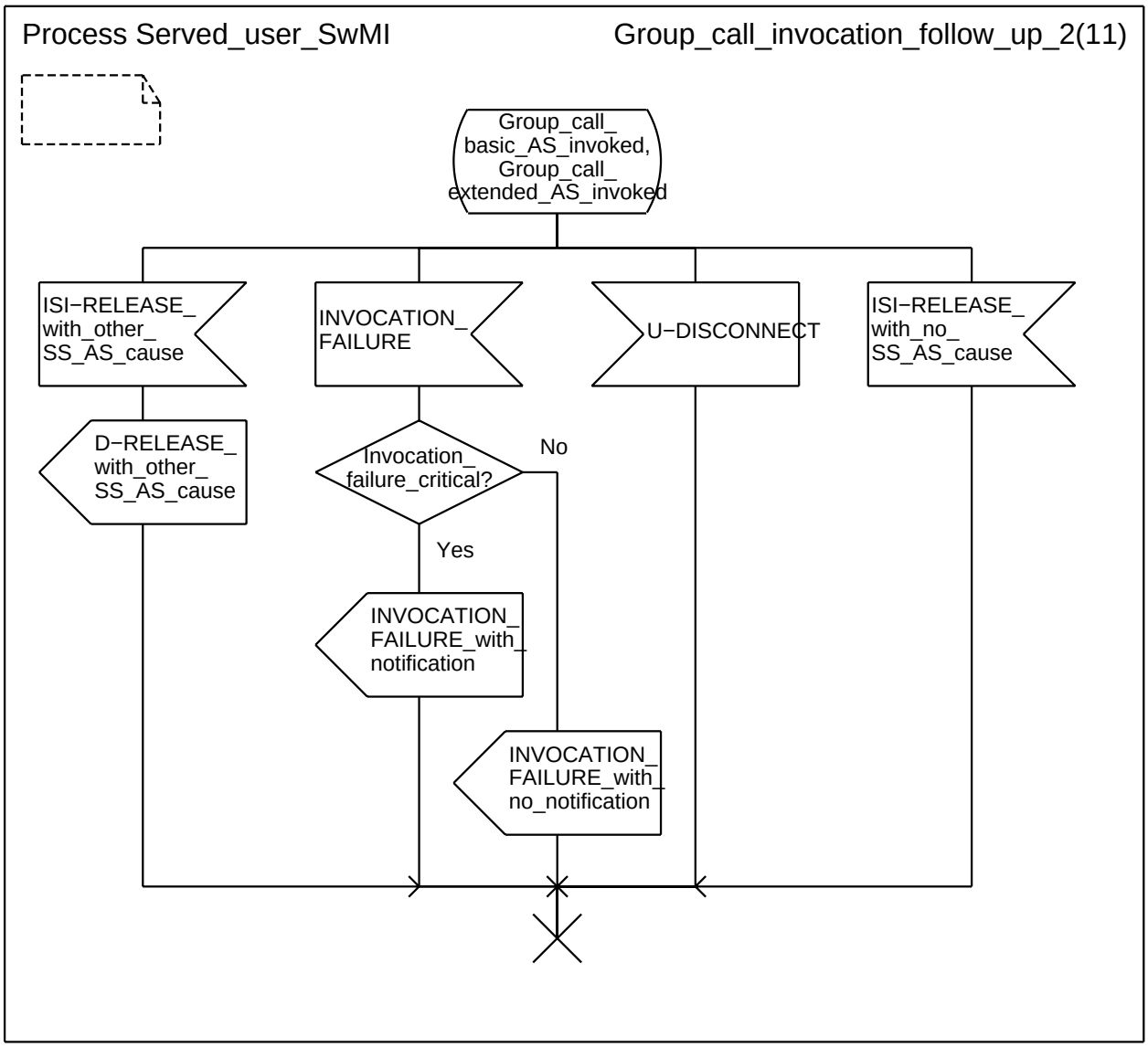
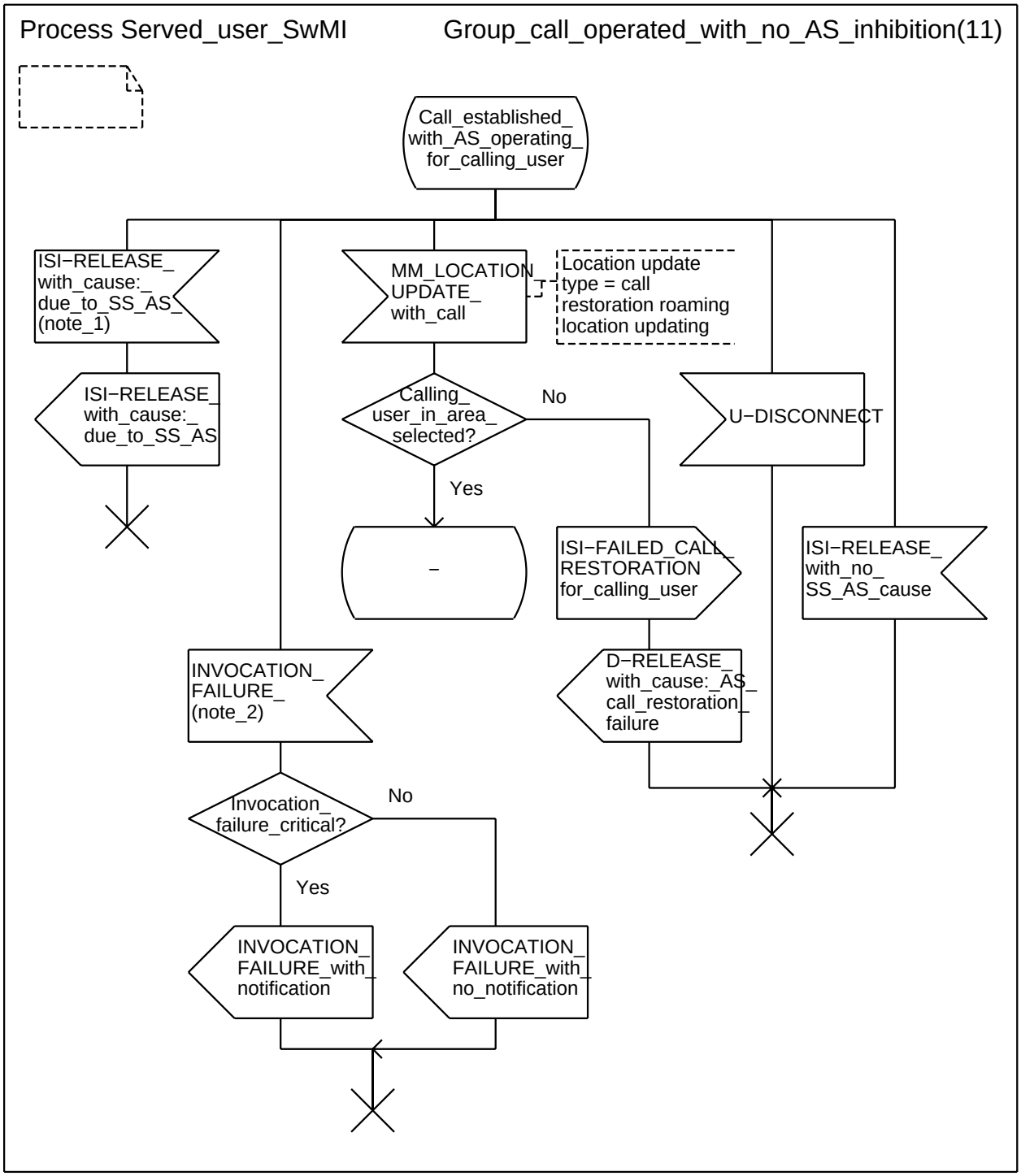


Figure B.2 (sheet 4 of 11): Served user SwMI SDL - Group call basic invocation follow up (continued)

NOTE: Sheets 3 and 4 apply to both states "group_call_basic_AS_invoked" (see sheet 1) and "group_call_extended_AS_invoked" (see sheet 6).



NOTE 1: At this stage of the group call establishment, the only possible call rejection cause due to SS-AS is when the call is an acknowledged group call and when one or more important users are outside the invoked selected area.

NOTE 2: At this stage of the group call establishment, the only possible cause why the originating SwMI may receive the INVOKCATION FAILURE PDU is because one or more participating SwMIs judged critical for SS-AS operation do not support it.

Figure B.2 (sheet 5 of 11): Served user SwMI SDL - Group call operation with basic invocation in the case where SS-AS has not been inhibited for the calling user

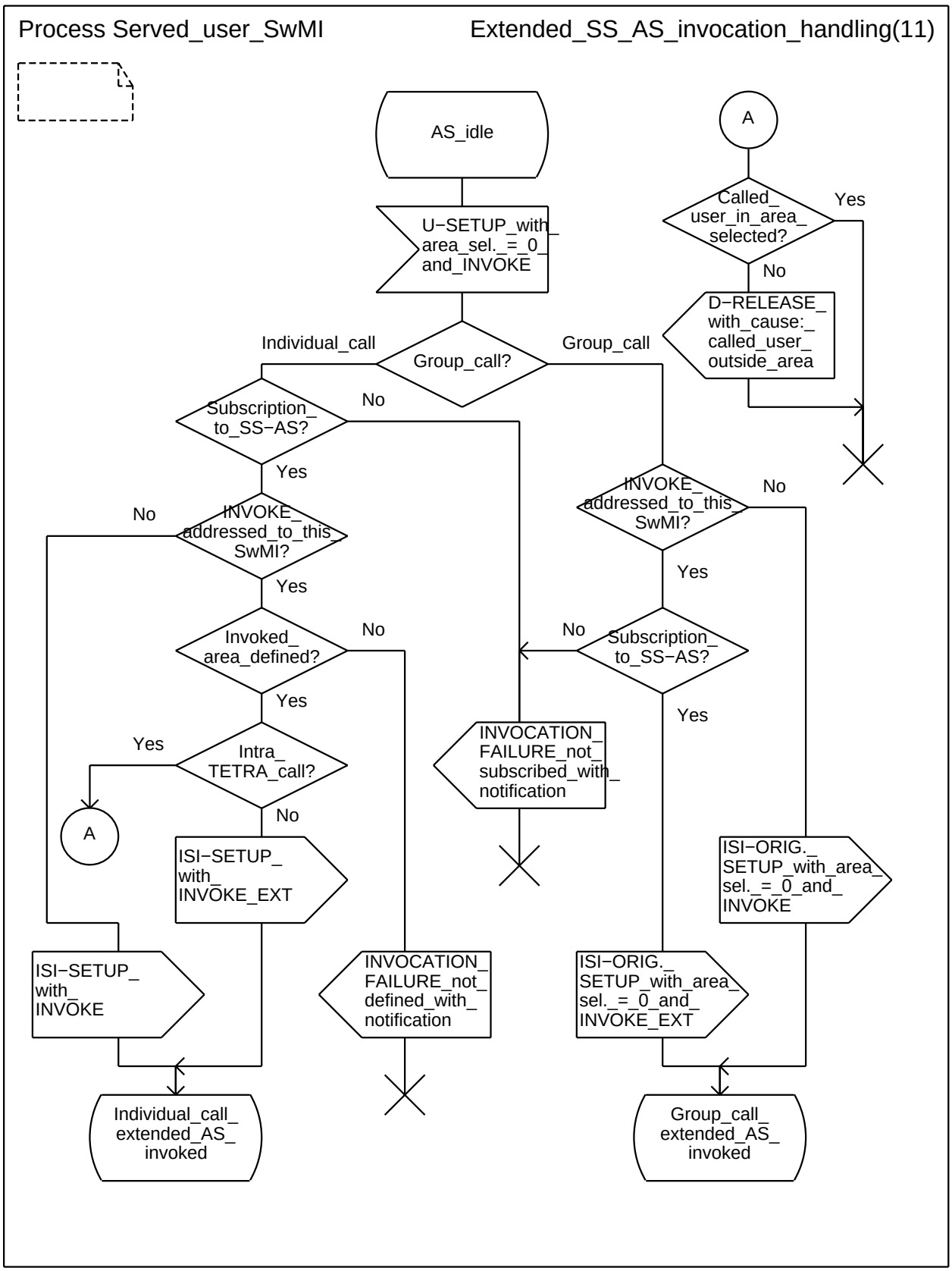
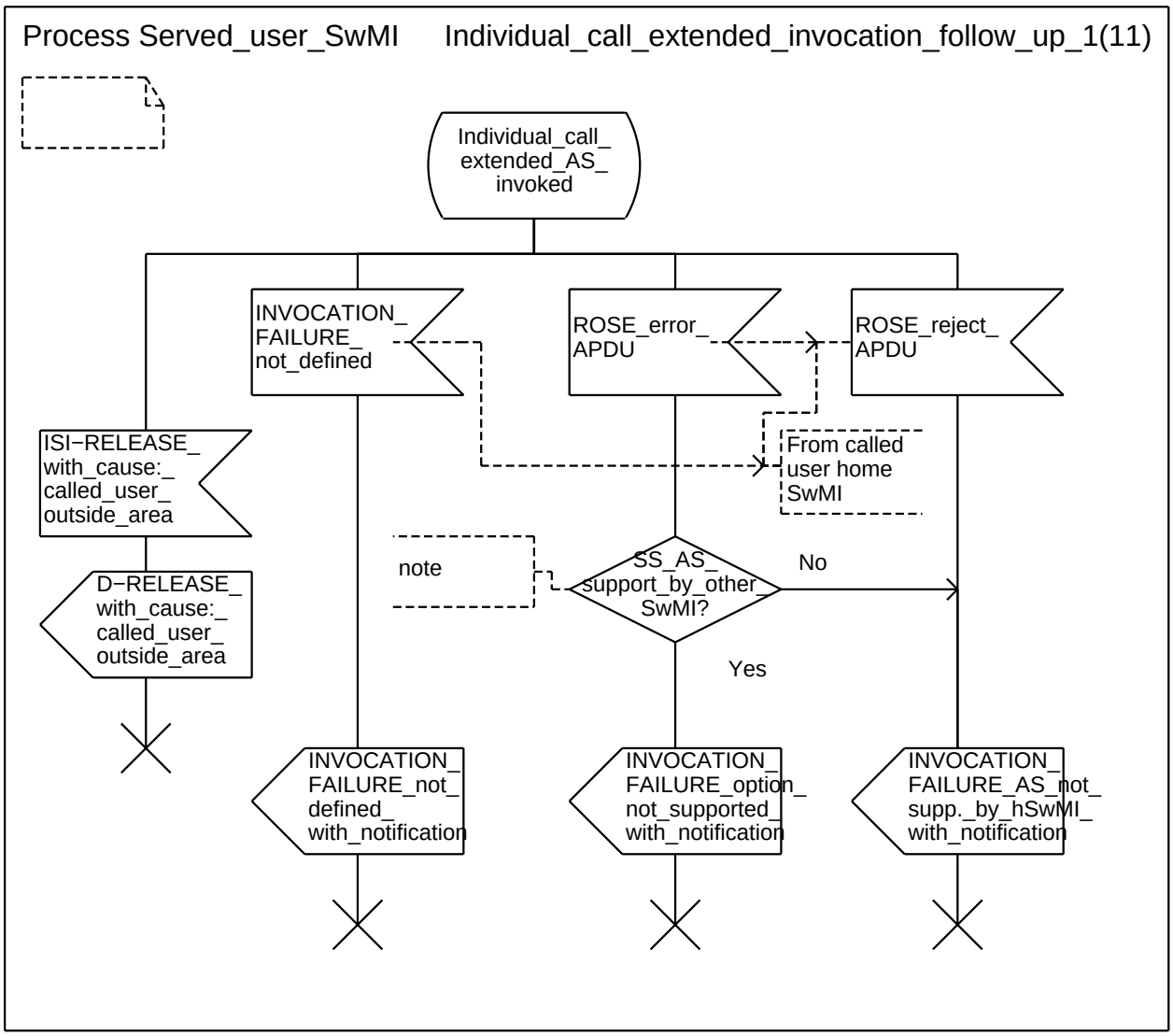


Figure B.2 (sheet 6 of 11): Served user SwMI SDL - Extended invocation handling



NOTE: If the called user home SwMI does not support the INVOKE EXT PDU (sent by the originating SwMI) this means that it does not support SS-AS. Hence it will never send the ROSE Return Error APDU indicating that it supports SS-AS but not that specific PDU. Therefore, it is only as a response to the INVOKE PDU that the ROSE Return Error APDU may indicate that the called user home SwMI supports SS-AS but not the specific PDU sent by the corresponding ROSE Invoke APDU.

Figure B.2 (sheet 7 of 11): Served user SwMI SDL - Individual call operation with extended invocation

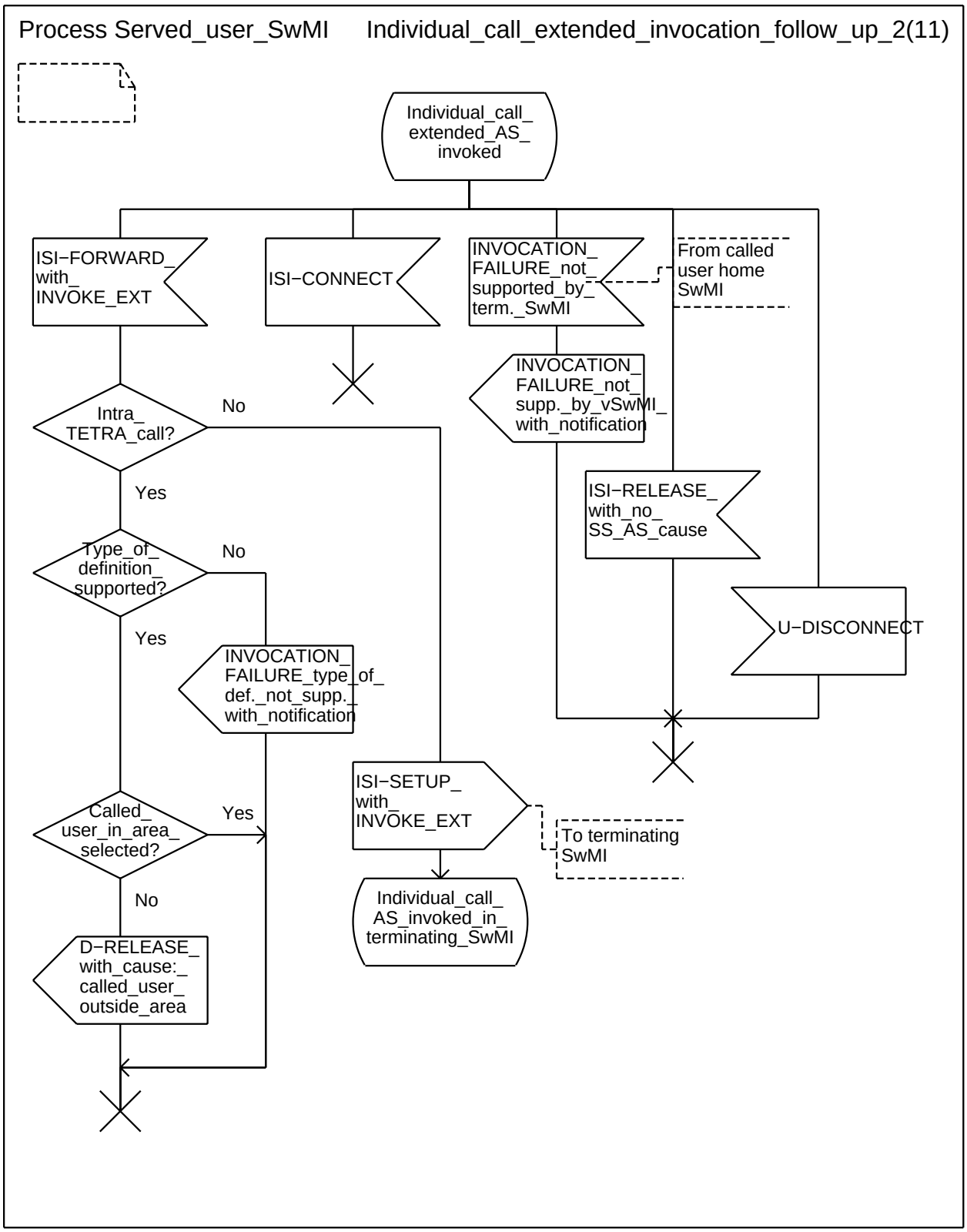
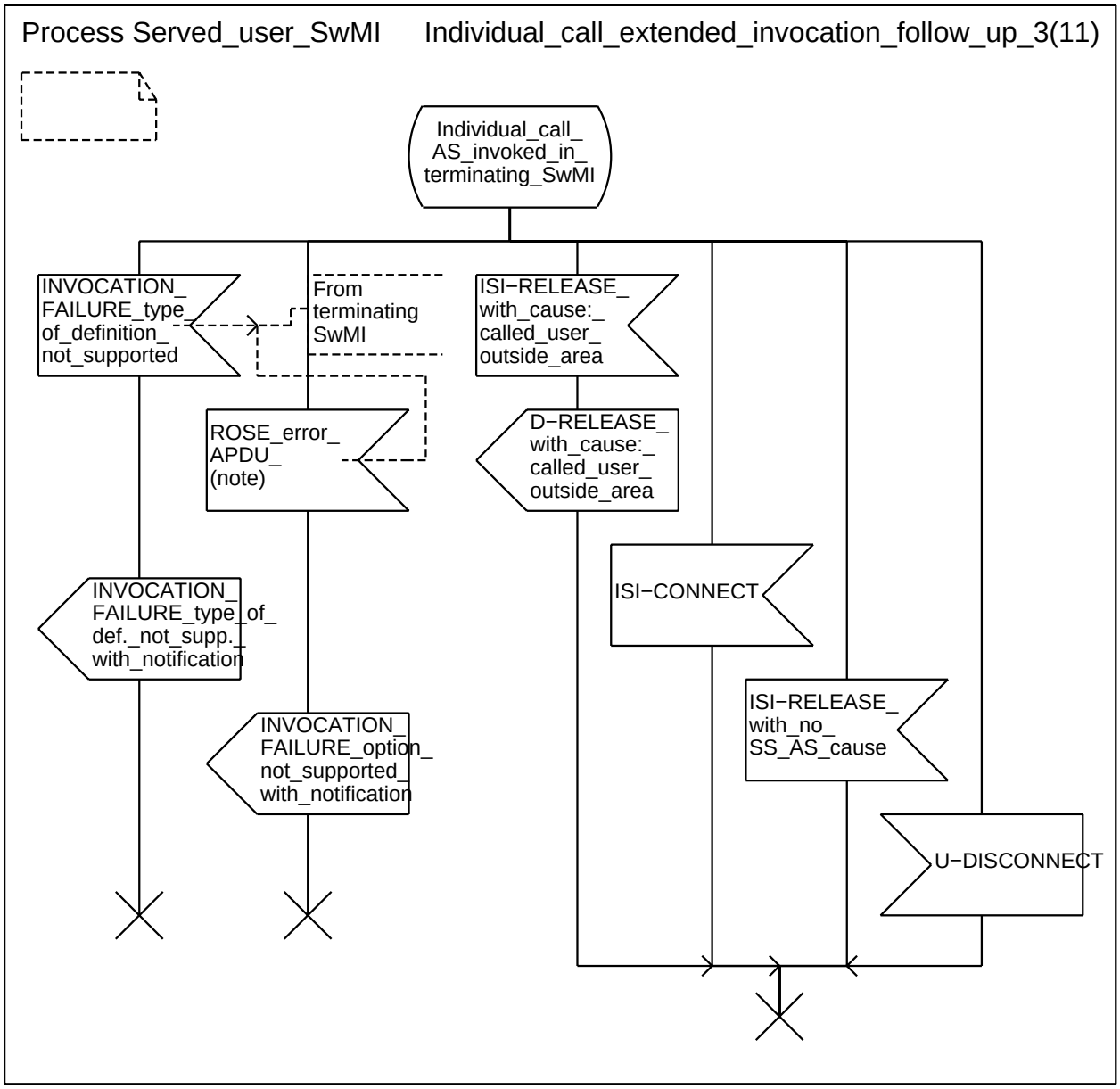
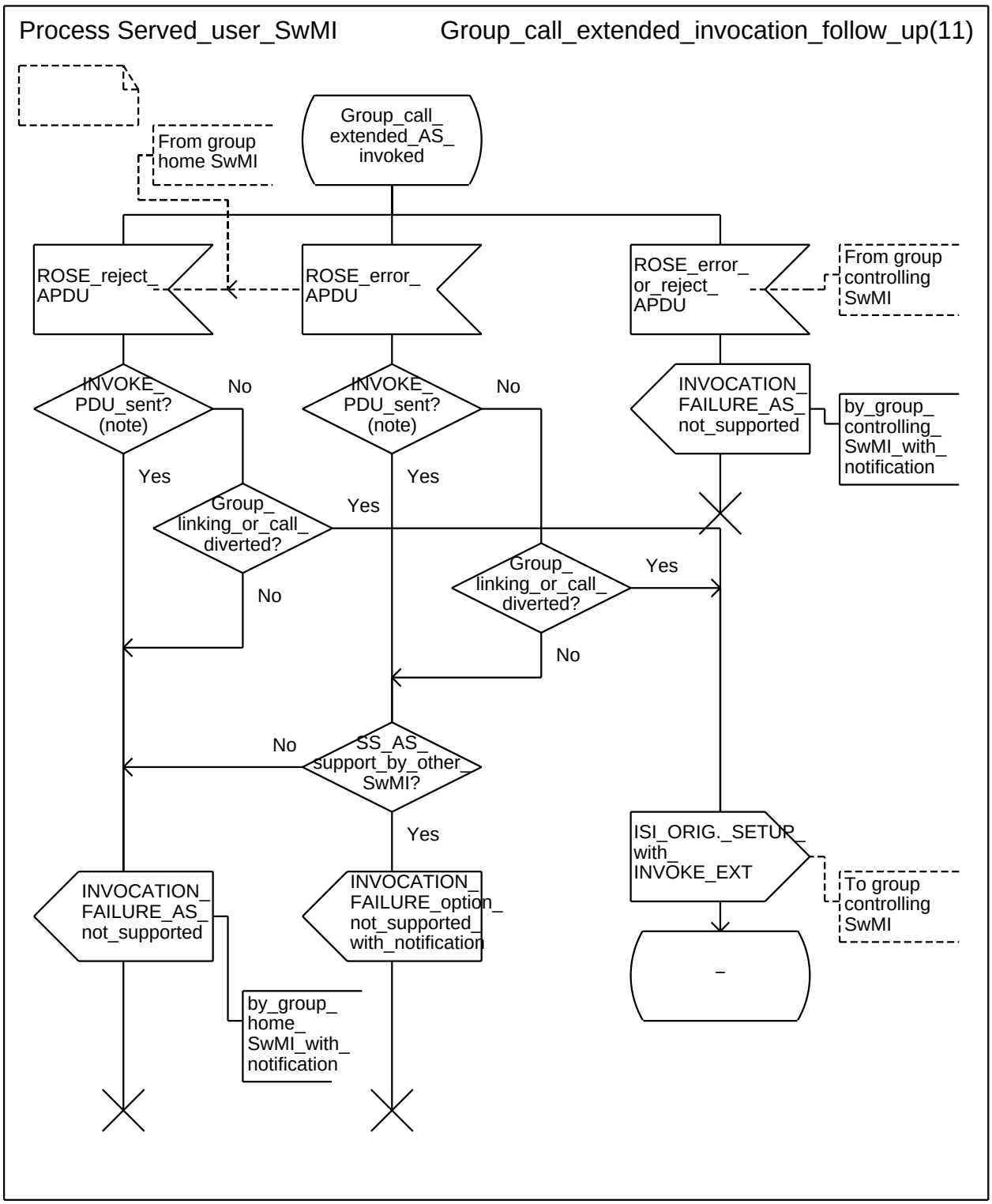


Figure B.2 (sheet 8 of 11): Served user SwMI SDL - Individual call operation with extended invocation (continued)



NOTE: The case where the terminating SwMI would return a ROSE Return Error APDU indicating that it does not support SS-AS has been excluded, since the called user home SwMI shall address the INVOKE EXT PDU to the terminating SwMI only if it knows that that SwMI supports SS-AS.

Figure B.2 (sheet 9 of 11): Served user SwMI SDL - Individual call operation with basic invocation with extended invocation (end)



NOTE: In this state (i.e. SS-AS has been invoked the calling user using the optional INVOKE PDU), the negative answer of the decision means that the ROSE Return Error APDU has been sent by the group home SwMI as a response to the INVOKE EXT PDU.

Figure B.2 (sheet 10 of 11): Served user SwMI SDL - Group call with extended invocation - Specific failure cases of operation

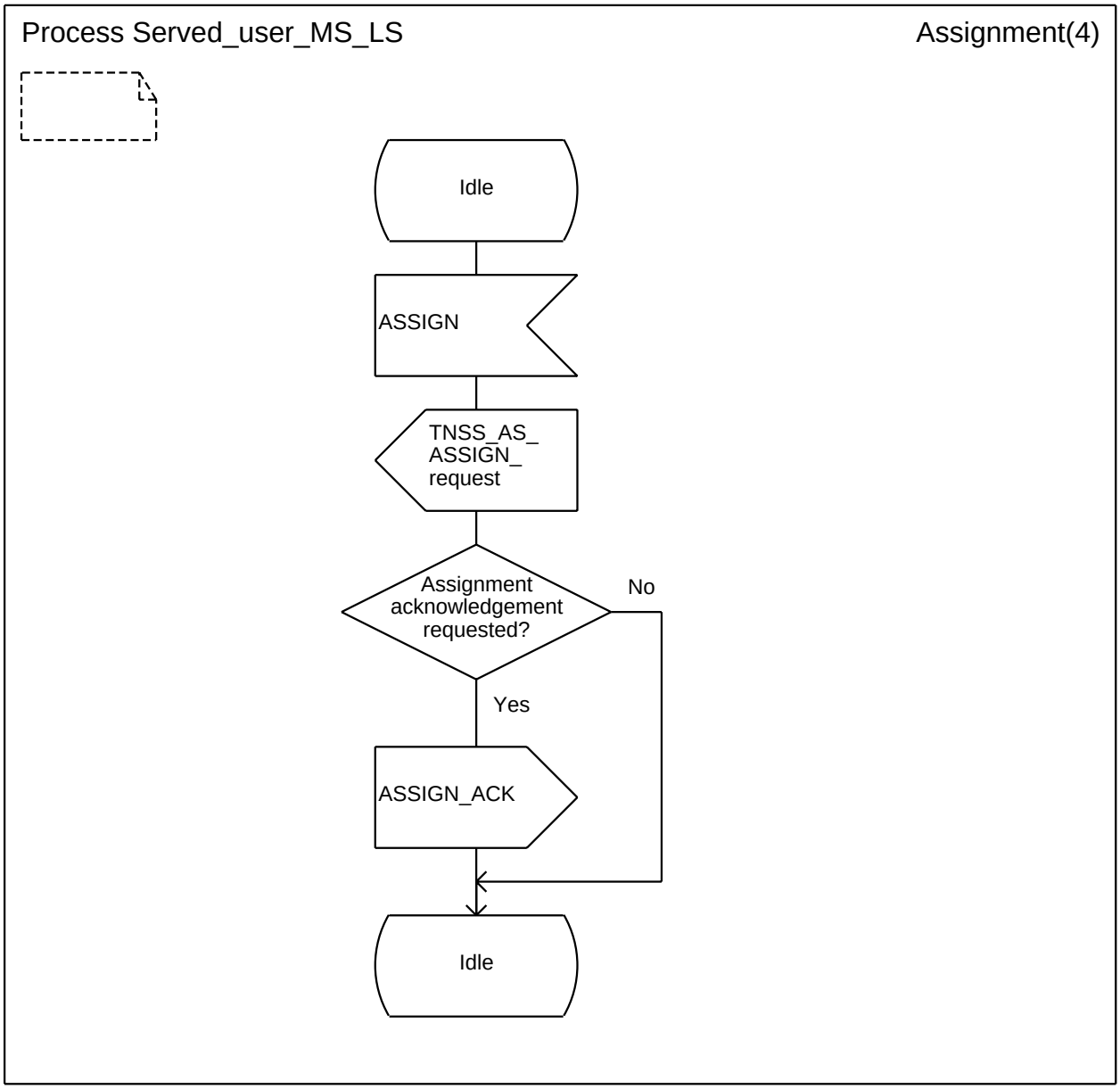


Figure B.2 (sheet 11 of 11): Served user SwMI SDL - Assignment

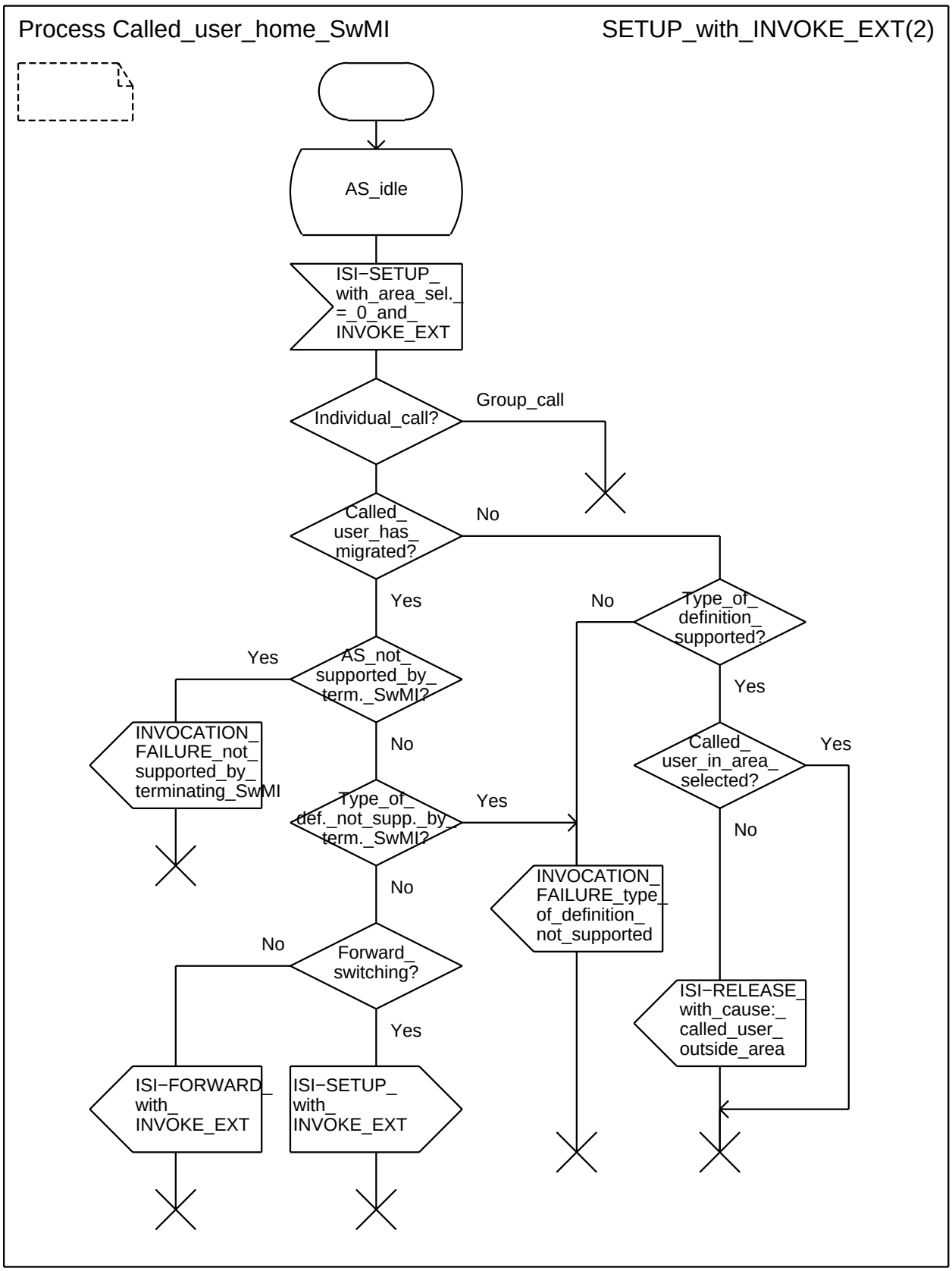
B.3 SDL representation of SS-AS at the called user home SwMI

Figure B.3 shows the behaviour of a SS-AS supplementary service control entity within the called user home SwMI.

The output signal to the right represents an ISI PDU sent to the terminating SwMI.

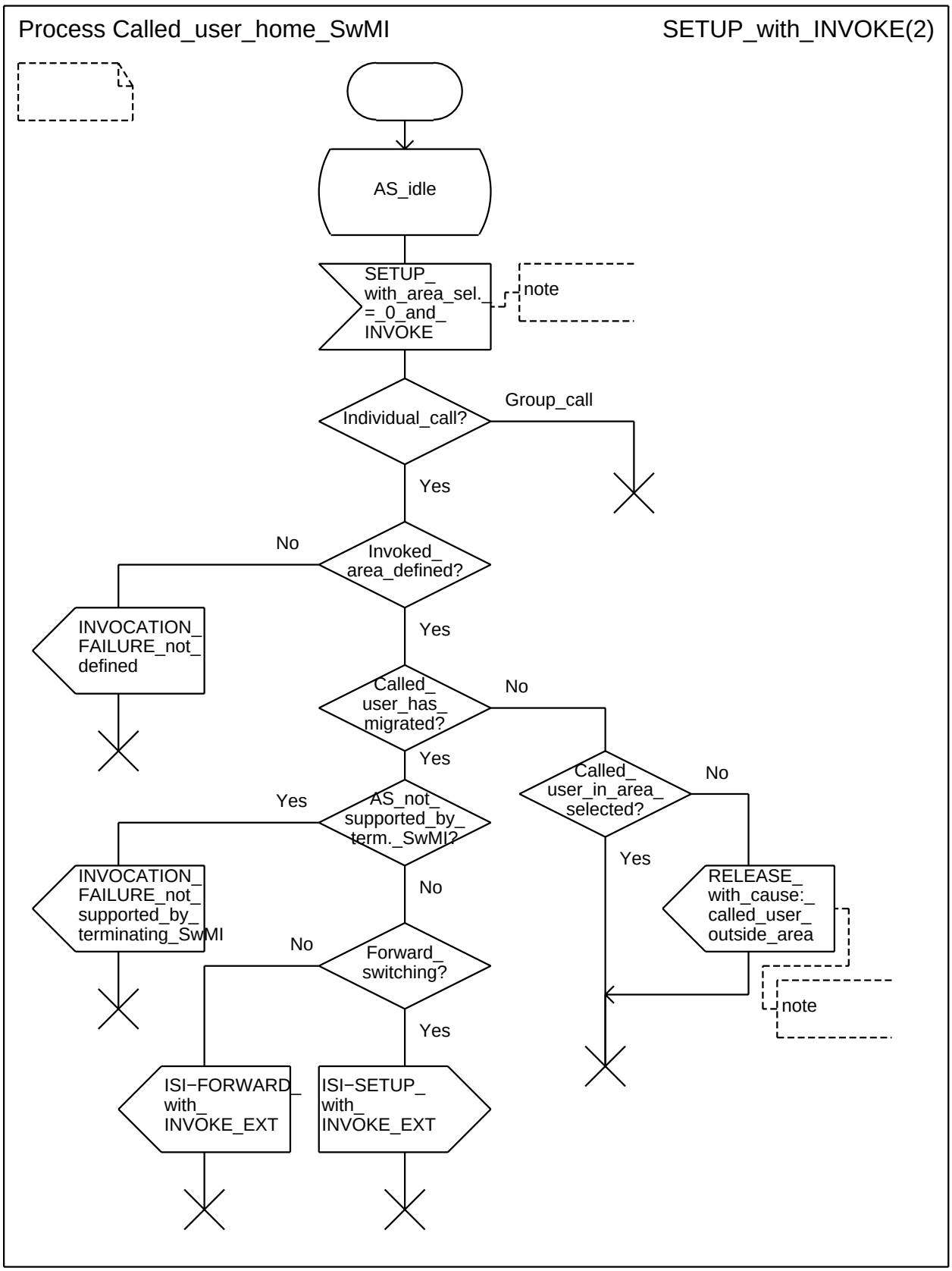
Input signals from the left represent ISI PDUs received from the served user SwMI (i.e. the originating SwMI for the call) or air interface PDUs from the calling user (i.e. the served user) if he happens to be registered in the called user home SwMI (i.e. the called user home SwMI coincides with the originating SwMI).

The output signal to the left represent ISI PDUs sent to the served user SwMI (i.e. the originating SwMI for the call) or air interface PDUs from the calling user (i.e. the served user) if he happens to be registered in the called user home SwMI (i.e. the called user home SwMI coincides with the originating SwMI).



NOTE: The ISI-FORWARD PDU is encoded as ISI-SETUP PDU.

Figure B.3 (sheet 1 of 2): Called user home SwMI SDL - INVOKE EXT received



NOTE: If the called user home SwMI does not coincide with the originating SwMI the PDU named SETUP PDU in the diagram is the ANF-ISIIC-SETUP PDU sent by the originating SwMI and that named RELEASE PDU, the ANF-ISIIC-RELEASE PDU sent to that SwMI. If the called user home SwMI coincides with the originating SwMI, those PDUs are the U-SETUP PDU sent by the calling user MS/LS and the D-RELEASE PDU sent to the MS/LS respectively.

Figure B.3 (sheet 2 of 2): Called user home SwMI SDL - INVOKE received

B.4 SDL representation of SS-AS at the group home SwMI

Figure B.4 shows the behaviour of a SS-AS supplementary service control entity within the group home SwMI.

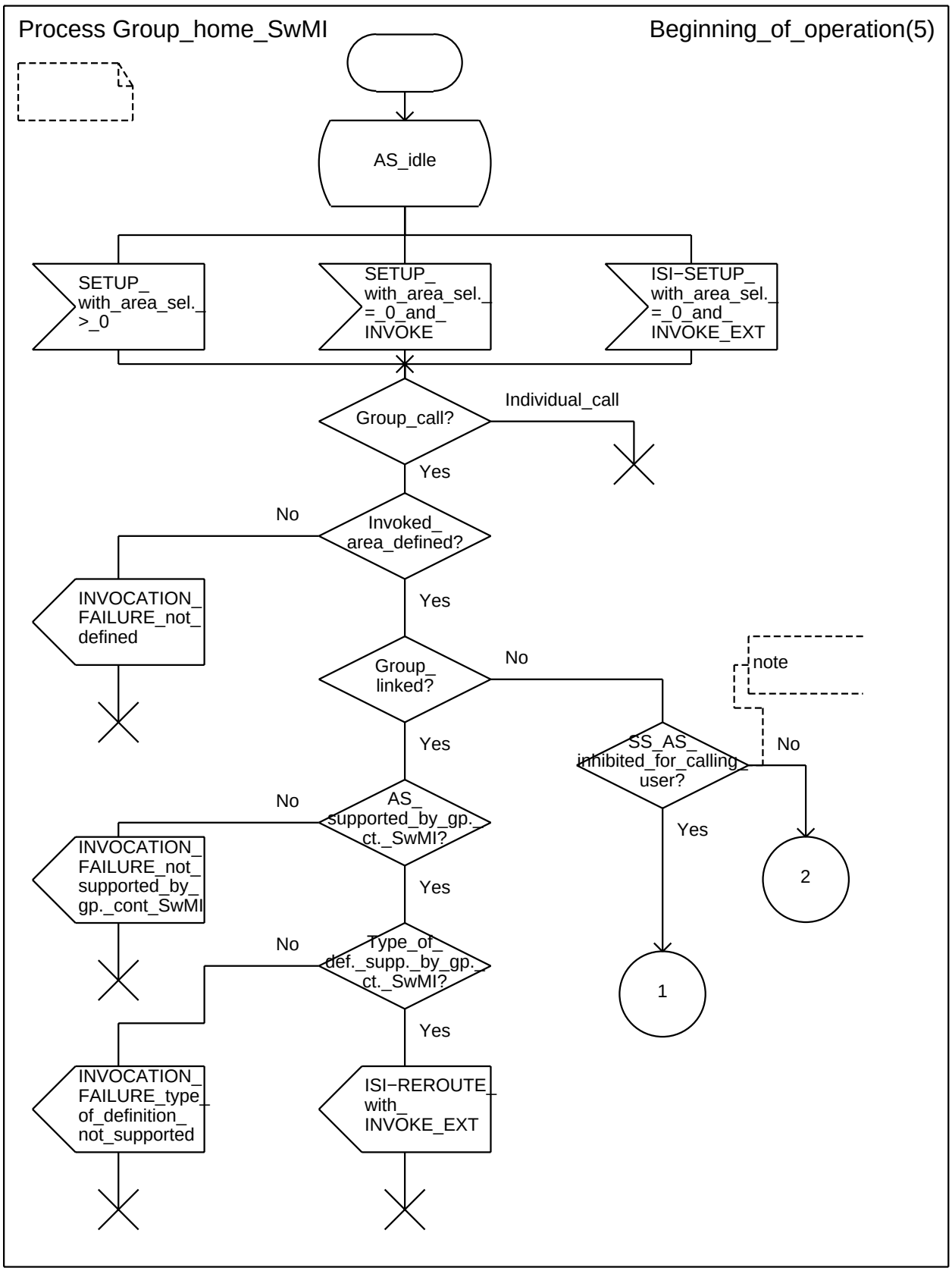
Input signals from the right represent PDUs received from users already participating in the call roaming in the group home SwMI or migrating into it or from the participating SwMIs where such roaming takes place or in which the users migrate, with one exception on sheet 5: the primitive informing the group home SwMI about the migration of a user already participating in the call, received from its mobility management entity (itself informed through ANF-ISIMM).

Output signals to the right represent PDUs sent:

- on sheets 2 and 4, to the group members in the invoked selected area within the group home SwMI (except the calling user if he happens to be a group member in that area);
- on sheets 3 and 5, to the user already participating in the call roaming in the group home SwMI roaming or migrating into it or to the participating SwMI into which a user already participating in the call migrates, with one exception: the RELEASE PDU, which is sent to every user participating in the call registered in the group home SwMI and to every participating SwMI.

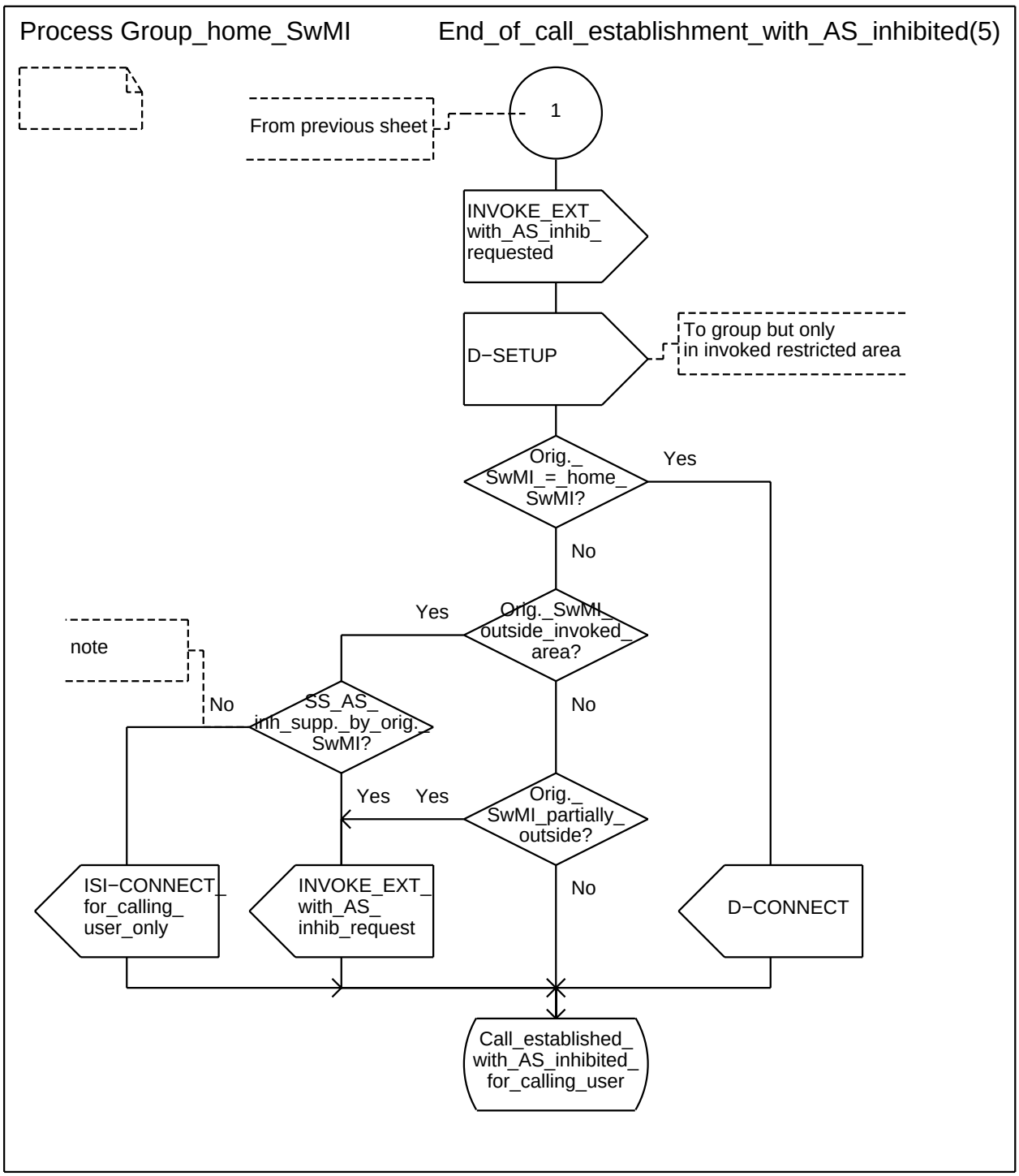
Input signals from the left represent PDUs from the calling user if he is registered in the group home SwMI, or from the originating SwMI otherwise, with one exception on sheet 3: the primitive call clearing received from the group home SwMI call control entity.

Output signal to the left represent PDUs sent to the calling user if he is registered in the group home SwMI, or to the originating SwMI otherwise.



NOTE: The answer of the decision shall indicate whether the group controlling SwMI has decided to request the inhibition of SS-AS operation for the calling user, independently of whether the originating SwMI has indicated that it supports such inhibition. Such decision shall hold not only of the calling user at set-up time, but also for the call restoration of that user or of another important user when he roams or migrates during the call.

Figure B.4 (sheet 1 of 5): Group home SwMI SDL



NOTE: The answer of the decision shall always be positive if the originating SwMI has indicated that it supports the inhibition of SS-AS operation for the calling user in the INVOKE or the INVOKE EXT PDU (sent together with the ANF-ISIGC-SETUP PDU). Similarly it shall always be negative if the originating SwMI has indicated that it does not support the inhibition of SS-AS operation for the calling user in the INVOCATION QUALIFIER, INVOKE or INVOKE EXT PDU.

Figure B.4 (sheet 2 of 5): Group home SwMI SDL

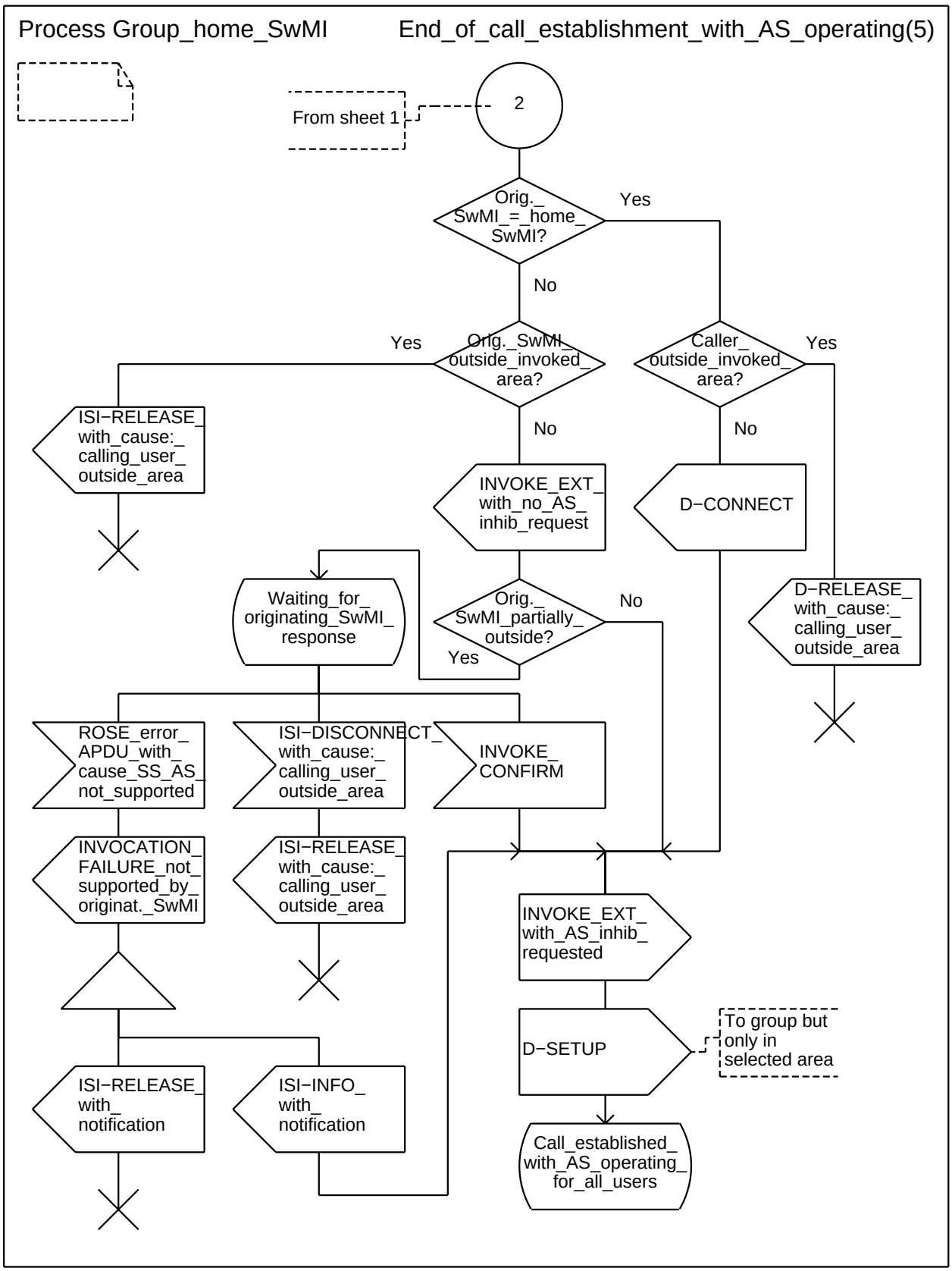
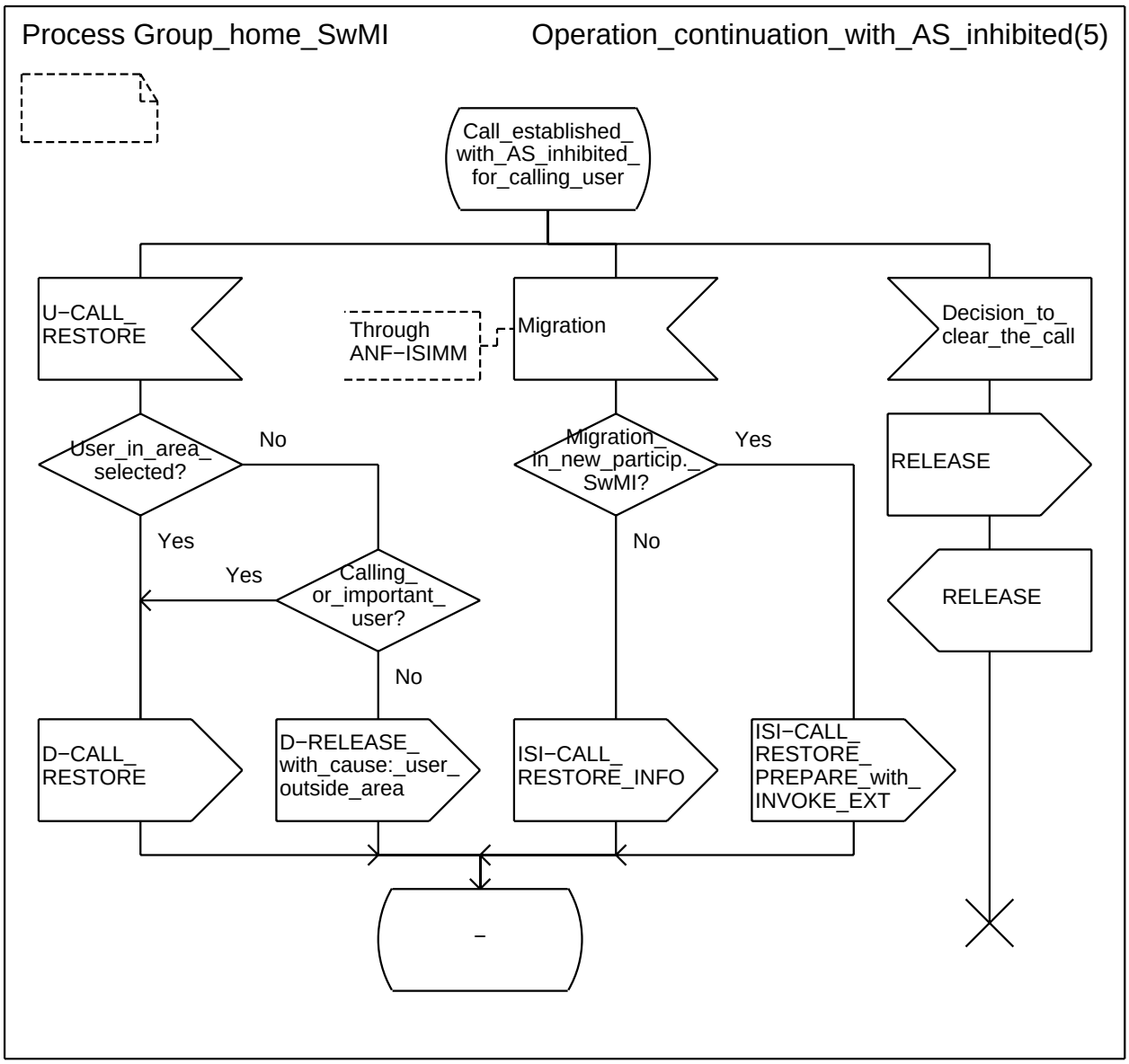
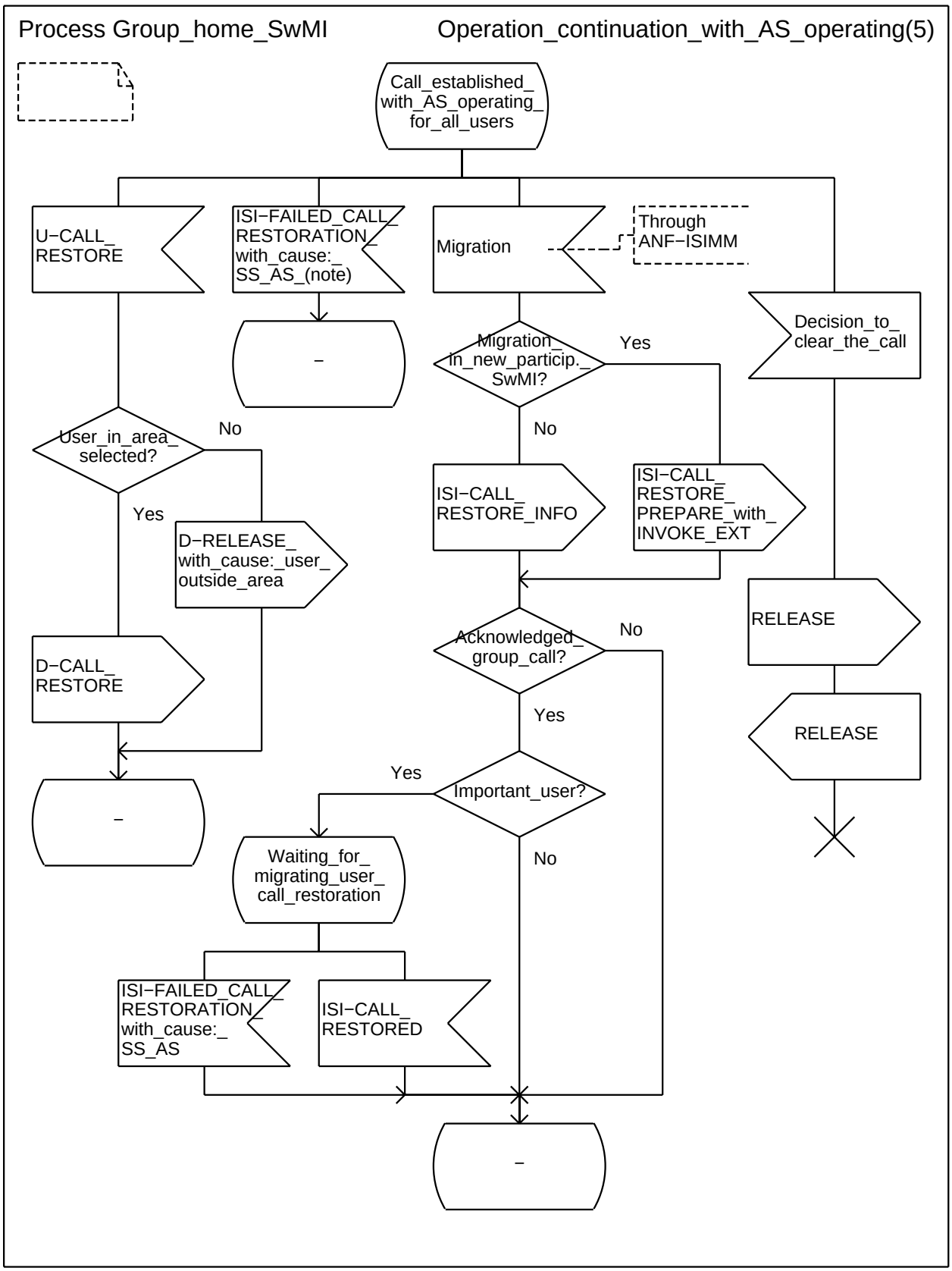


Figure B.4 (sheet 3 of 5): Group home SwMI SDL



NOTE: The ISI-CALL_RESTORE_PREPARE PDU is encoded as the ISI-RESTORATION PDU.

Figure B.4 (sheet 4 of 5): Group home SwMI SDL



NOTE 1: The group home SwMI shall receive the ANF-ISIGC-FAILED CALL RESTORATION PDU for a user (previously participating in the call) without having been informed about his migration when that user roams outside the invoked selected area in a participating SwMI.

NOTE 2: The ISI-CALL_RESTORE_PREPARE PDU is encoded as the ISI-RESTORATION PDU and the ISI-FAILED_CALL_RESTORE_ PDU is encoded as the ISI-RESTORATION NACK PDU.

Figure B.4 (sheet 5 of 5): Group home SwMI SDL

B.5 SDL representation of SS-AS at the group controlling SwMI

The protocol of the group controlling SwMI is defined in clause 5.4 and no SDL description of it is provided in the present document.

B.6 SDL representation of SS-AS at a participating SwMI

Figure B.5 shows the behaviour of a SS-AS supplementary service control entity within a participating SwMI.

The input signal from the right represents a PDU received from the MS of a roaming or migrating user (i.e. already participating in the group call).

Output signals to the right represent PDUs sent to that MS.

Input signals from the left represent PDUs received from the group controlling SwMI.

Output signals to the left represent PDUs sent to the group controlling SwMI.

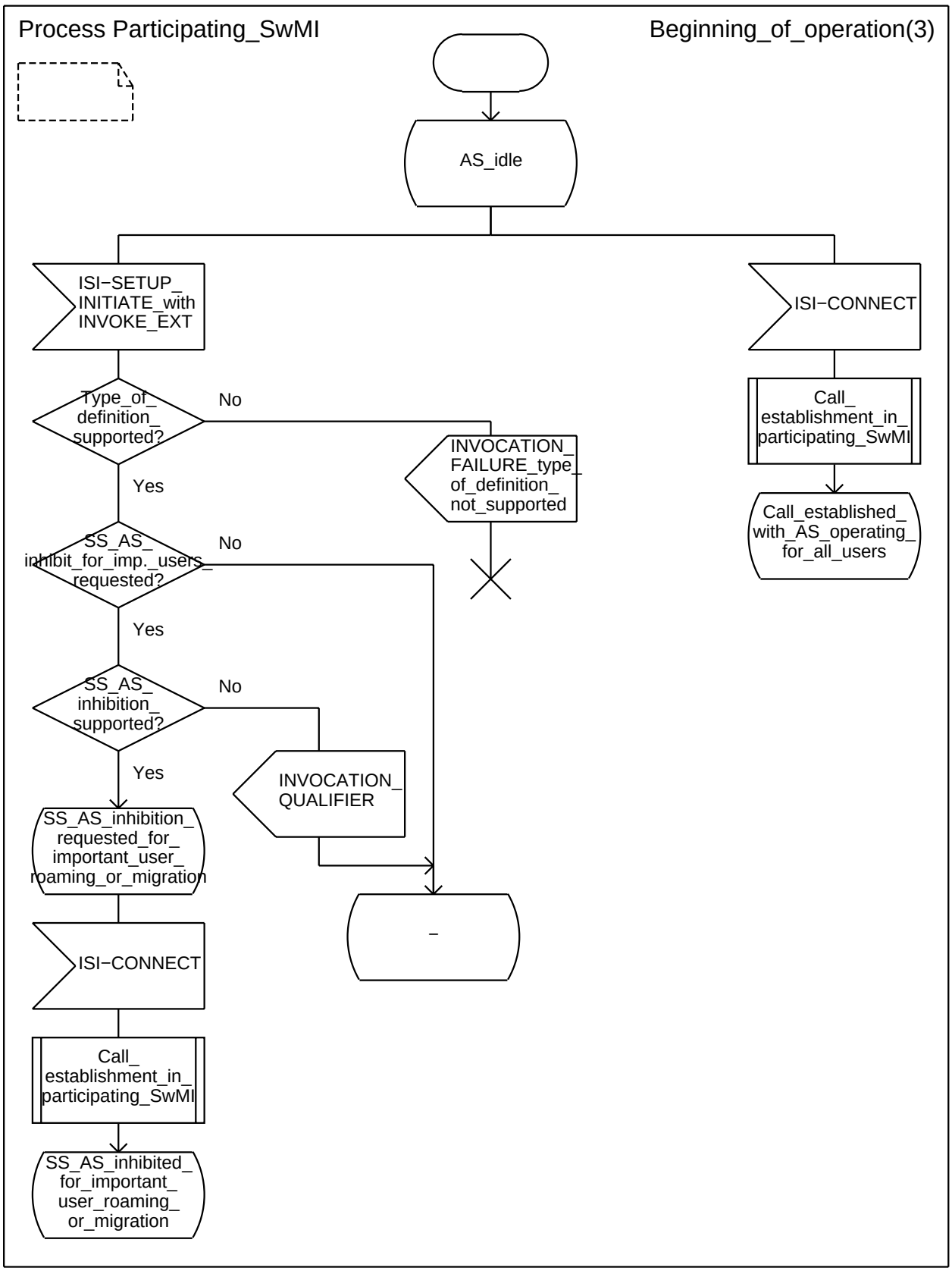


Figure B.5 (sheet 1 of 4): Participating SwMI SDL - Beginning of operation

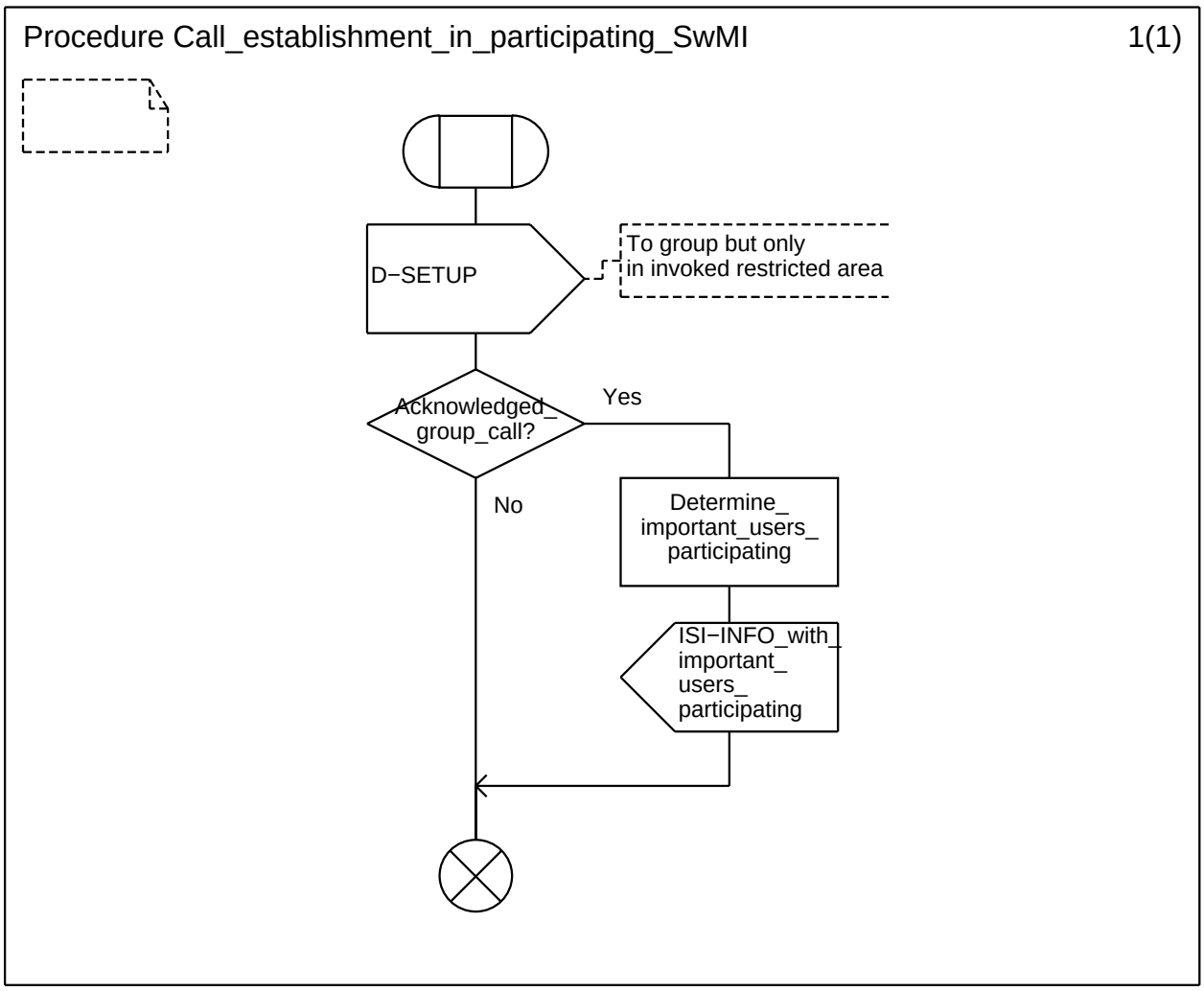


Figure B.5 (sheet 2 of 4): Participating SwMI SDL - Call establishment

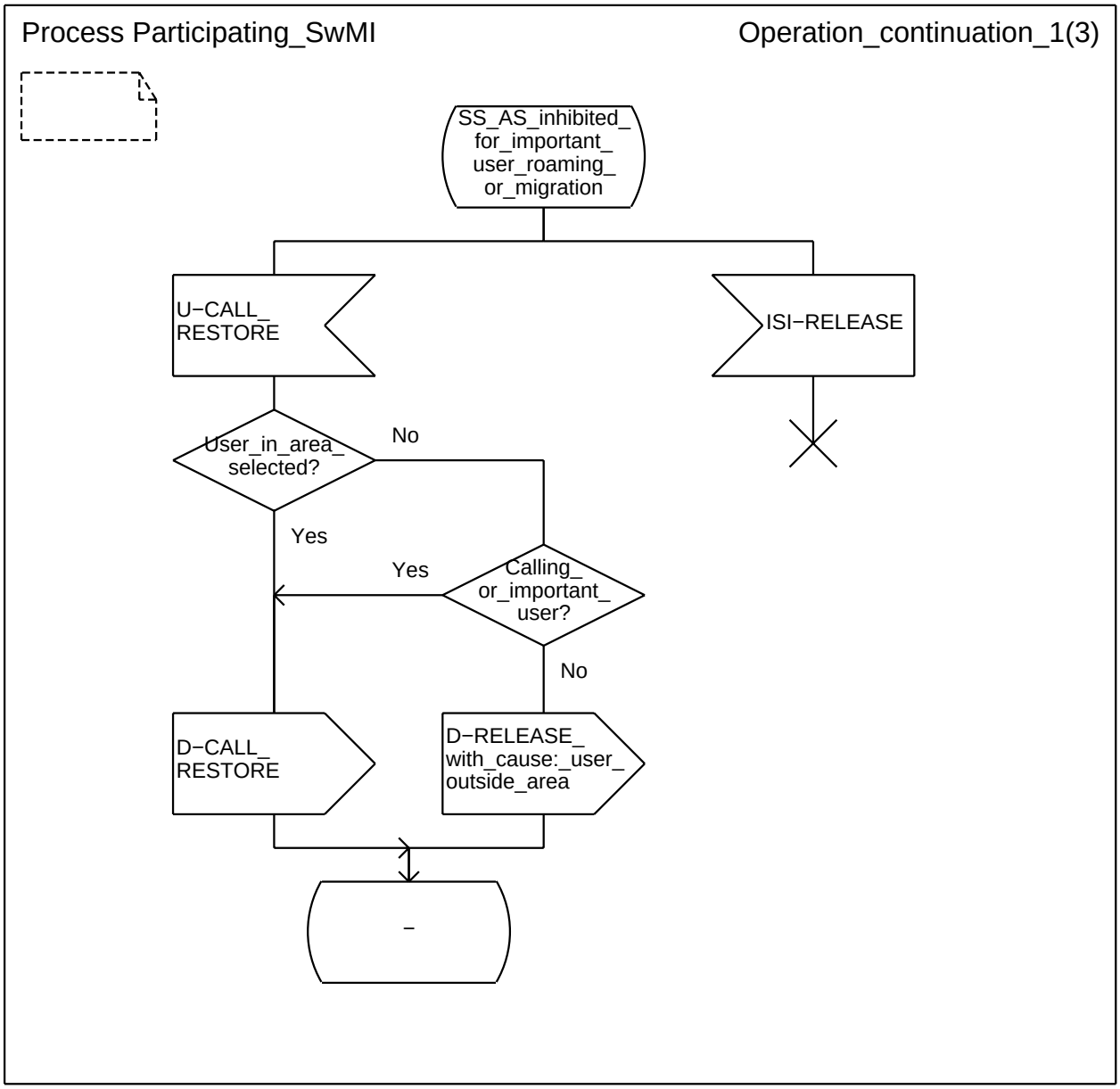
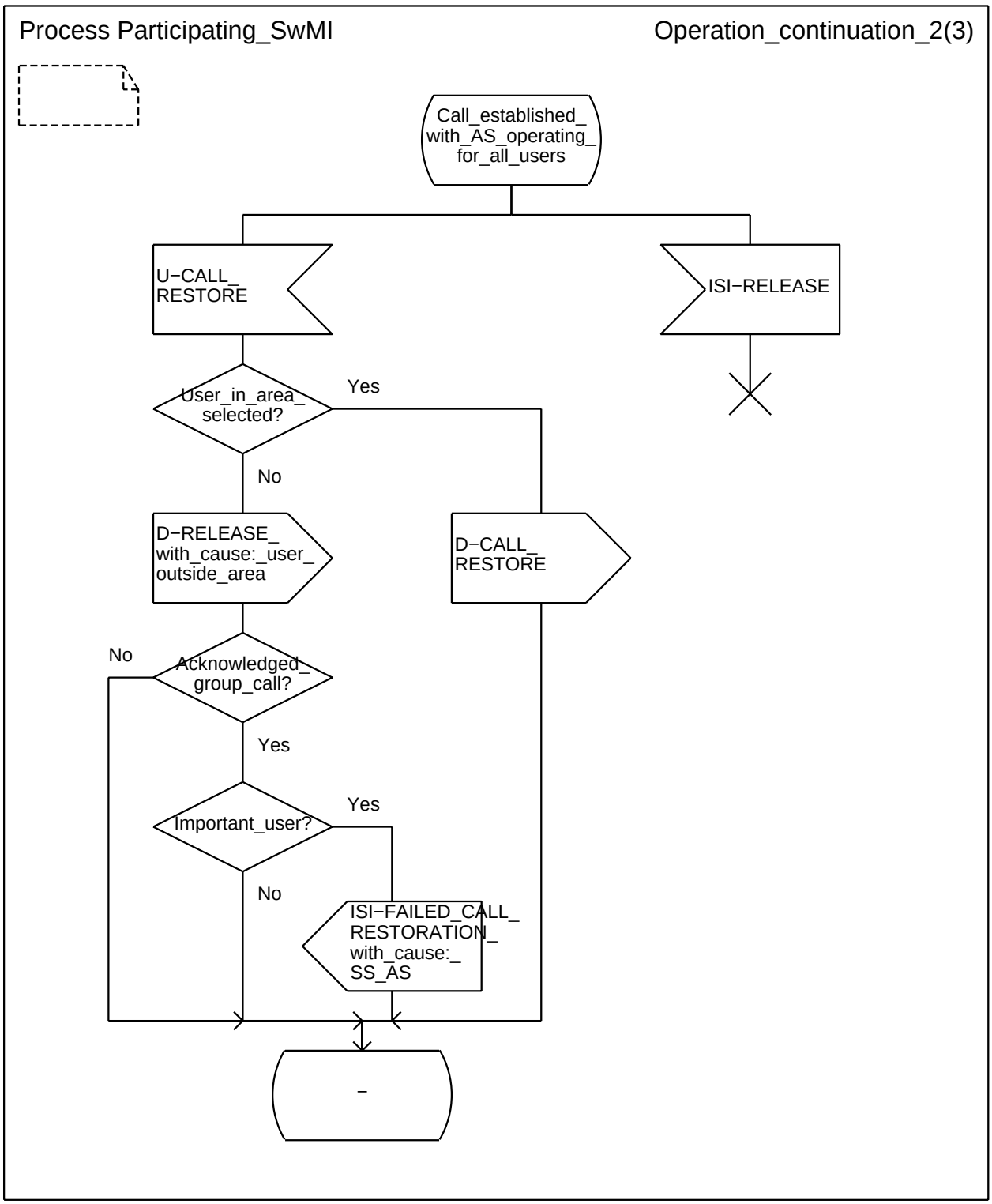


Figure B.5 (sheet 3 of 4): Participating SwMI SDL - Follow up operation



NOTE: The ISI-FAILED_CALL_RESTORE_ PDU is encoded as the ISI-RESTORATION NACK PDU.

Figure B.5 (sheet 4 of 4): Participating SwMI SDL - Follow up operation

B.7 SDL representation of SS-AS at a new participating SwMI

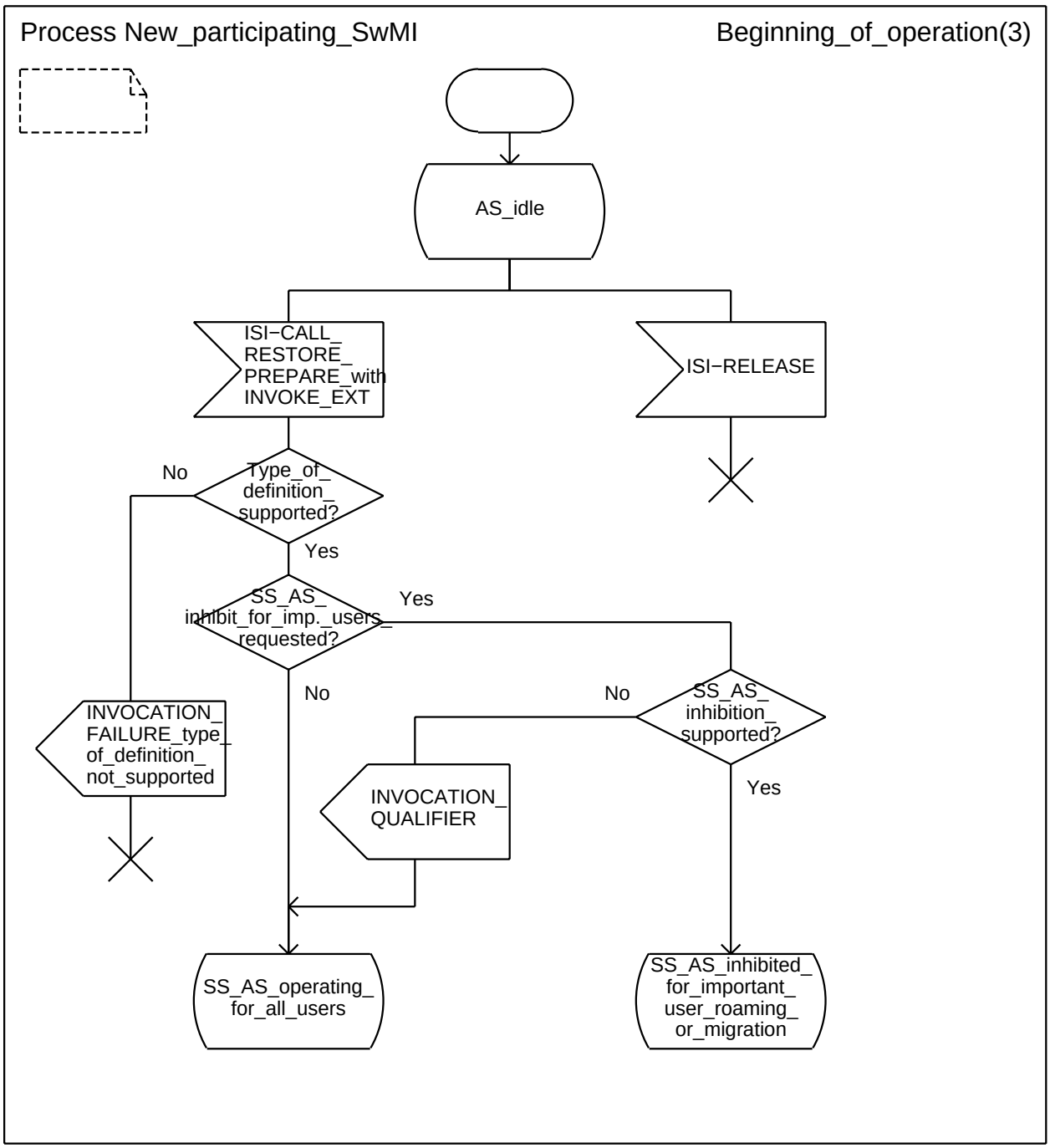
Figure B.6 shows the behaviour of a SS-AS supplementary service control entity within a new participating SwMI.

The input signal from the right represents a PDU received from the MS of a roaming or migrating user (i.e. already participating in the group call).

Output signals to the right represent PDUs sent to that MS.

Input signals from the left represent PDUs received from the group controlling SwMI.

Output signals to the left represent PDUs sent to the group controlling SwMI.



NOTE: The ISI-CALL_RESTORE_PREPARE PDU is encoded as the ISI-RESTORATION PDU.

Figure B.6 (sheet 1 of 3): New participating SwMI SDL - Beginning of operation

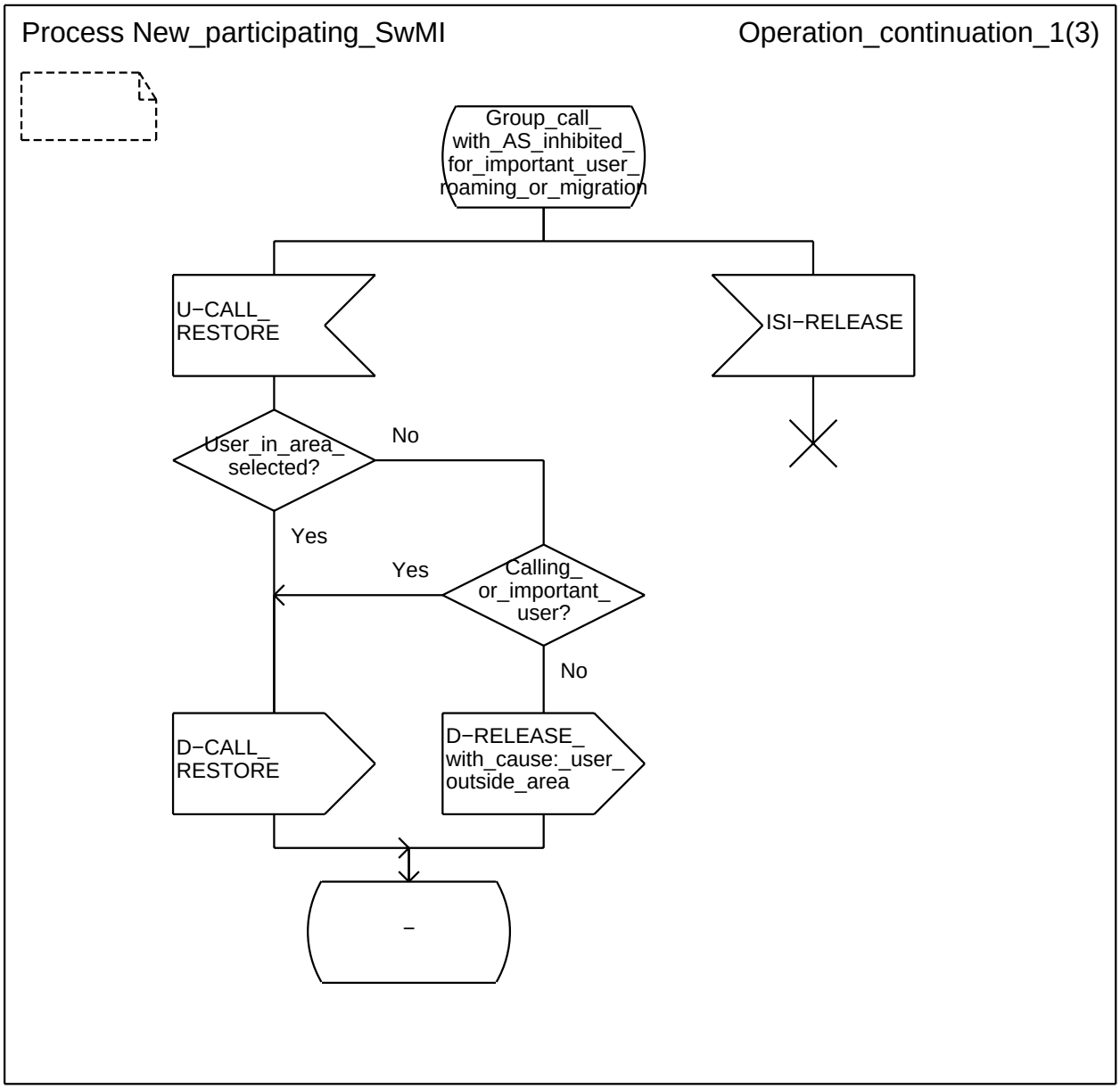
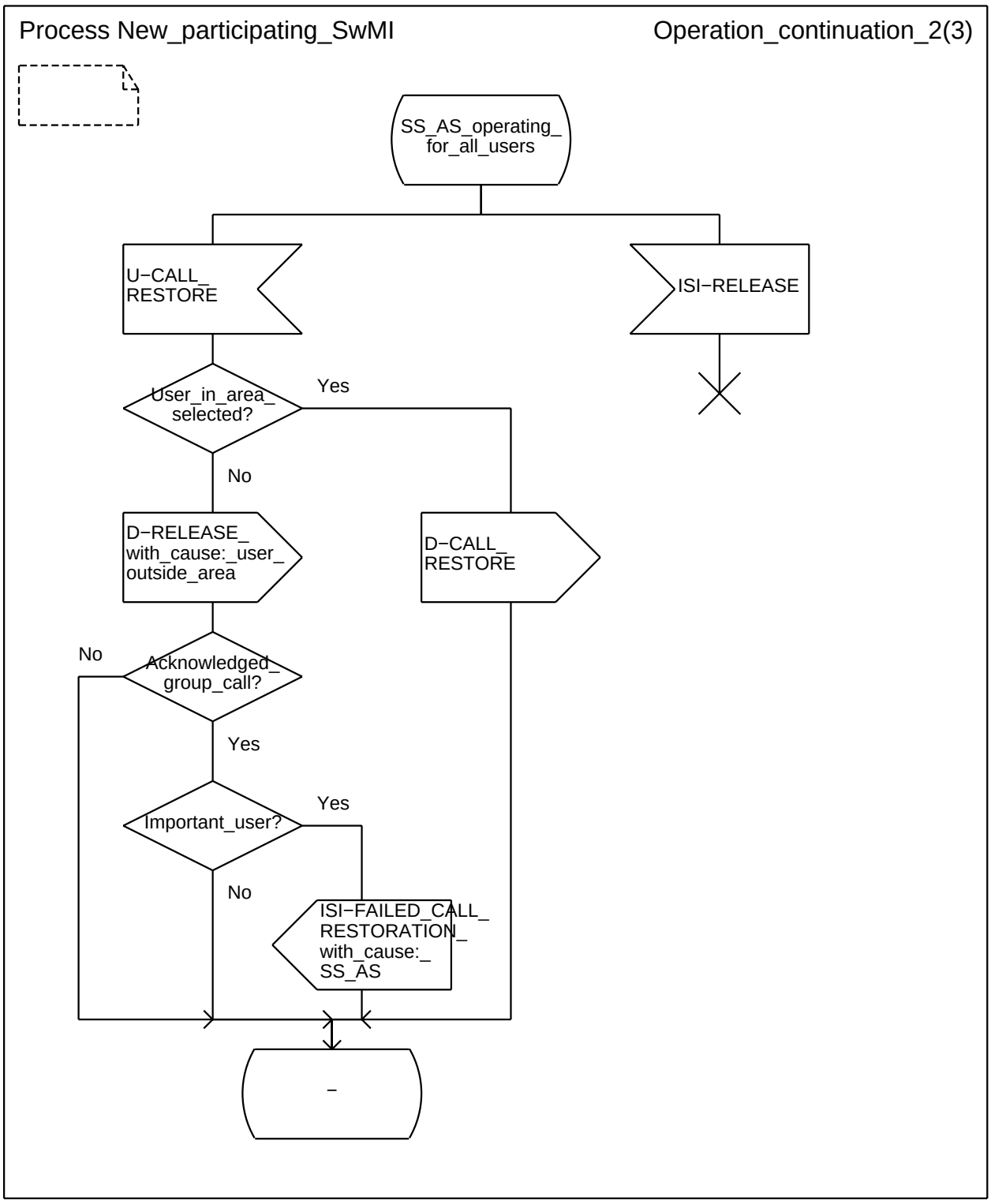


Figure B.6 (sheet 2 of 3): New participating SwMI SDL - Follow up operation



NOTE: The ISI-FAILED_CALL_RESTORE_ PDU is encoded as the ISI-RESTORATION NACK PDU.

Figure B.6 (sheet 3 of 3): New participating SwMI SDL - Follow up operation

B.8 SDL representation of SS-AS at the terminating SwMI

Figure B.7 shows the behaviour of a SS-AS supplementary service control entity within the terminating SwMI.

The input signal from the left represents a PDU received from either the called user home SwMI, if the call is forward switched, or from the originating SwMI, if it is re-routed.

The output signals to the left represent PDUs sent to the originating SwMI.

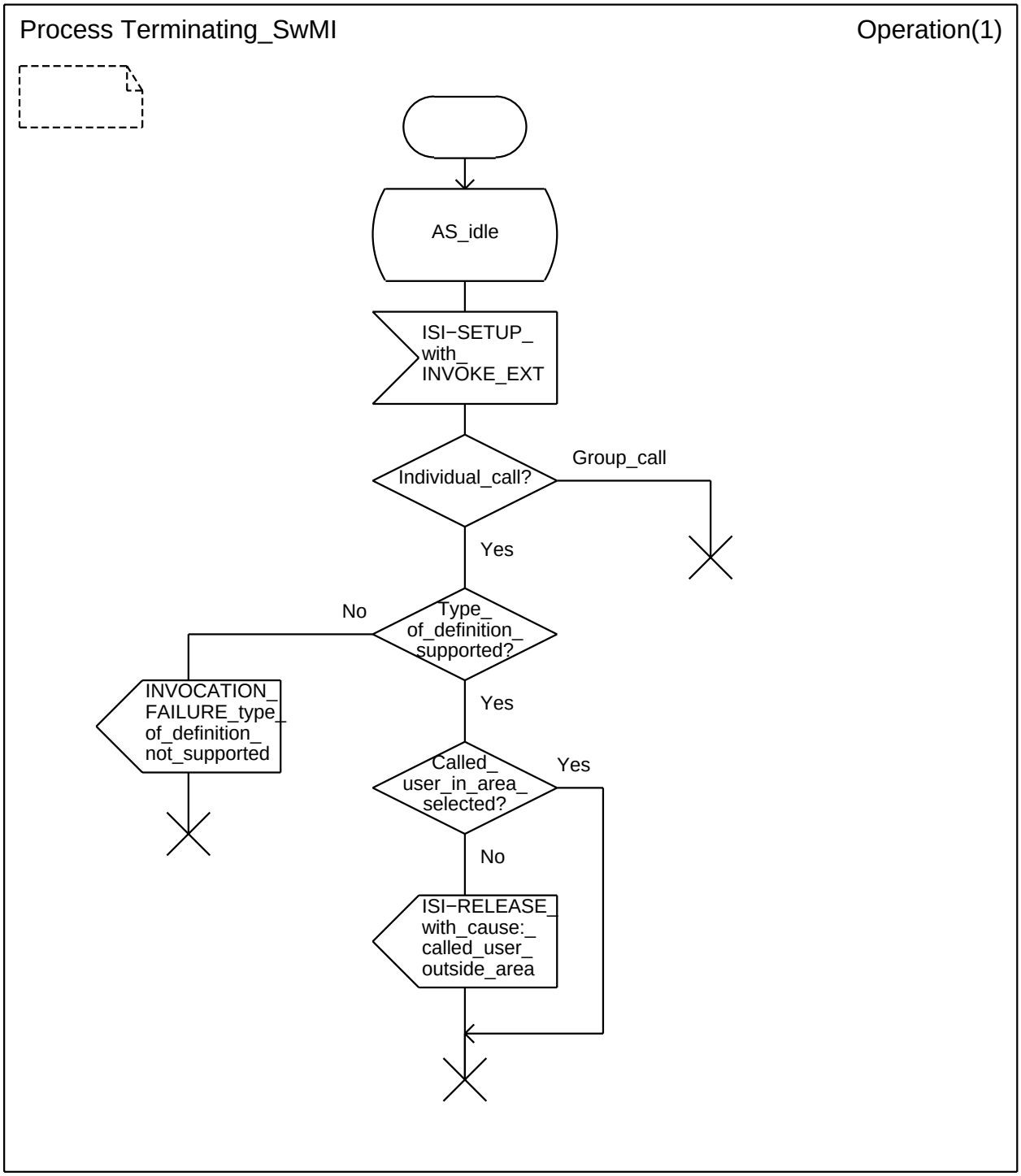


Figure B.7: Terminating SwMI SDL

B.9 SDL representation of SS-AS at the authorized user MS/LS

Figure B.8 shows the behaviour of the SS-AS supplementary service control entity within the authorized user MS/LS.

Input signals from the right represent air interface PDUs received from the authorized user SwMI.

Output signals to the right represent air interface PDUs sent to the authorized user SwMI.

Input signals from the left represent primitives from the authorized user application.

Output signals to the left represent primitives to the authorized user application.

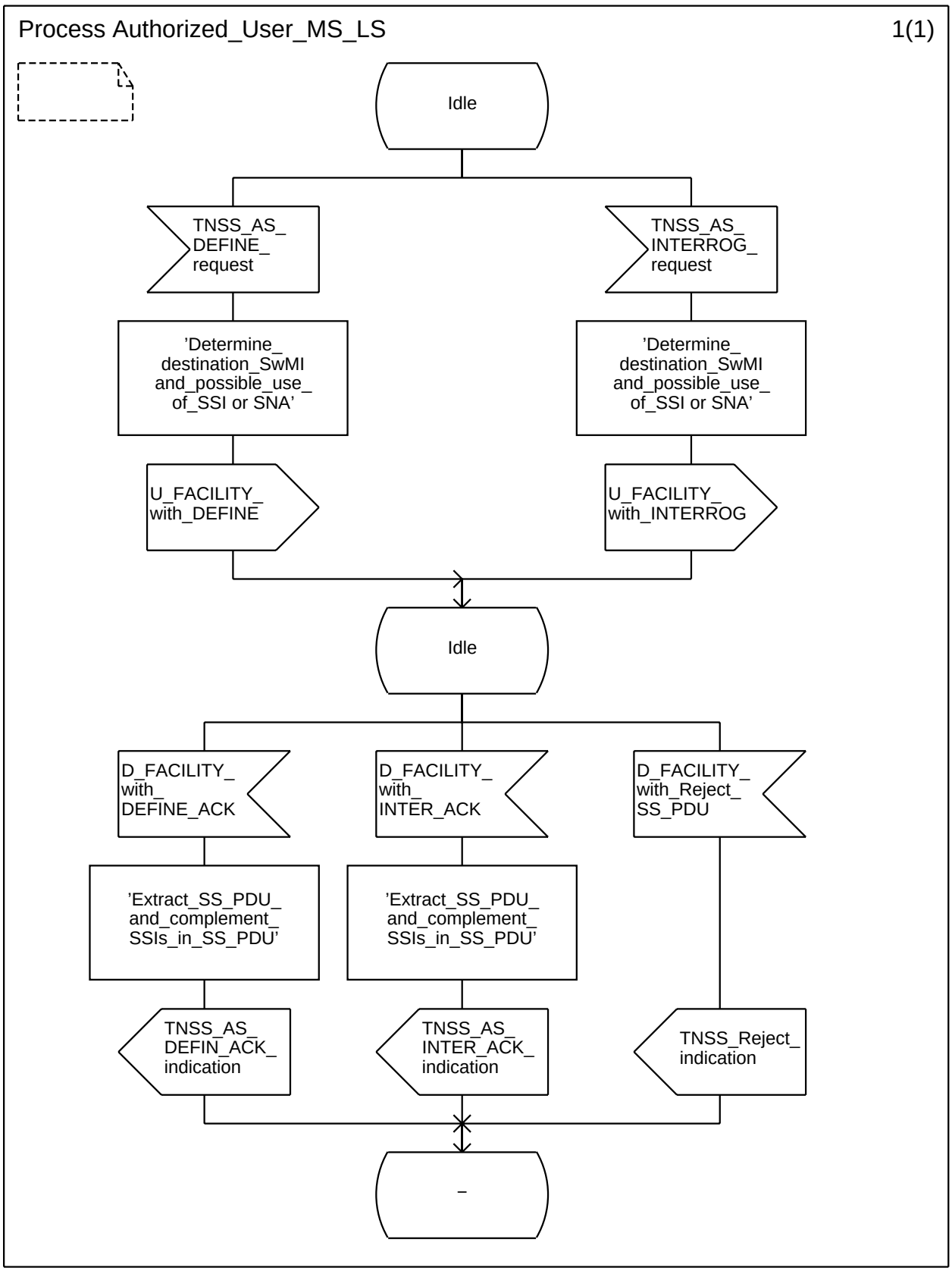


Figure B.8: Authorized user MS/LS SDL

NOTE: In the case where the served user would have some (limited) authorized user capabilities, the SDL in figure B.8 would be applicable to the served user MS/LS.

B.10 SDL representation of SS-AS at the authorized user SwMI

Figure B.9 shows the behaviour of the SS-AS supplementary service control entity specific to the authorized user SwMI.

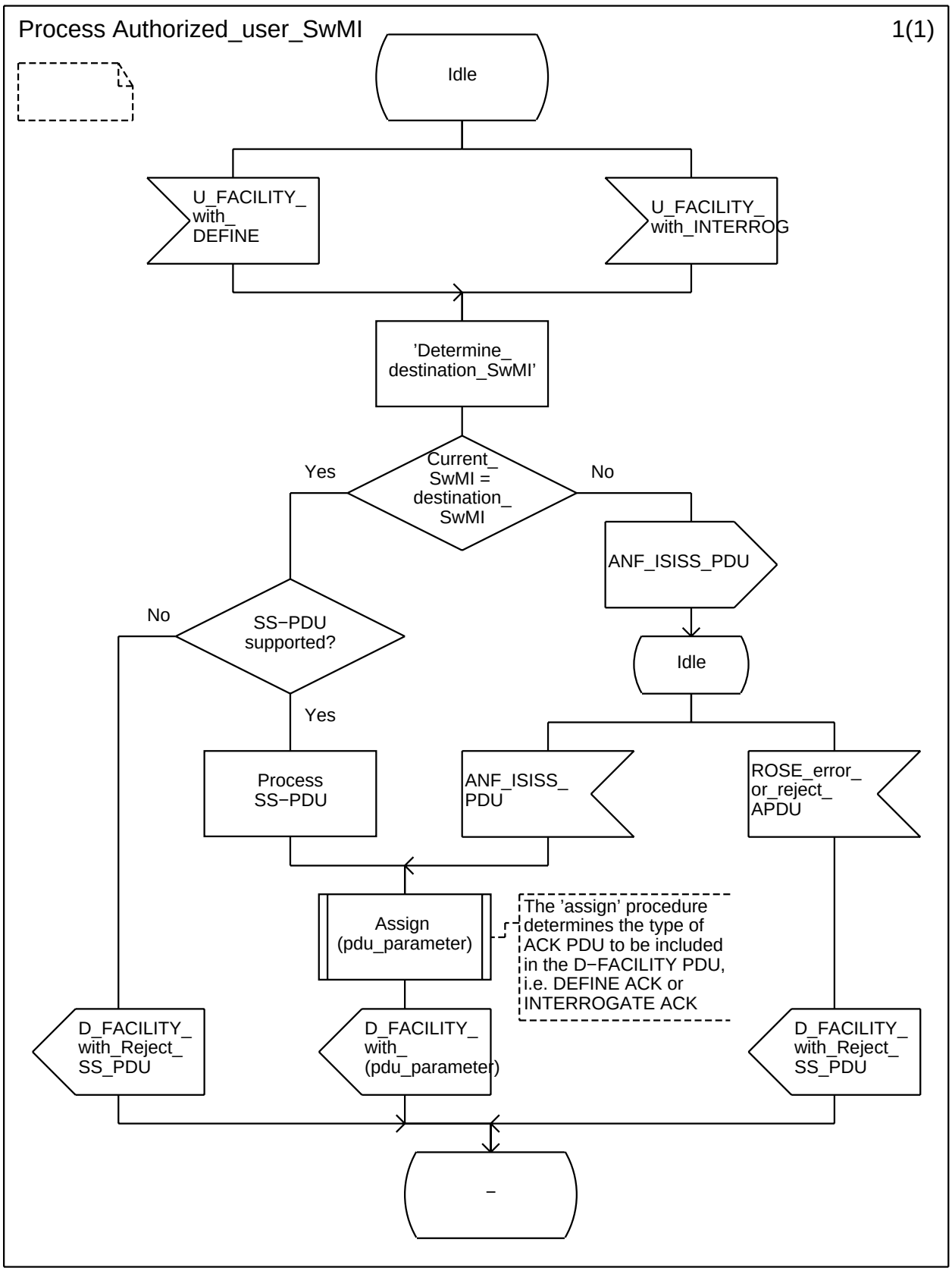
Depending on whether or not that SwMI is also home SwMI of the managed served user or group, it is or it is not the destination SwMI of the DEFINE or INTERROGATE PDUs sent by the authorized user MS/LS.

Input signals from the right represent PDUs received from the served user/group home SwMI.

Output signals to the right represent PDUs sent to the served user/group home SwMI.

Input signals from the left represent PDUs received from the authorized user MS/LS.

Output signals to the left represent PDUs sent to the authorized user MS/LS.



NOTE: Every ANF-ISISS PDU or ROSE APDU is conveyed by a PSS1 FACILITY message. The latter has not been shown in the corresponding signal symbols by lack of space.

Figure B.9: Authorized user SwMI SDL

NOTE 1: In the case where the served user would have some (limited) authorized user capabilities, the SDL in figure B.9 would be applicable to the served user SwMI.

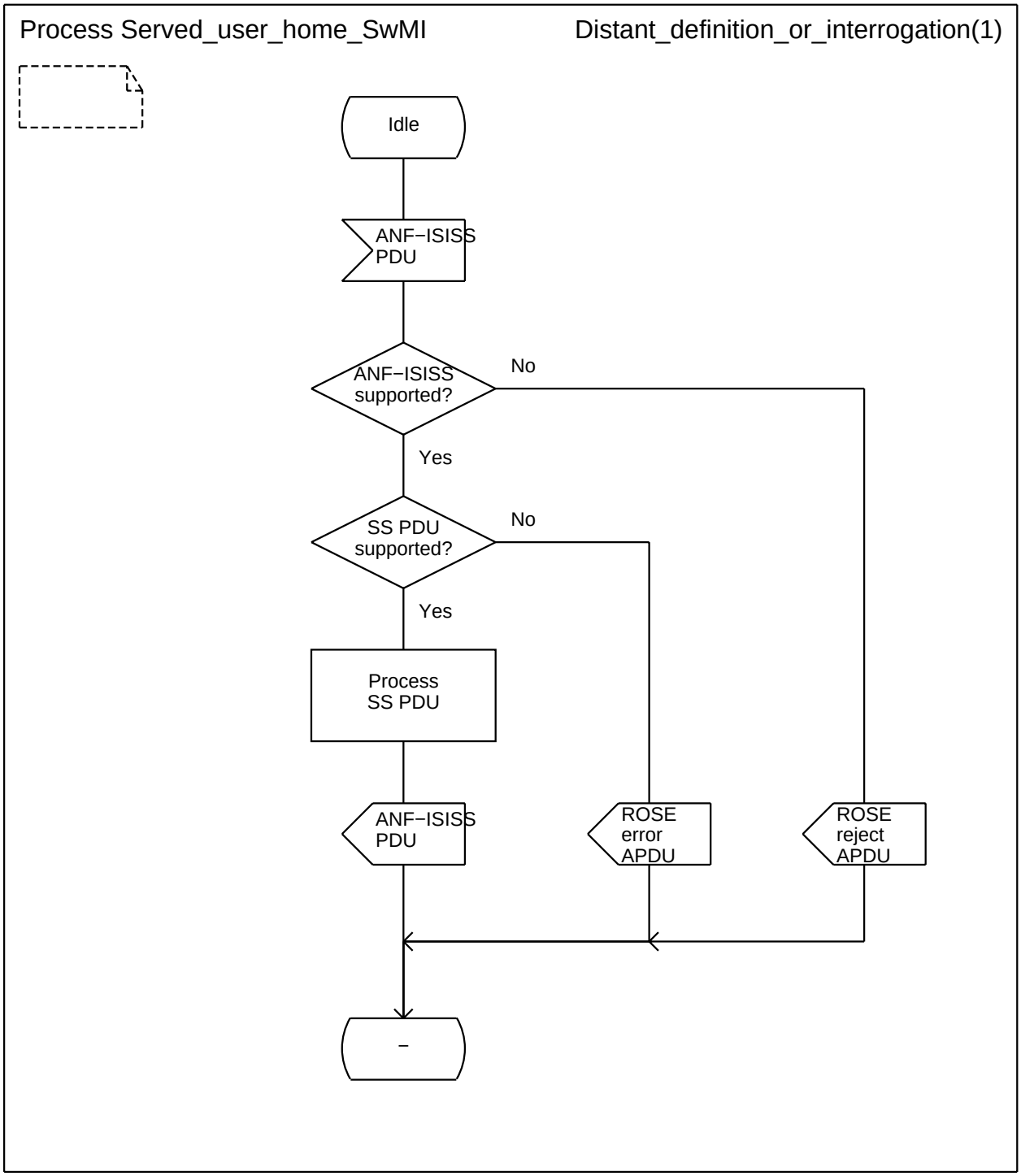
NOTE 2: If the served user SwMI coincides with the authorized user SwMI but they are different from the served user home SwMI, figure B.2 would apply to the authorized user SwMI in addition to figure B.9.

B.11 SDL representation of SS-AS at the served user/group home SwMI

Figure B.10 shows the behaviour of the SS-AS supplementary service control entity specific to the served user/group home SwMI when it is different from the authorized user SwMI.

Input signals from the left represent PDUs received from the authorized user SwMI.

Output signals to the left represent PDUs sent to the authorized user SwMI.



NOTE: Every ANF-ISISS PDU or ROSE APDU is conveyed by a PSS1 FACILITY message. The latter has not been shown in the corresponding signal symbols by lack of space.

Figure B.10: Served user/group home SwMI SDL

NOTE: If the served user is registered in his home SwMI, figure B.2 would apply to that SwMI in addition to figure B.10.

History

Document history		
Edition 1	December 1999	Public Enquiry PE 200016: 1999-12-22 to 2000-04-21
	October 2000	Converted from ETS to EN between Public Enquiry and Vote
V1.1.1	October 2000	Vote V 20001201: 2000-10-02 to 2000-12-01
V1.1.1	December 2000	Publication