

**Terrestrial Trunked Radio (TETRA);
Voice plus Data (V+D);
Part 12: Supplementary services stage 3;
Sub-part 18: Barring of Outgoing Calls (BOC)**



Reference

DEN/TETRA-03A-12-18

Keywords

radio, TETRA

ETSI

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Association à but non lucratif enregistrée à la
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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Project Terrestrial Trunked Radio (TETRA), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

The present document had been submitted to Public Enquiry as ETS 300 392-12-18. During the processing for Vote it was converted into an EN.

The present document is part 12, sub-part 18 of a multi-part deliverable covering Voice plus Data (V+D), as identified below:

- 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";
- Part 15: "TETRA frequency bands, duplex spacings and channel numbering";
- Part 16: "Network Performance Metrics".

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

1 Scope

The present document defines the stage 3 specification of the Barring of Outgoing Call (BOC) supplementary service for the Terrestrial Trunked Radio (TETRA).

SS-BOC supplementary service enables barring restrictions for outgoing services, e.g. calls, to be set. SS-BOC specifies the definition, interrogation and operation of the supplementary service. The Switching and Management Infrastructure (SwMI) applies the SS-BOC definitions when an outgoing service is requested for the restricted user. The SS-BOC actions are defined for SwMI, for the Mobile Station (MS) and for the Line Station (LS). The SS-BOC information flows may be delivered over the Inter System Interface (ISI).

SS-BOC is invoked for outgoing services within one TETRA system or for services that extend over ISI to several TETRA systems.

Man-Machine Interface (MMI) and charging principles are outside the scope of the present document.

Supplementary service stage 3 specification is preceded by the stage 1 and the stage 2 specifications of the service. Stage 1 describes the functional capabilities from the user's point of view. Stage 2 defines the functional behaviour in terms of functional entities and information flows. Stage 3 gives a precise description of the Supplementary Service from the implementation point of view. It defines the protocol for the service and the encoding rules for the information flows. It defines the processes for the functional entities and their behaviour. The described protocols and behaviour apply to the SwMI, for the MS and for the LS and may be applied over the ISI between TETRA systems. Aspects relating to all supplementary services are detailed in EN 300 392-9 [3].

2 References

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

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] ETSI EN 300 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".
- [2] ETSI ETS 300 392-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General network design".
- [3] ETSI EN 300 392-9: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 9: General requirements for supplementary services".
- [4] ITU-T Recommendation Z.100 (1993): "Specification and description language (SDL)".
- [5] 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".
- [6] 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)".
- [7] ITU-T Recommendation X.219: "Remote Operations: Model, notation and service definition".
- [8] ITU-T Recommendation X.229: "Remote Operations: Protocol specification".
- [9] ITU-T Recommendation X.217: "Information technology - Open Systems Interconnection - Service definition for the Association Control Service Element".

- [10] ETSI ETS 300 392-10-18: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 18: Barring of outgoing calls".
- [11] 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)".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

affected user: user whose outgoing service or services are barred

authorized user: user who is permitted to define SS-BOC on affected user's behalf

called party: party to whom the barred service request is made. Also defined as restricted party

packet data service: packet mode data service, see EN 300 392-2, clause 28

restricted party: user to whom outgoing service or services are barred

3.2 Symbols

For the purposes of the present document, the symbols used in SDL representations of procedures according to ITU-T Recommendation Z.100 [4] apply.

3.3 Abbreviations

3.3.1 General abbreviations

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

CC	Call Control sub-entity for SS-BOC in CMCE in SwMI
CMCE	Circuit Mode Control Entity
ISI	Inter System Interface
LS	Line Station
MCC	Mobile Country Code
MNC	Mobile Network Code
MS	Mobile Station
PDU	Protocol Data Unit
SAP	Service Access Point
SS	Supplementary service
SS-BOC	Supplementary Service Barring of Outgoing Calls
SSI	Short Subscriber Identity
SwMI	Switching and Management Infrastructure
TETRA	Terrestrial Trunked Radio
TNCC-SAP	Call Control Service Access Point
TNSS-SAP	Supplementary Service Service Access Point
TSI	TETRA Subscriber Identity

3.3.2 Supplementary service abbreviations

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

AS	Area Selection
BIC	Barring of Incoming Calls
BOC	Barring of Outgoing Calls
CAD	Call Authorized by Dispatcher

4 SS-BOC Stage 3 description

4.1 General

This clause describes SS-BOC services offered by Supplementary Service (SS) and call control sub-entities of CMCE of the TETRA voice plus data layer 3 service boundary in MS/LS.

NOTE: The layer 3 services and service boundary for SwMI are outside the scope of the present document.

The SS-BOC services shall be offered at:

- Supplementary Services Service Access Point (TNSS-SAP);
- Call Control Service Access Point (TNCC-SAP).

The SS-BOC services described in this clause shall complement the SS service and the call control service specified in EN 300 392-2 [1], clauses 12, 11, 24 and 26 respectively.

4.2 SS-BOC services

SS-BOC is an optional supplementary service for TETRA voice plus data layer 3. If SS-BOC is supported, this clause shall specify the services and their availability.

The following SS-BOC services shall be provided:

- barring indication: barring indication for a basic service (call control service).

NOTE 1: The barring indication for SDS service is outside the scope of the present document.

The following SS-BOC services may be provided:

- definition: a request to define SS-BOC into the SwMI;
- definition information: the reception of SS-BOC definition for information;
- interrogation: interrogation of SS-BOC definition.

The SS-BOC service access point may be used in conformance testing as a normative (but potentially not accessible) boundary in MSs and LSs.

NOTE 2: As the present document only deals with the SS-BOC all the service primitives have been shown without a TNSS-BOC-prefix, e.g. the TNSS-BOC-SERVICE request is shorten into the SERVICE request.

NOTE 3: As man-machine interface or User A MS/LS applications are outside the scope of this standard 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.

NOTE 4: The layer 3 services and service boundary for the SwMI are outside the scope of the present document.

The SS-BOC services described in this clause shall complement the call control service specified in EN 300 392-2 [1], clause 11.

4.3 Services at the TNSS-SAP

4.3.1 General on services

The SS-BOC definition, user definition and interrogation shall be provided at TNSS-SAP.

The SS-BOC service primitives for the affected user at the MS/LS TNSS-SAP may be:

- CALL BARRED indication;
- DEFINE USER indication;
- DEFINE EXTERNAL USER indication;
- INTERROGATE request;
- INTERROGATE indication; and
- NOTIFICATION indication.

The SS-BOC service primitives for the authorized user at the MS/LS TNSS-SAP may be:

- DEFINE request;
- DEFINE indication;
- DEFINE EXTERNAL request;
- DEFINE EXTERNAL indication;
- INTERROGATE request; and
- INTERROGATE indication.

NOTE: In the present document primitives request and indication are used instead of request and confirmation as there may not be a one to one correspondence between those primitives e.g. there can be multiple indications due to a single request.

The information contained in the following primitive description tables correspond to the following key:

- Remark: comment;
- C: conditional;
- O: optional;
- M: mandatory.

4.3.2 CALL BARRED indication

CALL BARRED indication informs the calling user that the basic service invocation has been barred due to SS-BOC.

The CALL BARRED indication primitive shall contain the SS-BOC parameters listed in table 1.

Table 1: Parameters for the primitive CALL BARRED indication

Parameter	Indication
Reject cause	M

NOTE: Also NOTIFICATION indication is available for informing the calling user, refer to EN 300 392-9 [3], clauses 5.2 and 7.2.2.

4.3.3 DEFINE request

The DEFINE request primitive shall be sent by the authorized user to the SS-BOC controlling entity over TNSS-SAP to define BOC supplementary service on affected user behalf. If there are several subscriber identities given in the primitive, the definition result shall be valid to all identities.

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

Table 2: Parameters for the primitive DEFINE request

Parameter	Request
Affected user identity	M, see note 1
Definition type	M
Services	M
Closed user groups	C, see note 2
Restricted identities	C, see note 2
Exceptions to restricted identities	M, see note 2
Delivery to affected user(s)	M
Acknowledgement requested	M
NOTE 1: Repeatable.	
NOTE 2: Parameter may be present only if the definition type is addition or replacement.	

4.3.4 DEFINE indication

The DEFINE indication primitive shall be sent to the authorized user by the SS-BOC controlling entity over TNSS-SAP to confirm the SS-BOC definition. If there are several subscriber identities given in the primitive, the definition results shall be valid to all identities. There may be multiple DEFINE indications due to a single DEFINE request.

The DEFINE ACK response/confirmation primitive shall contain the SS-BOC parameters listed in table 3.

Table 3: Parameters for the primitive DEFINE indication

Parameter	Indication
Affected user identity	M
Definition result	M

4.3.5 DEFINE EXTERNAL request

The DEFINE EXTERNAL request primitive shall be sent by the authorized user to the SS-BOC controlling entity over TNSS-SAP to define BOC supplementary service on affected user behalf. If there are several subscriber identities given in the primitive, the definition result shall be valid to all identities.

The DEFINE EXTERNAL request primitive shall contain the SS-BOC parameters listed in table 4.

Table 4: Parameters for the primitive DEFINE EXTERNAL request

Parameter	Request
Affected user identity	M, see note 1
Definition type	M
Services	M
Closed user group	C, see note 2
Restricted external numbers	C, see note 2
Exceptions to restricted external numbers	M, see note 2
Delivery to affected user(s)	M
Acknowledgement requested	M
NOTE 1: Repeatable.	
NOTE 2: Parameter may be present only if the definition type is addition or replacement.	

4.3.6 DEFINE EXTERNAL indication

The DEFINE EXTERNAL indication primitive shall be sent to the authorized user by the SS-BOC controlling entity over TNSS-SAP to confirm the SS-BOC definition. If there are several subscriber identities given in the primitive, the definition results shall be valid to all identities. There may be multiple DEFINE EXTERNAL indications due to a single DEFINE EXTERNAL request.

The DEFINE EXTERNAL indication primitive shall contain the SS-BOC parameters listed in table 5.

Table 5: Parameters for the primitive DEFINE EXTERNAL indication

Parameter	Indication
Affected user identity	M
Definition result	M

4.3.7 DEFINE USER indication

The DEFINE USER indication primitive may be sent to the affected (calling/barred) user by the SS-BOC controlling entity over TNSS-SAP to indicate SS-BOC definition made on affected user.

The DEFINE USER indication primitive shall contain the SS-BOC parameters listed in table 6.

Table 6: Parameters for the primitive DEFINE USER indication

Parameter	Indication
Definition type	M
Services	M
Closed user groups	C, see note
Restricted identities	C, see note
Exceptions to restricted identities	M, see note
Acknowledgement requested	M
NOTE: Parameter may be present only if the definition type is addition or replacement.	

4.3.8 DEFINE EXTERNAL USER indication

The DEFINE EXTERNAL USER indication may be sent to the affected (called/barred) user by the SS-BIC controlling entity over TNSS-SAP to indicate SS-BIC definition made on affected user. The DEFINE EXTERNAL USER ACK indication primitive shall contain the SS-BIC parameters listed in table 7.

Table 7: Parameters for the primitive DEFINE EXTERNAL USER indication

Parameter	Indication
Definition type	M
Services	M
Closed user groups	C, see note
Restricted external numbers	C, see note
Exceptions to restricted external numbers	C, see note
Acknowledgement requested	M
NOTE: Parameter may be present only if the definition type is addition or replacement.	

Entity over TNSS-SAP is not applicable in the present document.

4.3.9 INTERROGATE request

INTERROGATE request shall be sent either from authorized user or from affected user to the SS-BIC controlling entity over TNSS-SAP to interrogate a SS-BOC definition. The primitive shall contain parameters listed in table 8.

Table 8: Parameters for the primitive INTERROGATE request

Parameter	Request
Affected user identity	M, see note
NOTE: May be repeatable.	

4.3.10 INTERROGATE indication

INTERROGATE indication shall be offered to either authorized user or to affected user (calling/barred) by the SS-BOC controlling entity over TNSS-SAP as a response to a previously sent interrogation request. INTERROGATE indication shall contain the parameters listed in table 9. There may be multiple INTERROGATE indications due to a single INTERROGATE request.

If there are several subscriber identities given in the primitive, the following definitions shall be valid to all the identities. Interrogation result indicates if the interrogation was allowed and/or if SS-BOC is defined for the given identity or identities. For other parameter definitions, see parameters below.

Table 9: INTERROGATE indication contents

Parameter	Indication
Affected user identity	M, see note 1
Interrogation result	M
Services	M
Closed user groups	C, see note 2
Restricted user identities/external numbers	C, see note 2
Exceptions to restricted user identities/external numbers	C, see note 2
Delivery status to affected user(s)	C, see note 2
NOTE 1: May be repeatable.	
NOTE 2: Parameter may be present only if the Interrogation result is:	
- accepted, TETRA identities provided; or	
- accepted, external subscriber numbers provided.	

4.4 Services at the TNCC-SAP

The SS-BOC barring indication for call control service may be provided at TNCC-SAP.

The SS-BOC service element may be carried within the TNCC-RELEASE indication primitive over TNCC-SAP. The barring shall be indicated in TNCC-RELEASE primitive as Disconnect cause parameter having the value Not allowed traffic case. For a detailed description of the call control service primitives refer to EN 300 392-2 [1], clause 11.3.

4.5 Parameter descriptions

Acknowledgement requested =

- acknowledgement requested from affected user(s);
- acknowledgement not requested from affected user(s).

NOTE 1: Acknowledgement from affected user(s) indicates if the affected users shall acknowledge the received definition information.

Affector user identity =

- TETRA subscriber identity (TSI) = Mobile Country Code (MCC) + Mobile Network Code (MNC);

- + Short subscriber identity (SSI); or
- Short subscriber identity (SSI), see ETS 300 392-1 [2] clause 7.

Closed user group =

- a set of users belonging together, the contents definition is network dependent.

Definition result =

- request rejected for undefined reason;
- accepted by SwMI;
- accepted but some definition values changed by SwMI;
- user not authorized;
- unknown TETRA identity;
- parameters not valid;
- insufficient information.

NOTE 2: Definition result indicates the outcome of the definition request for the affected users given in the DEFINE ACK PDU. However, the result does not indicate neither of the following:

- if the definition information is successfully sent to the affected user(s);
- in case of result value "accepted, but definition values changed by SwMI" does not indicate what was changed.

NOTE 3: If a definition is requested for a range of affected users, the "definition result" may be different for different affected users and several DEFINE-ACK PDUs are sent to authorized user.

Definition type =

- replacement;
- addition;
- removal.

NOTE 4: Definition type indicates if the given restrictions are used to replace previous restrictions, add new restrictions or remove previous restrictions.

NOTE 5: Replace may apply to the case where no restrictions existed; in that case it is equivalent to definition.

NOTE 6: Removal is used to remove all existing SS-BOC definitions.

Delivery to affected user(s) =

- delivery to affected user(s);
- no delivery to affected user(s).

NOTE 7: Delivery to affected user(s) indicates that SwMI is requested to send the SS-BOC definition to affected user(s) for his (their) information.

Digit =

- 0;
- 1;
- etc.;
- 9; and optionally

- *;
- #;
- +.

Distribution result =

- successfully received by MS/LS;
- request failed for any reason;
- parameters not valid;
- insufficient information.

Exception to restricted external numbers =

- external number.

NOTE 8: Exception to restricted external numbers allows services requested to the user whose number is indicated.

Exceptions to restricted user identities =

- TETRA identity.

NOTE 9: Exception to restricted user identities allows services requested to the user whose identity is indicated.

Interrogation result =

- accepted, TETRA identities provided;
- accepted, external subscriber numbers provided;
- request failed for any reason;
- user not authorized;
- unknown TETRA identity;
- parameters not valid;
- insufficient information.

Interrogation type =

- TETRA identities;
- external subscriber numbers; or
- both.

Restricted external numbers =

- external numbers to which calls are barred.

Restricted identities =

- TETRA identities to which calls are barred.

Services =

- all applicable services;
- circuit mode speech service;
- circuit mode data service;
- SDS.

NOTE 10:Service causes barring of the given service.

Services outside closed user group causes barring of service requests received to a party outside the given closed group.

NOTE 11:The closed user group definition is outside the scope of the present document.

5 Signalling protocol for support of SS-BOC

5.1 General

This clause defines the SS-BOC layer 3 protocol for the SS-BIC services specified in clause 5. The SS-BIC protocol comprises of sub-protocols defined for SS and call control within CMCE. These SS-BOC sub-protocols complement the call control protocol defined in EN 300 392-2 [1], clause 14.

The present document is only normative for the protocol architecture and user application SAPs within the MS/LS, but gives an informative description of the protocol and the SAPs within the SwMI.

NOTE: The internal communication between processes within CMCE is outside the scope of ETS and will only be mentioned as informative statements.

5.2 SS-BOC Operational Requirements

5.2.1 Requirements on the affected user MS/LS

The affected (calling/barred) user MS/LS shall comply with the requirements in clause 14 of EN 300 392-2 [1], which apply to the tele- and bearer services which it supports. In addition, it shall comply with the relevant call unrelated requirements in clauses 7 and 11 of EN 300 392-9 [3].

5.2.2 Requirements on the affected user home SwMI

That SwMI shall support the affected user MS/LS complying with the requirements for individual calls set in EN 300 392-2 [1], clause 14 and in EN 300 392-9 [3].

If the call is over the ISI, the affected user home SwMI shall comply with the corresponding ISI requirements, set in EN 300 392-3-2 [6] for individual calls. It shall also comply with the relevant call unrelated in clauses 9 to 11 of EN 300 392-9 [3].

5.2.3 Requirements on the called user SwMI

The called user SwMI shall support the incoming individual call set-up and release as specified in EN 300 392-2 [1].

If the call is over the ISI, the calling user SwMI shall comply with the corresponding ISI requirements set in EN 300 392-3-2 [6] for individual calls.

5.2.4 Requirements on the called user MS/LS

The called user MS/LS shall comply with the call setup and call release requirements of EN 300 392-2 [1], clause 14.

5.2.5 Requirements on the SS-BOC Controlling SwMI

The SS-BOC Controlling SwMI shall support the individual call set-up and release as specified in EN 300 392-2 [1]. If the call is over the ISI, the SS-BOC Controlling SwMI shall comply with the corresponding ISI requirements, set in EN 300 392-3-2 [6] for individual calls. It shall comply with the relevant call related requirements in clauses 9 to 11 of EN 300 392-9 [3]. It shall comply with the call unrelated requirements in EN 300 392-9 [3].

5.2.6 Requirements on the SS-BOC authorized user MS/LS

It shall also comply with the relevant call unrelated in clauses 9 to 11 of EN 300 392-9 [3].

5.2.7 Requirements on the SS-BOC authorized user SwMI

It shall also comply with the relevant call unrelated requirements in clauses 9 to 11 of EN 300 392-9 [3].

It shall also comply with the relevant call unrelated requirements over ISI in EN 300 392-3-2 [6].

5.3 SS-BOC Coding requirements

5.3.1 SS-BOC PDUs

The Facility element, which is used to convey the supplementary service information specified in this clause to and from the MS/LS and over the ISI, shall be transported:

- in any call control PDU, if the MS/LS is engaged in the same call-up; or
- in a D-FACILITY or U-FACILITY PDU, if the MS/LS is not engaged in any call.

However, CALL-BARRED shall be conveyed in the FACILITY element in D-RELEASE PDU and it can be conveyed in D-DISCONNECT PDU. Notification indicator in those PDUs may be used to carry the call barring information.

The element coding shall be in accordance with the general rules specified in EN 300 392-2 [1], annex E.

The PDU element coding (independently of bearer PDU) for SS-BOC is detailed in the following clauses.

5.3.1.1 DEFINE

The DEFINE PDU may be offered from the authorized user MS/LS to the SS-BOC controlling SwMI. The DEFINE PDU shall have the format as shown in table 10.

Table 10: DEFINE PDU contents

Element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Refer EN 300 392-9 [3]
BOC PDU type	5	1	M	DEFINE
Range type for affected user identities	4	1	M	
Affected user SSI	24	1	M	see note 1
Affected user extension present	1	1	M	see note 1
Affected user extension	24		C	see note 2
Delivery to affected user(s)	1	1	M	see note 3
Acknowledgement from affected user(s)	1	1	M	see note 3
Definition type	2	1	M	
Number of services	3	1	M	see note 8
Service	3		C	see note 9
Range type for closed user groups	4		C	see notes 4 and 5
Closed user group identifier	24		C	see note 6
Closed user group identifier extension present	1		C	see note 6
Closed user group identifier extension	24		C	see note 7
Range type for restricted identities	4		C	see notes 4 and 10
Restricted SSI	24		C	see note 11
Restricted extension present	1		C	see note 11
Restricted extension	24		C	see note 12
Range type for exceptions to restricted identities	4		C	see notes 4 and 13
Exception to restricted SSI	24		C	see note 14
Exception to restricted extension present	1		C	see note 14
Exception to restricted extension	24		C	see note 15
NOTE 1: The information element shall be present as many times as defined by the range type for affected user information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 2: The presence of the information element shall be conditional on the affected user extension present information element.				
NOTE 3: An acknowledgement from affected user(s) may be requested only when a delivery to the affected user(s) is also requested.				
NOTE 4: The information element shall be conditional on the information element definition type: - for addition and replacement the information element shall be present; - for removal the information element shall not be present.				
NOTE 5: The closed user groups information element defines those groups for which the restriction does not apply (calls to those groups are allowed).				
NOTE 6: The information element shall appear as many times as defined by the range type for closed user groups information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 7: The information element shall be conditional on the closed user group identifier extension present information element.				
NOTE 8: The service information element defines those services for which the definition type applies.				
NOTE 9: The information element shall be present as many times as defined by the number of services information element.				
NOTE 10: The restricted identities information element defines those users for which the restriction applies.				
NOTE 11: The information element shall be present as many times as defined by the range type for restricted identities information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 12: The information element shall be conditional on the restricted extension present information element.				
NOTE 13: The exception to restricted identity information element defines those identities for which the restriction does not apply (calls to those identities are allowed).				
NOTE 14: The information element shall be present as many times as defined by the range type for exceptions to restricted identities information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 15: The information element shall be conditional on the exception to restricted extension present information element.				

5.3.1.2 DEFINE ACK

The DEFINE ACK PDU may be offered from the SS-BOC controlling SwMI to the authorized user MS/LS. The DEFINE ACK PDU shall have the format as shown in table 11. SwMI may generate multiple DEFINE ACK PDUs, if the definition result is different for different restricted parties.

NOTE: The DEFINE ACK PDU is used as response to DEFINE and DEFINE EXTERNAL PDUs.

Table 11: DEFINE ACK PDU contents

Element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Refer EN 300 392-9 [3]
BOC PDU type	5	1	M	DEFINE ACK
Range type for affected user identities	4	1	M	
Affected user SSI	24	1	M	see note 1
Affected user extension present	1	1	M	see note 1
Affected user extension	24		C	see note 2
Definition result	3	1	M	
NOTE 1: The information element shall be present as many times as indicated by the range type for subscriber identities information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 2: The information element shall be conditional on the affected user extension present information element.				

5.3.1.3 DEFINE EXTERNAL

The DEFINE PDU may be offered from the authorized user MS/LS to the SS-BOC controlling SwMI. The DEFINE PDU shall have the format as shown in table 12.

Table 12: DEFINE EXTERNAL PDU contents

Element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Refer EN 300 392-9 [3]
BOC PDU type	5	1	M	DEFINE EXTERNAL
Range type for affected user identities	4	1	M	
Affected user SSI	24	1	M	see note 1
Affected user extension present	1	1	M	see note 1
Affected user extension	24		C	see note 2
Delivery to affected user(s)	1	1	M	see note 3
Acknowledgement from affected user(s)	1	1	M	see note 3
Definition type	2	1	M	
Number of services	3	1	M	see note 8
Service	3		C	see note 9
Range type for closed user groups	4		C	see notes 4 and 5
Closed user group identifier SSI	24		C	see note 6
Closed user group identifier extension present	1		C	see note 6
Closed user group identifier extension	24		C	see note 7
Range type for restricted external numbers	4		C	see notes 4 and 10
Restricted external number length indicator	5		C	see note 11
Restricted external number	variable		C	see note 12
Range type for exceptions to restricted external numbers			C	see notes 4 and 13
Exception to restricted external number length indicator	5		C	see note 14
Exception to restricted external number	variable	1	C	see note 15
NOTE 1: The information element shall be present as many times as indicated by the range type for affected user information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 2: The presence of the information element shall be conditional on the affected user extension present information element.				
NOTE 3: An acknowledgement from affected user(s) may be requested only when a delivery to the affected user(s) is also requested.				
NOTE 4: The information element shall be conditional on the information element definition type: - for addition and replacement the information element shall be present; - for removal: the information element shall not be present.				
NOTE 5: The closed user groups information element defines those groups for which the restriction does not apply (calls from those groups are allowed. This information element has a meaning only if the external numbers are used in the definition of the closed user group members).				
NOTE 6: The information element shall appear as many times as defined by the range type for closed user groups information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 7: The information element shall be conditional on the closed user group identifier extension present information element.				
NOTE 8: The service information element defines those services for which the definition type applies.				
NOTE 9: The information element shall be present as many times as defined by the number of services information element.				
NOTE 10: The restricted external numbers information element defines those numbers for which the restriction applies.				
NOTE 11: The information element shall be present as many times as defined by the range type for restricted identities information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 12: The information element shall be conditional on the restricted external number length indicator information element.				
NOTE 13: The exceptions to restricted external number information element defines those numbers for which the restriction does not apply (calls from those numbers are allowed).				
NOTE 14: The information element shall be present as many times as defined by the range type for exceptions to restricted external number information element.				
NOTE 15: The information element shall be conditional on the exception to restricted external number length indicator information element.				

5.3.1.4 DEFINE USER

The DEFINE USER PDU may be offered from the affected user home SwMI to the affected user MS/LS. The DEFINE USER PDU shall have the format as shown in table 13.

Table 13: DEFINE USER PDU contents

Element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Refer EN 300 392-9 [3]
BOC PDU type	5	1	M	DEFINE USER
Acknowledgement from affected user	1	1	M	
Definition type	2	1	M	
Number of services	3	1	M	see note 5
Service	3		C	see note 6
Range type for closed user groups	4		C	see notes 1 and 2
Closed user group identifier	24		C	see note 3
Closed user group identifier extension present	1		C	see note 3
Closed user group identifier extension	24	1	C	see note 4
Range type for restricted identities	4		C	see notes 1 and 7
Restricted SSI	24		C	see note 8
Restricted extension present	1		C	see note 8
Restricted extension	24		C	see note 9
Range type for exceptions to restricted identities	4		C	see notes 1 and 10
Exception to restricted SSI	24	1	C	see note 11
Exception to restricted extension present	1	1	C	see note 11
Exception to restricted extension	24	1	C	see note 12
NOTE 1: The information element shall be conditional on the information element definition type: <ul style="list-style-type: none"> - for addition and replacement the information element shall be present; - for removal the information element shall not be present. 				
NOTE 2: The closed user groups information element defines those groups for which the restriction does not apply (calls to those groups are allowed).				
NOTE 3: The information element shall appear as many times as defined by the range type for closed user groups information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 4: The information element shall be conditional on the closed user group identifier extension present information element.				
NOTE 5: The service information element defines those services for which the definition type applies.				
NOTE 6: The information element shall be present as many times as defined by the number of services information element.				
NOTE 7: The restricted identities information element defines those users for which the restriction applies.				
NOTE 8: The information element shall be present as many times as defined by the range type for restricted identities information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 9: The information element shall be conditional on the restricted extension present information element.				
NOTE 10: The exception to restricted identity information element defines those identities for which the restriction does not apply (calls to those identities are allowed).				
NOTE 11: The information element shall be present as many times as defined by the range type for exceptions to restricted identities information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 12: The information element shall be conditional on the exception to restricted extension present information element.				

5.3.1.5 DEFINE USER ACK

The DEFINE USER ACK PDU may be offered from the affected user to the affected user home SwMI. The DEFINE USER ACK PDU shall have the format as shown in table 14.

NOTE: This PDU is a response to DEFINE USER and DEFINE EXTERNAL USER PDUs.

Table 14: DEFINE USER ACK PDU contents

Element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Refer EN 300 392-9 [3]
BOC PDU type	5	1	M	DEFINE USER ACK
Distribution result	3	1	M	

5.3.1.6 DEFINE EXTERNAL USER PDU

The DEFINE EXTERNAL USER PDU may be offered from the affected user SwMI to the affected user MS/LS. The DEFINE EXTERNAL USER PDU shall have the format as shown in table 15.

Table 15: DEFINE EXTERNAL USER PDU contents

Element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Refer EN 300 392-9 [3]
BOC PDU type	5	1	M	DEFINE EXTERNAL USER
Acknowledgement from affected user	1	1	M	
Definition type	2	1	M	
Number of services	3	1	M	see note 5
Service	3		C	see note 6
Range type for closed user groups	4		C	see notes 1 and 2
Closed user group identifier	24		C	see note 3
Closed user group identifier extension present	1		C	see note 3
Closed user group identifier extension	24		C	see note 4
Range type for restricted external numbers	4		C	see notes 1 and 7
Restricted SSI	24		C	see note 8
Restricted extension present	1		C	see note 8
Restricted extension	24		C	see note 9
Range type for exceptions to restricted identities	4		C	see notes 1 and 10
Exception to restricted SSI	24		C	see note 11
Exception to restricted extension present	1		C	see note 11
Exception to restricted extension	24		C	see note 12
<p>NOTE 1: The information element shall be conditional on the information element definition type:</p> <ul style="list-style-type: none"> - for addition and replacement the information element shall be present; - for removal the information element shall not be present. <p>NOTE 2: The closed user groups information element defines those groups for which the restriction does not apply (calls to those groups are allowed).</p> <p>NOTE 3: The information element shall appear as many times as defined by the range type for closed user groups information element, refer to EN 300 392-9 [3], clause 8.3.1.</p> <p>NOTE 4: The information element shall be conditional on the closed user group identifier extension present information element.</p> <p>NOTE 5: The service information element defines those services for which the definition type applies.</p> <p>NOTE 6: The information element shall be present as many times as defined by the number of services information element.</p> <p>NOTE 7: The restricted identities information element defines those users for which the restriction applies.</p> <p>NOTE 8: The information element shall be present as many times as defined by the range type for restricted identities information element, refer to EN 300 392-9 [3], clause 8.3.1.</p> <p>NOTE 9: The information element shall be conditional on the restricted extension present information element.</p> <p>NOTE 10: The exception to restricted identity information element defines those identities for which the restriction does not apply (calls to those identities are allowed).</p> <p>NOTE 11: The information element shall be present as many times as defined by the range type for exceptions to restricted identities information element, refer to EN 300 392-9 [3], clause 8.3.1.</p> <p>NOTE 12: The information element shall be conditional on the exception to restricted extension present information element.</p>				

5.3.1.7 INTERROGATE

The INTERROGATE PDU may be sent from either affected user MS/LS or authorized user MS/LS to SS-BOC affected user home SwMI. The INTERROGATE PDU shall have the following general format as shown in table 16.

NOTE: There may be multiple responses to a single INTERROGATE PDU interrogation type and number of affected users.

Table 16: INTERROGATE PDU contents

Element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Refer EN 300 392-9 [3]
BOC PDU type	5	1	M	INTERROGATE
Range type for affected user identities	4	1	M	
Affected user SSI	24	1	C	see note 1
Affected user extension present	1	1	C	see note 1
Affected user extension	24	1	C	see note 2
Interrogation type	2	1	M	
NOTE 1: The information element shall be present as many times as indicated by the range type for subscriber identities information element, refer to EN 300 392-9 [3], clause 8.3.1.				
NOTE 2: The information element shall be conditional on the affected user extension present information element.				

5.3.1.8 INTERROGATE ACK

The INTERROGATE ACK PDU may be sent from SS-BOC affected user home SwMI to either affected user MS/LS or authorized user MS/LS. The INTERROGATE ACK PDU shall have the format as shown in table 17.

Table 17: INTERROGATE ACK PDU contents

Element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Refer EN 300 392-9 [3]
BOC PDU type	5	1	M	INTERROGATE ACK
Range type for affected user identities	4	1	M	
Affected user SSI identity	24		C	repeatable, see note 1
Affected user extension present	1		C	see note 1
Affected user extension	24		C	see note 2
Interrogation result	3	1	M	
Delivery status to affected user(s)	2	1	M	
Number of services	3	1	M	see note 7
Service	3		C	see note 8
Range type for closed user groups	4		C	see notes 3 and 4
Closed user group identifier	24		C	see note 5
Closed user group identifier extension present	1		C	see note 5
Closed user group identifier extension	24		C	see note 6
Range type for restricted identities	4		C	see notes 9 and 10
Restricted SSI	24		C	see note 11
Restricted extension present	1		C	see note 11
Restricted extension	24		C	see note 12
Range type for exceptions to restricted identities	4		C	see notes 9 and 13
Exception to restricted SSI	24		C	see note 14
Exception to restricted extension present	1		C	see note 14
Exception to restricted extension	24		C	see note 15
Range type for restricted external numbers	4		C	see notes 16 and 17
Restricted external number length indicator	5		C	see note 18
Restricted external number	variable		C	see note 19
Range type for exceptions to restricted external numbers	4		C	see notes 16 and 20
Exception to restricted external number length indicator	5		C	see note 21
Exception to restricted external number	variable		C	see note 22

NOTE 1: The information element shall be present as many times as indicated by the range type for affected user information element, refer to EN 300 392-9 [3], clause 8.3.1.

NOTE 2: The presence of the information element shall be conditional on the affected user extension present information element.

NOTE 3: This information element shall be conditional on the element interrogation result:

- accepted, TETRA identities provided: the information element shall be present;
- accepted, external numbers provided: the information element shall be present;
- any other value: the information element shall not be present.

NOTE 4: The closed user groups information element defines those groups for which the restriction does not apply.

NOTE 5: The information element shall appear as many times as defined by the range type for closed user groups information element, refer to EN 300 392-9 [3], clause 8.3.1.

NOTE 6: The information element shall be conditional on the closed user group identifier extension present information element.

NOTE 7: The service information element defines those services for which the interrogation result applies.

NOTE 8: The information element shall be present as many times as defined by the number of services information element.

NOTE 9: This information element shall be conditional on the element Interrogation result:

- accepted TETRA identities provided: information element shall be present;
- any other value: information element shall not be present.

NOTE 10: The restricted identities information element defines those numbers for which the restriction applies.

NOTE 11: The information element shall be present as many times as defined by the range type for restricted identities information element, refer to EN 300 392-9 [3], clause 8.3.1.

NOTE 12: The information element shall be conditional on the restricted extension present information element.

NOTE 13: The exceptions to restricted identities information element defines those numbers for which the restriction does not apply (calls from those numbers are allowed).

NOTE 14: The information element shall be present as many times as defined by the range type for exceptions to restricted identities information element.

NOTE 15: The information element shall be conditional on the exception to restricted extension information element.

NOTE 16: This information element shall be conditional on the element interrogation result:

- accepted, external numbers provided: the information element shall be present;
- any other value: the information element shall not be present.

NOTE 17: The restricted external numbers information element defines those numbers for which the restriction applies.

NOTE 18: The information element shall be present as many times as defined by the range type for restricted external numbers information element, refer to EN 300 392-9 [3], clause 8.3.1.

NOTE 19: The information element shall be conditional on the restricted external number length indicator information element.

NOTE 20: The exceptions to restricted external number information element defines those numbers for which the restriction does not apply (calls from those numbers are allowed).

NOTE 21: The information element shall be present as many times as defined by the range type for exceptions to restricted external number information element.

NOTE 22: The information element shall be conditional on the exception to restricted external number length indicator information element.

5.3.1.9 CALL BARRED

The CALL BARRED PDU may be offered from SS-BOC operating SwMI to calling user MS/LS. The CALL BARRED PDU shall have the format as shown in table 18.

Table 18: CALL BARRED PDU contents

Element	Length	Type	C/O/M	Remark
SS-Type	6	1	M	Refer EN 300 392-9 [3]
BOC PDU type	5	1	M	CALL BARRED
Rejection cause	2	1	M	

NOTE 1: If presentation of the rejection cause is not important or SwMI can assume that the calling user MS/LS does not support SS-BOC functional entity FE1, then still the Notification indicator can be used, refer to clause 5.3.1.10.

NOTE 2: The CALL BARRED PDU is not applicable to the SDS and informing of the sending user is outside the scope of the present document.

5.3.1.10 Notification indicator

The notification indicator information element in the call disconnection D-RELEASE PDU may be used instead or in addition to the CALL BARRED PDU to indicate call barring. In that case the notification indicator shall be set to "Call barred by SS-BOC", refer to EN 300 392-9 [3], clause 7.2.2, table 3.

5.3.2 TETRA PDU Information element Coding

5.3.2.1 Acknowledgement from affected user(s)

Acknowledgement from affected user(s) information element shall have values as defined in table 19.

Table 19: Acknowledgement from affected user(s) information element contents

Information element	Length	Value	Remark
Acknowledgement from affected user(s)	1	0 ₂	Acknowledgement not requested
		1 ₂	Acknowledgement requested

5.3.2.2 Affected user extension

The affected user extension information element shall define the extension part of the TSI as presented in table 20.

Table 20: Affected user extension information element contents

Element	Length	Value	Remark
MCC and MNC	24	any	See ETS 300 392-1 [2], clause 7

5.3.2.3 Affected user extension present

The affected user extension present information element shall indicate the presence of the affected user extension information element as defined in table 21.

Table 21: Affected user extension present information element contents

Information element	Length	Value	Remark
Affected user extension present	1	0	Not present
		1	Present

5.3.2.4 Affected user SSI

The affected user SSI information element shall define the SSI part of the TSI as presented in table 22.

Table 22: Affected user SSI information element contents

Element	Length	Value	Remark
SSI	24	any	See ETS 300 392-1 [2], clause 7

5.3.2.5 BOC PDU type

BOC PDU type information element shall indicate the type of the SS-BOC action as described in table 23.

Table 23: BOC PDU type information element contents

Information element	Length	Value	Remark
BOC PDU type	4	0000 ₂	Refer EN 300 392-9 [3]
		0001 ₂	Refer EN 300 392-9 [3]
		0010 ₂	Refer EN 300 392-9 [3]
		0011 ₂	Refer EN 300 392-9 [3]
		0100 ₂	Refer EN 300 392-9 [3]
		0101 ₂	DEFINE
		0110 ₂	DEFINE ACK
		0111 ₂	DEFINE EXTERNAL
		1000 ₂	DEFINE USER
		1001 ₂	DEFINE USER ACK
		1010 ₂	DEFINE USER EXTERNAL
		1011 ₂	INTERROGATE
		1100 ₂	INTERROGATE ACK
		1101 ₂	CALL BARRED, see note
>1101 ₂	Reserved		
NOTE: This PDU may be replaced by the notification call barred due to SS-BOC.			

5.3.2.6 Closed user group identifier

Closed user group identifier information element shall identify a closed user group. It shall be composed of three information elements, the closed user group identifier SSI, the closed user group identifier extension present and the closed user group identifier extension. The information element encoding shall be as given in tables 24, 25 and 26.

NOTE: Although the format of the closed user group identifier is the same as for GTSI it is logically an independent identifier not linked or limited to the GTSIs. Its effective (SSI) size may be limited to say 16 bits but the information element length is 24 bits.

Table 24: Closed user group identifier information element contents

Information element	Length	Value	Remark
Closed user group identifier	24	any	

Table 25: Closed user group identifier extension present contents

Information element	Length	Value	Remark
Closed user group identifier extension present	1	0	Not present
		1	Present

Table 26: Closed user group identifier extension contents

Information element	Length	Value	Remark
Closed user group identifier extension	24	any	

5.3.2.7 Definition result

Definition result information element shall indicate whether the previously made definition request was successful or unsuccessful. Definition result information element shall be as described in table 27.

Table 27: Definition result information element contents

Information element	Length	Value	Remark
Definition result	3	000 ₂	Request failed for any reason
		001 ₂	Accepted by SwMI, see note 1
		010 ₂	Accepted, but definition values changed by SwMI
		011 ₂	User not authorized
		100 ₂	Unknown TETRA identity, see note 2
		101 ₂	Reserved
		110 ₂	Parameters not valid, see note 3
		111 ₂	Insufficient information
NOTE 1: Further details how definition values are changes may be available by interrogation.			
NOTE 2: Applicable to the restricted party information element.			
NOTE 3: Applicable to all other information elements than the restricted party information element.			

5.3.2.8 Definition type

Definition type information element shall indicate the type of the definition in relation to possible existing SS-BOC definition for the given subscriber identity or identities and service or services:

- addition shall complement a previous definition, if any;
- replacement shall replace a previous definition, if any;
- removal shall remove an existing definition, if any.

The information element shall be as described in table 28.

Table 28: Definition type information element contents

Information element	Length	Value	Remarks
Definition type	2	00 ₂	Addition
		01 ₂	Replacement
		10 ₂	Removal
		11 ₂	Reserved

5.3.2.9 Delivery status to affected user(s)

The delivery status to affecter user(s) shall indicate the status of the delivery as defined in table 29.

Table 29: Delivery status to affected user(s) information element contents

Information element	Length	Value	Remark
Delivery status to affected user(s)	2	00 ₂	Delivery not requested
		01 ₂	Definition sending to the affected user(s) pending in the SwMI
		10 ₂	Acknowledgement received from affected user(s)
		11 ₂	Delivery status unknown

5.3.2.10 Delivery to affected user(s)

Delivery to affected user(s) information element shall have values as defined in table 30.

Table 30: Delivery to affected user(s)) information element contents

Information element	Length	Value	Remark
Delivery to affected user(s)	1	0 ₂	Delivery not requested
		1 ₂	Delivery requested

5.3.2.11 Distribution result

Distribution result information element shall indicate whether the previously made distribution of definitions to affected user(s) was successful or unsuccessful. Distribution result element is described in table 31.

Table 31: Distribution result information element contents

information element	Length	Value	Remark
Distribution result	3	000 ₂	Request failed for any reason
		001 ₂	Successfully received by MS/LS
		010 ₂	Reserved
		011 ₂	Reserved
		100 ₂	Reserved
		101 ₂	Reserved
		110 ₂	Parameters not valid
		111 ₂	Insufficient information

5.3.2.12 Exception to restricted extension

The exception to restricted extension information element shall define the extension part of the TSI as presented in table 32.

Table 32: Exception to restricted extension information element contents

Element	Length	Value	Remark
MCC and MNC	24	any	See ETS 300 392-1 [2], clause 7

5.3.2.13 Exception to restricted extension present

The exception to restricted extension present information element shall indicate the presence of the affected user extension information element as defined in table 33.

Table 33: Exception to restricted extension present information element contents

Information element	Length	Value	Remark
Exception to restricted extension present	1	0	Not present
		1	Present

5.3.2.14 Exception to restricted external number

The exception to restricted external number information element shall be encoded as a string of decimal encoded digits defined in EN 300 392-9 [3], clause 8.4.3.

5.3.2.15 Exception to restricted external number length indicator

The exception to restricted external number length indicator shall be encoded as defined in EN 300 392-9 [3], clause 8.4.3, table 19 "Number of external subscriber number digits".

5.3.2.16 Exception to restricted SSI

The exception to restricted SSI information element shall define the SSI part of the TSI as presented in table 34.

Table 34: Exception to restricted SSI information element contents

Element	Length	Value	Remark
SSI	24	any	See ETS 300 392-1 [2], clause 7

5.3.2.17 Interrogation result

Interrogation result shall indicate whether the previously made interrogation request was successful or unsuccessful. Interrogation result element is described in table 35.

Table 35: Interrogation result contents

Element	Length	Value	Remark
Interrogation result	3	000 ₂	Request failed for any reason
		001 ₂	Accepted, TETRA identities provided
		010 ₂	Accepted, external numbers provided
		011 ₂	User not authorized
		100 ₂	Unknown affected user identity
		101 ₂	Reserved
		110 ₂	Parameters not valid
		111 ₂	Insufficient information

5.3.2.18 Interrogation type

The interrogation type information element shall indicate the type of interrogation as defined in table 36.

Table 36: Interrogation type information element contents

Information element	Length	Value	Remark
Interrogation type	2	00 ₂	Reserved
		01 ₂	Interrogate restricted TETRA identities
		10 ₂	Interrogate restricted external subscriber numbers
		11 ₂	Interrogate restricted TETRA identities and external subscriber numbers

5.3.2.19 Number of services

Number of services information element shall indicate how many service elements are present and follow this information element in the PDU. Number of services information element shall be as defined in table 37.

Table 37: Number of services information element contents

Element	Length	Value	Remarks
Number of services	3	000 ₂	Reserved, see note 1
		001 ₂	One service
		010 ₂	Two services
		etc...	Etc.
		111 ₂	Seven services, see note 2
NOTE 1: At least one service is defined in all PDUs.			
NOTE 2: The number of services value is limited by the number of different services as defined in table 42.			

5.3.2.20 Range type for affected user identities

The range type for affected user identities information element shall be encoded as defined in the EN 300 392-9 [3], clause 8.3.1.

5.3.2.21 Range type for closed user groups

The range type for closed user groups information element shall be encoded as defined in the EN 300 392-9 [3], clause 8.3.1.

5.3.2.22 Range type for exceptions to restricted external numbers

The range type for exceptions to restricted external numbers information element shall be encoded as defined in the EN 300 392-9 [3], clause 8.3.1.

5.3.2.23 Range type for restricted external numbers

The range type for restricted external numbers information element shall be encoded as defined in the EN 300 392-9 [3], clause 8.3.1.

5.3.2.24 Range type for restricted identities

The range type for restricted identities information element shall be encoded as defined in the EN 300 392-9 [3], clause 8.3.1.

5.3.2.25 Rejection cause

The rejection cause information element shall indicate the reason for the barring as described in table 38.

Table 38: Rejection cause information element contents

Element	Length	Value	Remarks
Rejection cause	2	00 ₂	Called party outside allowed user group
		01 ₂	Restricted service type
		10 ₂	Restricted destination address
		11 ₂	Reserved

5.3.2.26 Restricted extension

The restricted extension information element shall define the extension part of the TSI as presented in table 39.

Table 39: Restricted extension information element contents

Element	Length	Value	Remark
MCC and MNC	24	any	See ETS 300 392-1 [2], clause 7

5.3.2.27 Restricted extension present

The RESTRICTED extension present information element shall indicate the presence of the affected user extension information element as defined in table 40.

Table 40: Restricted extension present information element contents

Information element	Length	Value	Remark
Restricted extension present	1	0	Not present
		1	Present

5.3.2.28 Restricted external number

The restricted external number information element shall be encoded as a string of decimal encoded digits defined in EN 300 392-9 [3], clause 8.4.3.

5.3.2.29 Restricted external number length indicator

The restricted external number length indicator information element shall indicate how many digits there are in the restricted external number as defined in EN 300 392-9 [3], clause 8.4.3, table 19 "Number of external subscriber number digits".

5.3.2.30 Restricted SSI

The restricted SSI information element shall define the SSI part of the TSI as presented in table 41.

Table 41: restricted SSI information element contents

Element	Length	Value	Remark
SSI	24	any	See ETS 300 392-1 [2], clause 7

5.3.2.31 Service

Service information element shall indicate the service for which the definition is applicable as defined in table 42.

Table 42: Service information element contents

Element	Length	Value	Remarks
Service type	3	000 ₂	All applicable services, see note
		001 ₂	Circuit mode speech service
		010 ₂	Circuit mode data service
		011 ₂	Short Data Service
		100 ₂	Reserved
		101 ₂	Reserved
		110 ₂	Reserved
		111 ₂	Reserved
NOTE: All applicable services correspond to all services listed in this table.			

5.3.3 Additional coding requirements over the ISI

Clauses 9, 10 and 11 of EN 300 392-9 [3] shall apply.

The remote operations (RO) protocol is defined in ITU-T Recommendations X.219 [7] and X.229 [8]. The generic procedures defined in this Standard provide an encoding mechanism for the transport and use of this RO protocol in the PISN environment for the provision of supplementary services or additional network features.

In the OSI environment, communication between application processes is represented in terms of communication between a pair of application entities (AEs). Communication between application entities is inherently interactive. Typically, one entity requests that a particular operation be performed; the other entity attempts to perform the operation and then reports the outcome of the attempts. The concept of Remote Operations is a vehicle for supporting interactive applications of this type.

The generic structure of an operation is an elementary request/reply interaction. Operations are carried out within the context of an application-association.

Figure 1 models this view.

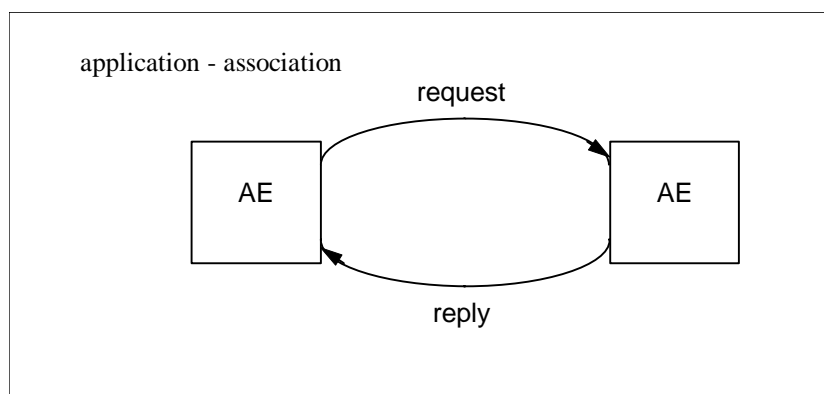


Figure 1: Remote Operations Model

Operations invoked by one AE (the invoker) are performed by the other AE (the performer). Operations may be classified according to whether the performer of an operation is expected to report its outcome:

- in the case of success or failure (a result reply is returned if the operation is successful, an error reply is returned if the operation is unsuccessful);
- in case of failure only (no reply is returned if the operation is successful, an error reply is returned if the operation is unsuccessful);
- in case of success only (a result reply is returned if the operation is successful, no reply is returned if the operation is unsuccessful); or
- not at all (neither a result nor an error reply is returned, whether the operation was successful or not).

Operations may also be classified according to two possible operation modes: synchronous, in which the invoker requires a reply from the performer before invoking another operation; and asynchronous, in which the invoker may continue to invoke further operations without awaiting a reply.

The following Operation Classes are defined:

Operation Class 1:	Synchronous, reporting success or failure (result or error).
Operation Class 2:	Asynchronous, reporting success or failure (result or error).
Operation Class 3:	Asynchronous, reporting failure (error) only, if any.
Operation Class 4:	Asynchronous, reporting success (result) only.
Operation Class 5:	Asynchronous, outcome not reported.

The Operation Class of each operation is agreed to be Operation Class 3 between application entities for the present document.

An application association defines the relationship between a pair of AEs, and is formed by the exchange of application (in this case supplementary services) Protocol Control information through the use of the services of underlying layers. The AE that initiates an association is called the association initiating AE, or the association initiator, while the AE that responds to the initiation of an application association by another AE is called the association responding AE, or the association responder.

NOTE 1: In the application of ROSE for the support of supplementary services in PSS1 the underlying services used by ROSE are those provided by GFT-Control or those provided by the Association Control Service Entity (ACSE). No use is made of the services of the Reliable Transport Service Element (RTSE).

Application associations are classified by which application-entity is allowed to invoke operations:

Association Class 1:	Only the association-initiating application-entity can invoke operations.
Association Class 2:	Only the association-responding application-entity can invoke operations.
Association Class 3:	Both the association-initiating and the association-responding application-entities can invoke operations.

The present document assumes Application associations of Association Class 1.

The explicit control of an application-association (establishment, release and abort) is performed by the Association Control Service Element (ACSE) defined in ITU-T Recommendation X.217 [9].

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

- both the sourceEntity and destinationEntity data elements in the Network Facility Extension of this PSS1 facility information element shall contain the value endPINX;
- no interpretation APDU shall be included in this PSS1 facility information element.

In the case of information flows such as DEFINE request which expect a reply DEFINE ACK response, the TETRA PDU such as DEFINE request shall be encoded in the IsiArgument tetraMessage IMPLICIT OCTET STRING of the ROSE Invoke APDU in support of TETRA encoding PDU from as defined in clause 8.4.1 of ETS 300 392-3-1 [5]. The expected information flow DEFINE ACK TETRA PDU shall be encoded in the IsiArgument tetraMessage IMPLICIT OCTET STRING of another ROSE Invoke APDU (in the opposite direction) defined in the same clause.

In the case of unconfirmed information flows such as CALL BARRED indication, the TETRA PDU such as CALL BARRED shall be encoded in the IsiArgument tetraMessage IMPLICIT OCTET STRING of the ROSE Invoke APDU in support of TETRA encoding PDU as defined in clause 8.4.1 of ETS 300 392-3-1 [5].

NOTE 2: The actions resulting from reception of ERRORS in reply to the ROSE Invoke APDU such as retry, time-out are outside the scope of the present document.

5.4 SS-BOC State Definitions

5.4.1 State at the called user MS/LS

No modification to the basic call state.

5.4.2 State at the called user SwMI

None.

5.4.3 State at the affected (calling) user MS/LS

SS-BOC Idle.

5.4.4 State at the affected (calling) user SwMI

SS-BOC Idle.

5.4.5 State at the authorized user MS/LS

SS-BOC Idle.

5.4.6 State at the SS-BOC controlling SwMI

SS-BOC Idle.

5.5 SS-BOC Signalling Procedures

5.5.1 Actions at calling (affected) user MS/LS

The SDL representation of the procedure at the affected user MS/LS is represented in SDL diagram in clause A.1.

In the case where the affected user MS/LS places a request for either basic or data packet service, the affected user shall send an U-SETUP as part of a normal call set-up and shall be ready to receive a D-DISCONNECT with the disconnect cause "SS-specific disconnection" and a notification value corresponding to "Call barred by SS-BOC". Affected user MS/LS shall then release that unsuccessful call.

NOTE: The barring indication is received and processed by the SS sub-entity, which has a fixed relationship with the call control sub-entity.

The affected user may be given the capability of interrogating the SS-BOC affecting his own identity by sending an INTERROGATE PDU in a call unrelated U-FACILITY; in that case, the affected user shall be ready to recognize the INTERROGATE ACK PDU received in a call unrelated D-FACILITY; in the case of INTERROGATE and INTERROGATE ACK procedure, the affected user shall follow the same procedures as for the authorized user.

Depending on definition options (sent by the authorized user) and in support of SS-BOC, the affected user may receive an DEFINE USER/DEFINE EXTERNAL USER PDU in a D-FACILITY PDU informing that affected user application that call barring has been defined against its ITSI. In the case where the DEFINE USER PDU contains an acknowledgement requested information element requesting that the affected user acknowledge receipt of that DEFINE USER/DEFINE EXTERNAL USER PDU, the affected user MS/LS shall send to the affected user home SwMI an DEFINE USER ACK PDU indicating that the DEFINE USER/DEFINE EXTERNAL USER PDU has been properly received by the user application.

5.5.2 Actions at calling (affected) user home SwMI

The SDL representation of the procedure at the affected user home SwMI is represented in SDL diagram in clause A.2.

The actions at affected user home SwMI may be decomposed into those actions which are identical to the SwMI where the authorized user is registered (INTERROGATE/INTERROGATE ACK) and which are described below and those actions particular to the affected user home SwMI.

The affected user home SwMI should:

- compose and decompose SS-BOC PDUs;
- upon reception of an SS-BOC definition request:
 - save the SS-BOC definition into the SwMI, if the request is valid and authorized; and
 - acknowledge the SS-BOC definition request to the authorized user;
- if the parameter Delivery to affected users so indicates, send the SS-BOC definitions to the concerned affected user(s);
- if the Acknowledgement from affected user(s) parameter is included in the DEFINE/DEFINE EXTERNAL PDU, start timer T1 and wait-for-ack.

Affected user home SwMI shall apply the SS-BOC definition from the moment it is received.

When all affected user MS/LS(s) have acknowledged the definition request, timer T1 shall be reset. If the timer T1 has expired, the action of the affected user home SwMI is implementation dependent.

NOTE 1: As an operator option, affected user home SwMI may keep the definition requests in SwMI if any of the affected user(s) is not reachable and send them later, if one or more affected users cannot be reached or has (have) not acknowledged the request.

In the case where SS-BOC is supported in the affected user home SwMI: upon reception of a call or connection service request from the affected user, Call Control should verify, if the barring shall take place, and if so, affected user home SwMI shall bar the call.

In case of an outgoing group call, which is requested by the restricted affected user from a visited system, CC in visited system may send the service request to CC in the home system as part of the normal call set-up procedure. If this is the case, the home system should bar the service and indicate that to the visited system, if the SS-BOC restrictions apply for the basic service.

NOTE 2: The SS-BOC functionality of the SS sub-entity which has fixed relationship with the call control sub-entity and the SS-BOC functionality of the call control sub-entity are not separated in this clause.

5.5.3 Actions at authorized user MS/LS

The SDL representation of procedures at the authorized user MS/LS is shown in clause A.3.

5.5.3.1 Normal procedures at the authorized user MS/LS

The authorized user MS/LS shall send a DEFINE/DEFINE EXTERNAL or INTERROGATE PDU for SS-BOC in a U-FACILITY PDU in filling in the appropriate value for the routing information element (see table 4 of EN 300 392-9 [3]). This value shall correspond:

- usually, to the SS-BOC controlling SwMI.

In accordance with clause 8.4.1 of EN 300 392-9 [3], identities included in DEFINE or INTERROGATE PDUs may be indicated using only their SSIs in the case where the corresponding MNI is that of the SwMI to which those PDUs are addressed.

NOTE: It is assumed that the specification of the DEFINE/DEFINE EXTERNAL or INTERROGATE PDUs for SS-BOC does not provide the possibility to indicate such identities using SNAs.

The authorized user MS/LS shall receive one DEFINE ACK or INTERROGATE ACK PDU for SS-BOC in a D-FACILITY PDU.

In accordance with clause 8.4.1 of EN 300 392-9 [3], 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.

5.5.3.2 Exceptional procedures at the authorized user MS/LS

Clause 11.2 of EN 300 392-9 [3] shall apply for the exceptional procedures at the authorized user MS/LS.

5.5.4 Actions at the SS-BOC Controlling entity at the SwMI where the authorized user is registered

The SDL representation of procedures at the supplementary service control entity at the SwMI where the authorized user is registered is shown in clause A.4.

5.5.4.1 Normal procedures at the SS-BOC control entity at the SwMI where the authorized user is registered

The SS-BOC control entity at the SwMI where the authorized user is registered shall:

- receive the U-FACILITY PDU containing a DEFINE/DEFINE EXTERNAL PDU or an INTERROGATE PDU, and route them according to the value of the routing information element in the U-FACILITY PDU (see table 4 of EN 300 392-9 [3]). This routing shall be as defined in clause 9.1 of EN 300 392-9 [3];
- if the SwMI where the authorized user is registered coincides with the restricted user home SwMI, its SS-BOC control entity shall process the DEFINE or INTERROGATE PDU. Notably, in accordance with clause 8.4.1 of EN 300 392-9 [3], the SwMI shall then complement any identities indicated using only their SSIs which have been included in that PDU;
- if the SwMI where the authorized user is registered does not coincide with the restricted user home SwMI, clause 9.1 of EN 300 392-9 [3] shall apply to route the DEFINE/DEFINE EXTERNAL and INTERROGATE PDU(s) over the ISI. Notably the identity of the authorized user will be added to the DEFINE/DEFINE EXTERNAL and INTERROGATE PDU(s) in the corresponding ANF-ISISS PDU (see table 24 of EN 300 392-9 [3]).

In addition only the following options shall apply for the PSS1 facility information element carrying this ANF-ISISS PDU (as a ROSE Invoke APDU):

- both the sourceEntity and the destinationEntity data elements in the Network Facility Extension (NFE) of this PSS1 facility information element shall contain the value endPINX (see clause 10.3.1 of EN 300 392-9 [3]);

- no interpretation APDU shall be included in this PSS1 facility information element (see clause 10.3.3 of EN 300 392-9 [3]);
- if the resulting DEFINE ACK and INTERROGATE ACK PDU(s) is (are) sent, the SS-BOC control entity at the SwMI where the authorized user is registered shall receive the corresponding ANF-ISISS ROSE Invoke APDU;
- the DEFINE ACK and INTERROGATE ACK PDU resulting from an authorized user request shall be sent to the authorized user MS/LS in a D-FACILITY PDU. Such D-FACILITY PDU shall be individually addressed.

In addition, the SS-BOC controlling SwMI shall, if requested according to the content of the information element "delivery to affected user" in the DEFINE PDU received from the authorized user, send to the affected (called/barred) user, the DEFINE USER/DEFINE EXTERNAL USER PDU to inform the affected user MS/LS that it is subject to call barring due to definition of SS-BOC against its ITSI. The SS-BOC controlling SwMI shall expect a DEFINE USER ACK PDU, on option, if so requested in the DEFINE USER/DEFINE EXTERNAL USER PDU.

If the Acknowledgement from affected user(s) parameter is included in the DEFINE USER/DEFINE EXTERNAL USER PDU, SS-BOC controlling SwMI should start timer T1 and wait for DEFINE USER ACK.

If the definition is made to a group, the affected users shall be all the members of that group.

NOTE: As an operator option, the SS-BOC controlling SwMI may keep the definition requests in the SwMI if any of the affected user(s) is(are) not reachable and send them later, if one or more affected user(s) cannot be reached or has (have) not acknowledged the request.

5.5.4.2 Exceptional procedures at the SS-BOC control entity at the SwMI where the authorized user is registered

Clause 11 of EN 300 392-9 [3] shall apply for the exceptional procedures at the SS-BOC control entity at the SwMI where the authorized user is registered, taking into account the fact that the support of each of the PDUs: DEFINE and INTERROGATE is optional.

The information defined in clause 11.2 of EN 300 392-9 [3] shall be sent to the authorized user MS/LS in a D-FACILITY PDU. Such D-FACILITY PDU shall be individually addressed.

If the Acknowledgement from affected user(s) parameter is set to "Acknowledgement requested" in the DEFINE USER/DEFINE EXTERNAL USER PDU, SwMI should start timer T1.

NOTE: No particular action is defined in the case where the affected user does not reply to the DEFINE USER/DEFINE EXTERNAL USER request PDU sent by the SS-BOC controlling SwMI.

5.6 Impact of Inter-working with Public ISDN

5.6.1 General

It shall not be possible to define/interrogate SS-BOC in the public ISDN from the TETRA gateway SwMI and it shall not be possible to define/interrogate SS-BOC within TETRA from the public ISDN.

It is assumed that inter-working does not apply to TETRA networks inter-working through public ISDN.

5.6.2 SS-BOC for Outgoing Call from TETRA to Public ISDN

The TETRA gateway to ISDN SwMI shall play the role of the public ISDN calling subscriber of an internal call within public ISDN; the TETRA ISDN gateway shall present to the calling SwMI either the ISI DISCONNECT or the ISI RELEASE it receives from the public ISDN in either CALL DISCONNECT or CALL RELEASE due to outgoing call barring.

5.6.3 SS-BOC for Outgoing Call from public ISDN to TETRA

TETRA gateway will normally not received any outgoing call from public ISDN in the case where SS-BOC has been invoked by public ISDN.

5.7 Protocol interactions between SS-BOC and other supplementary services and ANFs

5.7.1 Protocol interactions between SS-BOC and other supplementary services

According to SS-BOC stage 1 description in ETS 300 392-10-18 [10], there is no possible interaction between SS-BOC and other supplementary services; either stage 1 states "shall not have any interaction or "Not Applicable".

NOTE: SS-CAD may be used to override SS-BOC invocation.

5.7.2 Protocol interactions between SS-BOC and ANF-ISI-IC

The SS-BOC may extend to several TETRA networks. The requirements for the inter-working over ANF-ISI-IC are summarized as follows:

- deliver and receive the SS-BOC definition and interrogation information over the ISI;
- barring of requested services within the system based on the SS-BOC definitions received over the ISI;
- barring of services in the home system and indicating this to the visited SwMI over the ISI;
- barring of services in the visited system when indicated by the home SwMI over the ISI;
- the capability to support the generic supplementary service functions over the ISI, refer EN 300 392-9 [3].

For management and operation, the SS-BOC may extend to several TETRA networks. The requirements for the management part from the SwMI, in which the authorized user and/or user A can be located, are to deliver and receive SS-BOC definition information over the ISI and to the user(s) located in a visited SwMI.

Upon individual user migration the home SwMI may send user related SS-BOC profile to the visited SwMI and the visited SwMI may response with a modified temporary profile, refer to ETS 300 392-3-5 [11].

Annex A (normative): Specification and Description Language (SDL) representation of SS-BOC procedures

The diagrams in this annex use the Specification and Description Language defined in ITU-T Recommendation Z.100 [4].

Each diagram represents the behaviour of a supplementary service control entity either in a MS/LS or in an SwMI.

In accordance with the protocol model described in clause 14 of EN 300 392-2 [1], the supplementary service control entity at a MS/LS uses the services of the V+D air interface control. The same applies for the supplementary service control entity at the SwMI where the MS/LS is registered. If this SwMI or any other operates at the ISI, in accordance with the protocol model described in clause 8 of ETS 300 392-3-1 [5], their supplementary service control entities use, via the co-ordination function, the services of ANF-ISISS for the corresponding supplementary service ISI protocols.

All PDUs with no prefix specifying whether they are air interface (or LS) PDUs or ISI PDUs are to be understood as being air interface (or LS) PDUs if the users to which they are addressed are registered in the same SwMI, and as ISI PDUs otherwise.

The suffix PDU has been omitted after the PDU names (e.g. DEFINE or DEFINE ACK).

A.1 SDL representations of SS-BOC at calling user MS/LS

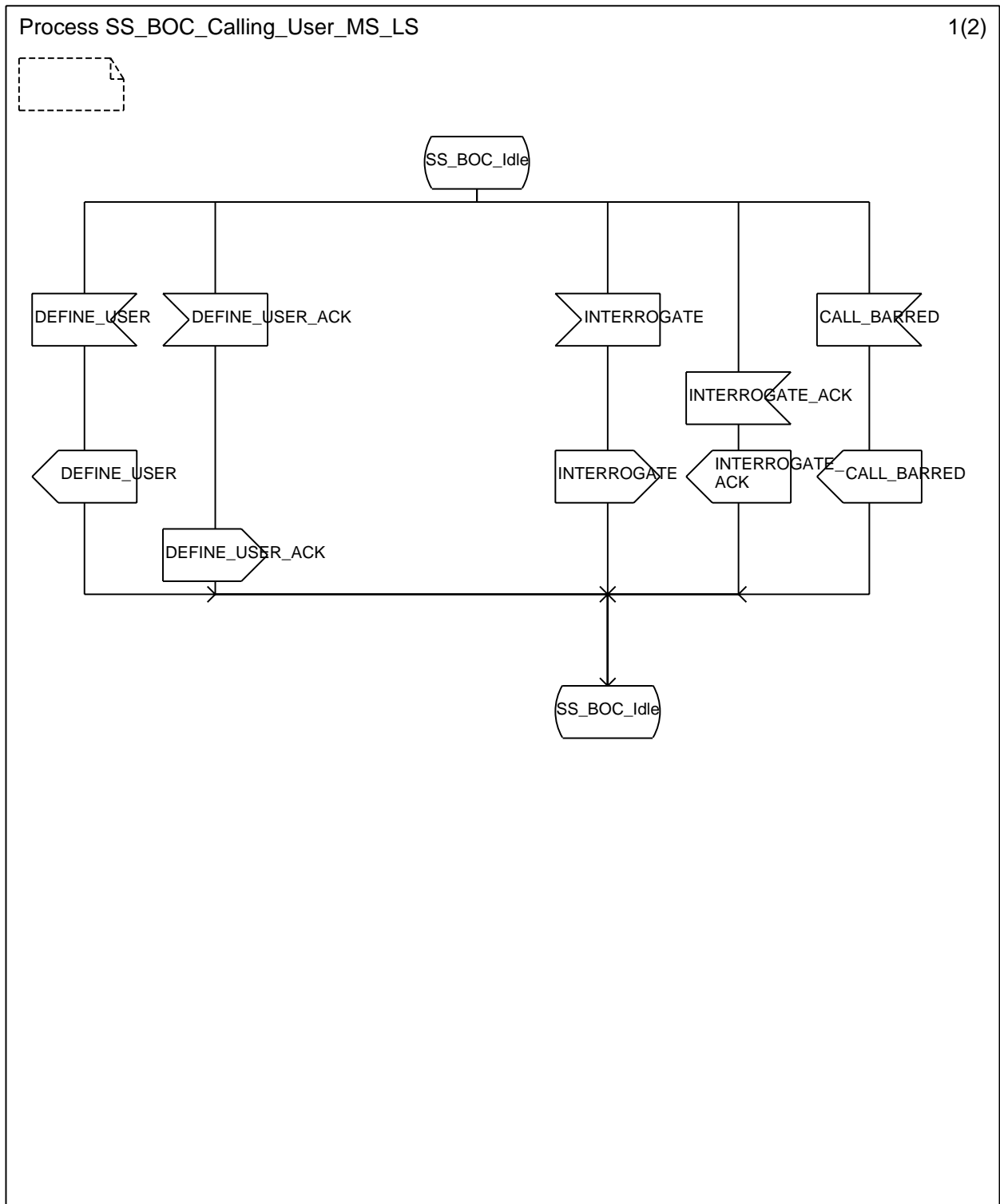


Figure A.1: SDL representations of SS-BOC at calling user MS/LS (1/2)

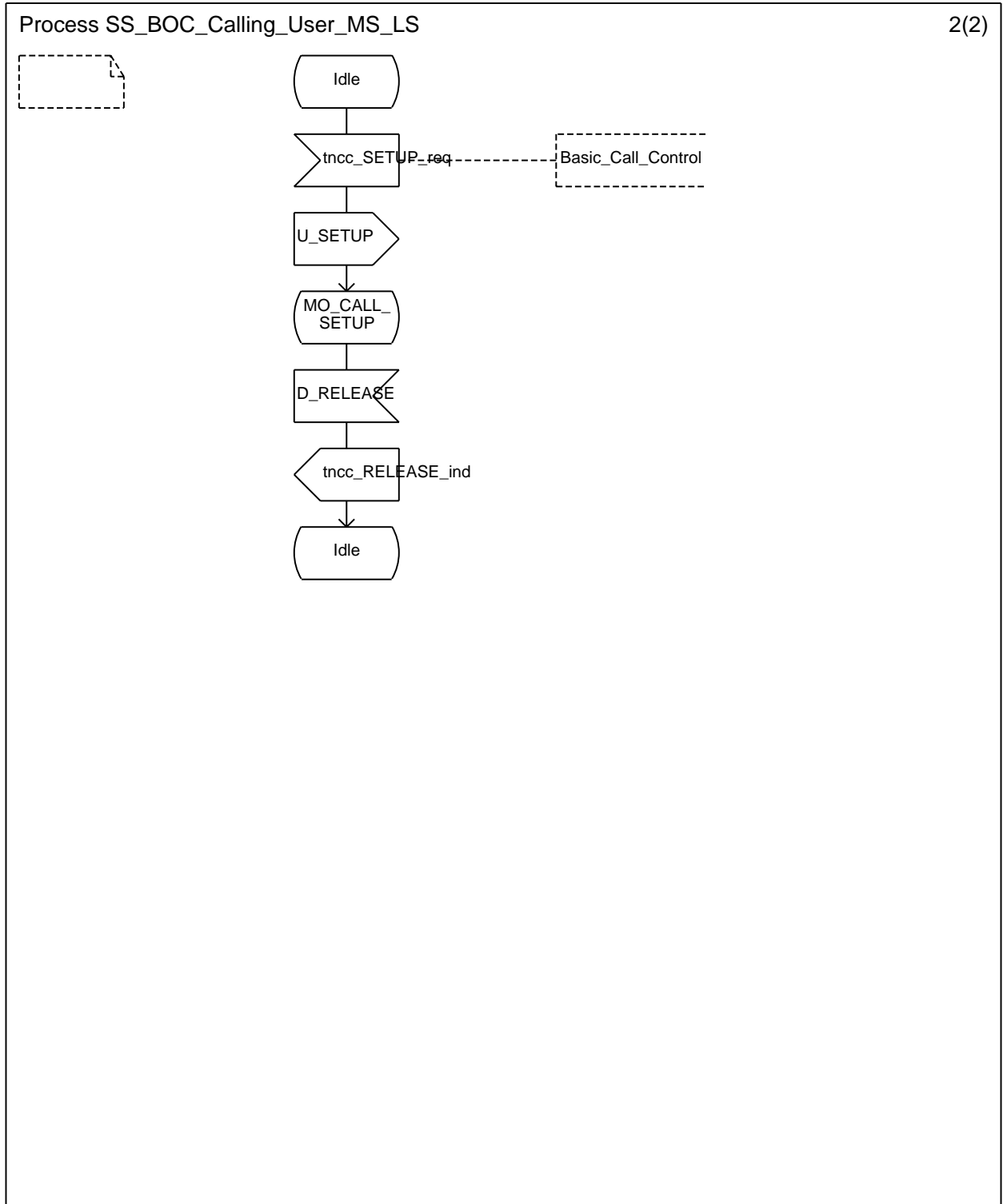


Figure A.1: SDL representations of SS-BOC at calling user MS/LS (2/2)

A.2 SDL representations of SS-BOC at calling user SwMI

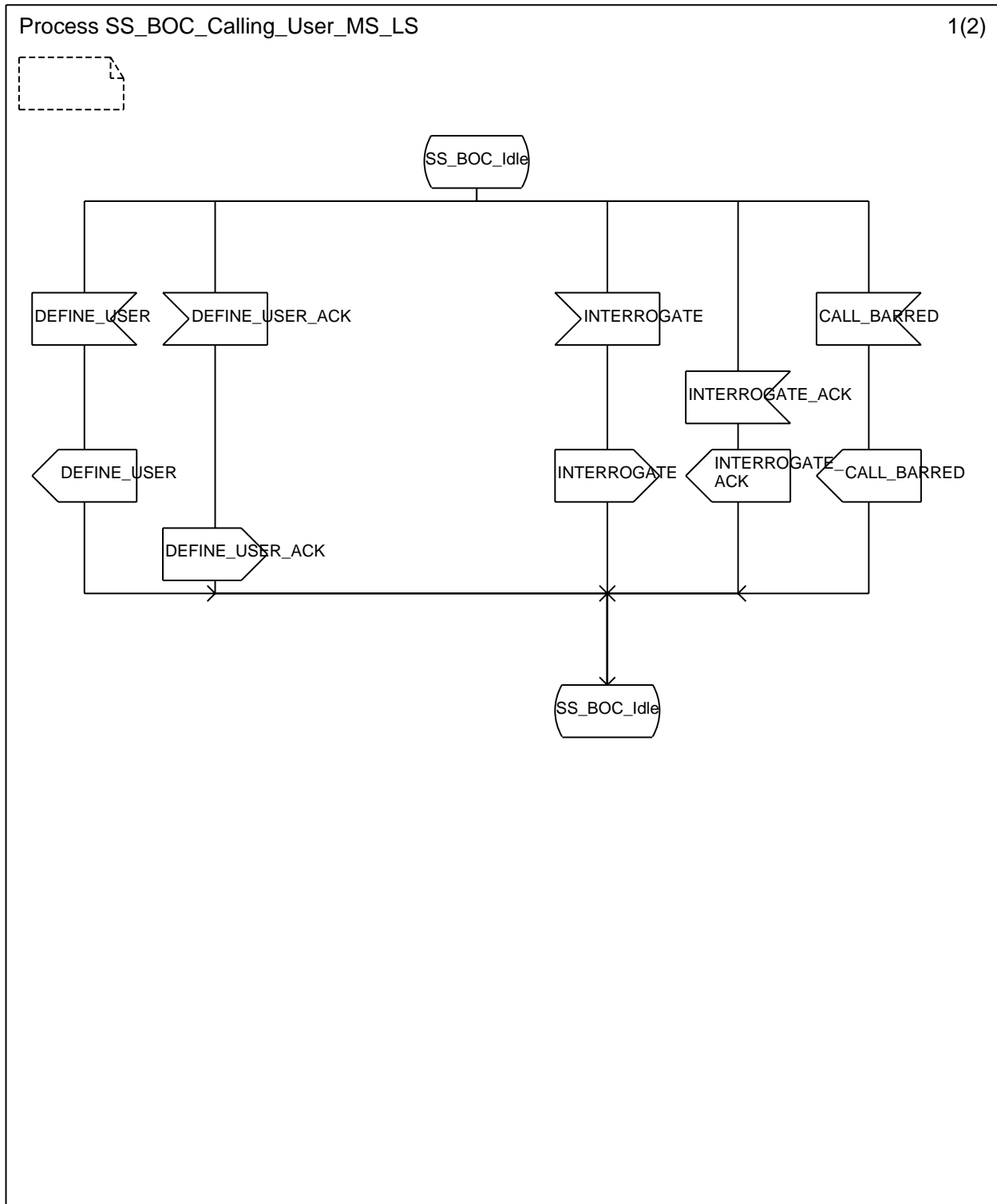


Figure A.2: SDL representations of SS-BOC at calling user home SwMI (1/2)

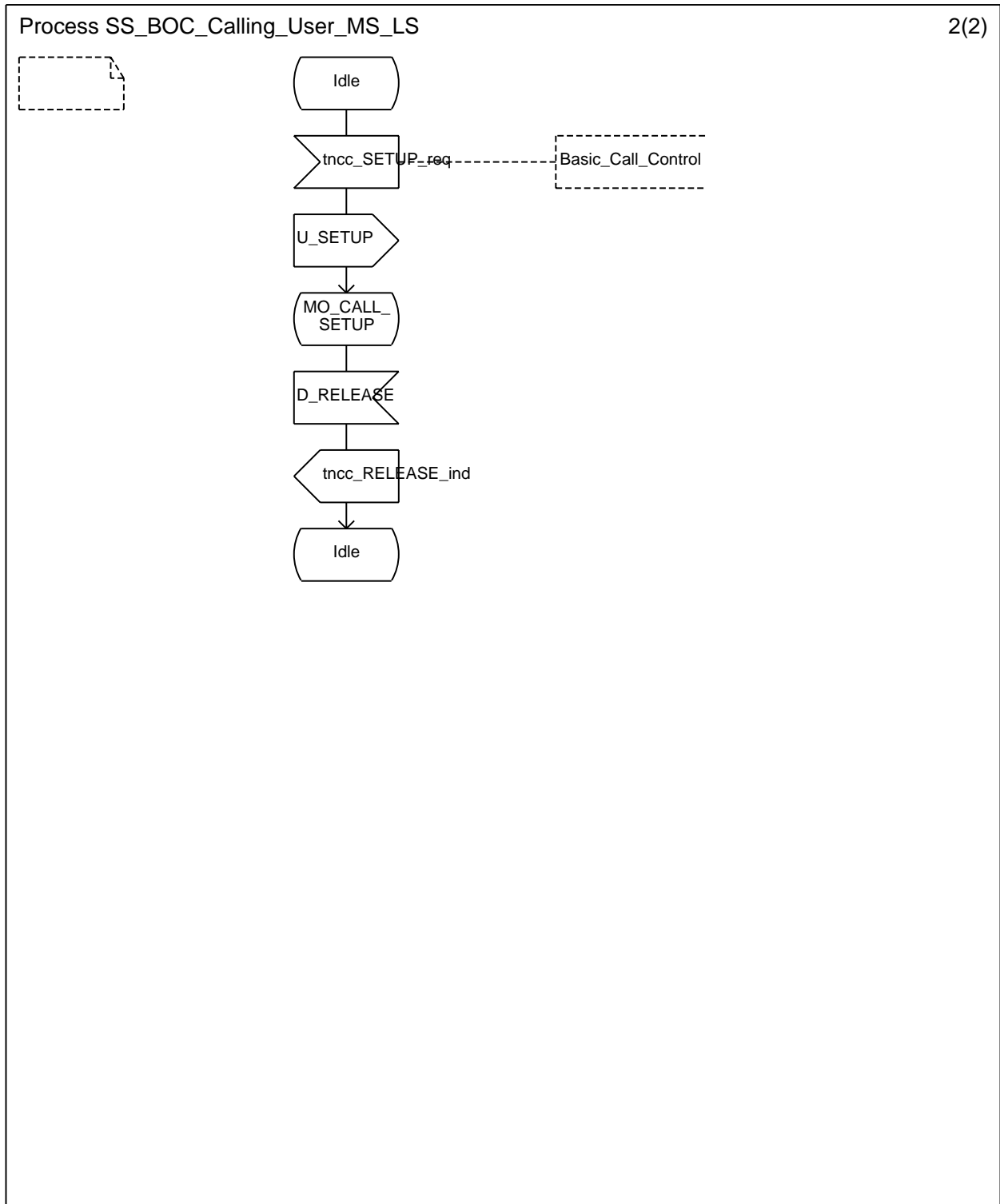
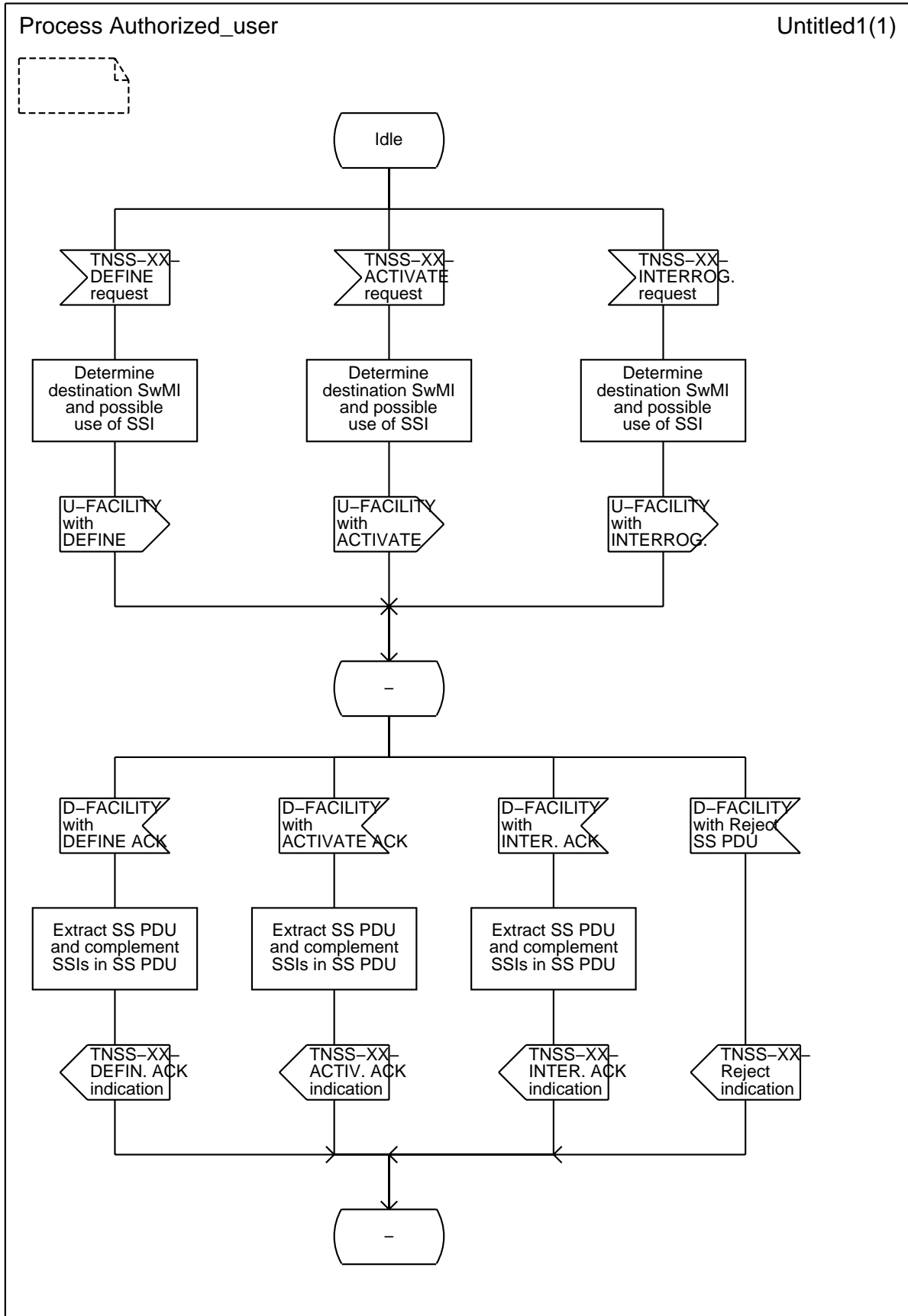


Figure A.2: SDL representations of SS-BOC at calling user home SwMI (2/2)

A.3 SDL representation at authorized user MS/LS

Input signals from the right and output signals to the right represent air interface PDUs.

Input signals from the left and output signals to the left represent primitives to the authorized user.



NOTE: In the case of SS-BOC, the served user has no authorized user capabilities; this SDL is not applicable to the served user MS/LS.

Figure A.3: Authorized user MS/LS SDL

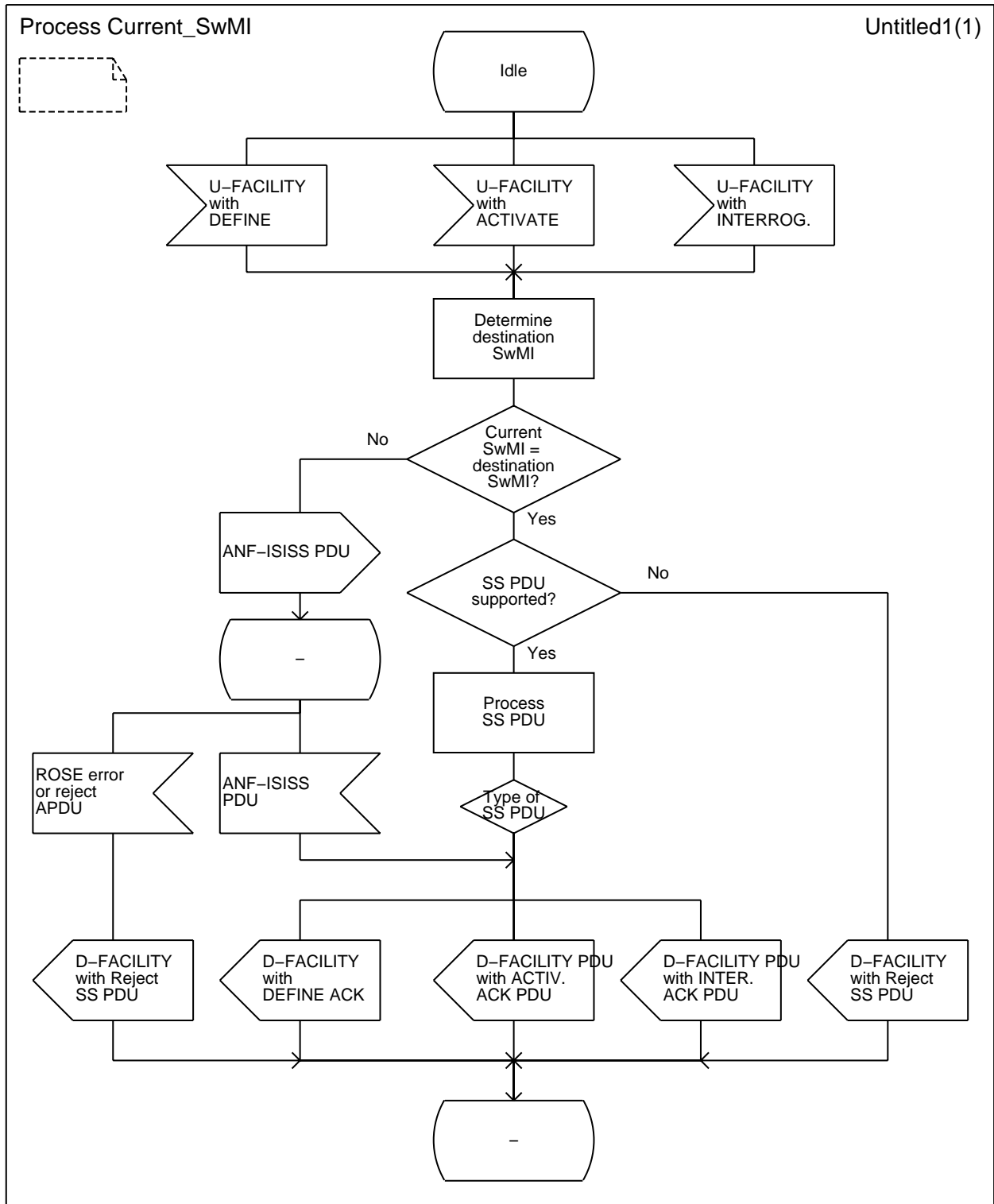
A.4 SDL representations of SS-BOC at SwMI where authorized user is registered

Figure A.4 shows the behaviour of the SS-BOC control entity specific to the SwMI where the authorized user is registered.

Depending on whether or not this SwMI is also the SS-BOC controlling SwMI, it is or it 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 restricted user home SwMI.
- Output signals to the right represent PDUs sent to the restricted user 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: While this SDL representation is generic for all supplementary services, ACTIVATE and ACTIVATE ACK are not defined in the case of SS-BOC.



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.

Figure A.4: Authorized user current SwMI SDL

NOTE: In the case where a user involved in the invocation or operation of some supplementary service would be registered in the same SwMI as the authorized user, the SDL applicable to the SwMI where the former user is registered would apply in addition to figure A.4 to the SwMI where the authorized user is registered.

Annex B (informative): Bibliography

- ETSI ETS 300 392-10-4: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 4: Call Forwarding (CF)".
- ETSI ETS 300 392-10-6: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 6: Call Authorized by Dispatcher (CAD)".
- ETSI EN 300 392-11-18: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 18: Barring of Outgoing Calls (BOC)".

History

Document history		
Edition 1	December 1996	Public Enquiry PE 120: 1996-12-16 to 1997-04-11
		Converted from ETS to EN between Public Enquiry and Vote
V1.1.1	June 2001	Vote V 20010803: 2001-06-04 to 2001-08-03