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Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 2: Call Report (CR)

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Foreword

This European Telecommunication Standard (ETS) has been produced by the ETSI Project Terrestrial Trunked Radio (TETRA).

This ETS consists 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".

Transposition dates	
Date of adoption of this ETS:	25 August 2000
Date of latest announcement of this ETS (doa):	30 November 2000
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 May 2001
Date of withdrawal of any conflicting National Standard (dow):	31 May 2001

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1 Scope

This European Telecommunication Standard (ETS) specifies the stage 3 description of the Supplementary Service CR Call Report for the Terrestrial Trunked RAdio (TETRA).

Call Report allows a calling User A MS/LS, encountering either a busy destination user B, a no reply user B or a not reachable user B to have the call reported to user B as soon as possible.

Man-Machine Interface and charging principles are outside the scope of this ETS.

The supplementary service stage 3 description is preceded by the stage 1 and the stage 2 description of the service, 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. The stage 2 description identifies the functional capabilities of each SS and the information flows needed to support the supplementary service as specified in its stage 1 description. The present stage 3 description specifies the protocols at the air interface and at the various Inter-System Interfaces (ISI) to support each Supplementary Service.

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.

This ETS is applicable to Voice plus Data individual call; this ETS is neither applicable to Packet Mode of Operation nor to DMO; more specifically to the following entities:

- the MS/LS of either the calling user or the called user during an individual call;
- the originating Switching and Management Infrastructure (SwMI) in an individual call;
- the terminating SwMI in an individual call.

The use of SDS-TL to provide Call report is outside the scope of this ETS.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] CCITT Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[2] ITU-T Recommendation Z.100 (1993): "CCITT Specification and description language (SDL)".

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

[4] 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".

[5] 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)".

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

[7] CCITT Recommendation X.219: "Remote operations: Model, notation and service definition".

[8] ITU-T Recommendation X.217: "Information technology - Open Systems Interconnection – Service definition for the association control service element".

[9] ISO/IEC 11572 (1997): "Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit mode bearer services - Inter-exchange signalling procedures and protocol".

[10] CCITT Recommendation X.229: "Remote operations: Protocol specification".

[11] ETSI ETS 300 392-10-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 2: Call report".

[12] ITU-T Recommendation I.221: "Common specific characteristics of services".

[13] ETSI ETS 300 392-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General network design".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this ETS, the following terms and definitions apply:

bearer service: type of telecommunication service that provides the capability for the transmission of signals between user-network interfaces.

busy: property of a user for whom either a network determined user busy or a user determined user busy condition applies (see ITU-T Recommendation I.221 [12]).

identity presentation: stored/displayed identification provided to the called party for subsequent call back.

Mobile Station (MS): physical grouping that contains all of the mobile equipment that is used to obtain TETRA services. By definition, a mobile station contains at least one Mobile Radio Stack (MRS).

CC-SS retention timer: timer started by the infrastructure upon disconnection of the call, which allows the user to use the call Identification in order to invoke/activate/interrogate a supplementary service related to that call. After expiry of the timer, the user is no longer able to use the call Identification in order to carry out supplementary service procedures.

SS-CR message validity timer: timer controlled by the infrastructure but defined by the served user, which determines how long a message can be stored in the infrastructure. After expiry of the timer the message is deleted.

supplementary service: supplementary service modifies or supplements a bearer service or a teleservice. A supplementary service cannot be offered to a customer as a stand alone service. It should be offered in combination with a bearer service or a teleservice.

Switching and Management Infrastructure (SwMI): all of the TETRA equipment for a Voice plus Data (V+D) network except for subscriber terminals. The SwMI enables subscriber terminals to communicate with each other via the SwMI.

teleservice: a type of telecommunications service that provides the complete capability, including terminal equipment functions, for communication between users according to agreed protocols.

user A: specific user that originated the call and requested the supplementary service.

user B: user that was initially addressed in the original call set up.

user C: user who is the diverted-to user.

3.2 Symbols

There are no other symbols in this ETS besides those symbols used in SDL diagrams according to ITU-T Recommendation Z.100 [2].

3.3 Abbreviations

3.3.1 General abbreviations

For the purposes of this ETS, the following general abbreviations apply:

ANF	Additional Network Feature
APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation no.1
CC	Call Control (functional entity)
CC	Call Completion
CCA	Call Control Agent (functional entity)
CCBS	Call Completion to Busy Subscribers (sometimes called Completion of Calls to Busy Subscriber)
CCNR	Completion of Calls on No Reply (sometimes called Completion of Call on No Reply)
CR	Cancellation Reason
CR	Call Report
FC	Failure Cause
FE	Functional Entity
FEA	Functional Entity Action
GTSI	Group TETRA Subscriber Identity
ISDN	Integrated Services Digital Network
ISI	Inter System Interface
ITSI	Individual TETRA Subscriber Identity
LS	Line Station
MS	Mobile Station
MSI	Manufacturer Specific Information
NDUB	Network Determined User Busy
PDU	Protocol Data Unit
PINX	Private Integrated Services Network Exchange
PISN	Private Integrated Services Network
RC	Reject Cause
RL	Request List
RM	Request Maintained
ROSE	Remote Operation Service Element
RVC	Reservation Capability
SDL	Specification and Description Language
SS	Supplementary Service

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

SwMI	Switching and Management Infrastructure
TETRA	TErrestrial Trunked RAdio
TE	Terminal Equipment
UDUB	User Determined User Busy
V+D	Voice Plus Data

3.3.2 Supplementary service abbreviations

For the purposes of this ETS, the following

AL	Ambiance Listening
AoC	Advice of Charge
AP	Access Priority
AS	Area Selection
BIC	Barring of Incoming Calls
BOC	Barring of Outgoing Calls
CAD	Call Authorized by Dispatcher
CFB	Call Forwarding on Busy
CFNRy	Call Forwarding on No Reply
CFNRc	Call Forwarding on Not Reachable
CFU	Call Forwarding Unconditional
CLIP	Calling Line Identification Presentation
CLIR	Calling/Connected Line Identification Restriction
COLP	COnnected Line Identification Presentation
COLR	COnnected Line Identification Restriction
CR	Call Report
CRT	Call Retention
CW	Call Waiting
DGNA	Dynamic Group Number Assignment
DL	Discreet Listening
HOLD	Call Hold
IC	Include Call
LE	Late Entry
LSC	List Search Call
PC	Priority Call
PPC	Pre-emptive Priority Call
SNA	Short Number Addressing
TC	Transfer of Control
TPI	Talking Party Identification

4 SS-CR Stage 3 Specifications

4.1 General

Call Report (SS-CR) is a supplementary service which allows a calling User A MS/LS, on encountering either a busy called user B, a no reply called user B or a not reachable called user B, to request that the user B receive a Call Reporting with identification of the calling user A.

This supplementary services is applicable to all basic circuit mode speech services defined in ETS 300 392-2 [3].

4.2 SS-CR services offered over the TNSS-SAP

This subclause describes SS-CR specific 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-CR service access point is used in conformance testing as a normative boundary in MSs and LSs.

NOTE 1: As this document only deals with the SS-CR all the service primitives have been shown without a TNSS-CR-prefix e.g. the TNSS-CR-request is shorten into a CR request.

NOTE 2: 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.

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

- CALL-INFO-RETENTION indication;
- CALL-REPORT indication;
- CALL-REPORT request.

The SS-CR service primitive at the affected user (called user) MS/LS TNSS-SAP shall be:

- CALL-REPORTING indication.

4.2.1 CALL REPORT indication

The CALL REPORT indication primitive shall be sent by the MS/LS CMCE to the User A MS/LS application over TNSS-SAP to report on the result of the CALL REPORT request of SS-CR.

The CALL REPORT indication shall support one CR identifier.

The CALL REPORT indication primitive shall contain the SS-CR parameters listed in table 1.

Table 1: Parameters for the primitive CALL REPORT indication

Parameter	Indication
CR Identifier (CRI)	M
SS-CR Accepted/Rejected	M
Reject Cause	C (note)
NOTE: Conditional on SS-CR Rejected.	

4.2.2 CALL REPORT request

The CALL REPORT request primitive shall be sent by the User A MS/LS application to the MS/LS CMCE over TNSS-SAP to request Call Report.

The CALL REPORT request primitive shall contain the SS-CR parameters listed in table 2.

Table 2: Parameters for the primitive CALL REPORT request

Parameter	Request
Called User Identity	M
Basic Service	M
CRI (Call-Report Identifier)	M
Message Validity Timer	O

4.2.3 CALL REPORTING indication

The CALL REPORTING indication primitive shall be sent by the MS/LS CMCE to the User B MS/LS application over TNSS-SAP to report the call that was presented unsuccessfully to the called party.

The CALL REPORTING indication primitive shall contain the SS-CR parameter listed in table 3.

Table 3: Parameters for the primitive CALL REPORTING indication

Parameter	Indication
Calling Party Identity	M
Basic Service	M
Call Priority	M
Time stamp used	M
Time stamp	C

4.2.4 CALL-INFO-RETENTION indication

The CALL-INFO-RETENTION indication primitive shall be sent by the MS/LS CMCE to the User A MS/LS application over TNSS-SAP to indicate that SS-CR may be invoked for the call, the parameters of which are retained.

The CALL-INFO-RETENTION indication primitive shall contain the SS-CR parameters listed in table 4.

NOTE: The CALL-INFO-RETENTION indication does not indicate the details of the invoked supplementary services which are assumed to be kept by the originating SwMI.

Table 4: Parameters for the primitive CALL-INFO-RETENTION indication

Parameter	Indication
Basic Service	M
Called Party Identity	M
Call Priority	O

4.3 Parameter description

- Called Party Identity:
  - SSI;
  - Extension;
  - External Subscriber Number.

- Calling Party Identity:
  - SSI;
  - Extension;
  - External Subscriber Number.

- CR Identifier (CRI):
  - 000 dummy;
  - 001-101 normal values;
  - >101 reserved.

- Message Validity Timer:
  - 10s. to 2 weeks.

- Reject Cause:
  - service withdrawn;
  - service not subscribed to;
  - completion failure;
  - limit of requests against user B already reached;
  - interworking with a network which does not support SS-CR;
  - the CC-SS retention timer has expired;
  - call parameters cannot be matched;
  - Call reporting has not been performed within the message validity timer (delayed reject cause).

- SS-CR Accepted/Rejected:
  - Accepted;
  - Rejected.

- Time stamp used:
  - Yes;
  - No.

- Time stamp:
  - year;
  - month;
  - day;
  - hour (24 hours);
  - minutes.

5 Signaling protocol for the support of SS-CR

5.1 SS-CR Operational requirements

5.1.1 Requirements on the served user MS/LS

The served user MS/LS shall comply with the requirements in clause 14 of 300 392-2 [3] 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 [6].

5.1.2 Requirements on the originating SwMI

That SwMI shall support the served user MS/LS complying with the requirements for individual calls set in subclause 5.1.1.

If the call is over the ISI, the originating SwMI shall comply with the corresponding ISI requirements, set in EN 300 392-3-2 [5] for individual calls. It shall also comply with the relevant call unrelated in clauses 9 to 11 of EN 300 392-9 [6].

5.1.3 Requirements on the terminating SwMI

The terminating SwMI shall support the incoming individual call set-up and release as specified in ETS 300 392-2 [3].

Generic procedures for the call related control of supplementary services, as specified in EN 300 392-9 [6] shall apply. The generic procedures for the call independent control (connection oriented) of supplementary services as specified in EN 300 392-9 [6] shall apply.

If the call is over the ISI, the terminating SwMI shall comply with the corresponding ISI requirements, set in EN 300 392-3-2 [5] for individual calls. It shall also comply with the relevant call related requirements in clauses 9 to 11 of EN 300 392-9 [6].

5.1.4 Requirements on the affected user MS/LS

The affected (called) user MS/LS shall comply with the call setup and call release requirements of ETS 300 392-2 [3] clause 14. In addition, it shall comply with the relevant call unrelated requirements in clauses 7 and 11 of EN 300 392-9 [6].

5.2 SS-CR Coding Requirements

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

- Length: length of the sub-argument in bits;
- Type: element type (1, 2 or 3) described in subclause 14.7 of ETS 300 392-2 [3];
- C/O/M: conditional/optional/mandatory;
- Remark: comment or reference to note(s).

5.2.1 SS-CR PDUs

5.2.1.1 CALL-INFO-RETENTION PDU

The CALL-INFO-RETENTION PDU is sent the served user A MS/LS to the user application to indicate possible invocation of CR when user B is found to be either busy, no reply or not reachable and to retain basic call related parameters for that CR later invocation. CALL-INFO-RETENTION PDU shall contain the SS-CR information elements described in table 5.

Table 5: CALL-INFO-RETENTION PDU contents

Information element (Note 2)	Length	Type	C/O/M		Remark
SS-Type	6	1	M		Defined in EN 300 392-9 [6]
CR-PDU type	5	1	M		CALL-INFO-RETENTION indication
Basic Service	8	1	M		
Called Party SSI	24	1	M		note 1
Called Party Extension	24	1	M		
NOTE 1: User B present address; all elements of identity are mandatory to keep track of mobility; Called Party Type Identifier is not needed since full ITSI is always used.					
NOTE 2: Any other call related information that could allow better identify the disconnected call could be added (half duplex/duplex, call priority).					

5.2.1.2 CALL REPORT request PDU

The CALL REPORT request PDU shall be sent by the served user to the originating SwMI to invoke the CR supplementary service. This PDU shall include elements of the initial call request. The served user expects no response to that request. In the case of rejection of the request, the originating SwMI shall send a call report indication with a reject cause.

CALL REPORT request PDU shall contain the SS-CR information elements described in table 6.

Table 6: CALL REPORT request PDU contents

Information element	Length	Type	C/O/M		Remark
SS-Type	6	1	M		Defined in EN 300 392-9 [6]
CR-PDU type	5	1	M		CALL REPORT request
Basic Service	8	1	M		
Called User SSI	12	1	M		Last user B full ITSI.
Called user Extension	12	1	M		
CRI	3	1	M		
Message Validity Timer	5	1	O		note
NOTE: In the case where this timer value is not provided by the requesting user, the originating SwMI shall use a default value validity timer.					

5.2.1.3 CALL REPORT indication PDU

The CALL REPORT indication PDU shall be sent by the originating SwMI to the served user to indicate that the CR supplementary service request has been rejected and the cause of rejection. This response includes the CR identifier in case there are several Call Report invocations. The rejection source may be either in the calling SwMI or in the terminating SwMI.

CALL REPORT indication PDU shall contain the SS-CR information elements described in table 7.

Table 7: CALL REPORT indication PDU contents

Information element	Length	Type	C/O/M		Remark
SS-Type	6	1	M		Defined in EN 300 392-9 [6]
CR-PDU type	5	1	M		CALL REPORT indication PDU
CRI	3	1	C		note 1
Accepted/Rejected	1	1	M		note 3
Reject Cause	5	1	C		notes 2 and 4
NOTE 1: The CRI is attached to that instance of SS-CR for that calling party full identity and is global. The full User A MS/LS ITSI is not repeated in that CALL REPORT indication PDU since it is addressed to User A MS/LS only. NOTE 2: Conditional upon SS-CR Rejected. NOTE 3: There is no planned indication of "accepted"; only indication of "rejected" is expected. NOTE 4: There is presently no mechanism to indicate whether MS supports SS-CR; the class of MS element contents could allow that indication of supports but does not contain enough bits to do so at this time.					

5.2.1.4 CALL REPORTING indication PDU

The CALL REPORTING indication PDU shall be sent by the originating SwMI to the affected user in the case of busy and no reply to indicate to the affected user call report from the calling user A.

CALL REPORTING indication PDU shall contain the SS-CR information elements described in table 8.

Table 8: CALL REPORTING indication PDU contents

Information element	Length	Type	C/O/M		Remark
SS-Type	6	1	M		Defined in EN 300 392-9 [6]
CR-PDU type	5	1	M		CALL REPORTING indication PDU
Calling Party SSI	14	1	M		
Calling Party Extension	14	1	M		
Time stamp used	1	1	M		
Time stamp	24	1	C		note
NOTE: Shall be conditional on time stamp used equals to 1 (time stamp used yes).					

5.2.1.5 ISI-SS-CR indication PDU

The ISI-SS-CR indication PDU shall be sent by the terminating SwMI to the originating SwMI in the cases of busy, no reply and not reachable to indicate to the originating SwMI that SS-CR can be invoked in the terminating swMI against user B.

NOTE: In the case of user B not reachable, this indication may originate in home swMI of user B.

ISI-SS-CR indication PDU shall contain the SS-CR information elements described in table 8.

Table 9: ISI-SS-CR indication PDU contents

Information element	Length	Type	C/O/M		Remark
SS-Type	6	1	M		Defined in EN 300 392-9 [6]
CR-PDU type	5	1	M		ISI-SS-CR indication
Called Party SSI	12	1	M		
Called Party Extension	12	1	M		
SS-CR invocation possible	1	1	O		

5.2.2 TETRA PDU information element coding

5.2.2.1 Accepted/Rejected

The purpose of the SS-CR Accepted/Rejected information element shall be to indicate whether the SS-CR request has been accepted or not. It shall be encoded as defined in table 10.

Table 10: Accepted/Rejected information element contents

Information element	Length	Value	Remark
SS-CR Accepted/Rejected	1	0_2	accepted
		1_2	rejected

5.2.2.2 Called party extension

The purpose of the called party extension element shall be to indicate to the SwMI the extended part of the TSI address of the called user. It is encoded as defined in table 95 of ETS 300 392-2 [3], the contents of which is reproduced in table 11.

Table 11: Called party extension element contents

Information sub-element	Length	Value	Remark
Country Code	10		See ETS 300 392-1 [13], clause 7.
Network Code	14		See ETS 300 392-1 [13], clause 7.

5.2.2.3 Called party SSI

The purpose of the Called party SSI element shall be to indicate to the SwMI the SSI address of the called user. It is encoded as defined in table 96 of ETS 300 392-2 [3], the contents of which is reproduced in table 12.

Table 12: Called party SSI element contents

Information element	Length	Value	Remark
Short Subscriber Identity (SSI)	24		See ETS 300 392-1 [13], clause 7.

5.2.2.4 Calling party extension

The purpose of the called party extension element shall be to indicate to the SwMI the extended part of the TSI address of the called user. It is encoded as defined in table 95 of ETS 300 392-2 [3], the contents of which is reproduced in table 13.

Table 13: Calling party extension element contents

Information sub-element	Length	Value	Remark
Country Code	10		See ETS 300 392-1 [13], clause 7.
Network Code	14		See ETS 300 392-1 [13], clause 7.

5.2.2.5 Calling party SSI

The purpose of the Called party SSI element shall be to indicate to the SwMI the SSI address of the called user. It is encoded as defined in table 96 of ETS 300 392-2 [3], the contents of which is reproduced in table 14.

Table 14: Calling party SSI element contents

Information element	Length	Value	Remark
Short Subscriber Identity (SSI)	24		See ETS 300 392-1 [13], clause 7.

5.2.2.6 CR-PDU type

CR-PDU type indicates the type of the CR-PDU as defined in table 15.

Table 15: CR-PDU type information element contents

Information element	Length	Value	Remark
CR-PDU type	5	00000_2	See EN 300 392-9 [6]
		00001_2	See EN 300 392-9 [6]
		00010_2	See EN 300 392-9 [6]
		00011_2	See EN 300 392-9 [6]
		00100_2	See EN 300 392-9 [6]
		00101_2	CALL-INFO-RETENTION
		00110_2	CALL-REPORT request
		00111_2	CALL-REPORT indication
		01000_2	CALL-REPORTING indication
		$>01000_2$	Reserved

5.2.2.7 CRI

The purpose of the call report identifier CRI element shall be to identify a specific invocation of call report supplementary service. It shall be encoded as defined in table 16. A maximum number of SS-CR invocation is set to 5.

Table 16: Call report identifier information element contents

Information element	Length	Value	Remark
Call Report Identifier CRI	3	000_2	dummy CR identifier
		001_2-101_2	identifies CR invocation uniquely for a given calling User A MS/LS
		$>101_2$	Reserved

5.2.2.8 Message Validity Timer

The Message Validity Timer information element shall indicate the length of time after receiving a CALL-REPORT request PDU that the SwMI should attempt to deliver the message. If this timer expires, the SwMI shall stop delivery attempts and may report message failure to the sending MS. The values shall be as defined in table 17. The maximum error of the validity period should be less than 40 %.

Table 17: Validity period information element contents

Information element	Length	Value	Remark
Validity period (VP)	5	0	No validity period (note 1)
		1 to 6	VP x 10 seconds (note 2)
		7 to 10	(VP - 5) x 1 minute (note 3)
		11 to 16	(VP - 10) x 10 minutes (note 4)
		17 to 21	(VP - 15) x 1 hour (note 5)
		22 to 24	(VP - 20) x 6 hour (note 6)
		25 to 30	(VP - 24) x 2 day (note 7)
		31	Infinite validity period (note 8)
NOTE 1: In this case, the SwMI should attempt to deliver the message. If unsuccessful, the message is dropped.			
NOTE 2: 10 second intervals up to 60 seconds.			
NOTE 3: 1 minute intervals up to 5 minutes.			
NOTE 4: 10 minute intervals up to 1 hour.			
NOTE 5: 1 hour intervals up to 6 hours.			
NOTE 6: 6 hour intervals up to 24 hours.			
NOTE 7: 2 day intervals up to 12 days.			
NOTE 8: In this case, the SwMI should attempt to deliver the message until expiry of a network dependant maximum time.			

NOTE: The coding of this information element is identical to the SDS-TL Validity Period.

5.2.2.9 Reject Cause

Reject Cause information element is a generic information element which regroups Reject Causes common to several PDUs; some of the values may not apply to some PDUs. Reject Cause information element shall be encoded as defined in table 18.

Table 18: Reject Cause information element contents

Information element	Length	Value	Remarks
Reject Cause	5	00000_2	Rejected for any reason
		00001_2	Service not subscribed to
		00010_2	Service withdrawn
		00101_2	Completion failure
		00100_2	Interworking with a network that does not support SS-CR
		00101_2	Invalid PDU contents (Note)
		00110_2	Maximum number of invocations exceeded (locally or remotely)
		00111_2	The CC-SS retention timer has expired
		01000_2	Network congestion
		01001_2	Call reporting failed due to expiration of message validity timer
		01010_2	Supplementary service interaction not allowed
		01011_2	Call parameters cannot be matched
		$>01010_2$	Reserved
NOTE: The PDU contents may be found invalid e.g.: - when some information element values do not exist; or because - the structure of an air interface PDU is wrong, e.g. O-bit or M-bit absent (see subclause 14.7 of ETS 300 392-2 [3]).			

5.2.2.10 SS-CR Invocation Possible

SS-CR Invocation Possible indicates whether invocation of SS-CR by the terminating or optionally by the user B home SwMIis possible.

NOTE: As an implementation option, the same information element could be used by the called user B MS/LS.

Table 19: SS-CR Invocation Possible

Information element	Length	Value	Remark
SS-CR Invocation Possible	1	0_2 1_2	SS-CR invocation not possible SS-CR invocation possible

5.2.2.11 SS-Type

SS-Type indicates the type of supplementary service to which the PDU belongs. The coding of the information element SS type is defined in table 5 of EN 300 392-9 [6] and is recalled in table 20 where SS-CR is highlighted.

Table 20: SS type information element contents

Information element	Length	Value	Remark
SS type	6	…/…	
		02	CR Call Report
		…/…	

5.2.2.12 Time stamp

The Time stamp information element shall indicates as defined in table 21 the (approximate) creation time of the message. The information element is added to a message by the SwMI to allow the destination to evaluate the age of the message.

Table 21: Time stamp information element contents

Information element	Length	Type	C/O/M	Remark
Reserved	4	1	M	Note
Month	4	1	M	1-12
Day	5	1	M	1-31
Hour	5	1	M	0-23
Minute	6	1	M	0-59
NOTE: This field is inserted to ensure that the following elements are aligned to octet boundaries and so ease processing by the application. The field shall be set to "0000_2" by default.				

NOTE: Time stamp coding is the same as the time stamp used in SDS-TL.

5.2.2.13 Time stamp used

The Time stamp used information element shall indicates as defined in table 25 the (approximate) creation time of the message. The information element is added to a message by the SwMI to allow the destination to evaluate the age of the message.

Table 22: Time stamp used information element contents

Information element	Length	Type	C/O/M	Remark
Time stamp used	1	1	M	Value 1 used (=yes); Value 0 not used (=no).

5.2.3 Additional coding requirements over the ISI

The remote operations (RO) protocol is defined in CCITT Recommendations X.219 [7] and X.229 [10]. 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 are 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.

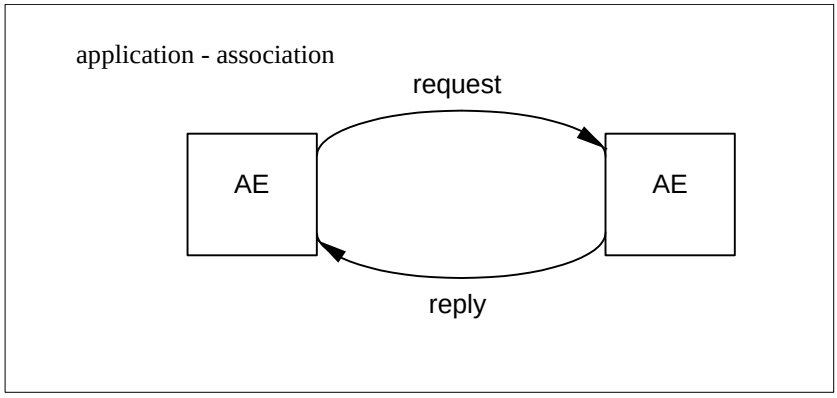


Figure 1: Remote Operations Model

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 this SS-CR Application Protocol ETS.

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: 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.

This ETS 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 Recommendation X.217 [8].

The following shall apply for the PSS1 facility information element carrying an APDU of the ROSE operation used by ANF ISISS for SS-CR 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 CALL-REPORT request which expect a reply CALL-REPORT indication, the TETRA PDU such as CALL-REPORT 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 subclause 8.4.1 of ETS 300 392-3-1 [4]. The expected information flow CALL-REPORT indication TETRA PDU shall be encoded in the IsiArgument tetraMessage IMPLICIT OCTET STRING of an other ROSE Invoke APDU (in the opposite direction) defined in the same subclause.

In the case of unconfirmed information flows such as CALL-REPORTING indication, the TETRA PDU such as FREE-NOTIFICATION shall be encoded in the IsiArgument tetraMessage IMPLICIT OCTET STRING of the ROSE Invoke APDU in support of TETRA encoding PDU as defined in subclause 8.4.1 of ETS 300 392-3-1 [4].

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

5.3 SS-CR State Definitions

5.3.1 States at User A MS/LS

5.3.1.1 SS-CR-Idle

5.3.1.2 Wait-SS-CR

User A MS/LS has received the call parameters needed for the SS-CR Request which has not yet been invoked.

5.3.2 States at User A SwMI

The procedures for the Originating SwMI are written in terms of the following conceptual states existing within the SS-CR Supplementary Service Control entity in that SwMI in association with a particular CR Request.

5.3.2.1 SS-CR-Idle

5.3.2.2 Call-Retention-Active

This state exists while call retention timer is running, call information retention has been initiated for User A MS/LS.

5.3.2.3 Call-Alerting-Active

This state exist while ALERTING is being presented to user A MS/LS.

5.3.3 States at User B SwMI

5.3.3.1 SS-CR-Idle

5.3.4 States at User B MS/LS

5.3.4.1 SS-CR-Idle

5.4 SS-CR Signaling Procedures

5.4.1 Actions at User A MS/LS

The actions at calling user A MS/LS are shown in the SDL diagram of clause A.1.

5.4.1.1 Normal Procedures

5.4.1.1.1 User B busy

The call related information retained by the User A MS/LS application shall contain all available basic call information needed to identify the call at the time Call Report is invoked. In relation to the initial call, it consists of:

- Called User full ITSI; and
- Basic service information; and
- Call priority; and
- Called party address information.

NOTE: Any additional information that helps identifying the last unsuccessful call could be added; TETRA call identifier is local, is lost in restoration procedure and is not kept by the MS/LS after a call release.

The originating SwMI stores the same data for the duration of the call retention timer. The originating SwMI may restrict the number of calls that can simultaneously be subject to the call information retention procedure.

On operation of SS-CR that requires the call information, the SwMI shall add the relevant supplementary services invoked to the call information available for SS-CR from User A MS/LS.

To invoke SS-CR, User A MS/LS shall send a CALL REPORT request PDU which includes called user full ITSI, a CRI (Call Report Identifier), basic service and on option call priority and area selection and/or any data that improves the "post-disconnect" identification of the call to the originating SwMI, using the procedures of a call unrelated facility in ETS 300 392-2 [3]. User A MS/LS shall retain the CRI parameter for further reference.

Upon expiration of the call retention timer (SS-CC timer), the calling user MS/LS invocation of SS-CR will not be successful. At the expiration of a timer the value of which is implementation dependent, the MS/LS user application shall release all information relating to that SS-CR invocation.

5.4.1.1.2 User B no reply

The call related information retained by the User A MS/LS application in order to invoke SS-CR shall contain all available basic call information needed to identify the call at the time Call Report is invoked. In relation to the initial call, it consists of:

- Called User full ITSI; and
- Basic service information; and
- Call priority; and
- Called party address information.

NOTE: Any additional information that helps identifying the last unsuccessful call could be added; TETRA call identifier is local, is lost in restoration procedure and is not keep by the MS/LS after a call release.

This call related information is also stored by the originating SwMI for the duration of the SS-CC call retention timer.

To invoke SS-CR, user A shall send a CALL REPORT request PDU including the list of parameters described above to the originating SwMI, using the procedures of a call unrelated facility in ETS 300 392-2 [3].

User A shall retain the CRI parameter for further reference.

5.4.1.1.3 User B not reachable

The call related information retained by the User A MS/LS application in order to invoke SS-CR shall contain all available basic call information needed to identify the call at the time Call Report is invoked. In relation to the initial call, it consists of:

- Called User full ITSI; and
- Basic service information; and
- Call priority; and
- Called party address information.

NOTE: Any additional information that helps identifying the last unsuccessful call could be added; TETRA call identifier is local, is lost in restoration procedure and is not keep by the MS/LS after a call release.

This call related information is also stored by the originating SwMI for the duration of the SS-CC call retention timer.

To invoke SS-CR, user A shall send a CALL REPORT request PDU including the list of parameters described above to the originating SwMI, using the procedures of a call unrelated facility in ETS 300 392-2 [3].

User A shall retain the CRI parameter for further reference.

5.4.1.2 Exceptional Procedures

5.4.1.2.1 Called user B busy

In the case where user A MS/LS has not subscribed to SS-CR, user A MS/LS will receive a CALL REPORT indication PDU with a rejected information element and a reject cause indicating not subscribed.

In the case where user A MS/LS requests SS-CR in a CALL REPORT request PDU after the expiry of timer T1 (Call retention timer), user A MS/LS will receive CALL REPORT indication PDU with a rejected information element and a reject cause call retention timer expired.

If the originating SwMI cannot accept the CALL REPORT request PDU because User A MS/LS has provided invalid TETRA Call parameters (as compared to the last call not successfully connected), then the originating SwMI shall send a CALL REPORT indication PDU with a Reject Cause "Call parameters cannot be matched" using the procedure in clause 14 of ETS 300 392-2 [3]. User A MS/LS application shall remove knowledge of all call related parameters.

If the originating SwMI cannot accept the CALL REPORT request because queue A is full (number of maximum CR requests reached), then the originating SwMI shall send a CALL REPORT indication PDU with a Reject Cause "Maximum number of invocations exceeded (locally or remotely)" using the procedure in clause 14 of ETS 300 392-2 [3].

If the terminating SwMI cannot accept the CALL REPORT request because queue B is full (number of maximum CR requests reached), then the originating SwMI shall send a CALL REPORT indication PDU with a Reject Cause "Maximum number of invocations exceeded (locally or remotely)" using the procedure in clause 14 of ETS 300 392-2 [3].

5.4.1.2.2 Called user B no reply

Same as subclause 5.4.1.2.1.

5.4.1.2.3 Called user not reachable

Same as subclause 5.4.1.2.1.

5.4.2 Actions at calling user A SwMI

The SDL representation of procedures at the originating SwMI is shown in figure A.2.

5.4.2.1 Normal Procedures

5.4.2.1.1 Called user B busy

In order that User A MS/LS who has subscribed to SS-CR may invoke the service when a busy destination B is encountered, it is necessary for the originating SwMI to use the call information retention procedure. The originating SwMI shall provide the call information retention procedure as described below when the following conditions apply:

- SS-CR subscribed to for user A;
- call failure cause is busy;
- SS-CR is available at the destination SwMI;
- User A MS/LS CR queue limit has not been reached; and
- there are no other supplementary services that preclude CR.

NOTE 1: The condition that SS-CR has not been invoked for an identical call is not required in the case of TETRA CR.

NOTE 2: These conditions do not prevent the originating SwMI from providing the call retention procedures in other circumstances.

NOTE 3: The information SS-CR available at destination SwMI is obtained as part of the ISI-DISCONNECT with the associated flow ISI-SS-CR.

Furthermore, the originating SwMI shall retain the following information provided by terminating SwMI in order to decide if SS-CR is permitted or not:

- call failure reason; and
- CR available indication.

When interacting with other supplementary services, retention of further information may be mandatory.

Call information retention

The call information retention procedure is used for a specific call if a supplementary service which needs the call information may be in operation for that call. This procedure is described in generic terms so that it could be picked up by other supplementary services.

To provide the call information retention procedure, the calling user A SwMI shall:

- retain all the call information of the call just released; and
- start SS-CC Timer.

The originating SwMI may restrict the number of calls that can simultaneously be subject to the call information retention procedure.

The TETRA call identifier cannot be used in the CR context as a sufficient identifier due to possible call-restoration.

On operation of SS-CR that requires the call information, the SwMI shall add the relevant supplementary services invoked to the call information available for SS-CR from User A MS/LS.

At the expiration of the call information retention timer, the SwMI shall release the call information and the TETRA call identifier which becomes available for other calls. If the originating SwMI releases the call information on operation of SS-CR, the originating SwMI shall stop timer T1, releases the TETRA Call Identifier parameter and make the value available for subsequent use, release unwanted retained call information.

On receiving this CALL REPORT request PDU and after checking its validity, the originating SwMI shall send CALL REPORT indication PDU to the user A MS/LS with the same CRI value as was presented in the request from the user A MS/LS, and shall send to the terminating SwMI the CALL-REPORT request.

NOTE: The CALL-REPORT indication may either be locally generated and provided within a short time delay or generated remotely at the end of the message validity timer with a relatively long time delay.

5.4.2.1.2 Called user B no reply

In order that user A who has subscribed to SS-CR may invoke the service when a destination B, which does not answer a call, is encountered, it is necessary for the originating SwMI to use the call information retention procedure. The originating SwMI shall provide the call information retention procedure as described below when the following conditions apply:

- CR subscribed;
- alerting indication has been received from user B;
- SS-CR is available at the destination SwMI;
- user A CR queue limit has not been reached; and
- there are no other supplementary services that preclude CR.

NOTE 1: The condition that CR has not been invoked for an identical call is not required in the case of TETRA CR.

NOTE 2: These conditions do not prevent originating SwMI from providing the call retention procedures in other circumstances.

NOTE 3: SS-CR is available at the destination SwMi is provided as an implementation option by the ISI-SS-CR flow.

NOTE 4: There is only one queue for SS-CR requests regardless of the source of the original call failure.

The call related information that shall be retained by the user A SwMI shall be, in relation to the initial call:

- list of invoked supplementary services.

Furthermore, the originating SwMI shall retain the following information provided by terminating SwMI in order to decide if CR is permitted or not:

- call failure reason; and
- SS-CR available indication.

When interacting with other supplementary services, retention of further information may be mandatory.

On receiving this CALL REPORT request PDU and after checking its validity, the originating SwMI shall send ISI-CALL REPORT request PDU to the terminating SwMI and shall send a CALL REPORT indication PDU to the user A MS/LS with a CRI value.

NOTE 5: It is assumed that there is only one SS-CR invocation attempt and that this attempt is not repeated.

5.4.2.1.3 Called user B not reachable

In the case where user A originating SwMI receives an ISI-DISCONNECT with a cause called user not reachable, it will present the call retention parameters in the same way and in the same content as in subclause 5.4.2.1.1 (user B busy); presentation will happen at disconnect time and that the situation will be similar to the user B busy case; user A shall be allowed to invoke SS-CR during timer T1 for call retention and using CALL REPORT request PDU.

5.4.2.2 Exceptional procedures

5.4.2.2.1 Called user B busy

If the originating SwMI receives a CALL REPORT request that it determines to be identical to an outstanding CALL REPORT request in queue A, the originating SwMI will not reject the request but will reset timers relating to that identical request and will not increment the number of CALL REPORT requests.

To determine whether the new CALL-REPORT request and a CALL REPORT request in queue A are identical, the following basic call information shall be compared:

- Basic Service Information; and
- Calling Party Address; and
- Called Party Address; and
- Call Priority; and
- Area Selection.

If the originating SwMI cannot accept the CALL REPORT request because there are invalid supplementary service(s) interactions between SS-CR and the call identified by the TETRA Call Identifier, then the originating SwMI shall send a CALL REPORT indication PDU with a Reject Cause "Supplementary service interaction not allowed" using the procedure in clause 14 of ETS 300 392-2 [3].

If the originating SwMI cannot accept the CALL REPORT request identified by the call parameters because SS-CR is not available at the terminating SwMI, then the originating SwMI shall send a CALL REPORT indication PDU with a Reject Cause "SS-CR not provided remotely" (a long term denial) using the procedure in clause 14 of ETS 300 392-2 [3].

NOTE: This includes the case where the terminating SwMI did not indicate that CR was available when the call failed, and the case that the request for SS-CR was rejected by the terminating SwMI.

If establishment of the call independent signaling connection fails or if the answer is a return error PDU or a reject PDU, a failure indication shall be given to User A MS/LS, and the Originating SwMI shall return to state CR-Idle.

In the case where the originating SwMI receives from the terminating SwMI, an indication that the call reporting message has not been "consumed" by the destination MS/LS at the expiration of the message validity timer, the user B home SwMI shall present to the calling user A MS/LS a delayed reject cause with reject cause "call reporting failed due to expiration of message validity timer".

5.4.2.2.2 Called user B no reply

See subclause 5.4.2.2.1.

SS-CR may be invoked either while SwMI is still presenting U-ALERT to user A MS/LS or once alerting has stopped.

5.4.2.2.3 Called user B not reachable

Same as subclause 5.4.2.2.1 replacing busy by not reachable.

5.4.3 Actions at user B terminating SwMI

The actions at user B terminating SwMI are described in the SDL diagrams in clause A.3.

5.4.3.1 Normal procedures

5.4.3.1.1 Called user B busy

In the case where the called user B SwMI determines that the user B is busy, user B SwMI shall send an ISI-DISCONNECT PDU to the user A SwMI with a disconnect cause "user B busy"; if user B SwMI is able to support SS-CR against user B at this time, it shall send in a facility the PDU ISI-SS-CR with the information element SS-CR invocation possible set to 1 indicating that SS-CR is available for this call and this user.

In the case where user B terminating SwMI receives an ISI-CALL-REPORT request PDU, the terminating SwMI shall check user B ITSI. Regardless of whether user B MS/LS supports SS-CR, is equipped with a display or not, user B SwMI shall present CALL REPORTING indication PDU in a D-FACILITY with an optional time stamp information element. In the case where user B SwMI can determine that user B MS/LS either does not support SS-CR or is not equipped with a display, and as an implementation option, the terminating SwMI shall present a notification element in a call unrelated signalling to indicate that user B has received a call while it was determined to be busy. This notification does not include the calling user identity and does not include any time stamp.

NOTE 1: CALL REPORTING PDU may be considered as presented to the MS/LS when the layer 2 exchange corresponding to the presentation of that PDU is successfully acknowledged. The layer 2 acknowledgement in no way indicates that the user B MS/LS application has "consumed" the CALL REPORTING indication PDU; it only indicates that that PDU has reached the MS/LS.

NOTE 2: User B MS/LS application may then request from a call centre the information about the calling user identity.

NOTE 3: The provision of the CALL REPORTING indication by other means than a PDU to the user B MS/LS (e.g. voice message) while not excluded by this ETS is outside the scope of this ETS.

5.4.3.1.2 Called user B is no reply

In the case where the terminating SwMI sends to the originating SwMI an ISI-ALERTING to indicate that the call is proceeding but that no reply has been obtained from user B called MS/LS, the terminating SwMI shall indicate that SS-CR may be invoked for that call by sending the ISI-SS-CR PDU in a facility.

Either while ISI-ALERTING is still being presented by the terminating SwMI to the originating SwMI or while ISI-ALERTING has been discontinued as a result of the expiration of the no reply timer, the terminating SwMI may receive from the originating SwMI an ISI-CALL-REPORT request PDU in a call unrelated facility. The terminating SwMI shall start the message validity timer upon receipt of this CALL REPORT request PDU and will repeatedly try to present CALL-REPORTING PDU. CALL REPORTING PDU shall be considered as presented to the MS/LS when the layer 2 exchange corresponding to the presentation of that PDU is successfully acknowledged.

NOTE: The layer 2 acknowledgement in no way indicates that the user B MS/LS application has "consumed" the CALL REPORTING indication PDU; it only indicates that that PDU has reached the MS/LS.

5.4.3.1.3 Called user B is not reachable

In the case where user B has not been reachable for a long term, the terminating SwMI will have reported to the home SwMI that user B is not reachable (power off, out of reach of user B SwMI, etc…). In that case, the CALL REPORT request PDU shall be forwarded to user B home SwMI by the terminating SwMI; user B home SwMI shall store the CALL REPORT request PDU with the associated optional message validity timer; as long as the message validity timer is running, user B home SwMI monitors user B for becoming reachable; as soon as user B is reported reachable in a terminating SwMI (which may be different from the original terminating SwMI and/or different from the user B home SwMI), the home SwMI shall send a call unrelated ISI-CALL-REPORT request PDU in a facility. Upon sending that ISI-CALL-REPORT request to the new user B visited SwMI, user B SwMI shall stop the message validity timer and shall delete all informations pertaining to that SS-CR invocation. The terminating SwMI where user B has now registered shall present to user B MS/LS the CALL REPORTING indication PDU at the air interface. The new terminating SwMI (FE25' in stage 2) shall then present to the reachable user B the CALL REPORTING indication PDU with the original time stamp as an option.

In the case where user B has become reachable, the CALL REPORTING indication PDU shall be considered as delivered if a layer 2 acknowledgement corresponding to the PDU transmission is received by the terminating SwMI. Once this acknowledgement is received, the terminating SwMI shall stop the message validity timer and erase all parameters related to that particular SS-CR invocation.

In the case where user B has just become not reachable, the terminating SwMI shall store the CALL REPORT request PDU for a short duration as well as the message validity timer; after expiration of that short duration (value implementation dependent; could be null), the terminating SwMI shall proceed to declare user B not reachable for a long term and will proceed as described in the paragraph above.

5.4.3.2 Exceptional procedures

In all cases of Called user B busy, no reply and short term not reachable, the terminating SwMI and in the case where the number of outstanding call reporting requests against user B is exceeded, the terminating SwMI shall reject a new CALL-REPORT request indication PDU with a reject cause : Rejected due to number of SS-CR invocation exceeded (locally or remotely).

5.4.3.2.1 Called user B is busy

In the (exceptional) case where user B is found busy but that the terminating SwMI cannot present CALL-REPORTING indication PDU during the message validity timer, the terminating SwMI shall indicate to the originating SwMI that SS-CR failed due to expiration of the message validity timer.

5.4.3.2.2 Called user B is no reply

In the case where no acknowledgement of user B layer 2 reception of the CALL REPORTING indication PDU has been received by the terminating SwMI and where the message validity timer expires, the terminating SwMI shall send to the originating SwMI a CALL-REPORT indication with a rejected value and a reject cause "failure due to expiration of message validity timer".

NOTE: The distinction between this case and the not reachable case is debatable.

In the case where user B SwMI can determine that the user B MS/LS does not support SS-CR (no display for example), the terminating SwMI shall not present CALL REPORTING indication PDU to the user B MS/LS and shall present instead a notification to the user B MS/LS.

5.4.3.2.3 Called user B is not reachable

In the case where user B remains not reachable for the duration of the message validity timer running, and in the case where this message validity timer expires, the user B home SwMI shall send a CALL REPORT indication over ISI to the originating SwMI with SS-CR rejected and reject cause: "expiration of message validity timer".

NOTE: The signalling connection between the originating SwMI and either the terminating SwMI or the home user B SwMI may need to be re-established.

5.4.4 Actions at User B MS/LS

Actions at User B MS/LS are described in SDL diagrams in clause A.4.

5.4.4.1 Normal procedures

In the case where user B is busy or no reply, the user B MS/LS shall receive the call unrelated CALL REPORTING indication PDU and shall display it.

In the case where user B is not reachable, it will not be informed of any outstanding CALL REPORTING indication as long as user B MS/LS is not reachable.

5.4.4.2 Exceptional procedures

In the case where user B MS/LS does not support SS-CR, user B MS/LS shall either reject the CALL REPORTING indication PDU as invalid PDU or shall ignore it.

5.5 Impact of inter-working with public ISDN

There is no equivalent Call Report Supplementary Service in the Public ISDN; a request towards a call report towards public ISDN for an outgoing call shall be rejected by the TETRA Gateway. Since this supplementary service does not exist in public ISDN, it will not be invoked for an incoming call from public ISDN towards TETRA.

NOTE: There exists similar services such as "Message Waiting" in public ISDN but the interaction with such supplementary services are outside the scope of this ETS.

5.6 Protocol Interaction between SS-CR and Other Supplementary Services and ANFs

This subclause specifies protocol interactions with other supplementary services and ANFs for which stage 3 TETRA European Standards had been published at the time of publication of this ETS. For interactions with supplementary services and ANFs for which stage 3 ETSs are published subsequent to the publication of this ETS, see those other stage 3 ETSs.

NOTE 1: Additional interactions that have no impact on the signalling protocol neither at the air interface nor at the ISI can be found in the relevant stage 1 description standards.

NOTE 2: Simultaneous conveyance of APDUs for SS-CR and another supplementary service or ANF in the same message, each in accordance with the requirements of its respective stage 3 International Standard, does not, on its own, constitute a protocol interaction.

NOTE 3: Interactions between supplementary services that have been indicated in stage 1 ETS 300 392-10-2 [11] as not applicable or there is no interaction have not been repeated here.

5.6.1 Area Selection

If user B is outside of the selected area, there is no call set up and the invocation of SS-CR shall not be possible.

If user B is not reachable, but subsequently reappears outside the selected area, then the SS-CR information may be forwarded.

If user B is not reachable, but subsequently reappears within the selected area, then the SS-CR information shall be forwarded.

5.6.2 CAD

If, in the case when the dispatcher has not answered the intercepted call and subsequently, the served user has invoked the SS-CR, then the invocation shall be rejected.

In the case where the dispatcher has previously authorized the call, then there shall be no interaction.

5.6.3 CFB

If the call from user A to user B is diverted to user C by SS-Call Forwarding on Busy (CFB) and user C is busy or does not answer or is not reachable, then a SS-CR request made by user A shall be applied to the originally called user B.

5.6.4 CFNRy

If the call from user A to user B is diverted to user C by SS-Call Forwarding on No Reply (CFNRy) and user C is busy or does not answer or is not reachable, then a SS-CR request made by user A shall be applied to the originally called user B.

5.6.5 CFNRc

If the call from user A to user B is diverted to user C by SS-Call Forwarding on Not Reachable (CFNRc) and user C is busy or does not answer or is not reachable, then a SS-CR request made by user A shall be applied to the originally called user B.

5.6.6 CFU

If the call to user B is diverted to user C by SS-Call Forwarding Unconditional (CFU) and user C is busy, does not answer or is not reachable, then a SS-CR request from user A shall be applied to the diverted-to user C.

5.6.7 CLIR

SS-CR shall override SS-CLIR; if the calling user invokes SS-CR this shall take precedence over any SS-CLIR subscription option; moreover, SS-CR is call unrelated and occurs at a time when SS-CLIR is idle due to the non successful completion of the call.

5.6.8 DL

In case SS-CR is invoked for an unsuccessful SS-DL monitoring call, this call report request shall be ignored by the originating SwMI.

5.6.9 Interaction with Inter System Interface (ANF ISI-IC)

There is no ISI call retention defined timer; moreover, the signalling connection may be released as soon as the ISI call release is indicated. In order to transport the ISI-CALL-REPORT request PDU in a call unrelated facility, a new signalling connection may need to be established.

In the case where an ISI-DISCONNECT is received with not reachable, the originating SwMI shall send the CALL-REPORT request PDU to the home SwMI of the called user B in a call unrelated facility as described in EN 300 392-9 [6].

NOTE: ANF ISI-IC refers to ISO/IEC 11572 [9] timers.

5.6.10 Interactions with ISI Mobility Management (ANF ISIMM)

5.6.10.1 Calling user A migrates

The calling user may migrate either prior to invocation of SS-CR or after invocation of SS-CR. Note that if calling user A migrates either before invocation of SS-CR or after expiration of the message validity timer, the migration process is a normal migration process. In the description below, it is assumed that the proper invocation of SS-CR has occurred before expiration of the call retention timer and that the message validity timer has not yet expired at the time of the migration.

NOTE: The case where user A migrates during the running of the call retention timer and prior to sending the CALL-REPORT request will lead to a failure of the eventual SS-CR invocation in the new SwMI; the new SwMI has not started its own call retention timer and does not necessarily recognizes the call parameters needed to invoke SS-CR.

5.6.10.1.1 Calling user A migrates to a SwMI which does not support SS-CR

Calling user A who has invoked SS-CR will not get the indication that the call reporting was not delivered within the message validity timer; beside this exception, the operation of SS-CR is not affected by this migration.

5.6.10.1.2 Calling user A migrates to a SwMI which supports SS-CR

As part of the migration process, the new SwMI shall inform the user A home SwMI that user A has now registered in the new SwMI; the new SwMI will obtain from the home SwMI the profile indicating that SS-CR has been invoked against called user B for user A and will provide the new SwMI with the message validity timer value. It is not necessary for user A home SwMI to provide the whole set of parameters concerning the call since the SS-CR invocation has been completed. Only the CRI (Call Report identifier) will need to be passed to the new user A SwMI.

5.6.10.2 Called user B migrates

5.6.10.2.1 Called user B migrates to a SwMI which does not support SS-CR

5.6.10.2.2 Called user migrates to a swMI which supports SS-CR

The new visited terminating SwMI for user B shall receive from the home SwMI the information that user B MS/LS supports SS-CR using table 167 of ETS 300 392-2 [3] modified as in clause above. In the case where the user B MS/LS does not support SS-CR, the new visited terminating SwMI shall reject any SS-CR request.

In the case where the user B is declared non reachable (in a long term condition), user B home SwMI shall store the CALL REPORT request and shall monitor for user B becoming reachable again. Once user B becomes reachable again and message validity timer T2 has not expired, the home SwMI shall send the CALL REPORT request to the terminating SwMI where the user B has registered.

In the case where the message validity timer T2 expires and the user B home SwMI has not been able to present to user B MS/LS the CALL REPORTING PDU, the user B home SwMI shall send to the originating SwMI a CALL REPORT indication with rejected due to expiration of the message validity timer.

In the case where the calling user migrates during the call retention timer from the originating SwMI to a new visited SwMI, it will not be possible to invoke SS-CR.

5.7 Parameter values (timers)

T321: Call retention timer: also called CC-SS timer. This timer is started when information retention occurs as a result of an uncompleted call to either a busy subscriber, a no reply subscriber or a not reachable subscriber and stopped on receipt of CALL REPORT Request from user A MS/LS.

NOTE 1: This timer is common to several supplementary services and may be reset by another supplementary service such as either SS-CCBS or SS-CCNR.

If timer T321 expires, the call information retention is terminated, the call related information is released and user A MS/LS SS-CR invocation will be rejected. Timer T1 shall have a value above 15 seconds and is defined in ETS 300 392-2 [3].

NOTE 2: There is only one SS-CC call retention timer (T321) common to all supplementary services for one MS/LS. In the case that there are two supplementary services which can be invoked by the same MS/LS user application say SS-CCBS and SS-CR, the timer should run to its full value as long as there is one subscribed supplementary service the invocation of which is still pending. invocation of one of the two supplementary services (say SS-CCBS) will not stop the call retention timer so that an invocation of the second supplementary service (say SS-CR) is still possible. There is no reason to have several timers for each supplementary services.

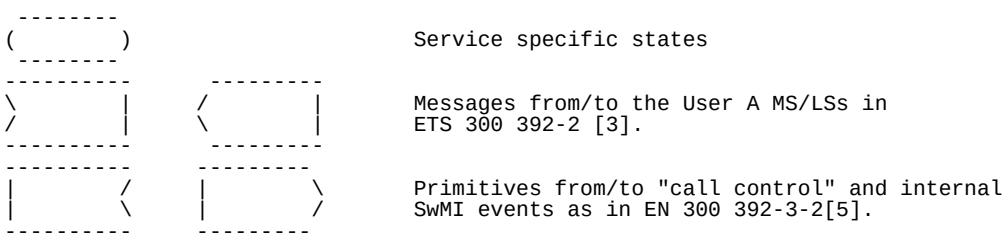
T2: Message validity timer: this timer T2 is started upon receipt by either the terminating SwMI or the user B home SwMI of the CALL-REPORT request PDU; this timer is terminated when the CALL-REPORTING PDU is presented to the called user MS/LS B.

If timer T2 expires, either the terminating SwMI or user B home SwMI shall delete the CALL REPORT request and any call related parameters.

Annex A (informative): SDL Representation of Procedures

The dynamic description specified in figures A.1 to A.4 are according to ITU-T Recommendation Z.100 [2].

A.1 SS-CR calling user side process SDL diagrams



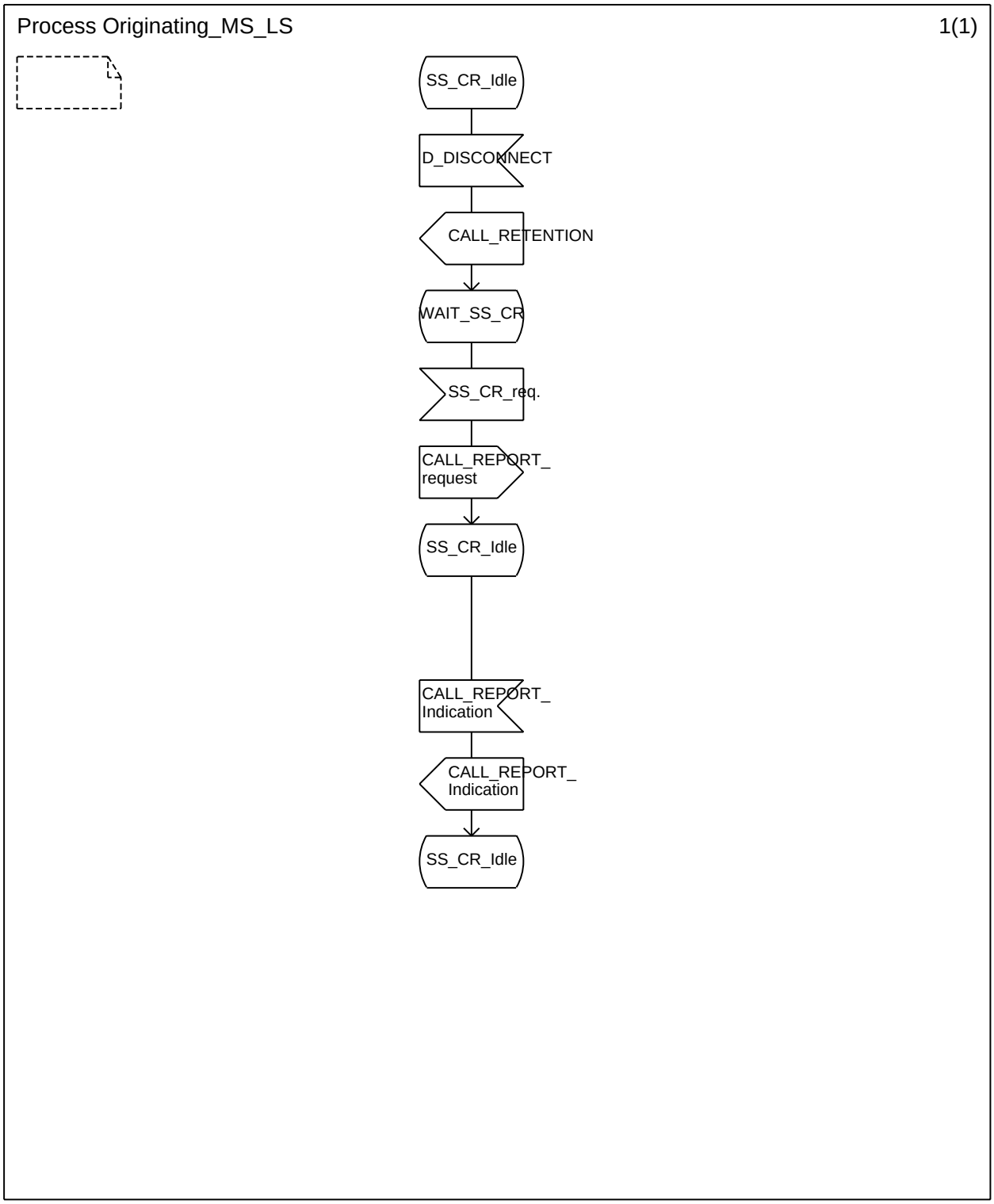


Figure A.1: SS-CR Calling User A SDL

A.2 SS-CR Originating SwMI process SDL diagrams

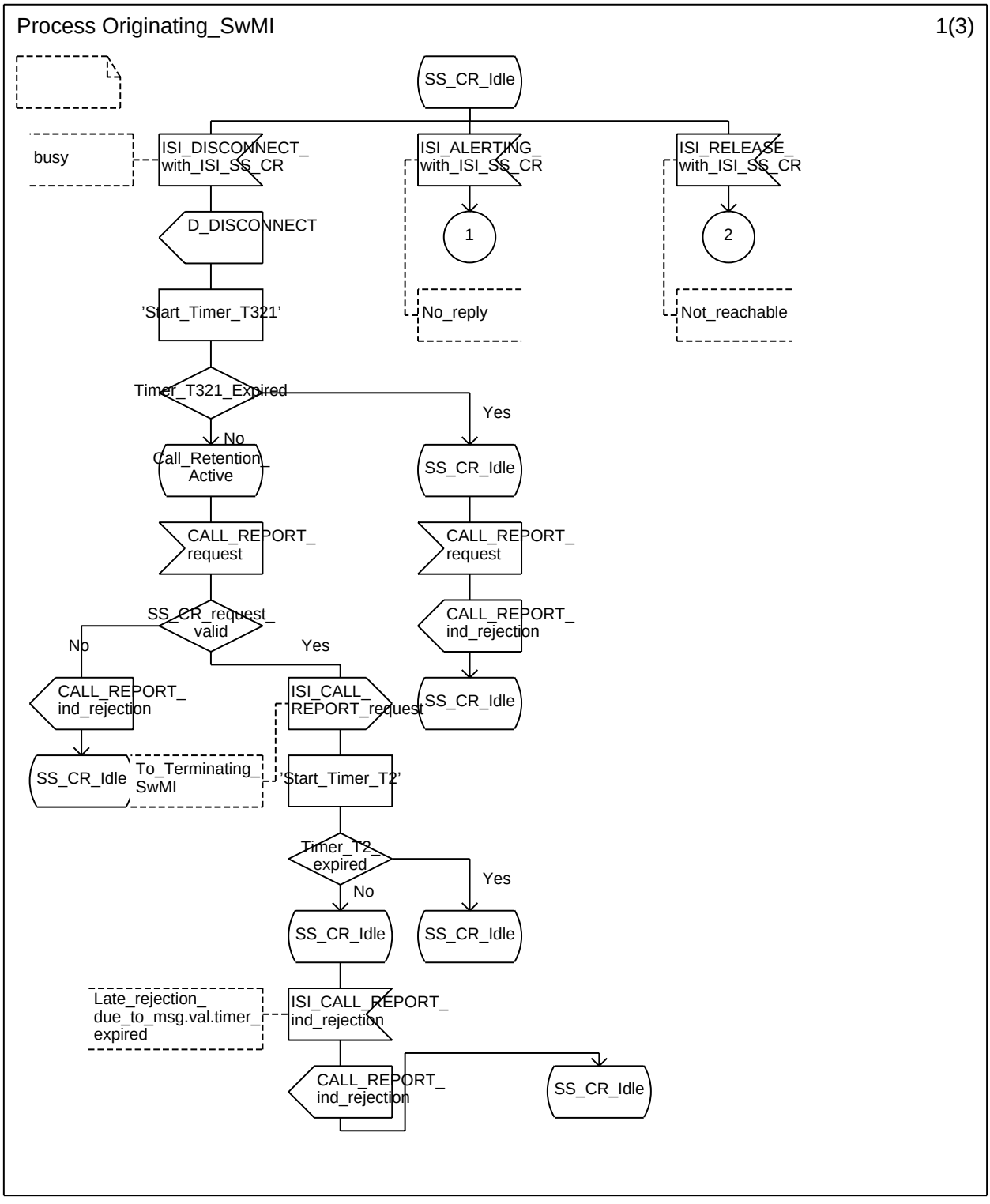


Figure A.2 (sheet 1 of 3): SS-CR Originating SwMI SDL

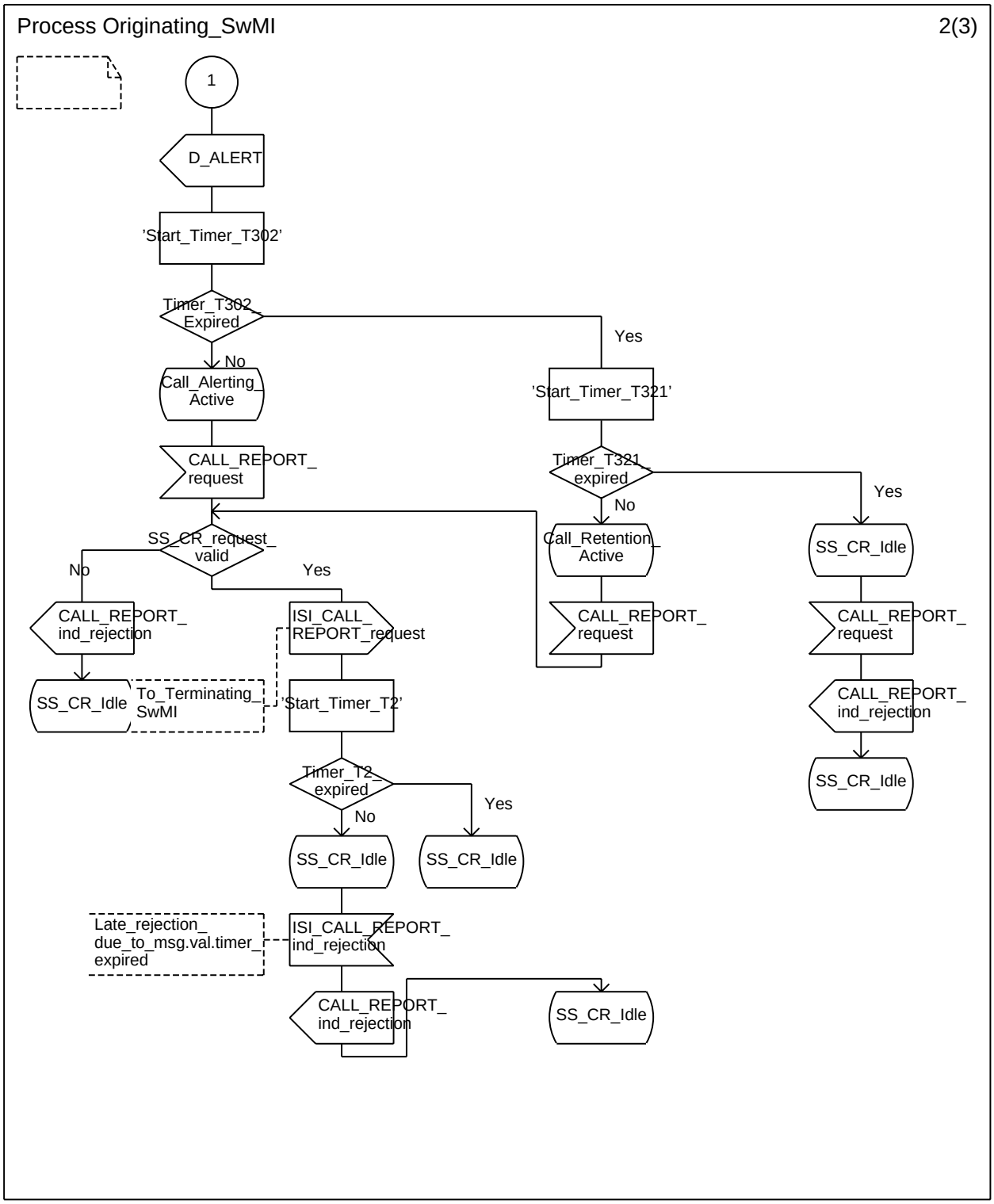


Figure A.2 (sheet 2 of 3): SS-CR Originating SwMI SDL

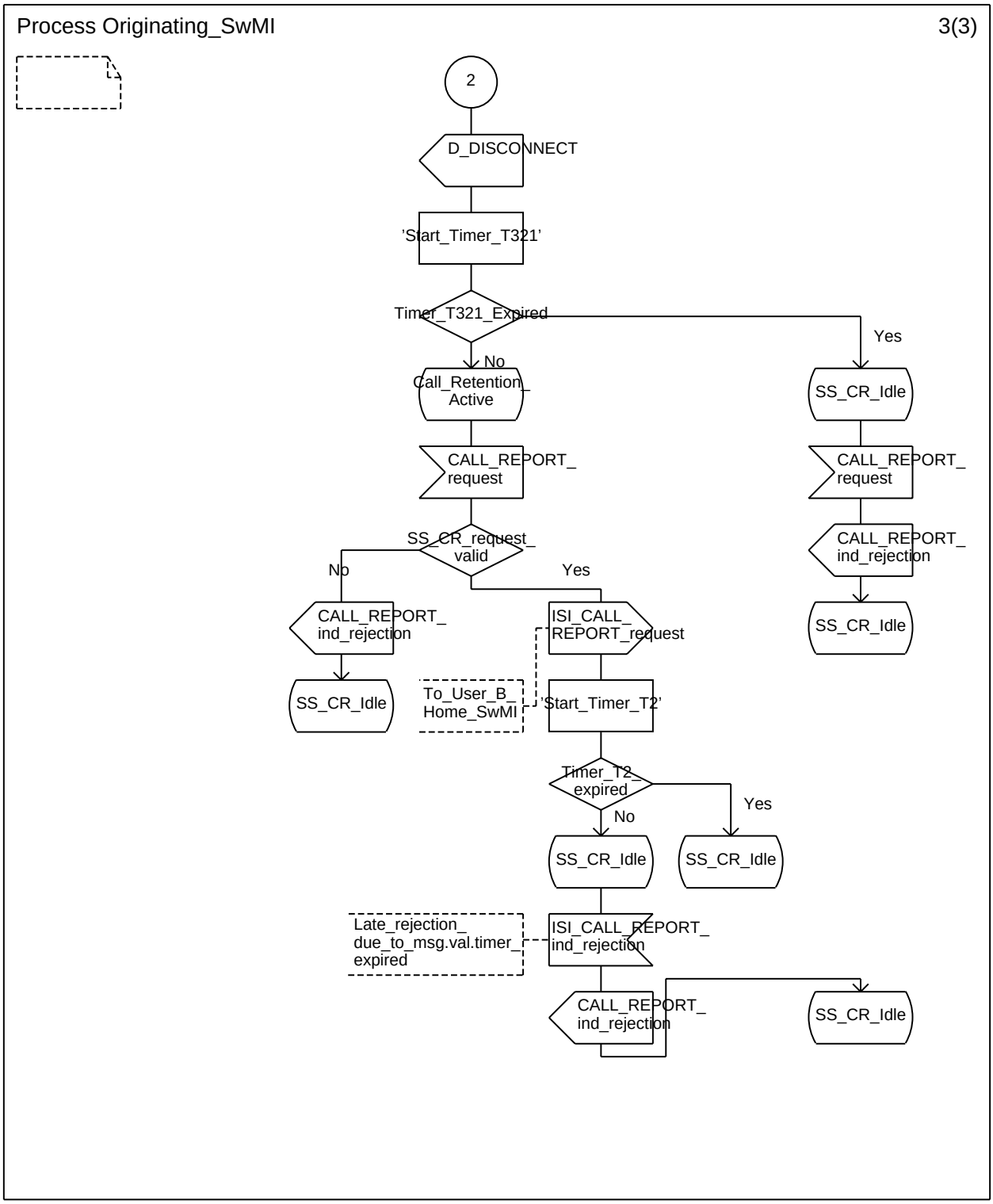


Figure A.2 (sheet 3 of 3): SS-CR Originating SwMI SDL

A.3 SS-CR Terminating SwMI process SDL diagrams

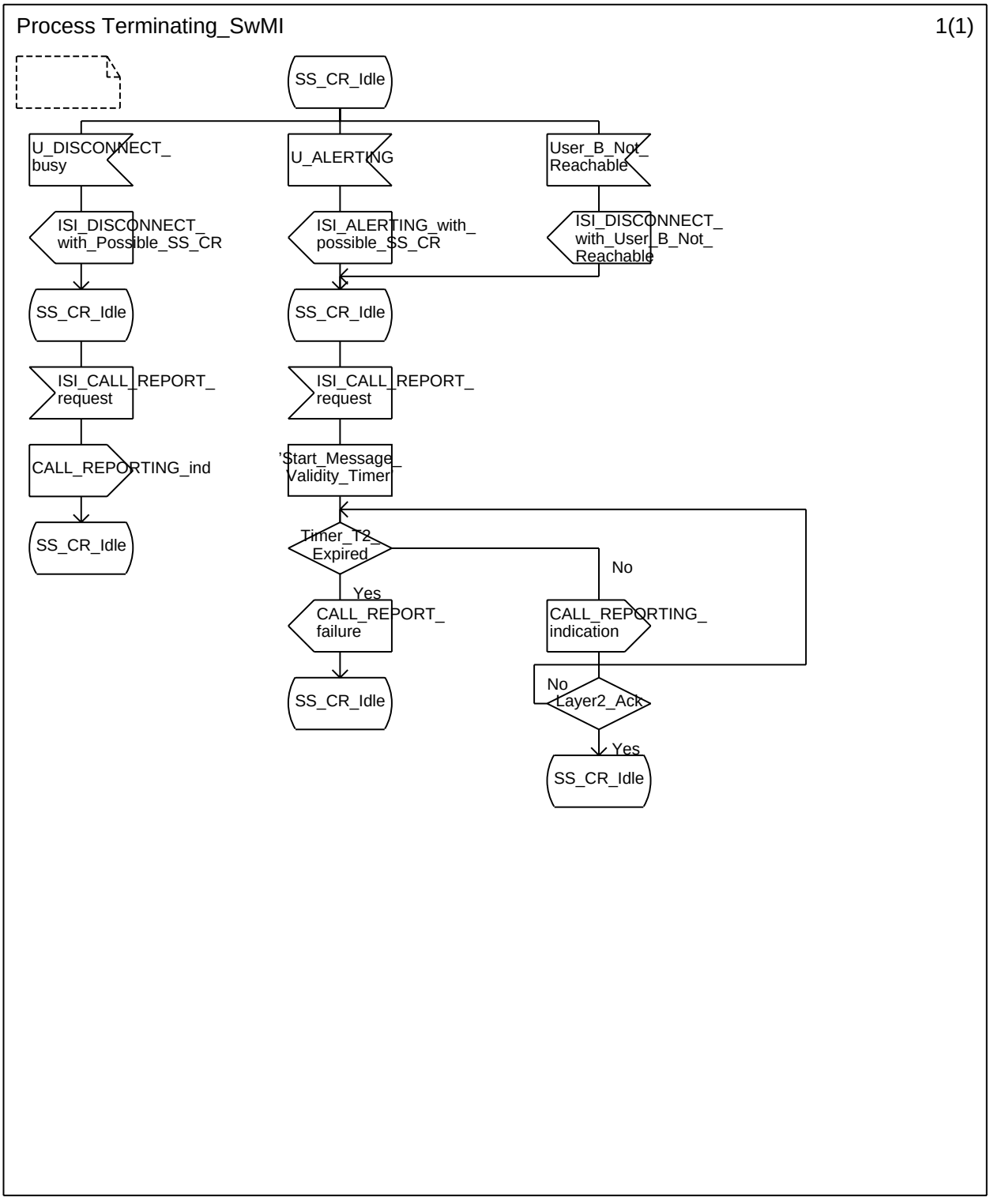


Figure A.3: SS-CR Terminating SwMI SDL

A.4 SS-CR Called User B process SDL diagrams

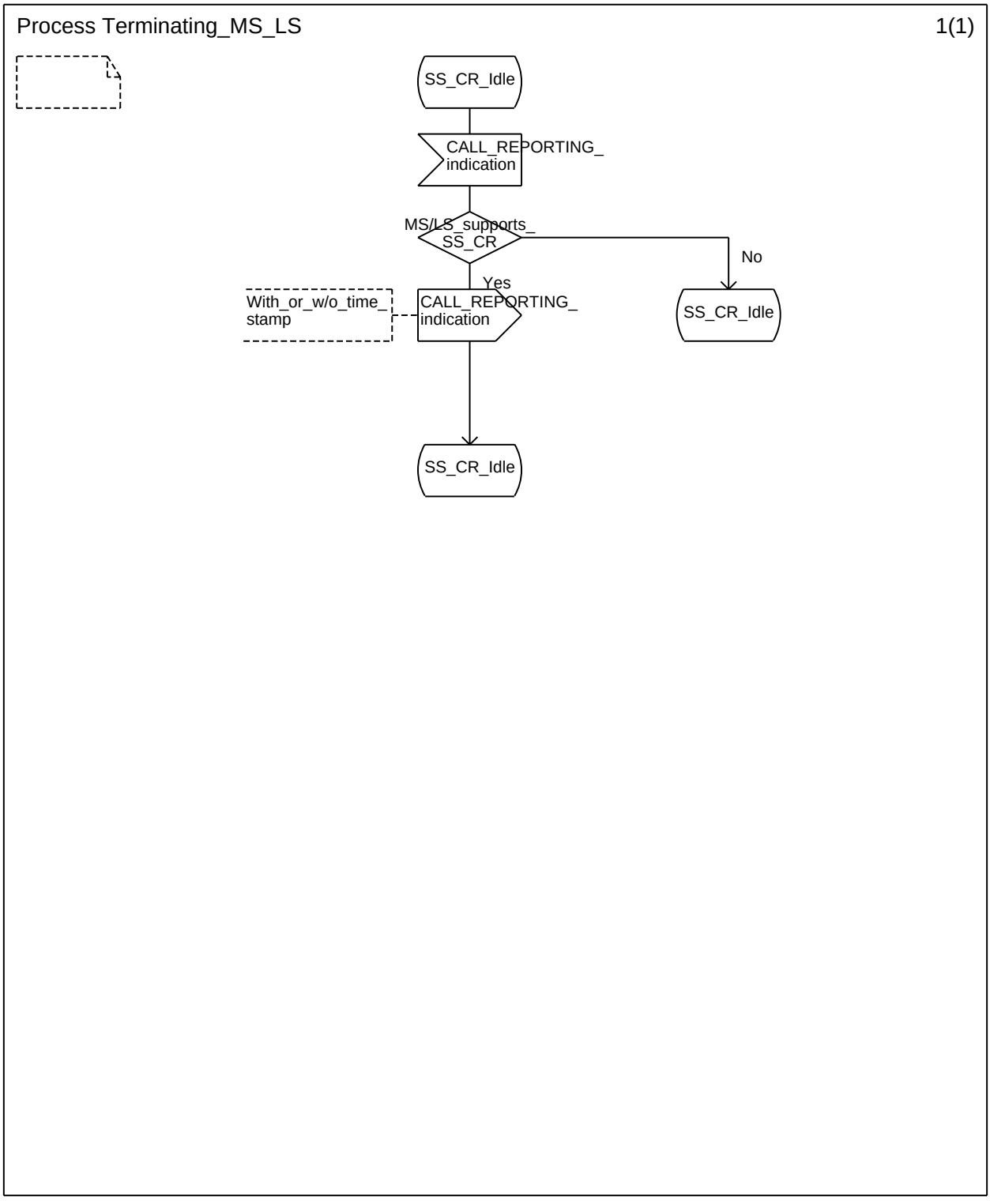


Figure A.4: SS-CR Called User B SDL

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

ITU-T Recommendation I.112 (1993): "Vocabulary of terms for ISDNs".

ITU-T Recommendation I.210 (1993): "Principles of telecommunication services supported by an ISDN and the means to describe them".

ETS 300 392-11-02: "Terrestrial Trunked Radio (TETRA); Voice+Data (V+D); Part 11: Supplementary services stage 2; Sub-part 2: Call Report (CR)".

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)".

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