

# ETSI EN 300 392-12-14 V1.1.1 (2002-07)

---

*European Standard (Telecommunications series)*

**Terrestrial Trunked Radio (TETRA);  
Voice plus Data (V+D);  
Part 12: Supplementary services stage 3;  
Sub-part 14: Late Entry (LE)**

---



---

Reference

DEN/TETRA-03001-12-14

---

Keywords

late entry, supplementary service, TETRA

**ETSI**

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

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

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

---

**Important notice**

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, send your comment to:

[editor@etsi.fr](mailto:editor@etsi.fr)

---

**Copyright Notification**

No part may be reproduced except as authorized by written permission.  
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2002.  
All rights reserved.

**DECT™**, **PLUGTESTS™** and **UMTS™** are Trade Marks of ETSI registered for the benefit of its Members.  
**TIPHON™** and the **TIPHON logo** are Trade Marks currently being registered by ETSI for the benefit of its Members.  
**3GPP™** is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

# Contents

Intellectual Property Rights .....	5
Foreword.....	5
1 Scope .....	7
2 References .....	7
3 Definitions and abbreviations.....	8
3.1 Definitions .....	8
3.2 Abbreviations .....	8
4 SS-LE service description .....	9
4.1 General .....	9
4.2 SS-LE services offered over the TNSS-SAP and TNCC-SAP .....	9
4.3 SS-LE service primitives.....	10
4.3.1 List of SS-LE service primitives.....	10
4.3.2 ACKNOWLEDGE LE indication.....	10
4.3.3 ACKNOWLEDGE LE response.....	10
4.3.4 BROADCAST LE indication .....	11
4.3.5 DEFINE request.....	11
4.3.6 DEFINE indication .....	12
4.3.7 INTERROGATE request.....	12
4.3.8 INTERROGATE indication.....	12
4.3.9 PAGING LE indication .....	13
4.3.10 PAGING LE response .....	13
4.4 Parameter descriptions .....	13
5 Signalling protocol for the support of SS-LE.....	15
5.1 General .....	15
5.2 SS-LE operational requirements.....	15
5.2.1 Served user MS/LS .....	15
5.2.2 Served user SwMI.....	15
5.2.3 Group controlling SwMI.....	15
5.2.4 Served user home SwMI.....	15
5.2.5 Authorized user MS/LS .....	15
5.2.6 Authorized user SwMI.....	15
5.2.7 Calling user MS/LS .....	16
5.3 SS-LE Coding requirements.....	16
5.3.1 SS-LE PDUs .....	16
5.3.1.1 General on SS_LE PDUs .....	16
5.3.1.2 DEFINE PDU .....	16
5.3.1.3 DEFINE ACK PDU .....	17
5.3.1.4 INFORM1 PDU .....	17
5.3.1.5 INFORM2 PDU .....	17
5.3.1.6 INFORM2 ACK PDU.....	17
5.3.1.7 INFORM3 PDU .....	18
5.3.1.8 INFORM3 ACK PDU.....	18
5.3.1.9 INFORM4 PDU .....	18
5.3.1.10 INTERROGATE PDU.....	18
5.3.1.11 INTERROGATE ACK PDU .....	19
5.3.2 Information element coding.....	19
5.3.2.1 Basic service type.....	19
5.3.2.2 Call behaviour .....	20
5.3.2.3 Defined group extension .....	20
5.3.2.4 Defined group SNA.....	20
5.3.2.5 Defined group SSI.....	20
5.3.2.6 Defined group type identifier .....	21
5.3.2.7 Interrogated group extension.....	21

5.3.2.8	Interrogated group SNA .....	21
5.3.2.9	Interrogated group SSI .....	21
5.3.2.10	Interrogated group type identifier .....	21
5.3.2.11	LE definition .....	21
5.3.2.12	LE used over ISI .....	21
5.3.2.13	Notification indicator .....	21
5.3.2.14	Range type for defined groups .....	22
5.3.2.15	Range type for interrogated groups .....	22
5.3.2.16	Repetition rate .....	22
5.3.2.17	Result of definition .....	22
5.3.2.18	Result of interrogation .....	23
5.3.2.19	SS-LE PDU type .....	23
5.4	SS-LE protocol states .....	23
5.4.1	Protocol states of the served user MS/LS .....	23
5.4.2	Protocol states of the home SwMI .....	24
5.4.2.1	State IDLE .....	24
5.4.2.2	State SS-LE ACTIVE .....	24
5.4.3	Protocol states of the authorized user MS/LS .....	24
5.4.4	Protocol states of the visited SwMI .....	24
5.4.4.1	State IDLE .....	24
5.4.4.2	State SS-LE ACTIVE .....	24
5.5	SS-LE signalling procedures .....	24
5.5.1	Address usage .....	24
5.5.2	Procedures for served user MS/LS .....	24
5.5.3	Procedures for home SwMI .....	25
5.5.3.1	Definition in the home SwMI .....	25
5.5.3.2	Interrogation in the home SwMI .....	25
5.5.3.3	Invocation and operation in group home SwMI .....	26
5.5.4	Procedures for FE3 .....	26
5.5.5	Procedures for FE2 in visited SwMI .....	27
5.5.5.1	Support of SS-LE definition and interrogation in FE2 in visited SwMI .....	27
5.5.5.2	Support of SS-LE operation in FE2 in visited SwMI .....	27
5.5.6	Generic SS procedures in the visited SwMI .....	27
5.6	Protocol timers .....	27
6	SS-LE FE behaviour .....	27
6.1	General .....	27
6.2	Behaviour of FE1 .....	28
6.3	Behaviour of FE2 in home SwMI .....	29
6.4	Behaviour of FE3 .....	31
6.5	Behaviour of FE2 in visited SwMI .....	32
7	Interworking considerations .....	33
History	.....	34

---

# Intellectual Property Rights

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

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

---

## Foreword

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

The present document had been submitted to Public Enquiry as ETS 300 392-12-14. During the processing for Vote it was converted into an EN.

The present document is part 12, sub-part 14 of a multi-part deliverable covering Voice plus Data (V+D), as identified below:

- EN 300 392-1: "General network design";
- EN 300 392-2: "Air Interface (AI)";
- EN 300 392-3: "Interworking at the Inter-System Interface (ISI)";
- ETS 300 392-4: "Gateways basic operation";
- EN 300 392-5: "Peripheral Equipment Interface (PEI)";
- EN 300 392-7: "Security";
- EN 300 392-9: "General requirements for supplementary services";
- EN 300 392-10: "Supplementary services stage 1";
- EN 300 392-11: "Supplementary services stage 2";
- EN 300 392-12: "Supplementary services stage 3";**
  - Sub-part 1: "Call Identification (CI)";
  - Sub-part 2: "Call Report (CR)";
  - Sub-part 3: "Talking Party Identification (TPI)";
  - Sub-part 4: "Call Forwarding (CF)";
  - Sub-part 5: "List Search Call (LSC)";
  - Sub-part 6: "Call Authorized by Dispatcher (CAD)";
  - Sub-part 7: "Short Number Addressing (SNA)";
  - Sub-part 8: "Area Selection (AS)";
  - Sub-part 9: "Access Priority (AP)";
  - Sub-part 10: "Priority Call (PC)";

Sub-part 11: "Call Waiting (CW)";

Sub-part 12: "Call Hold (CH)";

Sub-part 13: "Call Completion to Busy Subscriber (CCBS)";

**Sub-part 14: "Late Entry (LE)";**

Sub-part 16: "Pre-emptive Priority Call (PPC)";

Sub-part 17: "Include Call (IC)";

Sub-part 18: "Barring of Outgoing Calls (BOC)";

Sub-part 19: "Barring of Incoming Calls (BIC)";

Sub-part 20: "Discreet Listening (DL)";

Sub-part 21: "Ambience Listening (AL)";

Sub-part 22: "Dynamic Group Number Assignment (DGNA)";

Sub-part 23: "Call Completion on No Reply (CCNR)";

Sub-part 24: "Call Retention (CRT)";

ETS 300 392-13: "SDL model of the Air Interface (AI)";

ETS 300 392-14: "Protocol Implementation Conformance Statement (PICS) proforma specification";

TS 100 392-15: "TETRA frequency bands, duplex spacings and channel numbering";

TS 100 392-16: "Network Performance Metrics";

TS 100 392-17: "TETRA V+D and DMO Release 1.1 specifications".

<b>National transposition dates</b>	
Date of adoption of this EN:	12 July 2002
Date of latest announcement of this EN (doa):	31 October 2002
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 April 2003
Date of withdrawal of any conflicting National Standard (dow):	30 April 2003

---

# 1 Scope

The present document defines the stage 3 specifications of the Supplementary Service Late Entry (SS-LE) for the Terrestrial Trunked Radio (TETRA).

SS-LE allows radio users to be informed of and, if they are concerned, to join an already existing point-to-multipoint speech or data call.

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 protocols 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 for the Switching and Management Infrastructure (SwMI), for the Mobile Station (MS) and for the Line Station (LS) and can be applied over the Inter System Interface (ISI) between TETRA systems.

---

# 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 300 392-10-14: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 10: Supplementary services stage 1; Sub-part 14: Late Entry (LE)".
- [2] ETSI EN 300 392-11-14: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 11: Supplementary services stage 2; Sub-part 14: Late Entry (LE)".
- [3] ETSI ETS 300 392-1: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General network design".
- [4] ETSI EN 300 392-9: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 9: General requirements for supplementary services".
- [5] ETSI ETS 300 392-12-7: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 12: Supplementary services stage 3; Sub-part 7: Short Number Addressing (SNA)".
- [6] ETSI EN 300 392-2: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".
- [7] ETSI ETS 300 392-3-3: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V+D); Part 3: Interworking at the Inter-System Interface (ISI); Sub-part 3: Additional Network Feature Group Call (ANF-ISIGC)".
- [8] ETSI EN 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".
- [9] ITU-T Recommendation Z.100 (1993): "Specification and description language (SDL)".
- [10] 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 and abbreviations

### 3.1 Definitions

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

**acknowledge LE:** indication sent in LE messages by a SwMI to inform a member who would like to join the call that he has to inform the SwMI of his entering the call

**authorized user:** identified user who is able to define and interrogate the SS-LE parameters

**broadcast LE:** indication sent by a SwMI to inform members of a multipoint call which are currently not already involved in this call that they can join directly an existing communication (a channel is already allocated in this cell)

**home SwMI:** TETRA system in which SS-LE can be defined and invoked.

NOTE: Home SwMI is the TETRA system which has same Mobile Network Identity (MNI) as the TETRA group identity to which SS-LE is defined.

**paging LE:** indication sent by a SwMI to inform members of a multipoint call which are currently not already involved in this call that they need to ask for a communication channel for that call if they wish to participate the call (a channel is not yet allocated in this cell)

**server user:** party that receives the SS-LE indications about an ongoing call and joins the call

NOTE: Also known as user B.

**user B:** in a group call a party that receives the SS-LE indications about an ongoing call

**visited SwMI:** TETRA system to which SS-LE can be extended and invoked.

NOTE: Visited SwMI is a TETRA system which has a different MNI as the TETRA group identity to which SS-LE is defined.

### 3.2 Abbreviations

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

CC	Call Control
FE	Functional Entity
GTSI	Group TETRA Subscriber Identity
ISI	Inter-System Interface
LE	Late Entry
LS	Line Station
MS	Mobile Station
SS	Supplementary Service

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

SwMI	Switching and Management Infrastructure
------	---



---

## 4 SS-LE service description

### 4.1 General

SS-LE supplementary service enables users to join the group call after the original call setup. SS-LE specifies the definition, interrogation and operation of the supplementary service. The Switching and Management Infrastructure (SwMI) applies the SS-LE definitions when a call is active for the group. The SS-LE actions are defined for the SwMI and for the Mobile Station (MS). The SS-LE information flows may be delivered over the Inter System Interface (ISI).

This supplementary service is applicable to circuit mode speech and data group call services defined in EN 300 392-2 [6].

The Functional Entities used in the present document are defined in EN 300 392-11-14 [2].

### 4.2 SS-LE services offered over the TNSS-SAP and TNCC-SAP

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

The following SS-LE services shall be provided:

- late entry indications for a basic service (call control service).

The following SS-LE services may be provided:

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

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

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

NOTE 2: As man-machine interface and MS/LS applications are outside the scope of the present document service primitives are used to define information exchange to and from the standardized part of the MS/LS. Those primitives may be only indirectly accessible.

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

The SS-LE services described in this clause shall complement the call control service specified in EN 300 392-2 [6], clause 11.

## 4.3 SS-LE service primitives

### 4.3.1 List of SS-LE service primitives

The SS-LE services as defined in EN 300 392-10-14 [1] are accessed in the SS-LE protocol description via service primitives. The SS-LE service primitives at the authorized user MS/LS (FE3) shall be:

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

The SS-LE service primitives at the served user MS/LS (FE1) may be:

- BROADCAST LE indication;
- ACKNOWLEDGE LE indication;
- ACKNOWLEDGE LE response;
- PAGING LE indication; and
- PAGING LE response.

Clauses 4.3.2 to 4.3.10 present the service primitive descriptions in alphabetic order.

### 4.3.2 ACKNOWLEDGE LE indication

The ACKNOWLEDGE LE indication primitive may be offered from FE1 to application over TNSS-SAP with the corresponding basic call primitive TNCC-SETUP indication indicating an acknowledged group call. The ACKNOWLEDGE LE indication primitive shall contain the SS-LE parameters listed in table 1. The ACKNOWLEDGE indication implies, that application shall send an ACKNOWLEDGE LE response, if it wants to joint in the call.

**Table 1: ACKNOWLEDGE LE indication contents**

Parameter	C/O/M	Remark
LE type	M	Acknowledge LE

### 4.3.3 ACKNOWLEDGE LE response

The ACKNOWLEDGE LE response primitive may be offered from application to FE1 over TNSS-SAP with the corresponding basic call primitive TNCC-SETUP response. Application shall send the primitive if the subscriber joins the call.

Application should discard any other ACKNOWLEDGE LE indications to the same call item:

- while it is making a response to the received ACKNOWLEDGE LE indication; and
- after sending an ACKNOWLEDGE LE response for the same call.

However, if the subscriber receives another ACKNOWLEDGE LE indication after leaving the call and if the user wants to re-join in the group call, application shall send a new ACKNOWLEDGE LE response.

If the subscriber leaves the acknowledged call, e.g. due to another call, the application shall send a TNCC-RELEASE request which invokes sending of a U-RELEASE PDU to SwMI to indicate that the user leaves the call.

If the paging LE is changed to acknowledge LE within a call and if the application has sent a PAGING LE response for that call, the sent PAGING LE response shall be considered also as an ACKNOWLEDGE LE response.

In case of acknowledge LE, the response shall be sent in the allocated traffic channel, if any.

The ACKNOWLEDGE LE response primitive shall contain no SS-LE parameters.

#### 4.3.4 BROADCAST LE indication

The BROADCAST LE indication primitive may be offered from FE1 to application over TNSS-SAP with the corresponding basic call primitive TNCC-SETUP indication. The BROADCAST LE indication primitive shall contain the SS-LE parameters listed in table 2.

**Table 2: BROADCAST LE indication contents**

Parameter	C/O/M	Remark
LE type	O	Broadcast LE

#### 4.3.5 DEFINE request

DEFINE request primitive may be offered from application to FE3 over TNSS-SAP. The primitive shall contain the SS-LE parameters listed in table 3.

Defined group TETRA identity parameter is a repeatable parameter, which can define one group number, a list of 2 to 15 group numbers or a range of group numbers. Each defined group TETRA identity element shall comprise of any of the following:

- address type identifier and Short Number Address (SNA);
- address type identifier and Short Subscriber Identity (SSI); or
- address type identifier and SSI and address extension (GTSI).

SNA, if used and supported, shall refer to the SS-SNA defined for sending authorized user. The SS-LE definition shall be requested to all group numbers given as defined group TETRA identity according to the parameters listed after the defined group TETRA identity.

**Table 3: DEFINE request contents**

Parameter	C/O/M	Remark
Defined group identity	M	Repeatable
LE definition	M	See note
LE used over ISI	M	See note
Basic service type	M	See note
Repetition rate	M	See note
NOTE: This parameter value is common to all defined group identities in this service primitive.		

### 4.3.6 DEFINE indication

DEFINE indication primitive may be offered from FE3 to application over TNSS-SAP. The primitive shall contain the SS-LE parameters listed in table 4.

Defined group TETRA identity element is a repeatable parameter that shall define one group identity, a list of 2 to 15 group identities or a range of group identities. There shall be at least one defined group identity in a DEFINE primitive.

It is required that result for definition apply for all group identities given as defined group identity. If the result for definition parameter would be different, FE3 shall deliver separate DEFINE indication primitives to application.

**Table 4: DEFINE indication contents**

Parameter	C/O/M	Remark
Defined group identity	M	Repeatable
Result of definition	M	

### 4.3.7 INTERROGATE request

INTERROGATE request primitive may be offered from application to FE3 over TNSS-SAP. The primitive shall contain the SS-LE parameters listed in table 5.

Interrogated group identity element is a repeatable parameter that shall define one group identity, a list of 2 to 14 group identities or a range of group identities. There shall be at least one interrogated group identity in an INTERROGATE primitive. SNA, if used, shall refer to the SNA defined for the sending authorized user.

**Table 5: INTERROGATE request contents**

Parameter	C/O/M	Remark
Interrogated group identity	M	Repeatable

### 4.3.8 INTERROGATE indication

INTERROGATE indication primitive may be offered from FE3 to application over TNSS-SAP. The primitive shall contain the SS-LE parameters listed in table 6.

Interrogated group TETRA identity element is a repeatable parameter that shall define one group number, a list of 2 to 14 group identities or a range of group identities. There shall be at least one interrogated group identity in an INTERROGATE primitive.

The interrogation result and any following parameters in the primitive apply for all group numbers given as interrogated group identity. If the parameters would be different, FE3 shall deliver separate INTERROGATE indication primitives to application.

**Table 6: INTERROGATE indication contents**

Parameter	C/O/M	Remark
Interrogated group identity	M	Repeatable
Result of interrogation	M	See note 1
LE type	C	See note 2
LE used over ISI	C	See note 2
Basic service type	C	See note 2
Repetition rate	C	See note 2
NOTE 1: If the interrogation request failed, the reason is specified here.		
NOTE 2: These parameters are present only when the interrogation is accepted.		

### 4.3.9 PAGING LE indication

If the FE1 supports SS-LE paging function the PAGING LE indication primitive shall be offered from FE1 to application over TNSS-SAP with the corresponding basic call primitive TNCC-SETUP indication. The primitive shall contain the SS-LE parameters listed in table 7. The PAGING LE indication implies, that application shall send a PAGING LE response, if the subscriber wishes to join in the call.

**Table 7: PAGING LE indication contents**

Parameter	C/O/M	Remark
LE type	M	LE Paging

### 4.3.10 PAGING LE response

The PAGING LE response primitive may be offered from application to FE1 over TNSS-SAP with the corresponding basic call primitive TNCC-SETUP response. The application shall send the primitive only if the subscriber wishes to join the call. The primitive shall contain no SS-LE parameters.

Application should discard any other PAGING LE indications to the same call while it is making the response to the received PAGING LE indication or while it is waiting for a BROADCAST LE or ACKNOWLEDGE LE indication after sending the LE PAGING response.

If the FE1 receives a BROADCAST LE indication after sending a PAGING LE response to the same call, it may try to cancel the sending of the PAGING LE response and shall deliver the BROADCAST indication to the application.

The application shall not send any response to ACKNOWLEDGE LE indications, when it has sent an LE PAGING LE response to the same call.

## 4.4 Parameter descriptions

Address extension =

- Mobile Network Identity comprising Mobile Country Code (MCC) and Mobile Network Code (MNC).
- See ETS 300 392-1 [3], clause 7.

Basic service type =

- multipoint circuit mode speech call; or
- multipoint circuit mode data call.

Defined group identity =

- Short Number Address (SNA);
- Short Subscriber Identity (SSI); or
- Short Subscriber Identity (SSI) + Address extension i.e. full GTSI.
- See ETS 300 392-1 [3], clause 7.

NOTE: The SwMI may not support Short Number Address (SNA) nor mixing of Short Number Address (SNA) and Short Subscriber Identity (SSI) with or without Address extension.

Interrogated group identity, as defined group identity.

LE definition

- remove late entry definition; or
- LE definition.

LE type =

- broadcast LE;
- acknowledge LE; or
- paging LE.

LE used over ISI =

- applied over ISI; or
- not applied over ISI.

Repetition rate =

- any rate;
- low;
- normal; or
- high.

Result of definition =

- rejected for unknown reason;
- accepted;
- user not authorized;
- unknown TETRA identity;
- parameters not valid;
- insufficient information; or
- SS-LE not supported for the basic service.

Result of interrogation =

- rejected for unknown reason;
- accepted;
- user not authorized;
- unknown TETRA identity;
- SS-LE not supported for the basic service;
- parameters not valid; or
- insufficient information.

Short Number Address (SNA), see ETS 300 392-12-7 [5].

---

## 5 Signalling protocol for the support of SS-LE

### 5.1 General

Clauses 5.2 to 5.6 define the SS-LE layer 3 protocol for the SS-LE services specified in clause 4. The SS-LE protocol comprises of sub-protocols defined for SS and call control (CC) within CMCE. These SS-LE sub-protocols complement the call control protocol defined in EN 300 392-2 [6], clause 14.

The present document is only normative for the protocol architecture and user application SAPs within the MS, 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 the present document and will only be mentioned as informative statements.

### 5.2 SS-LE operational requirements

#### 5.2.1 Served user MS/LS

The served user MS/LS shall comply with the requirements in clause 14 of EN 300 392-2 [6] which apply to the tele- and bearer services which it supports and which are invoked as group calls.

If the served user MS/LS supports SS-LE services it shall comply with the requirements in clause 7.2.2 of EN 300 392-9 [4].

#### 5.2.2 Served user SwMI

That SwMI shall support as served user SwMI the served user MS/LS complying with the requirements for group calls set in clause 14 of EN 300 392-2 [6].

If the call is over the ISI, the served user SwMI shall comply with the corresponding ISI requirements for group calls, set in ETS 300 392-3-3 [7] and general ISI requirements set in EN 300 392-3-1 [8].

#### 5.2.3 Group controlling SwMI

Group controlling SwMI shall support as served user SwMI the served user MS/LS complying with the requirements for group calls set in clause 14 of EN 300 392-2 [6].

If the call is over the ISI, the group controlling SwMI shall comply with the corresponding ISI requirements for group calls, set in ETS 300 392-3-3 [7], general ISI requirements set in EN 300 392-3-1 [8] and the requirements for call independent signalling set in EN 300 392-9 [4].

#### 5.2.4 Served user home SwMI

No additional requirements are set to the served user home SwMI on the basic call point of view.

#### 5.2.5 Authorized user MS/LS

The authorized user MS/LS shall comply with the requirements for call independent signalling set in EN 300 392-9 [4].

#### 5.2.6 Authorized user SwMI

The authorized user SwMI shall comply general ISI requirements set in EN 300 392-3-1 [8] and to the requirements for call independent signalling set in EN 300 392-9 [4].

## 5.2.7 Calling user MS/LS

The calling user (user A) MS/LS shall comply with the requirements in clause 14 of EN 300 392-2 [6] which apply to the tele- and bearer services which it supports and which are invoked as group calls.

## 5.3 SS-LE Coding requirements

### 5.3.1 SS-LE PDUs

#### 5.3.1.1 General on SS\_LE PDUs

- SS-LE operation related SS-LE PDUs shall be conveyed inside the basic call PDUs except unless otherwise defined in the SS-LE PDU descriptions. The SS-LE specific definition and interrogation SS-LE PDUs shall be conveyed in a U/D-FACILITY PDU over the air interface (see EN 300 392-2 [6], clause 14.7) and in the ISI-FACILITY PDU over the ISI interface. The present document is normative for the protocol architecture and user application SAPs within the MS.

The element coding used in the PDUs is in accordance with the general rules specified in annex E of EN 300 392-2 [6].

The information contained in the following argument PDU definition tables correspond to the following key:

Length: length of the sub-argument in bits;  
 Type: element type (1, 2 or 3) described in EN 300 392-2 [6], annex E;  
 C/O/M: conditional/optional/mandatory;  
 Remark: comment.

#### 5.3.1.2 DEFINE PDU

DEFINE PDU shall be offered from FE3 to FE2. The PDU shall be addressed to FE2 even if FE3 is in a visited SwMI.

If the acknowledgements are different for different "defined group identities" FE2 shall send separate DEFINE ACK PDUs to FE3 for each result.

DEFINE PDU shall contain the SS-LE information elements described in table 8.

**Table 8: DEFINE PDU contents**

Element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Refer to EN 300 392-9 [4], clause 8.1
SS-LE PDU type	5	1	M	
Range type for defined groups	4	1	M	See note 1
Defined group address type	2	1	M	Repeatable
Defined group SNA	8	1	C	See note 2
Defined group SSI	24	1	C	See note 2
Defined group extension	24	1	C	See note 2
LE definition	1	1	M	See note 3
LE used over ISI	1	1	C	See notes 3 and 4
Call behaviour	2	1	C	See notes 3 and 4
Basic service type	2	1	C	See notes 3 and 4
Repetition rate	2	1	C	See notes 3 and 4
NOTE 1: At least one defined group shall be given.				
NOTE 2: Shall be conditional on the value of defined group address type information element value: 0 defined group SNA; 1 defined group SSI; 2 defined group SSI + defined group extension; 3 reserved.				
NOTE 3: These information elements shall be applicable to the all group numbers in this PDU.				
NOTE 4: These information elements shall be present only when the LE definition information element has value "LE definition".				



### 5.3.1.3 DEFINE ACK PDU

DEFINE ACK PDU shall be offered from FE2 to FE3. The PDU shall be passed via FE2 in visited SwMI if FE3 is in TETRA visited SwMI.

DEFINE ACK PDU shall contain the SS-LE information described in table 9.

**Table 9: DEFINE ACK PDU contents**

Element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Refer to EN 300 392-9 [4], clause 8.1
SS PDU type	4	1	M	
Range type for defined groups	4	1	M	See note 1
Defined group type identifier	2	1	M	Repeatable
Defined group SNA	8	1	C	See note 2
Defined group SSI	24	1	C	See note 2
Defined group extension	24	1	C	See note 2
Result for definition	3	1	M	
NOTE 1: At least one defined group shall be given.				
NOTE 2: Shall be conditional on the value of group address type information element value:				
0 defined group SNA;				
1 defined group SSI;				
2 defined group SSI + defined group extension;				
3 reserved.				

### 5.3.1.4 INFORM1 PDU

The INFORM1 PDU shall be offered from FE2 to FE1. INFORM1 PDU is a conceptual presentation of broadcast LE information without a specific supplementary service PDU. The LE type information shall be transported in the notification information element of the corresponding D-SETUP PDU. The INFORM1 PDU shall set the notification information element value into "LE broadcast" using information element coding as defined in EN 300 392-9 [4], clause 7.2.2.

### 5.3.1.5 INFORM2 PDU

INFORM2 PDU shall be offered from FE2 to FE1. INFORM2 PDU is a conceptual presentation of acknowledge LE information without a specific supplementary service PDU. The LE type information shall be transported in the notification information element of the corresponding D-SETUP PDU. The INFORM2 PDU shall set notification information element value into "LE acknowledge" using information element coding as defined in EN 300 392-9 [4], clause 7.2.2.

### 5.3.1.6 INFORM2 ACK PDU

INFORM2 ACK PDU shall be offered from FE1 to FE2. The PDU shall be sent by MS FE1 to indicate that MS/LS participates the call. The INFORM2 ACK PDU is a conceptual presentation of acknowledge LE acceptance without a specific supplementary service PDU. The INFORM2 ACK information shall be transported in the poll response information element of the basic call U-INFO PDU by setting the poll response information element to value "poll response".

NOTE: Both INFORM2 ACK PDU and INFORM3 ACK PDU result in the same basic call PDU with the same contents.

### 5.3.1.7 INFORM3 PDU

INFORM3 PDU shall be offered from FE2 to FE1. INFORM3 PDU shall contain the LE type. The LE type information shall be transported in the notification information element of the corresponding D-SETUP PDU. The INFORM3 PDU shall set notification information element value into "Paging LE" using information element coding as defined in EN 300 392-9 [4], clause 7.2.2. The communication type in basic service information element of the D-SETUP PDU may be either point-to-multipoint, point-to-multipoint acknowledged or broadcast.

The D-SETUP PDU shall be sent without a lower layer channel allocation information.

NOTE: The paging LE type requires a response from the MS and the MS has to support this feature of the SS-LE in order to joint the call.

### 5.3.1.8 INFORM3 ACK PDU

INFORM3 ACK PDU shall be offered from FE1 to FE2. The PDU shall be sent by MS FE1 to indicate that a subscriber (MS/LS) requests for the participation of the call. The INFORM3 ACK PDU is a conceptual presentation of paging LE acceptance without a specific supplementary service PDU. The INFORM3 ACK information shall be transported in the poll response information element of the basic call U-INFO PDU by setting the poll response information element to value "poll response".

NOTE: Both INFORM2 ACK PDU and INFORM3 ACK PDU result in the same basic call PDU with the same contents.

### 5.3.1.9 INFORM4 PDU

INFORM4 PDU shall be offered from FE2 to FE2 in visited SwMI. The INFORM4 PDU shall contain information elements as defined in table 10.

**Table 10: INFORM4 PDU contents**

Element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Refer to EN 300 392-9 [4], clause 8.1
SS-LE PDU type	4	1	M	
Call behaviour	2	1	M	

### 5.3.1.10 INTERROGATE PDU

INTERROGATE PDU shall be offered from FE3 to FE2. INTERROGATE PDU shall contain the SS-LE information described in table 11.

**Table 11: INTERROGATE PDU contents**

Element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Refer to EN 300 392-9 [4], clause 8.1
SS PDU type	4	1	M	
Range type for interrogated groups	4	1	M	See note 1
Interrogated group type identifier	2	1	M	Repeatable
Interrogated group SNA	8	1	C	See note 2
Interrogated group SSI	24	1	C	See note 2
Interrogated group extension	24	1	C	See note 2
NOTE 1: At least one Interrogated party shall be given.				
NOTE 2: The presence of the information element shall be conditional on the value of interrogated group type identifier information element value:				
0 interrogated group SNA;				
1 interrogated group SSI;				
2 interrogated group SSI + interrogated group extension;				
3 reserved.				

### 5.3.1.11 INTERROGATE ACK PDU

INTERROGATE ACK PDU shall be offered from FE2 to FE3.

If interrogation results are different for different "interrogated group numbers" FE2 shall send several INTERROGATE ACK PDUs to FE3.

If incompatible LE types or repetition rates are defined for different basic service types FE2 may send multiple INTERROGATE ACK PDUs as responses to one INTERROGATE PDU.

INTERROGATE ACK PDU shall contain the SS-LE information as defined in table 12.

**Table 12: INTERROGATE ACK PDU contents**

Element	Length	Type	C/O/M	Remark
SS-type	6	1	M	Refer to EN 300 392-9 [4], clause 8.1
SS-LE PDU type	4	1	M	Refer to clause 5.3.2.19
Range type for interrogated groups	4	1	M	See note 1
Interrogated group type identifier	2	1	M	Repeatable
Interrogated group SNA	8	1	C	See note 2
Interrogated group SSI	24	1	C	See note 2
Interrogated group extension	24	1	C	See note 2
Result of interrogation	3	1	M	See note 3
LE used over ISI	1	1	C	See notes 3 and 4
Call behaviour	2	1	C	See notes 3 and 4
Basic service type	2	1	C	See notes 3 and 4
Repetition rate	2	1	C	See notes 3 and 4
NOTE 1: At least one Interrogated party shall be given.				
NOTE 2: The presence of the information element shall be conditional on the value of interrogated group type identifier information element value: 0 interrogated group SNA; 1 interrogated group SSI; 2 interrogated group SSI + interrogated group extension; 3 reserved.				
NOTE 3: These information elements shall be applicable to the all group numbers in this PDU.				
NOTE 4: These information elements shall be present only when the result of interrogation information element has value "Accepted".				

## 5.3.2 Information element coding

### 5.3.2.1 Basic service type

The basic service type shall indicate to which the SS-LE shall be applied as defined in table 13.

**Table 13: Basic service type information element contents**

Element	Length	Value	Remark
Basic service type	2	00 <sub>2</sub>	Reserved
		01 <sub>2</sub>	Multipoint circuit mode speech call
		10 <sub>2</sub>	Multipoint circuit mode data call
		11 <sub>2</sub>	All multipoint circuit mode call types

### 5.3.2.2 Call behaviour

The call behaviour information element shall define call actions as defined in table 14.

**Table 14: Call behaviour information element contents**

Element	Length	Value	Remark
Call behaviour	2	00 <sub>2</sub>	LE information sent only on the sites where users were identified to be in the original call set-up (call area does not change during the call), see note
		01 <sub>2</sub>	LE information sent on all sites which should be in the call (call area may change during the call)
		10 <sub>2</sub>	Reserved
		11 <sub>2</sub>	Reserved
NOTE: Usage of this information element value may imply that presence indication or acknowledged group call set-up is used.			

### 5.3.2.3 Defined group extension

The defined group extension information element shall indicate the extended part of the TSI address of the defined group as defined in table 15.

**Table 15: Defined group extension information element contents**

Element	Length	Value	Remark
Country Code	10	any	See ETS 300 392-1 [3], clause 7
Network Code	14	any	See ETS 300 392-1 [3], clause 7

### 5.3.2.4 Defined group SNA

The optional defined party SNA information element shall indicate the SNA of the defined group as defined in table 16. The SNA shall refer to the SS-SNA definitions for the authorized user.

**Table 16: Defined group SNA information element contents**

Element	Length	Value	Remark
Short Number Address (SNA)	8	0-255 <sub>10</sub>	Refer to ETS 300 392-12-7 [5]

### 5.3.2.5 Defined group SSI

The defined group SSI information element shall indicate the SSI address of the defined GTSI as defined in table 17.

**Table 17: Defined group SSI information element contents**

Element	Length	Value	Remark
Short subscriber identity	24	any	See ETS 300 392-1 [3], clause 7

### 5.3.2.6 Defined group type identifier

The defined group type identifier information element shall indicate the type of address which shall follow in the PDU as defined in table 18.

**Table 18: Defined group type identifier information element contents**

Element	Length	Value	Remark
Defined group type identifier	2	00 <sub>2</sub>	Short Number Address (SNA)
		01 <sub>2</sub>	Short Subscriber Identity (SSI)
		10 <sub>2</sub>	TETRA Subscriber Identity (GTSI)
		11 <sub>2</sub>	Reserved

### 5.3.2.7 Interrogated group extension

See defined group extension.

### 5.3.2.8 Interrogated group SNA

See defined group SNA.

### 5.3.2.9 Interrogated group SSI

See defined group SSI.

### 5.3.2.10 Interrogated group type identifier

See defined group type identifier.

### 5.3.2.11 LE definition

The LE definition shall indicate whether LE is defined or removed as defined in table 19.

**Table 19: LE definition information element contents**

Element	Length	Value	Remark
LE definition		00 <sub>2</sub>	Remove late entry definition
		01 <sub>2</sub>	LE definition

### 5.3.2.12 LE used over ISI

The LE used over ISI information element shall indicate whether SS-LE should be invoked also in other SwMIs when the call extends to the other SwMIs as defined in table 20.

**Table 20: LE used over ISI information element contents**

Element	Length	Value	Remark
LE used over ISI	1	0	LE not extended over ISI
		1	LE extended over ISI

### 5.3.2.13 Notification indicator

The notification indicator shall indicate the LE type currently applied for the call for new participants. The notification information element shall be encoded as defined in EN 300 392-9 [4], clause 7.2.2 for values "LE broadcast", "LE acknowledgement" and "LE paging".

### 5.3.2.14 Range type for defined groups

The range type for defined groups information element shall indicate if following GTSI or GTSIs shall be one number, range of number or a list of these numbers. The encoding of the range type for defined groups information element shall be as defined in EN 300 392-9 [4], clause 8.4.1.

The endpoints of a range shall use the same defined group type identifier type.

### 5.3.2.15 Range type for interrogated groups

The range type for interrogated groups information element shall indicate if following GTSI or GTSIs shall be one number, range of number or a list of these numbers. The encoding of the range type for interrogated groups information element shall be as defined in EN 300 392-9 [4], clause 8.4.1.

The endpoints of a range shall use the same defined group type identifier type.

### 5.3.2.16 Repetition rate

The repetition rate information element shall indicate the relative repetition rate according to which the SS-LE indications are sent as defined in table 21.

**Table 21: Repetition rate information element contents**

Element	Length	Value	Remark
Repetition rate	2	00 <sub>2</sub>	Any rate, see note 1
		01 <sub>2</sub>	Low, see note 2
		10 <sub>2</sub>	Normal, see note 2
		11 <sub>2</sub>	High, see note 2
NOTE 1: SwMI may choose the rate.			
NOTE 2: Network dependent, so globally meaningless.			

### 5.3.2.17 Result of definition

The result of definition shall indicate whether the previously made request was successful or unsuccessful. If the request was unsuccessful, the reason shall be indicated by the element. The result of definition information element shall be encoded as defined in table 22.

**Table 22: Result of definition information element contents**

Element	Length	Value	Remark
Result of definition	3	000 <sub>2</sub>	Rejected for any reason
		001 <sub>2</sub>	Accepted
		010 <sub>2</sub>	Reserved
		011 <sub>2</sub>	User not authorized
		100 <sub>2</sub>	Unknown TETRA identity
		101 <sub>2</sub>	SS-LE not supported for the basic service
		110 <sub>2</sub>	Parameters not valid
		111 <sub>2</sub>	Insufficient information

### 5.3.2.18 Result of interrogation

The result of interrogation shall indicate whether the previously made request was successful or unsuccessful. If the request was unsuccessful, the reason shall be indicated by the element. The result of interrogation information element shall be encoded as defined in table 23.

**Table 23: Result of interrogation information element contents**

Information element	Length	Value	Remark
Result of interrogation	3	000 <sub>2</sub>	Rejected for any reason
		001 <sub>2</sub>	Accepted
		010 <sub>2</sub>	LE not defined, see note
		011 <sub>2</sub>	User not authorized
		100 <sub>2</sub>	Unknown TETRA identity
		101 <sub>2</sub>	Reserved
		110 <sub>2</sub>	Parameters not valid
		111 <sub>2</sub>	Insufficient information
NOTE: This information element value also indicated that LE definition is supported and authorized user may perform definition.			

### 5.3.2.19 SS-LE PDU type

The action type shall indicate the type of the action as defined in table 24.

**Table 24: SS-LE PDU type information element contents**

Information element	Length	Value	Remark
SS-LE PDU type	4	0000 <sub>2</sub>	Refer to EN 300 392-9 [4], clause 8.2
		0001 <sub>2</sub>	Refer to EN 300 392-9 [4], clause 8.2
		0010 <sub>2</sub>	Refer to EN 300 392-9 [4], clause 8.2
		0011 <sub>2</sub>	Refer to EN 300 392-9 [4], clause 8.2
		0100 <sub>2</sub>	Refer to EN 300 392-9 [4], clause 8.2
		0101 <sub>2</sub>	DEFINE
		0110 <sub>2</sub>	DEFINE ACK
		0111 <sub>2</sub>	INTERROGATE
		1000 <sub>2</sub>	INTERROGATE ACK
		1001 <sub>2</sub>	INFORM4
		1010 <sub>2</sub>	Reserved
		...	Etc.
		1111 <sub>2</sub>	Reserved

## 5.4 SS-LE protocol states

### 5.4.1 Protocol states of the served user MS/LS

IDLE is the only state of the served user MS/LS (FE1).

## 5.4.2 Protocol states of the home SwMI

### 5.4.2.1 State IDLE

In IDLE state the home SwMI (FE2) receives the definition and interrogation requests from the authorized user MS/LS (FE3) and send acknowledgements and results to the authorized user MS/LS.

In the IDLE state the home SwMI (group controlling SwMI) invokes operation of SS-LE.

### 5.4.2.2 State SS-LE ACTIVE

In SS-LE ACTIVE state the group controlling SwMI sends SS-LE information at a predetermined rate.

## 5.4.3 Protocol states of the authorized user MS/LS

IDLE is the only state of authorized user MS/LS (FE3).

## 5.4.4 Protocol states of the visited SwMI

### 5.4.4.1 State IDLE

In IDLE state the visited SwMI (FE2) passes definition and interrogation information between authorized user and home SwMI and invokes operation of SS-LE.

NOTE: The passing action is not a part of the SS-LE functionality but a part of generic information transfer.

### 5.4.4.2 State SS-LE ACTIVE

In SS-LE ACTIVE state the visited SwMI (participating SwMI) (FE2) sends SS-LE information at a predetermined rate.

## 5.5 SS-LE signalling procedures

### 5.5.1 Address usage

If an entity uses SSI form identities then the receiving entity shall expand it into a full TSI as defined in EN 300 392-9 [4], clause 8.4.1.

### 5.5.2 Procedures for served user MS/LS

At the reception of INFORM1 PDU the served user MS/LS (FE1) may inform application about the received LE indication by a BROADCAST LE indication. At the reception of INFORM2 or INFORM3 PDU, the served user MS/LS shall inform application about the received LE indication by an ACKNOWLEDGE LE or a PAGING LE indication respectively. In case of the acknowledge LE or paging LE the served user MS shall send INFORM2ACK/INFORM3ACK PDU to SwMI, if the application indicates that the subscriber joins (ACKNOWLEDGE LE response) or wishes to join (PAGING LE response) the ongoing call. The served user MS/LS should send only once the INFORM2 ACK/INFORM3 ACK PDU for one call. If, as a response to the INFORM3 ACK PDU, the LE paging is changed to the acknowledge LE, the paging LE response replaces the acknowledge LE response and only the INFORM3 ACK PDU should be sent. However, if MS/LS leaves the call and wants to re-join it later a new LE response shall be sent.

If the MS/LS leaves an acknowledged group call is has joined due to SS-LE operation, it shall follow the basic call procedures.

After the BROADCAST LE indication and sending of the INFORM2 ACK/INFORM3 ACK PDU the call shall continue as a basic group call.



To comply with the present document the support of the broadcast LE indication is optional to served user MS/LS. To comply with the acknowledge LE and paging LE features of the present document the served user MS/LS shall support sending of INFORM2 ACK/INFORM3 ACK PDU.

### 5.5.3 Procedures for home SwMI

#### 5.5.3.1 Definition in the home SwMI

At the reception of a DEFINE PDU, the home SwMI (FE2) should verify that the request is authorized and that the parameters are in the correct range. After making the checks, the home SwMI shall either continue to carry out the request, or reject it.

The SNA shall refer to authorized user's SS-SNA definitions. The home SwMI shall replace the SNA by the complete group identity, GSSI. Support of SNA in the definition process of SS-LE is optional.

If address extension is not used with SSI that implies that the address extension shall be the MNI of the group home SwMI, refer to clause 6.5.1.

If the definition is requested for a group number range or a list of group numbers, the "Result of definition" can be different for different group identities. In that case, the home SwMI shall send separate acknowledgements for each different result to the authorized user MS/LS. If e.g. the user has requested the definition for a list of two group identities, and the request is accepted for one group identity but the request is rejected for the other, the home SwMI should send two separate acknowledgements using DEFINE ACK PDUs back to authorized user MS/LS.

When a definition due to a DEFINE PDU is accepted, the home SwMI shall save the definition to database. The home SwMI may invoke SS-LE operation due to a new definition if there is an ongoing call using the defined number.

To comply with the present document the support of the definition process is optimal to the home SwMI.

#### 5.5.3.2 Interrogation in the home SwMI

At the reception of SS-LE INTERROGATE request, the home SwMI (FE2) should verify that the request is authorized and that the parameters are in the correct range. After making the checks, the home SwMI shall either continue to carry out the request, or reject it.

The SNA shall refer to authorized user's SNA definitions. If the authorized user uses SNA numbers those shall be defined for the authorized user, if not, the home SwMI shall not accept the interrogation on that number indicating result of interrogation "unknown TETRA identity".

If address extension is not present with SSI, that shall imply that the address extension is same as MNI of the SwMI, refer to clause 6.5.1.

If the request is acceptable the home SwMI shall prepare and send an interrogation acknowledgement to the authorized user in an INTERROGATE ACK PDU.

If the user has interrogated the SS-LE for a group number range or list, and if any of the information elements listed below are different for any of these numbers, the home SwMI shall send separate INTERROGATE ACK PDUs to FE3. The information elements that causes separate INTERROGATE-ACKs, if the values are different:

- result for interrogation;
- LE type;
- LE used over ISI;
- basic service type; or
- repetition rate.

To comply with the present document the support of the interrogation process is optional to SwMI.

### 5.5.3.3 Invocation and operation in group home SwMI

At the reception of call invocation the home SwMI (FE2) shall determine the SS-LE type and invoke the SS-LE operation after the initial call set-up, if the SS-LE is defined for the group, and home SwMI FE2 shall move to the state SS-LE ACTIVE. Broadcast LE should be invoked for normal group calls and acknowledge LE should be invoked for acknowledged group calls. If no traffic channel is currently available on a site paging LE should be invoked. The site on which the LE is invoked may be defined by the "Call behaviour" information. The details how the sites as selected is outside the scope of the present document.

Upon call invocation the home SwMI, if a traffic channel is available on that site, shall include into the repeated D-SETUP PDUs the INFORM1 PDU for broadcast LE (normal group call) and INFORM2 PDU for acknowledge LE (acknowledged group call). The INFORM3 PDU (LE paging) is used instead of INFORM1 and INFORM2 PDUs, when the call is intended to take place on a site where no users were identified during call set-up or no traffic channel were available at the call-setup or the traffic channel came later unavailable. The INFORM3 PDU (LE paging) informs to the MSs that there is a group call going on in the SwMI but a traffic channel is not allocated for the call (at this site) at the sending of the D-SETUP PDU. The D-SETUP PDU with an INFORM PDU should be sent during the call as indicated by the repetition parameter.

When the call extends to other SwMIs the ISI-SETUP PDU shall contain INFORM4 PDU, if SS-LE operation is extended to the participating SwMIs.

When in the SS-LE ACTIVE state any MS FE1 acknowledges the INFORM2 PDU using U-INFO PDU with the poll response information element set to value "poll response", SwMI FE2 shall consider and behave as it had received it as an acknowledged group call poll response.

When in the SS-LE ACTIVE state any served user MS (FE1) responses to the INFORM3 using U-INFO PDU with the poll response information element set to value "poll response" the home SwMI (FE2) should allocate a traffic channel to the call on that site and send the MS to that traffic channel and change the LE type either to broadcast LE or acknowledge LE according to the group call type and shall consider and behave as it had received it as an acknowledged group call poll response.

At the reception of call release indication FE2 shall stop the LE operation and the sending of all SS-LE indications related to the call.

To comply with the present document the support of the broadcast LE is mandatory and support of the acknowledge LE and/or paging LE is optional.

### 5.5.4 Procedures for FE3

At the reception of SS-LE DEFINE and INTERROGATE request from application, MS FE3 shall construct the SS-LE definition (DEFINE PDU) according to the user's request. The definition can be made to:

- one group number;
- a list of group numbers; or
- a range of group numbers.

The SS-LE can be defined differently for different basic services: The SS-LE can be defined to be different for multipoint circuit mode speech calls and multipoint circuit mode data calls.

The SNA shall refer to authorized user's SNA definitions, if applied. The support of SS-SNA with SS-LE is optional in the SwMI and use of SNA by the authorized user is not recommended.

The SSI without address extension should imply that the address extension is equal to the MNI of the SwMI to which the DEFINE PDU is addressed.

MS FE3 shall construct the SS-LE interrogation (INTERROGATE PDU) according to the authorized user's request. The authorized user can interrogate the defined SS-LE of:

- one group number;
- a list of group numbers; or
- a range of group numbers.

## 5.5.5 Procedures for FE2 in visited SwMI

### 5.5.5.1 Support of SS-LE definition and interrogation in FE2 in visited SwMI

The FE2 in the visited SwMI shall be transparent to all SS-LE definition and interrogation PDUs. At the reception of any PDU to be routed over ISI to another TETRA system, FE2 shall follow the routing address; at the reception of any PDU received over ISI from another TETRA system, FE2 follow the routing address and pass the PDU to the addressed MS.

### 5.5.5.2 Support of SS-LE operation in FE2 in visited SwMI

The FE2 in the visited SwMI shall note the contents of the INFORM4 PDU in the ISI-SETUP PDU received from the group controlling SwMI and the visited SwMI, if a traffic channel is available on site, shall include into the repeated D-SETUP PDUs the INFORM1 PDU for broadcast LE (normal group call) and INFORM2 PDU for acknowledge LE (acknowledged group call). The INFORM3 PDU (LE paging) is used instead of INFORM1 and INFORM2 PDUs, when the call is intended to take place on a site where no users were identified during call set-up or no traffic channel were available at the call-setup or the traffic channel came later unavailable. The INFORM3 PDU (LE paging) informs to the MSs that there is a group call going on in the SwMI but a traffic channel is not allocated for the call (at this site) at the sending of the D-SETUP PDU. The D-SETUP PDU with an INFORM PDU should be sent during the call as indicated by the repetition parameter.

During SS-LE operation in an acknowledged group call the FE2 in the visited SwMI shall inform the group controlling SwMI about reception of INFORM2 ACK PDUs, and INFORM3 ACK PDUs, when the visited SwMI allocates a traffic channel to the call as defined for the acknowledged group call.

At the reception of call release indication FE2 shall stop the LE operation and the sending of all SS-LE indications related to the call.

To comply with the present document support of LE broadcast is mandatory and support of LE acknowledgement and LE paging is optional.

## 5.5.6 Generic SS procedures in the visited SwMI

Upon reception of the PDUs from FE3 or FE1 addressed to the home SwMI FE2 the visited SwMI FE2 shall send them to the home SwMI FE2, and upon reception of the PDUs from FE2 in home SwMI addressed to FE1 or FE3 the visited SwMI FE2 shall send them to the corresponding entities, refer to clause 10.3 of EN 300 392-9 [4].

## 5.6 Protocol timers

FE2 should use timer T1 to supervise the repetition rate for sending SS-LE indications to FE1s (user Bs). The values for the timer values are outside the scope of the present document.

---

# 6 SS-LE FE behaviour

## 6.1 General

The figures contained in clauses 6.2 to 6.5 are intended to illustrate typical SS-LE specific FE behaviour in terms of information flows sent and received.

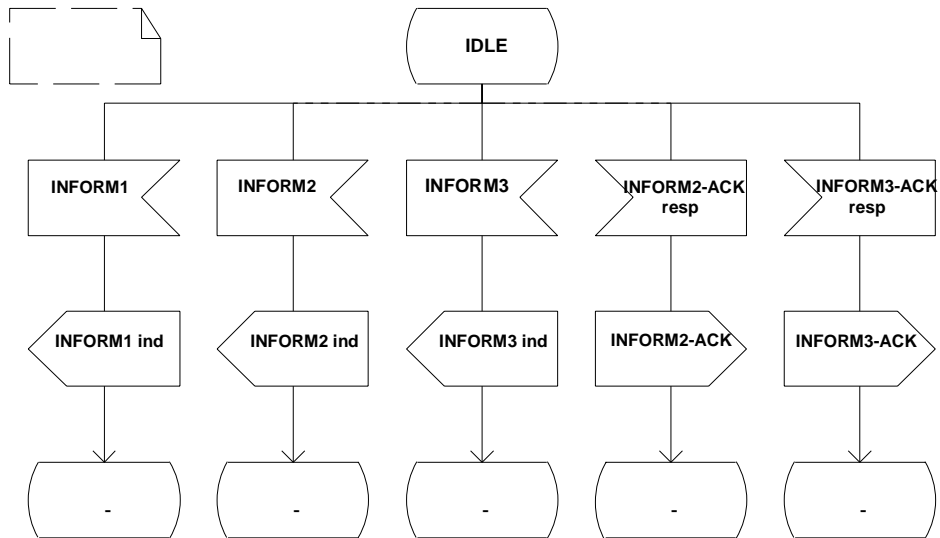
The behaviour of each FE is shown using the Specification and Description Language (SDL) (see ITU-T Recommendation Z.100 [9]). Notice, however, that due to simplicity there are deviations from syntactical rules and descriptions of process creations are not defined.

The convention used in the figures below is that within MS/LS (FE1, FE3 and FE5):

- primitives are received from or sent to the application and they are represented as output/input signals to the left;
- PDUs are received from or sent to the SwMI and they are represented as output signals to the right.

## 6.2 Behaviour of FE1

Process description of FE1 (SS entity in user B) in state IDLE is given in figure 1. Refer to clause 5.3.2 for details of the protocol.



**Figure 1: Process description of FE1**

## 6.3 Behaviour of FE2 in home SwMI

Process description of FE2 (SS entity in SwMI) for state IDLE is shown in figure 2. Refer to clause 5.3.3 for details of the protocol.

Support of definition and interrogation is optional.

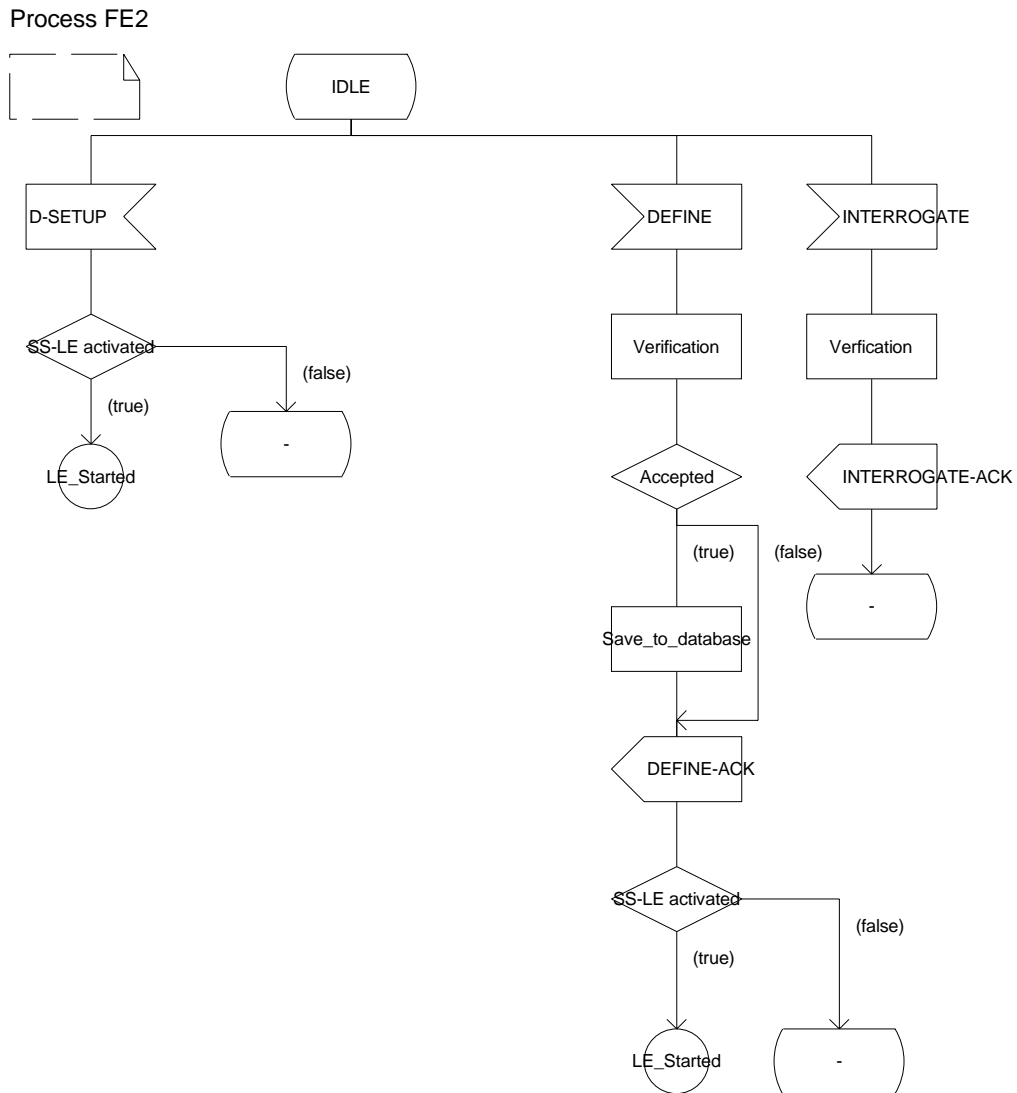


Figure 2: Process description of state IDLE of FE2

Process description of FE2 (SS entity in SwMI) for state SS-LE ACTIVE is shown in figure 3. Refer to clause 5.3.3 for details of the protocol.

Process FE2

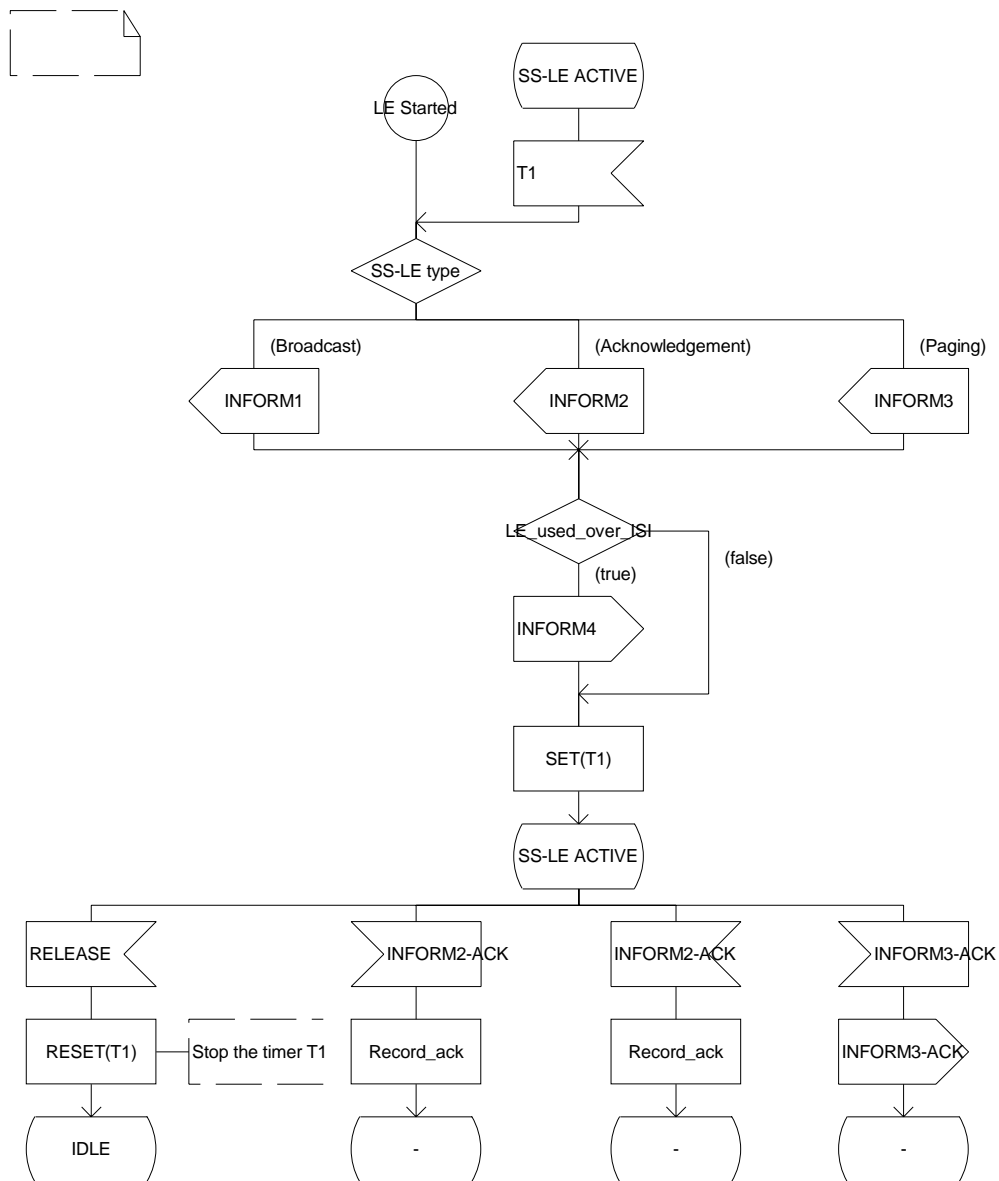


Figure 3: Process description of state SS-LE ACTIVE of FE2

## 6.4 Behaviour of FE3

Process description of FE3 (SS entity in authorized user) for state IDLE is shown in figure 4. Refer to clause 5.3.4 for protocol details.

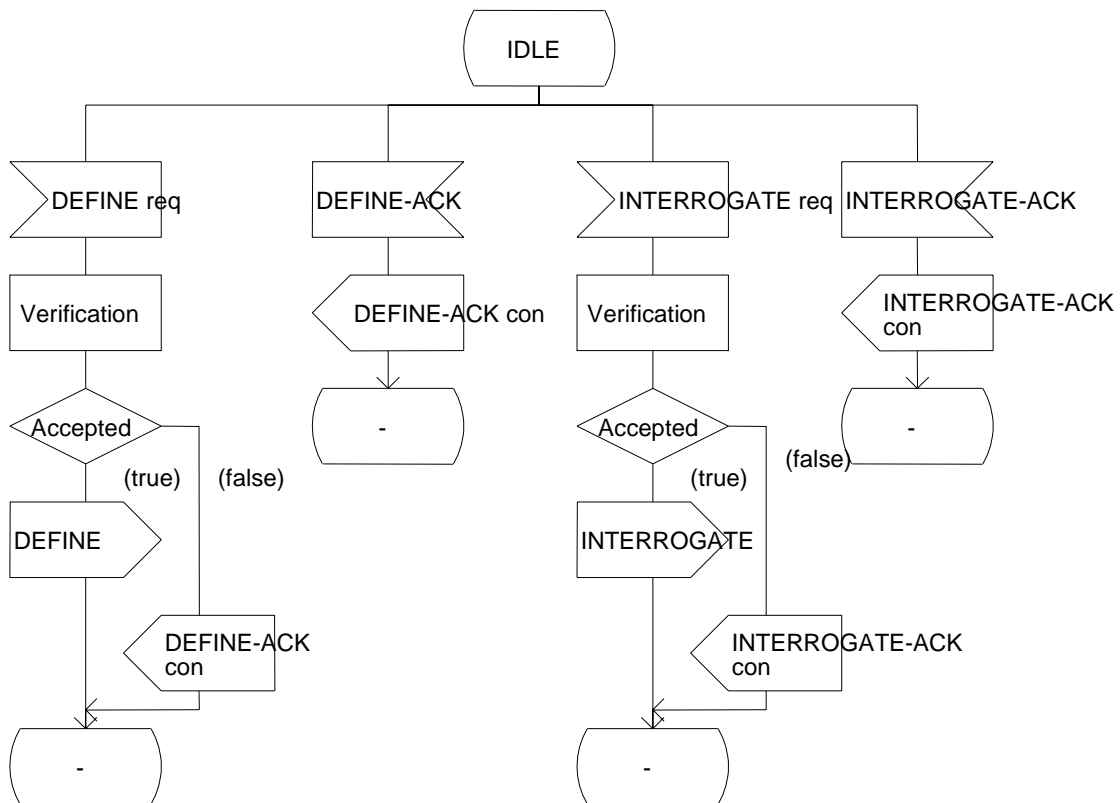


Figure 4: Process description of FE3

## 6.5 Behaviour of FE2 in visited SwMI

Process description of FE2 (SS entity in visited SwMI) for state IDLE is shown in figure 5. Refer to clause 5.3.5.1 for protocol details.

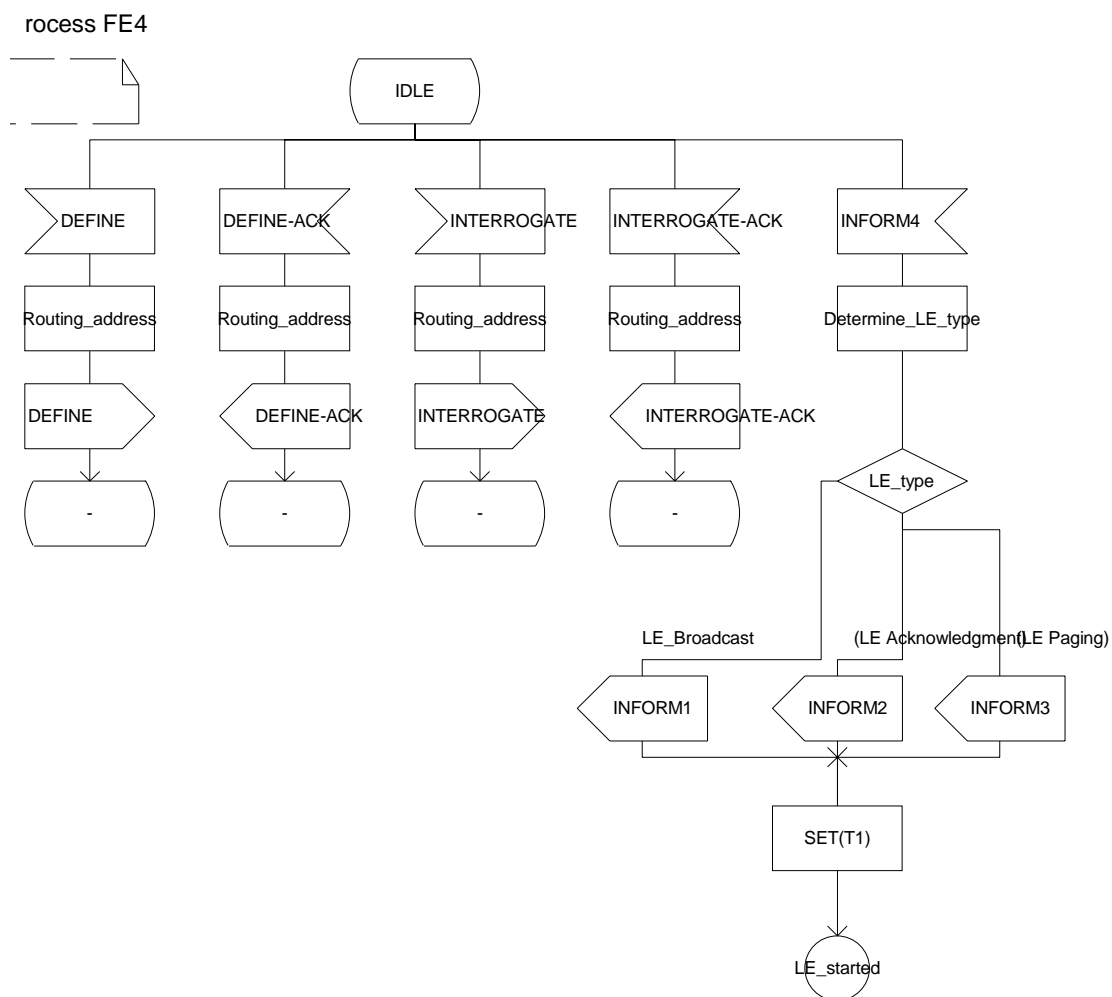


Figure 5: Process description of state IDLE of FE2 in visited SwMI



Process description of FE2 (SS entity in visited SwMI) for SS-LE ACTIVE is shown in figure 6. Refer to clause 5.3.5.2 for protocol details.

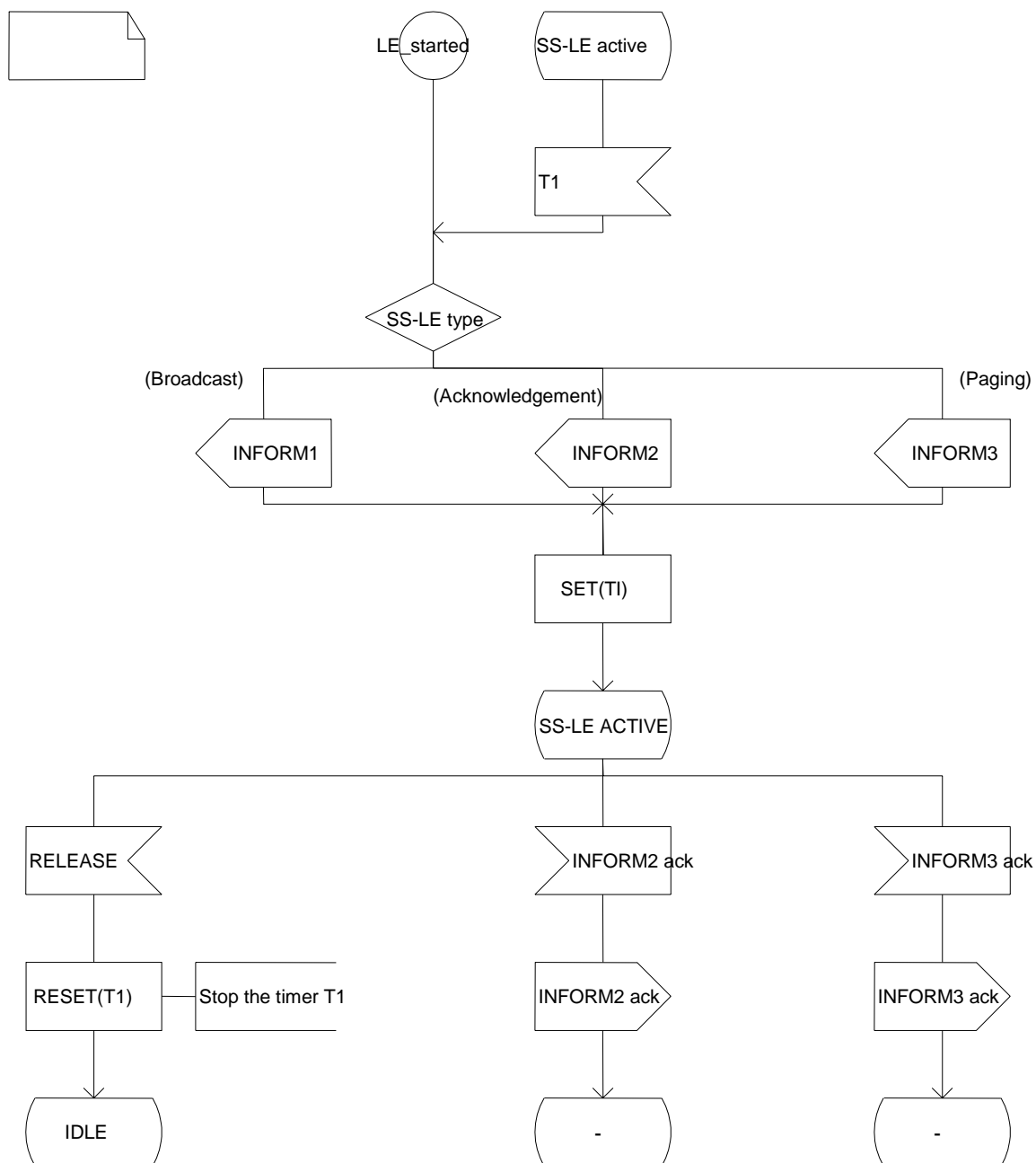


Figure 6: Process description of state SS-ACTIVE of FE2 in visited SwMI

## 7 Interworking considerations

In order to enable the SS-LE to extend to several TETRA systems over the ISI, the FE2s in different TETRA systems shall be able to send and receive call related and call unrelated supplementary service information flows over the ISI as defined in EN 300 392-9 [4] and exchange supplementary service profile information as defined in ETS 300 392-3-5 [10].

Entities which are sending information which will flow via TETRA Inter System Interface (ISI) shall use full TSI as defined in EN 300 392-9 [4]. Notably that is valid for an MS which sends messages to another SwMI where it is currently registered. Refer to clause 5 for signalling and coding requirements.

---

## History

<b>Document history</b>			
Edition 1	September 1996	Public Enquiry	PE 114: 1996-09-23 to 1997-01-17
V1.1.0	May 2002	Vote	V 20020712: 2002-05-13 to 2002-07-12
V1.1.1	July 2002	Publication	