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Contents

Foreword

This draft European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Public Enquiry phase of the ETSI standards approval procedure.

This ETS is a multi-part standard and will consist of the following parts:

Part 1: "General network design".

Part 2: "Air Interface (AI)".

Part 3: "Inter-working", (DE/RES-06001-3).

Part 4: "Gateways", (DE/RES-06001-4).

Part 5: "Terminal equipment interface", (DE/RES-06001-5).

Part 6: "Line connected stations", (DE/RES-06001-6).

Part 7: "Security".

Part 8: "Management services", (DE/RES-06001-8).

Part 9: "Performance objectives", (DE/RES-06001-9).

Part 10: "Supplementary Services (SS) Stage 1".

Part 11: "Supplementary Services (SS) Stage 2".

Part 12: "Supplementary Services (SS) Stage 3".

Part 13: "SDL Model of the Air Interface".

Part 14: "PICS Proforma", (DE/RES-06001-14).

Part 15: "Inter-working - Extended Operations", (DE/RES-06001-15).

Proposed transposition dates	
Date of latest announcement of this ETS (doa):	3 months after ETSI publication
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Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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1 Scope

This European Telecommunication Standard (ETS) defines the stage 3 specification of the Supplementary Service Ambience Listening (SS-AL) for the Trans-European Trunked Radio (TETRA) as provided by European operators. Stage 3 defines the signalling system protocols and switching functions needed to implement the service described in stage 1 and stage 2.

Charging principles and Man-Machine Interface (MMI) are outside the scope of this ETS.

The SS-AL enables a served user to place a TETRA Mobile Station (MS) or Line Station (LS) into a special type of voice call teleservice whereby the called MS (or LS) transmits without any action from, or indication to, the affected user. The teleservice may include a second listening party.

2 Normative references

This ETS incorporates, by dated or 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] ETS 300 392-2: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)".

[3] ETS 300 392-1: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Voice plus Data (V+D); Part 1: General Network Design".

[4] ITU-T Recommendation Z.100 (1993): "Specification and Description Language (SDL)".

3 Definitions and Abbreviations

3.1 Definitions

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

AL call: A call in which ambience listening functionality is requested. During an AL call, the affected user's MS (or LS) transmits without any action from, or indication to, the affected user.

affected user: The user who is subject to the operation.

served user: The user who is invoking this supplementary service.

second listening party: A TETRA individual or group which listens into the AL call.

3.2 Abbreviations

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

AL	Ambience Listening
CC	Call Control
CCA	Call Control (functional entity Agent)
CMCE	Circuit Mode Control Entity
FE	Functional Entity
GTSI	Group TETRA Subscriber Identity
ISDN	Integrated Services Digital Network
ISI	Inter-System Interface
ITSI	Individual TETRA Subscriber Identity
LS	Line Station
MCC	Mobile Country Code
MNC	Mobile Network Code
MS	Mobile Station
SAP	Service Access Point
SDL	(Functional) Specification and Description Language
SNA	Short Number Address
SS	Supplementary Service

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

SSI	Short Subscriber Identity
SwMI	Switching and Management Infrastructure
TETRA	Trans-European Trunked Radio
TSI	TETRA Subscriber Identity

4 Supplementary Services Ambience Listening (SS-AL) Stage 3 specification

4.1 Functional model

4.1.1 Functional model description

The functional model shall comprise the following FEs:

- FE1 served user's service agent;
- FE2 ambience listening control entity in the served user's home system;
- FE3 affected user's service agent;
- FE4 generic functional control entity in a visited system with respect to the served user;
- FE5 second listening party's service agent.

The following relationships shall exist between these FEs:

- ra between FE1 and FE2;
- rb between FE2 and FE3;
- rc between FE2 and FE4 in different systems;
- rd between FE4 and FE1;
- re between FE4 and FE3;
- rf between FE5 and FE2;
- rg between FE5 and FE4.

Figure 1 shows these FEs and their relationships.

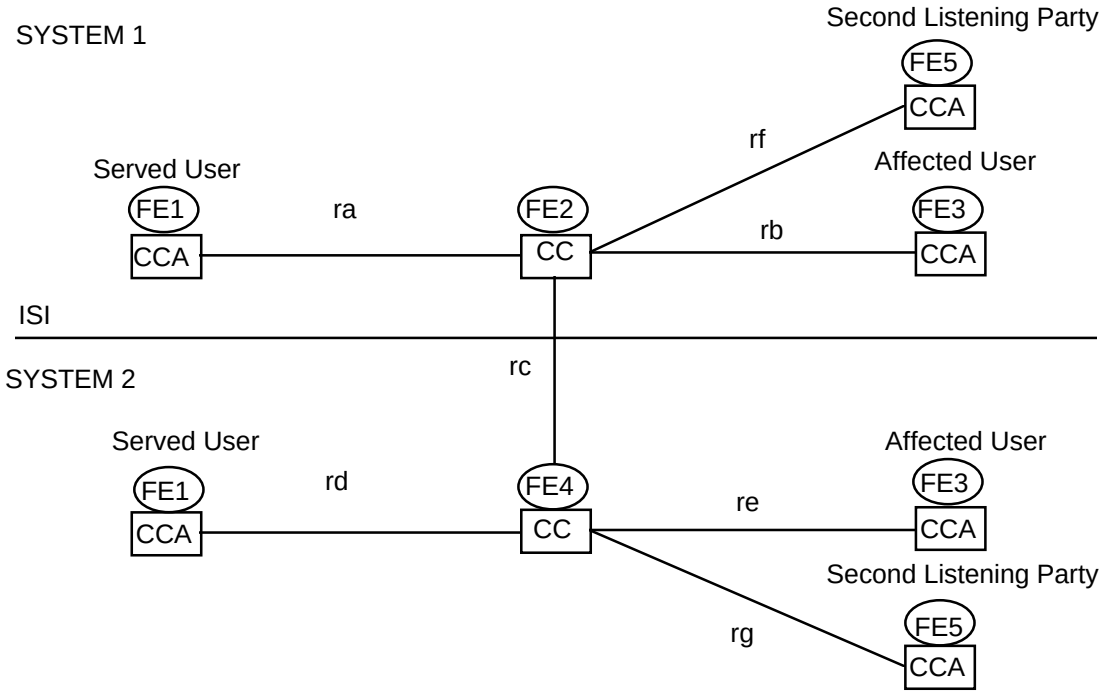


Figure 1: Operational and management functional model for SS-AL

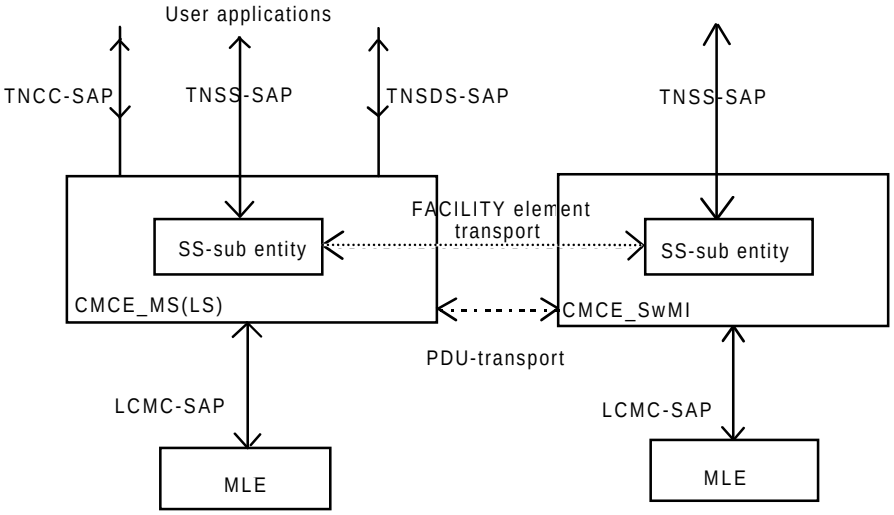
4.1.2 Functional entities and Circuit Mode Control Entities (CMCE) sub-entities

Functional Entities (FEs, CCs and CCAs) correspond to sub-entities in CMCE described in ETS 300 392-2 [2] according to the following rules:

- FE1: Supplementary Service (SS) sub-entity in CMCE in Served User's MS/LS;
- FE2: Supplementary Service (SS) sub-entity in CMCE in SwMI in System 1;
- FE3: Supplementary Service (SS) sub-entity in CMCE in Affected User’s MS/LS;
- FE4: Supplementary Service (SS) sub-entity in CMCE in SwMI in System 2;
- FE5: Supplementary Service (SS) sub-entity in CMCE in Second Listening Party;
- CC: Call Control (CC) sub-entity in CMCE in SwMI;
- CCA: Call Control (CC) sub-entity in CMCE in MS/LS.

4.2 Protocol structure and protocol stack

Figure 2 shows the position of the layer 3 SS sub-entity within the CMCE and the TNSS-SAP in both the MS/LS and in the SwMI protocol stack. The SS-AL information elements shall be conveyed in a SS FACILITY element within the SS sub-entity. The FACILITY element is then conveyed in any suitable CMCE defined PDU (see ETS 300 392-2 [2], subclause 14.7) between the MS/LS and the SwMI or over the Inter System Interface (ISI). This ETS is only normative for the protocol architecture and user application SAPs within the MS/LS but gives an informative description of the protocol and the SAPs within the SwMI.



CMCE-MS	Circuit Mode Control Entity, Mobile Station
CMCE-SwMI	Circuit Mode Control Entity, SwMI Station
LCMC-SAP	Mobile Link Entity - Circuit Mode Control Service Access Point
MLE	Mobile Link Entity
TNCC-SAP	TETRA Network - Call Control Service Access Point
TNSDS-SAP	TETRA Network - Short Data Service Service Access Point
TNSS-SAP	TETRA Network - Supplementary Service Service Access Point

Figure 2: System view

5 SS-AL service description

5.1 General

This clause describes SS-AL specific services offered by the CMCE at the SS Service Access Point (TNSS-SAP) to application, or vice versa, of the TETRA Voice plus Data (V+D) layer 3 service boundary. The specific SS-AL services shall be carried as arguments within the following 3 general generic SS primitives:

a) TNSS-SERVICE;

b) TNSS-INFO;

c) TNSS-ERROR.

For a detailed description of the generic SS primitives refer to ETS 300 392-2 [2] subclause 12.3. The flow of the generic SS primitives shall be as illustrated in figure 3.

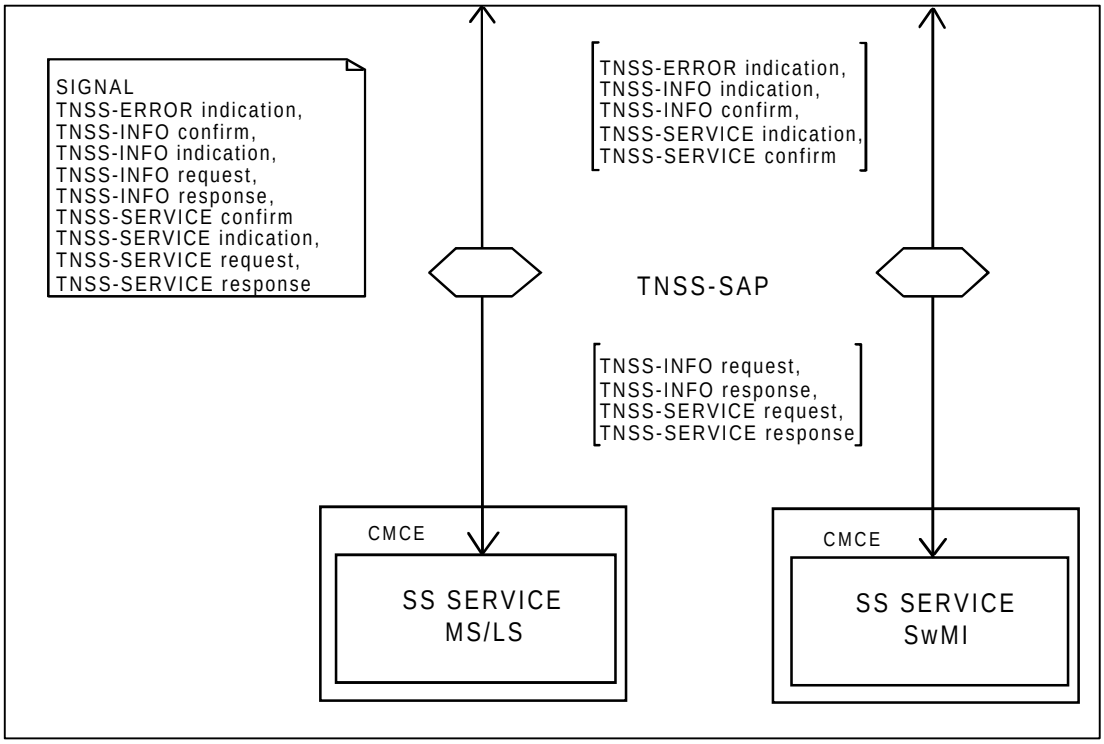


Figure 3: Supplementary services provided at the TNSS-SAP

The TNSS-SERVICE shall enable an invoking entity to request and to be informed about, an operation to be performed by the performing entity.

The TNSS-INFO shall enable an entity to be informed of ongoing transactions.

The TNSS-ERROR shall enable a performing entity to return the negative reply of a unsuccessfully performed operation to the invoking entity.

5.2 SS-AL services offered over the TNSS-SAP

5.2.1 SS-AL primitives

The primitives shall as operation argument contain the following SS-AL sub arguments:

a) INTERROGATE request;

b) INTERROGATE confirm;

c) INVOKE request1;

d) INVOKE request2;

e) INVOKE indication;

f) INVOKE response;

g) INVOKE confirm;

h) INFORMATION indication.

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

- C/O/M: conditional/optional/mandatory
- Remark: comment

5.2.1.1 INTERROGATE request

INTERROGATE request primitive shall be offered from application to FE1 over TNSS-SAP when a served user makes an interrogation request. The primitive shall contain the SS-AL information parameters listed in table 1.

Interrogated individual number type should indicate the number of Interrogated individual TETRA identity items that follow the parameter. The parameter should also indicate whether the following Interrogated individual TETRA identity items should be interpreted as one individual number, a list of 2-10 individual numbers or a range of individual numbers. In case of range, the first and last parameter of the range should be given.

Interrogated individual TETRA identity parameter is a repeatable parameter that should appear and should be interpreted as indicated by Interrogated individual number type parameter. There should be at least one Interrogated group TETRA identity in a INTERROGATE request primitive. Each Interrogated individual TETRA identity parameter should comprise of any of the following:

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

The partial parameters of Interrogated individual TETRA identity parameter should always be in the order given above. Thus, address type should be the first parameter which is always followed by any other partial parameter, except address extension. Address extension should always follow SSI, if address extension is used. Omitted address extension should imply that the address extension is the address extension of served user. SNA, if used, should refer to a SNA defined for served user.

The SS-AL interrogation should be requested to all individual numbers given as Interrogated individual TETRA identity according to the items listed after the parameter Interrogated individual TETRA identity.

Table 1: Parameters for the primitive INTERROGATE request

Parameter	Request	Remark
SS Type	M	:= SS-AL
SS Operation Type	M	:= INTERROGATE request
Interrogated individual number type	M	
Interrogated individual TETRA identity	M	Repeatable
Address type identifier	M	
Short Number Address	C	
Short Subscriber Identity	C	
Address extension	C	

5.2.1.2 INTERROGATE confirm

Interrogate confirm primitive shall be offered from FE1 to application over TNSS-SAP as a response to a previously sent interrogation request. The primitive shall contain the SS-AL information parameters listed in table 2.

Interrogated individual number type should indicate the number of Interrogated individual TETRA identity items that follow the parameter. The parameter should also indicate whether the following Interrogated individual TETRA identity items should be interpreted as one individual number, a list of 2-10 individual numbers or a range of individual numbers. In case of range, the first and last parameter of the range should be given.

Interrogated individual TETRA identity parameter is a repeatable parameter that should appear and should be interpreted as indicated by Interrogated individual number type parameter. There should be at least one Interrogated individual TETRA identity in a INTERROGATE primitive. Interrogated individual TETRA identity parameter should always have address type as first partial parameter. Address type should be followed by SNA or SSI. Address extension should always follow SSI, if address extension is used. Omitted address extension should imply that the address extension is the address extension of served user. SNA, if used, shall refer to a SNA defined for served user.

It is required that Result for interrogation applies to each individual number given as Interrogated individual TETRA identity.

Table 2: Parameters for the primitive INTERROGATE confirm

Parameter	Confirm	Remark
SS Type	M	:= SS-AL
SS Operation Type	M	: = INTERROGATE confirm
Interrogated individual number type	M	
Interrogated individual TETRA identity	M	Repeatable
Address type identifier	M	
Short Number Address	C	
Short Subscriber Identity	C	
Address extension	C	
Result for interrogation	M	Repeatable

5.2.1.3 INVOKE request1

INVOKE request1 primitive shall be offered from application to FE1 over TNSS-SAP when a served user invokes an ambience listening call request. The primitive shall contain the SS-AL information parameters listed in table 3.

Table 3: Parameters for the primitive INVOKE request1

Parameter	Request	Remark
SS Type	M	:= SS-AL
SS Operation Type	M	:= INVOKE request1
Affected user individual TETRA identity	M	
Address type identifier	M	
Short Number Address	C	
Short Subscriber Identity	C	
Address extension	C	
Second listening party identity	O	
Address type identifier	O	
Short Number Address	C	
Short Subscriber Identity	C	
Address extension	C	

5.2.1.4 INVOKE request2

INVOKE request2 primitive shall be offered from application to FE1 over TNSS-SAP when a served user invokes a request to include a second listening party into an ongoing ambience listening call. The primitive shall contain the SS-AL information parameters listed in table 4.

Table 4: Parameters for the primitive INVOKE request2

Parameter	Request	Remark
SS Type	M	:= SS-AL
SS Operation Type	M	:= INVOKE request2
Second listening party identity	O	
Address type identifier	O	
Short Number Address	C	
Short Subscriber Identity	C	
Address extension	C	

5.2.1.5 INVOKE indication

INVOKE indication primitive shall be offered from FE3 to application over TNSS-SAP when an affected user is the recipient of an ambience listening call. The primitive shall contain the SS-AL information parameters listed in table 5.

Table 5: Parameters for the primitive INVOKE indication

Parameter	Indication	Remark
SS Type	M	:= SS-AL
SS Operation Type	M	:= INVOKE indication

5.2.1.6 INVOKE response

INVOKE response primitive shall be offered from the application to FE3 over TNSS-SAP when an affected user responds to an ambience listening call invocation. The primitive shall contain the SS-AL information parameters listed in table 6.

Table 6: Parameters for the primitive INVOKE response

Parameter	Response	Remark
SS Type	M	:= SS-AL
SS Operation Type	M	:= INVOKE response
Result for invocation	M	

5.2.1.7 INVOKE confirm

INVOKE confirm primitive shall be offered from FE1 to the application over TNSS-SAP to inform the served user of a successful, or otherwise, invocation of an ambience listening call. INVOKE confirm primitive shall also be offered from FE1 to the application over TNSS-SAP to inform the served user of a successful, or otherwise, inclusion of a second listening party into an ongoing ambience listening call. The primitive shall contain the SS-AL information parameters listed in table 7.

Table 7: Parameters for the primitive INVOKE confirm

Parameter	Confirm	Remark
SS Type	M	:= SS-AL
SS Operation Type	M	:= INVOKE confirm
Affected user individual TETRA identity	M	
Address type identifier	M	
Short Number Address	C	
Short Subscriber Identity	C	
Address extension	C	
Result for invocation	M	

5.2.1.8 INFORMATION indication

INFORMATION indication shall be presented to the application from FE5 to indicate that the incoming call is an ambience listening call. The primitive shall contain the SS-AL information parameters listed in table 8.

Table 8: Parameters for the primitive INFORMATION indication

Parameter	Indication	Remark
SS Type	M	:= SS-AL
SS Operation Type	M	:= INFORMATION indication
Affected User individual TETRA identity	M	
Address type identifier	M	
Short Number Address	C	
Short Subscriber Identity	C	
Address extension	C	

5.2.2 Parameter description

Address Extension =

Mobile Country Code (MCC) + Mobile Network Code (MNC).
See ETS 300 392-1 [4], clause 7.

Address type Identifier =

0 Short Number address (SNA);
1 Short Subscriber Identity (SSI);
2 TETRA Subscriber Identity (TSI = SSI + Address Extension);
See ETS 300 392-1 [4], clause 7.

Interrogated individual number type =

0 subscriber number, 1 subscriber number following of any allowed type;
1 range of numbers, 2 subscriber numbers following of any allowed type;
2 list of subscriber numbers, 2-10 subscriber numbers following of any allowed type.

Result for interrogation =

0 invoked;
1 service not invoked for TETRA identity;
2 user not authorized;
3 unknown TETRA identity;
4 parameters not valid;
5 insufficient information;
6 rejected for any reason.

Result for invocation =

0 accepted;
1 service not supported;
2 user not authorized;
3 affected user busy;
4 second listening party not included;
5 unknown TETRA identity;
6 parameters not valid;
7 insufficient information;
8 rejected for any reason.

5.2.3 Mapping of SS-AL primitives to TNSS primitives

Table 9 shows the mapping of the SS-AL primitives to TNSS primitives.

Table 9: Mapping of the SS-AL primitives to TNSS primitives

SS-AL Primitive	TNSS-SERVICE request	TNSS-SERVICE confirm	TNSS-SERVICE indication	TNSS-SERVICE response	TNSS-INFO indication	TNSS-ERROR indication
INTERROGATE request	in FE1	-	-	-	-	note
INTERROGATE confirm	-	in FE1	-	-	-	note
INVOKE request1	in FE1	-	-	-	-	note
INVOKE request2	in FE1	-	-	-	-	note
INVOKE indication	-	-	in FE3	-	-	note
INVOKE response				in FE3		note
INVOKE confirm	-	in FE1	-	-	-	note
INFORMATION indication	-	-	-	-	in FE5	note
NOTE: FE1/FE3 should include a primitive received from application in a TNSS-ERROR indication if FE1/FE3 cannot recognize or accept the primitive. FE1/FE3/FE5 should include a primitive received from FE2/FE4 in a TNSS-ERROR indication if FE1/FE3 cannot recognize or accept the primitive.						

6 SS-AL protocol description

6.1 SS-AL protocol states

6.1.1 Protocol states of FE1

6.1.1.1 State IDLE

IDLE shall be the normal state of FE1. In this state FE1 shall receive interrogation requests from the application and send them to FE2. FE1 shall receive an acknowledge to the interrogation from FE2 and send the result to the application.

FE1 shall receive invocation requests from the application which shall be verified by FE1. FE1 shall receive two different invocation requests from the application: request1 shall be to include a second listening party at the set-up of the AL call, request2 shall be to include a second listening party into an ongoing AL call. If verification is successful, FE1 shall send the invocation request to FE2. FE1 shall receive an acknowledgement to the invocation requests from FE2 and the result shall then be sent to the application.

6.1.2 Protocol states of FE2

6.1.2.1 State IDLE

IDLE should be the normal state of FE2. In this state, FE2 should receive interrogation requests from FE1. FE2 should verify the interrogation request and establish if an AL call has been invoked for the requested identities. FE2 should return the result of the interrogation to FE1.

FE2 should receive an invocation request1 from FE1 to invoke an AL call. FE2 should verify the invocation request, and if verification is successful, should send an invocation to FE3. FE2 should receive the invocation acknowledge from FE3 and the result should be sent to FE1. If a second listening party is present in the invocation request then FE2 shall send an information to FE5.

FE2 should receive an invocation request2 from FE1 to include a second listening party into an ongoing AL call. FE2 should verify the invocation request, and if verification is successful, should send an information to FE3 and send the result of the invocation to FE1.

6.1.3 Protocol states of FE3

6.1.3.1 State IDLE

IDLE shall be the normal state of FE3. In this state, FE3 shall receive an invocation from FE2. FE3 shall authenticate the invocation (this shall be performed by the application) and send an invocation indication to the application. FE3 shall receive an invocation response from the application which shall subsequently be sent to FE2.

6.1.4 Protocol states of FE4

6.1.4.1 State IDLE

IDLE should be the normal state of FE4. In this state FE4 should receive the information flows from FE2 to be delivered to FE3 and FE5 in another system. FE4 should also receive the information flows from FE3 in another system, to be delivered to FE2.

FE4 should receive the information flows from FE1 to be delivered to FE2 located in this system. FE4 should also be able to receive information flows from FE2 in another system, to be delivered to FE1.

6.1.5 Protocol states of FE5

6.1.5.1 State IDLE

IDLE shall be the normal state of FE5. In this state, FE5 shall receive information to identify that a call is an AL call. FE5 shall send an information indication to the application.

6.2 SS-AL Procedures

6.2.1 Procedures for FE1

6.2.1.1 Verification for interrogation

At the reception of an SS-AL interrogation request from the application, FE1 shall verify that the request is authorized and the parameters are in the correct range. After making the checks, FE1 shall either continue to carry out the request, or reject it.

FE1 shall construct the SS-AL INTERROGATE PDU according to the interrogation request.

6.2.1.2 Verification for invocation

At the reception of an SS-AL invocation request from the application, FE1 shall verify that the request is authorized and the parameters are in the correct range. After making the checks, FE1 shall either continue to carry out the request, or reject it.

FE1 shall construct the either the SS-AL INVOKE-REQUEST1 PDU or INVOKE-REQUEST2 PDU according to the interrogation request.

6.2.2 Procedures for FE2

6.2.2.1 Verification for interrogation

At the reception of an SS-AL INTERROGATION PDU from FE1, FE2 should verify that the request is authorized and the parameters are in the correct range. After making the checks, FE2 should either continue to carry out the request, or reject it.

6.2.2.2 Interrogation

For each interrogated subscriber number supplied in the INTERROGATE PDU, FE2 should determine if ambience listening has been invoked for that subscriber number.

FE2 should construct the SS-AL INTERROGATE-ACK PDU containing the result for interrogation for each interrogated subscriber number supplied in the INTERROGATE PDU.

6.2.2.3 Verification for invocation

At the reception of either a SS-AL INVOKE-REQUEST1 PDU or INVOKE-REQUEST2 PDU from FE1, FE2 should verify that the request is authorized and the parameters are in the correct range. After making the checks, FE2 should either continue to carry out the request, or reject it.

6.2.2.4 Invocation

If an INVOKE-REQUEST1 PDU has been received from FE1 and the affected user is not busy, FE2 should construct the notification indicator element for incorporation into the D-SETUP PDU.

At the reception of an SS-AL INVOKE-ACK PDU, FE2 shall construct the SS-AL INVOKE-RESULT PDU to report the outcome of the invocation to FE1.

If an INVOKE-REQUEST2 PDU has been received from FE1, FE2 should determine if the call identifier supplied in the PDU applies to an ongoing AL call. If the call identifier is found to be valid for an ongoing AL call then FE2 shall construct the SS-AL INFORMATION PDU. The mechanism for inclusion of the second listening party into the AL call is outside the scope of this ETS

6.2.3 Procedures for FE3

6.2.3.1 Verification for invocation

At the reception of an INVOKE (contained in the notification indicator element of a D-SETUP PDU) from FE2, FE3 shall verify that the ambience listening service is supported and the parameters are in the correct range. After making the checks, FE2 shall pass the invocation to the application which shall determine whether to continue to carry out the request, or reject it.

6.2.3.2 Invocation

FE3 shall accept the invocation response from the application and construct the SS-AL INVOKE-ACK PDU containing the result for the invocation.

6.2.4 Procedures for FE4

6.2.4.1 Routeing address in FE4

If FE4 receives any information flow, that should be routed over ISI to another TETRA system, FE4 adds the routeing address to the request. If FE4 receives any information flow from another TETRA system over ISI, FE4 should deliver the information to FE1/FE3/FE5 located in the same system (as FE4).

6.3 PDU Descriptions

The SS-FACILITY element which shall be used to convey the supplementary service information to and from MS/LS and over the ISI can be transported in any call control PDU if inside a call or in a D-FACILITY or U-FACILITY PDU if the information is call-unrelated. The PDU element coding used is in accordance with the general rules specified in ETS 300 392-2 [2], clause 14.

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

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

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

6.3.1 INTERROGATE

INTERROGATE information flow shall be offered from FE1 to FE2 and FE4. The flow shall be offered to FE4 only if FE1 is in another TETRA system.

INTERROGATE shall be contained in the SS-AL PDU described in table 10.

Table 10: INTERROGATE PDU contents

Information element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	000001_2	AL
Action Type	4	1	M	0011_2	Interrogation
Interrogated subscriber type	4	1	M		
Interrogated party type identifier	2	1	M		Repeatable
Interrogated party short number	8	1	C		Repeatable, note
Interrogated party SSI	24	1	C		Repeatable, note
Interrogated party extension	24	1	C		Repeatable, note
NOTE: Shall be conditional on the value of Interrogated Party Type Identifier (IPTI). IPTI = 0; Interrogated Party SNA. IPTI = 1; Interrogated Party SSI. IPTI = 2; Interrogated Party SSI + Interrogated Party Extension. At least one interrogated party shall be given.					

6.3.2 INTERROGATE-ACK

INTERROGATE-ACK information flow shall be offered from FE2 to FE1 and to FE4. The flow shall be offered to FE4 only if FE1 is in another TETRA system.

INTERROGATE-ACK shall be contained in the SS-AL PDU described in table 11.

Table 11: INTERROGATE-ACK PDU contents

Information element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	000001_2	AL
Action Type	4	1	M	0011_2	Interrogation
Interrogated subscriber type	4	1	M		
Interrogated party type identifier	2	1	M		Repeatable, note 1
Interrogated party short number	8	1	C		Repeatable, note 1, note 2
Interrogated party SSI	24	1	C		Repeatable, note 1, note 2
Interrogated party extension	24	1	C		Repeatable, note 1, note 2
Result for interrogation	3	1	M		Repeatable, note 1
NOTE 1: These elements shall be repeated together, dependent on the value of Interrogated subscriber type. NOTE 2: Shall be conditional on the value of Interrogated Party Type Identifier (IPTI). IPTI = 0; Interrogated Party SNA. IPTI = 1; Interrogated Party SSI. IPTI = 2; Interrogated Party SSI + Interrogated Party Extension. At least one interrogated party shall be given.					

6.3.3 INVOKE-REQUEST1

INVOKE-REQUEST1 information flow shall be offered from FE1 to FE2 and FE4. The flow shall be offered to FE4 only if FE1 is in another TETRA system.

INVOKE-REQUEST1 shall be contained in the SS-AL PDU described in table 12.

Table 12: INVOKE-REQUEST1 PDU contents

Information element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	000001_2	AL
Action Type	4	1	M	0101_2	Invocation
Affected party type identifier	2	1	M		
Affected party short number	8	1	C		note 1
Affected party SSI	24	1	C		note 1
Affected party extension	24	1	C		note 1
Second listening party type	2	2	O		
Second listening party short	8	2	C		note 2
Second listening party SSI	24	2	C		note 2
Second listening party extension	24	2	C		note 2
NOTE 1: Shall be conditional on the value of Affected Party Type Identifier (CPTI).					

6.3.4 INVOKE-REQUEST2

INVOKE-REQUEST2 information flow shall be offered from FE1 to FE2 and FE4. The flow shall be offered to FE4 only if FE1 is in another TETRA system.

INVOKE-REQUEST2 shall be contained in the SS-AL PDU described in table 13.

Table 13: INVOKE-REQUEST2 PDU contents

Information element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	000001_2	AL
Action Type	4	1	M	0101_2	Invocation
Call Identifier	14	1	M		
Second listening party type	2	1	M		
Second listening party short	8	1	C		note
Second listening party SSI	24	1	C		note
Second listening party extension	24	1	C		note
NOTE: Shall be conditional on the value of Second Listening Party Type Identifier (SLPTI).					

6.3.5 INVOKE

INVOKE information flow shall be offered from FE2 to FE3 and FE4. The flow shall be offered to FE4 only if FE3 is in another TETRA system.

INVOKE shall be contained in the notification indicator element of the D-SETUP PDU described in table 14.

Table 14: D-SETUP PDU contents

Information element	Length	Type	C/O/M	Value	Remark
PDU Type					note
Call identifier					note
Call time-out					note
Hook method selection					note
Simplex/duplex selection					note
Basic service information					note
Transmission grant					note
Transmission request permission					note
Call priority					note
Notification indicator	6	2	O	000011_2	AL Operation
Temporary address					note
Calling party type identifier					note
Calling party address SSI					note
Calling party extension					note
External subscriber number					note
Facility					note
Proprietary					note
NOTE: See ETS 300 392-2 [2], clause 14.					

6.3.6 INVOKE-ACK

INVOKE-ACK information flow shall be offered from FE3 to FE2 and FE4. The flow shall be offered to FE4 only if FE3 is in another TETRA system.

INVOKE-ACK shall be contained in the SS-AL PDU described in table 15.

Table 15: INVOKE-ACK PDU contents

Information element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	000001_2	AL
Action Type	4	1	M	0101_2	Invocation
Call identifier	14	1	M		
Result for invocation	4	1	M		

6.3.7 INVOKE-RESULT

INVOKE-RESULT information flow shall be offered from FE2 to FE1 and FE4. The flow shall be offered to FE4 only if FE1 is in another TETRA system.

INVOKE-RESULT shall be contained in the SS-AL PDU described in table 16.

Table 16: INVOKE-RESULT PDU contents

Information element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	000001_2	AL
Action Type	4	1	M	0101_2	Invocation
Affected party type identifier	2	1	M		
Affected party short number	8	1	C		note
Affected party SSI	24	1	C		note
Affected party extension	24	1	C		note
Result for invocation	4	1	M		
NOTE: Shall be conditional on the value of Affected Party Type Identifier (CPTI).					

6.3.8 INFORMATION

INFORMATION flow shall be offered from FE2 to FE5 and FE4. The flow shall be offered to FE4 only if FE5 is in another TETRA system.

INFORMATION shall be contained in the SS-AL PDU described in table 17.

Table 17: INFORMATION PDU contents

Information element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	000001_2	AL
Action Type	4	1	M	0101_2	Invocation
Call identifier	14	1	M		
Affected party type identifier	2	1	M		
Affected party short number	8	1	C		note
Affected party SSI	24	1	C		note
Affected party extension	24	1	C		note
NOTE: Shall be conditional on the value of Affected Party Type Identifier (APTI).					

6.4 Element coding

6.4.1 Action type

Action type shall indicate the type of the action as described in table 18. With SS-AL only Invocation and Interrogation shall be used.

Table 18: Action type contents

Information element	Length	Value	Remark
Action type	4	0000_2	SS-Service not supported
		0001_2	Definition
		0010_2	Distribution
		0011_2	Interrogation
		0100_2	Cancellation
		0101_2	Invocation
		0110_2	Information
		0111_2	Operation
		1000_2	Deletion
		1001_2	Reserved
		...	etc.
		1111_2	Reserved

6.4.2 Affected party extension

The purpose of the affected party extension element shall be to indicate to the SwMI the extended part of the TSI address of the affected user. The element is described in table 19.

Table 19: Affected party extension element contents

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

6.4.3 Affected party SNA

The purpose of the affected party SNA element shall be to indicate to the SwMI the SNA of the affected user. The SNA shall refer to a short number defined for the FE1, that requested the SS-AL interrogation or invocation. The element is described in table 20.

Table 20: Affected party SNA element contents

Information element	Length	Value	Remark
Affected party SNA	8	$0\text{-}255_{10}$	See ETS 300 392-1 [3], clause 7.

6.4.4 Affected party SSI

The purpose of the affected party SSI element shall be to indicate to the SwMI the SSI address of the affected user. The element is described in table 21.

Table 21: Affected party SSI element contents

Information element	Length	Value	Remark
SSI	24		See ETS 300 392-1 [3], clause 7.

6.4.5 Affected party type identifier

The purpose of the affected party type identifier element shall be to indicate the type of address which shall follow in the PDU. The element is described in table 22.

Table 22: Affected party type identifier element contents

Information element	Length	Value	Remark
Affected party type identifier	2	00_2	SNA
		01_2	SSI
		10_2	TSI
		11_2	Reserved.

6.4.6 Call identifier

The purpose of the call Identifier element shall be to uniquely identify a specific call. The element is described in table 23.

Table 23: Call identifier elements contents

Information element	Length	Value	Remark
Call Identifier	14		See ETS 300 392-2 [2], clause 14.

6.4.7 Interrogated party extension

See affected party extension.

6.4.8 Interrogated party SNA

See affected party SNA.

6.4.9 Interrogated party SSI

See affected party SSI.

6.4.10 Interrogated party type identifier

See affected party type identifier.

6.4.11 Interrogated subscriber type

Interrogated subscriber type shall indicate if the following subscriber number, or numbers, shall be one number, range of numbers or a list of these numbers.

The element shall indicate how many "Interrogated subscriber number" elements shall follow this element. There shall be 1-10 Interrogated subscriber elements and the numbers can be interpreted as a single subscriber number, a list of subscriber numbers or a range of subscriber numbers. In the case of range, two subscriber number element follow; in the case of list, up to ten subscriber number elements can follow. The element shall also indicate how the subscriber numbers are interpreted, e.g. if two subsequent numbers shall be considered as a list of two numbers or as a range where the first number is the element in the range and the second element in the last element in the range.

One "Interrogated subscriber number" element shall include all elements of one of the following:

- interrogated party type identifier and interrogated party SNA;
- interrogated party type identifier and interrogated party SSI;
- interrogated party type identifier, interrogated party SSI and interrogated party extension.

Interrogated subscriber type element is described in table 24.

Table 24: Interrogated subscriber type contents

Information element	Length	Value	Remark
Interrogated subscriber type	4	0000_2	Subscriber number, 1
		0001_2	Range of subscriber numbers, 2
		0010_2	List of subscriber numbers, 2
		0011_2	List of subscriber numbers, 3
		0100_2	List of subscriber numbers, 4
		0101_2	List of subscriber numbers, 5
		0110_2	List of subscriber numbers, 6
		0111_2	List of subscriber numbers, 7
		1000_2	List of subscriber numbers, 8
		1001_2	List of subscriber numbers, 9
		1010_2	List of subscriber numbers, 10
		1011_2	Reserved
		...	etc.
		1111_2	Reserved
NOTE: The number in Remark column indicates how many subscriber number			

6.4.12 Result for interrogation

Result for interrogation shall indicate the outcome of the interrogation. Table 25 describes the element Result for definition/interrogation.

Table 25: Result for interrogation contents

Element	Length	Value	Remark
Result for interrogation	3	000_2	invoked
		001_2	service not invoked for TETRA identity
		010_2	user not authorized
		011_2	unknown TETRA identity
		100_2	parameters not valid
		101_2	insufficient information
		110_2	rejected for any reason
		111_2	Reserved

6.4.13 Result for invocation

Result for interrogation shall indicate whether the previously made invocation was successful or unsuccessful. If the request was unsuccessful, the reason shall be indicated by the element. Table 26 describes the element Result for definition/interrogation.

Table 26: Result for invocation contents

Element	Length	Value	Remark
Result for invocation	4	0000_2	accepted
		0001_2	service not supported
		0010_2	user not authorized
		0011_2	affected user busy
		0100_2	second listening party not included
		0101_2	unknown TETRA identity
		0110_2	parameters not valid
		0111_2	insufficient information
		1000_2	rejected for any reason
		1001_2	Reserved
		...	etc.
		1111_2	Reserved

6.4.14 Second listening party extension

See affected party extension.

6.4.15 Second listening party SNA

See affected party SNA.

6.4.16 Second listening party SSI

See affected party SSI.

6.4.17 Second listening party type identifier

See affected party type identifier.

7 SS-AL FE behaviour

The figures contained in this clause are intended to illustrate typical SS-AL 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) defined in CCITT Recommendation Z.100 [4]. Notice, however, that due to simplicity there are deviations from syntactical rules.

The convention used in the figures below is that output signals to the left represent information towards the user and output signals to the right represents information flows towards the SwMI part of the AL function. Input signals from the left represent information flows from the user and input signals from the right represent information flows from the central part of the SwMI.

7.1 Behaviour of FE1

7.1.1 Service interaction for FE1 (SS entity in served user)

Service interaction for FE1 (SS entity in Served User) is show in figure 4.

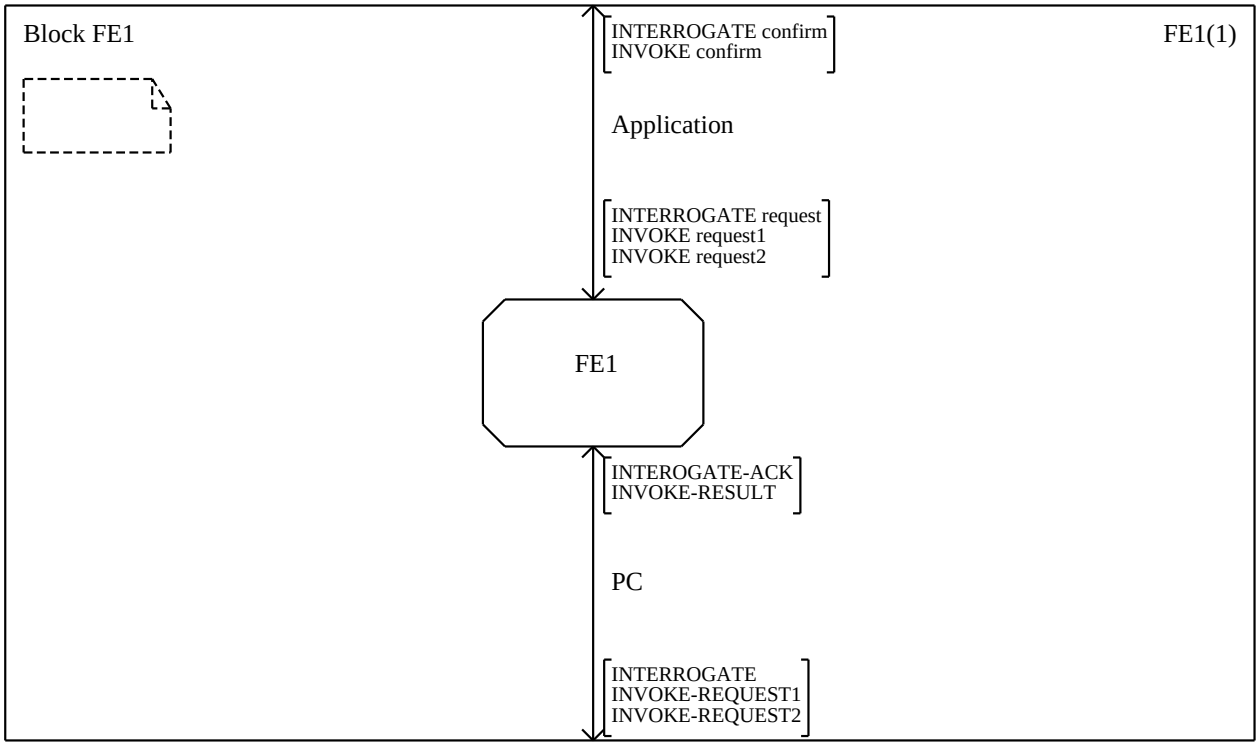


Figure 4: Service interaction for FE1

7.1.2 Process description of FE1 (SS entity in served user)

Process description of FE1 (SS entity in Served User) in state IDLE is given in figure 5.

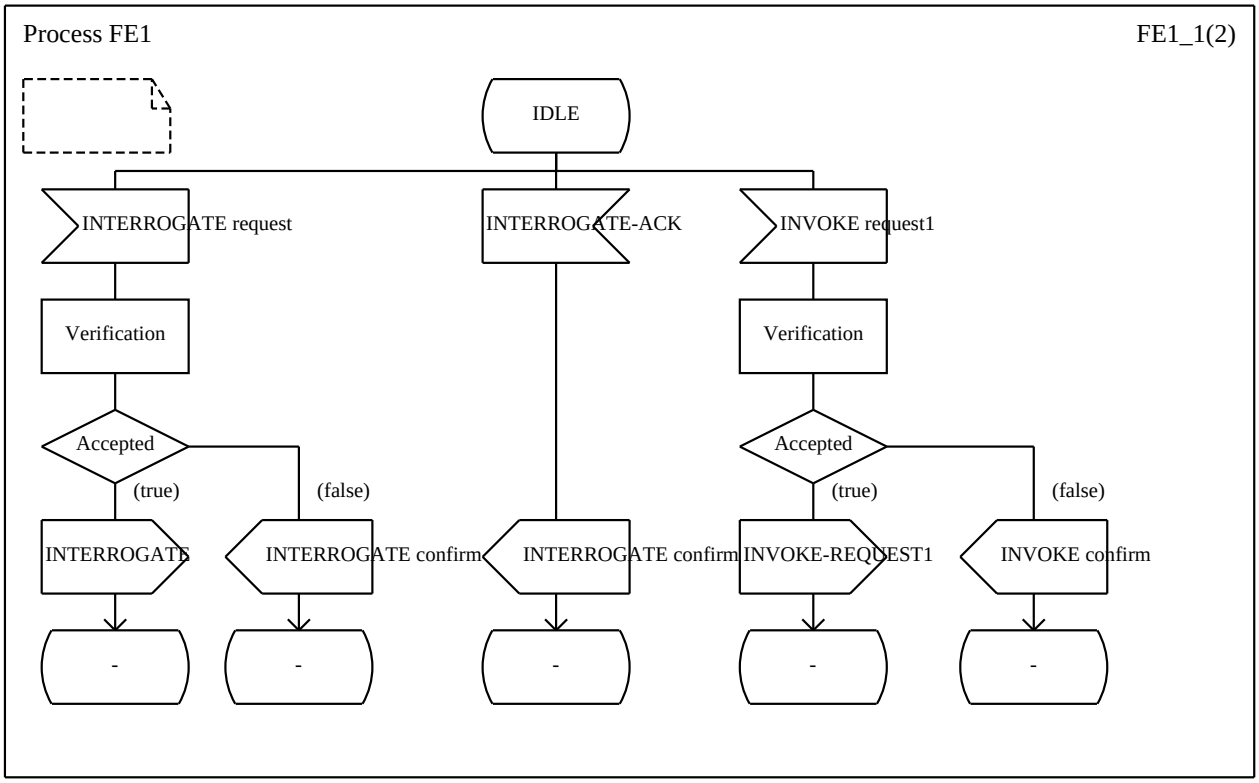


Figure 5: Process description of state IDLE of FE1 (part 1)

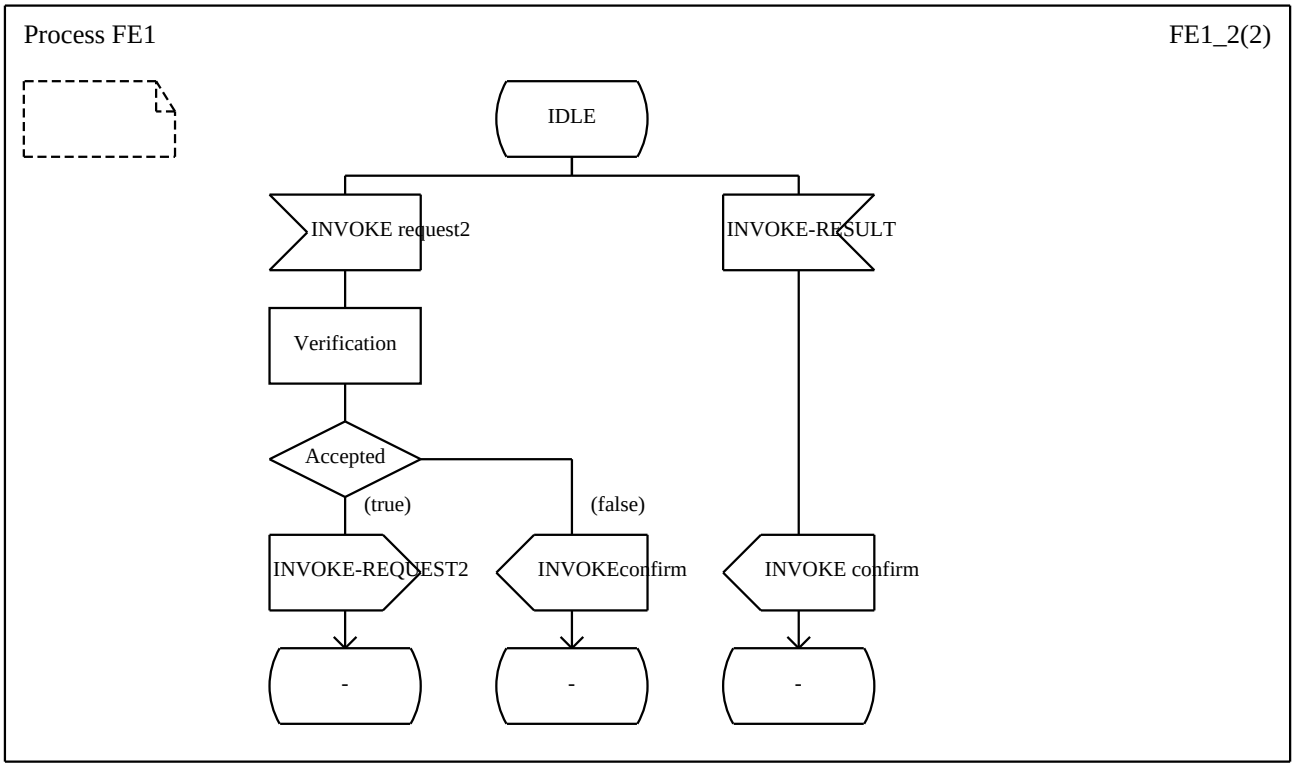


Figure 6: Process description of state IDLE of FE1 (part 2)

7.2 Behaviour of FE2

7.2.1 Service interaction for FE2 (SS entity in SwMI in system 1)

Service interaction for FE2 (SS entity in SwMI in system 1) is show in figure 7.

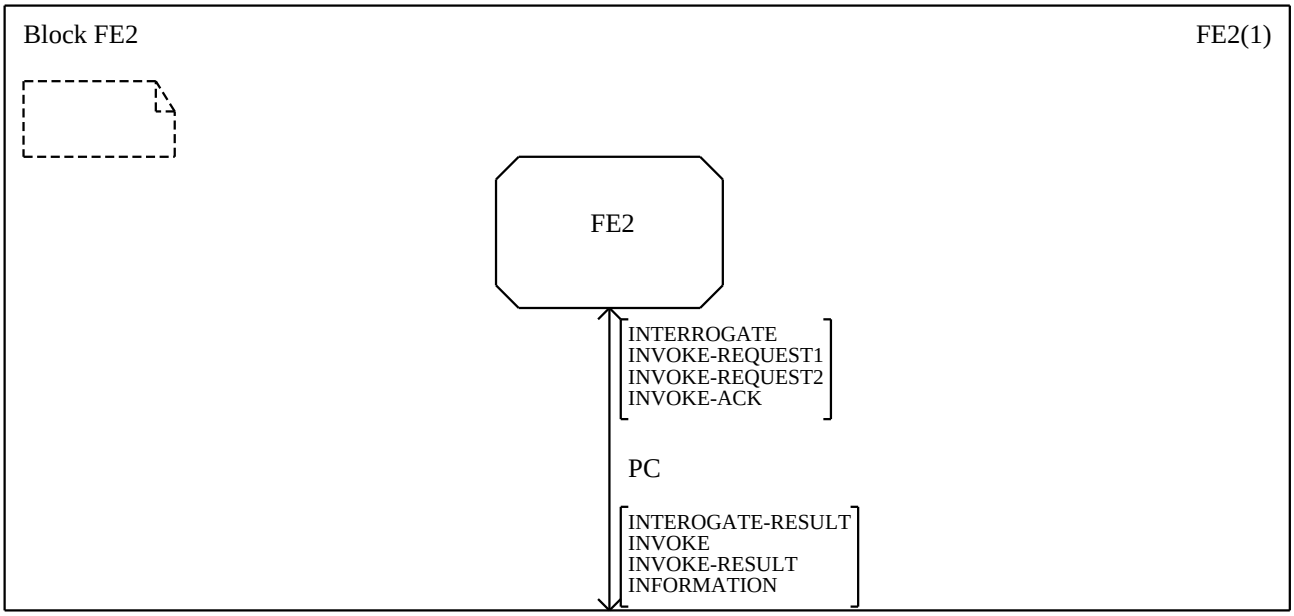


Figure 7: Service interaction for FE2

7.2.2 Process description of FE2 (SS entity in SwMI in system 1)

Process description of FE2 (SS entity in SwMI in system 1) in state IDLE is given in figure 8.

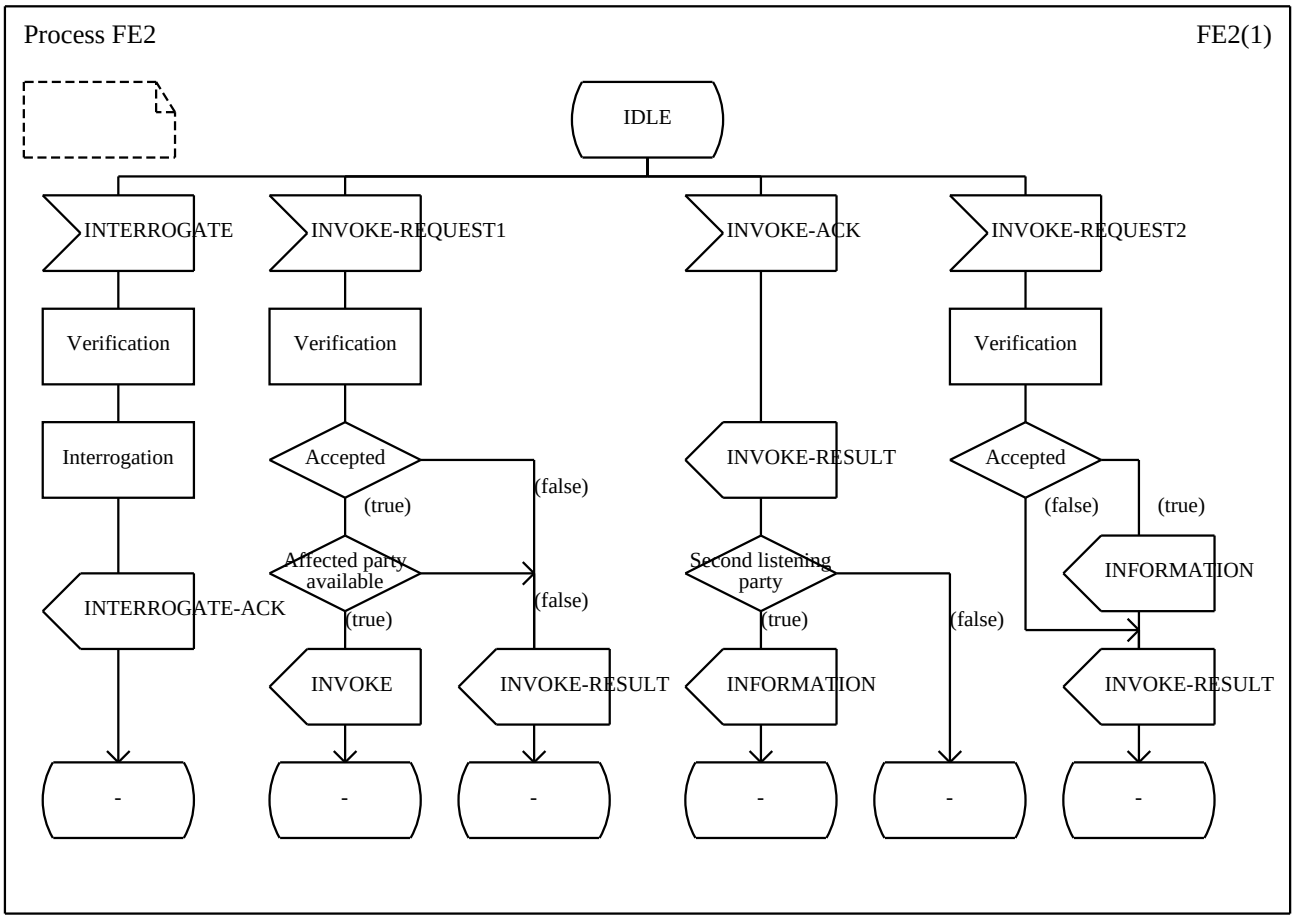


Figure 8: Process description of state IDLE of FE2

7.3 Behaviour of FE3

7.3.1 Service interaction for FE3 (SS entity in affected user)

Service interaction for FE3 (SS entity in Affected User) is show in figure 9.

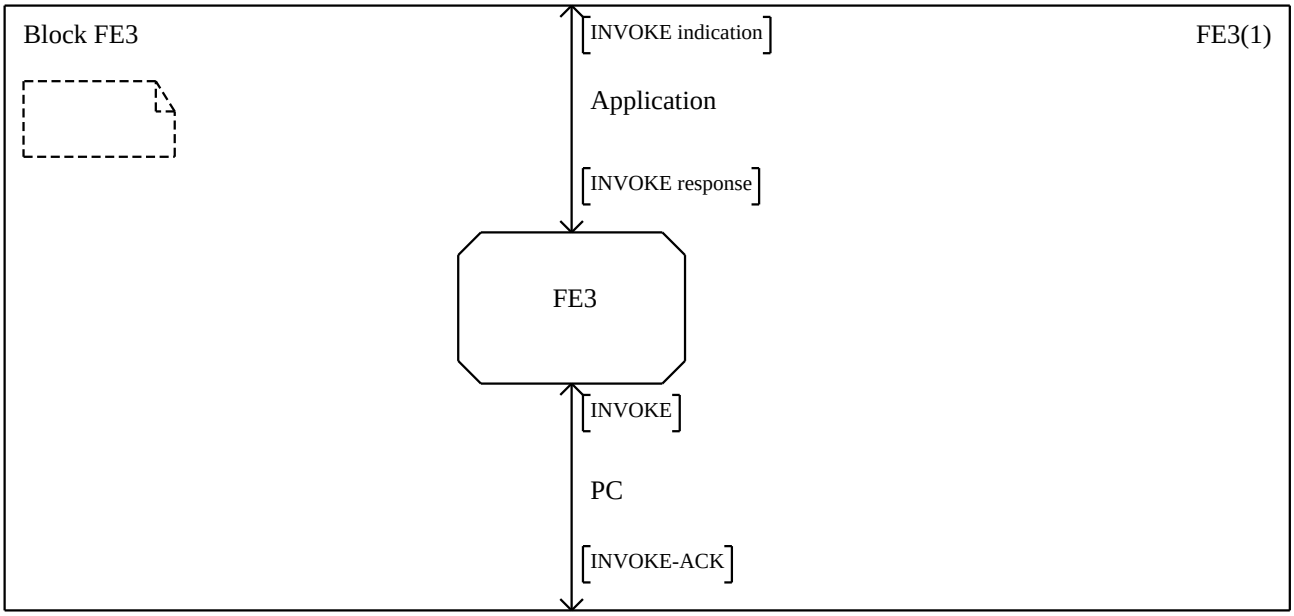


Figure 9: Service interaction for FE3

7.3.2 Process description of FE3 (SS entity in affected user)

Process description of FE2 (SS entity in Affected User) in state IDLE is given in figure 10.

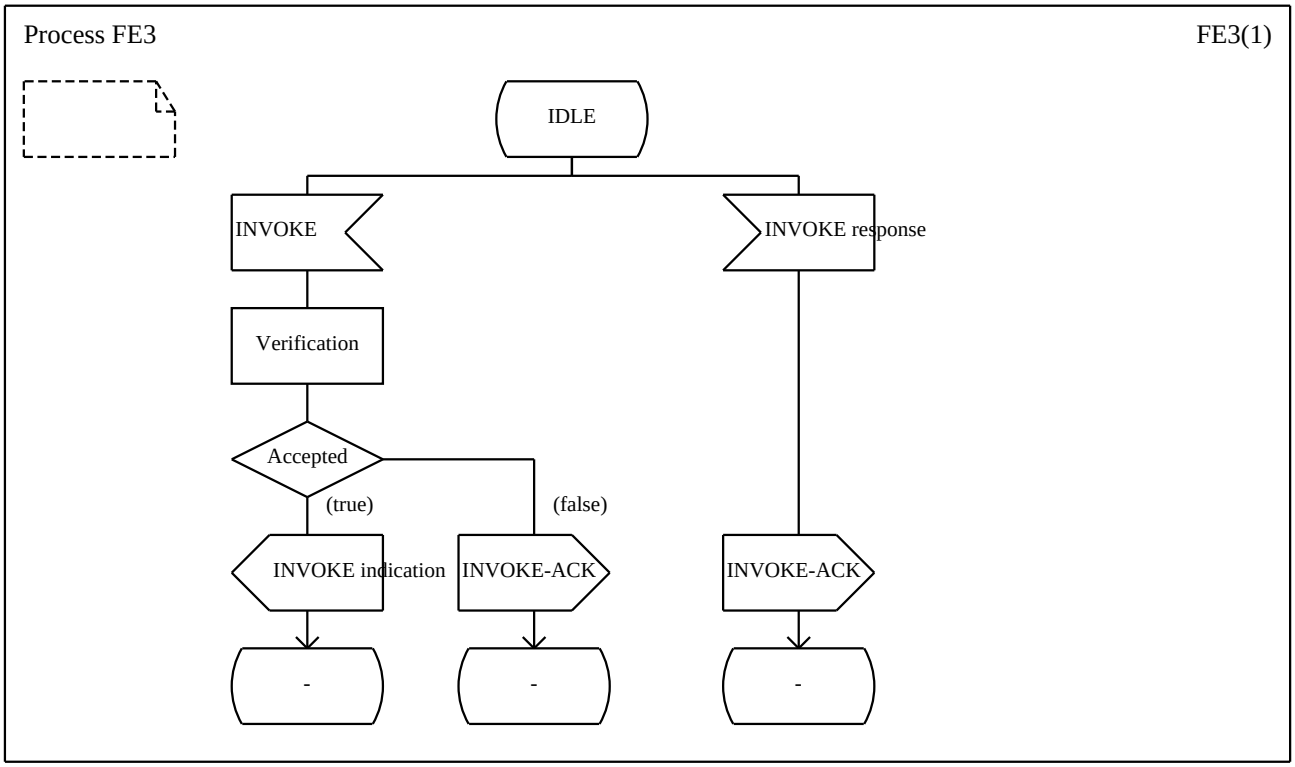


Figure 10: Process description of state IDLE of FE3

7.4 Behaviour of FE4

7.4.1 Service interaction for FE4 (SS entity in SwMI in system 2)

Service interaction for FE3 (SS entity in Affected User) is show in figure 11.

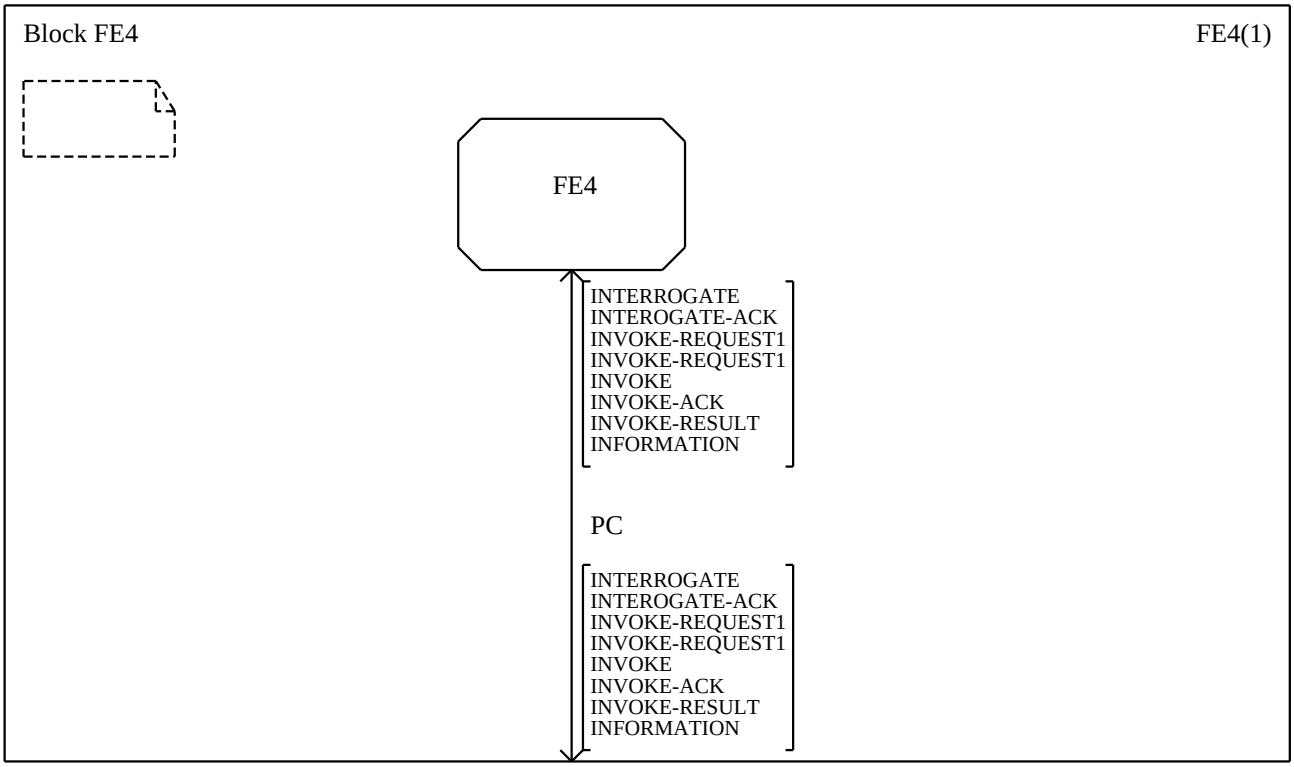


Figure 11: Service interaction for FE4

7.4.2 Process description of FE4 (SS entity in SwMI in system 2)

Process description of FE4 (SS entity in SwMI in system 2) in state IDLE is given in figure 12.

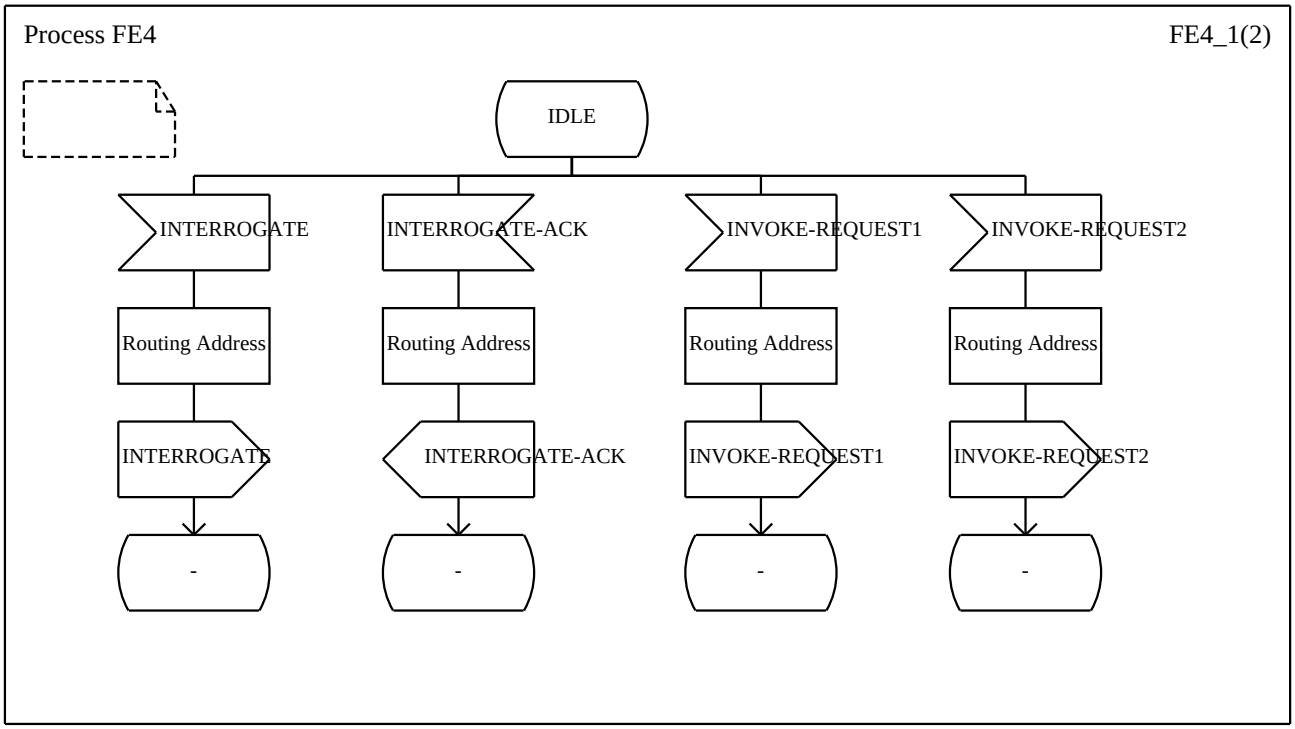


Figure 12: Process description of state IDLE of FE4 (part 1)

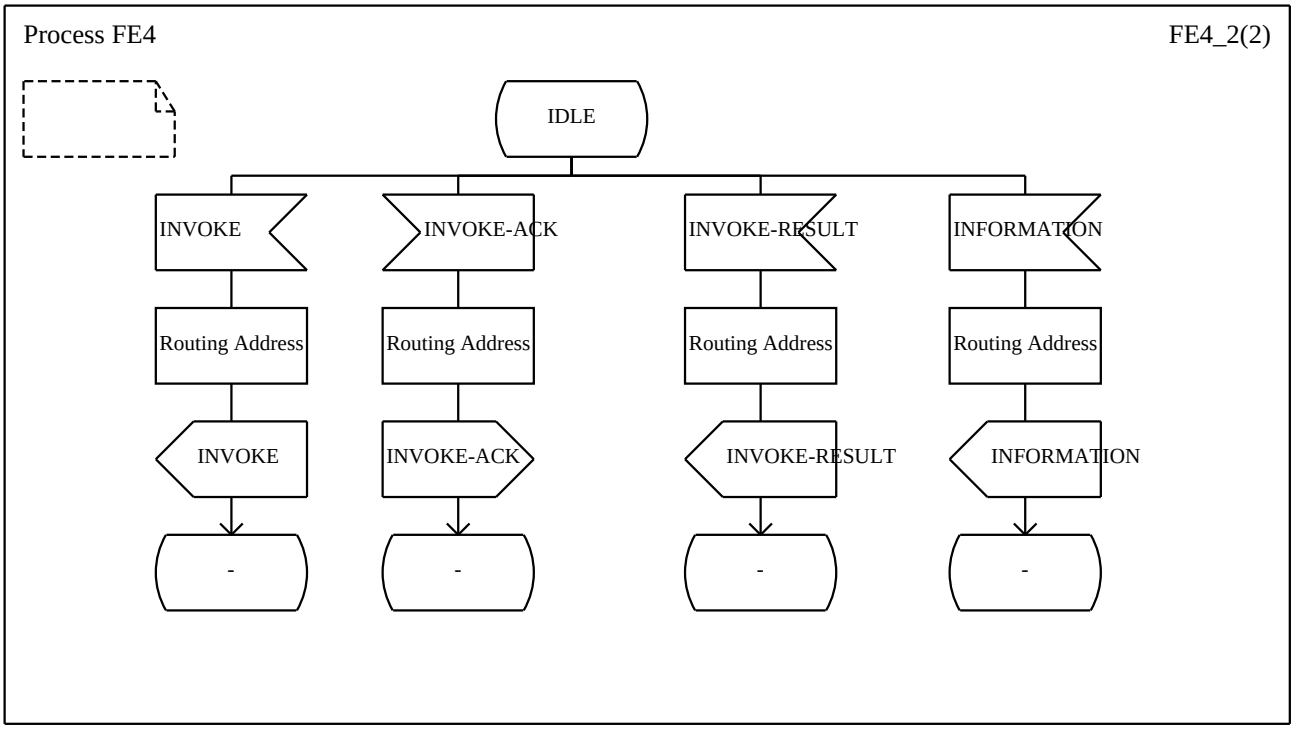


Figure 12: Process description of state IDLE of FE4 (part 2)

7.5 Behaviour of FE5

7.5.1 Service interaction for FE5 (SS entity in second listening party)

Service interaction for FE3 (SS entity in Second Listening Party) is show in figure 13.

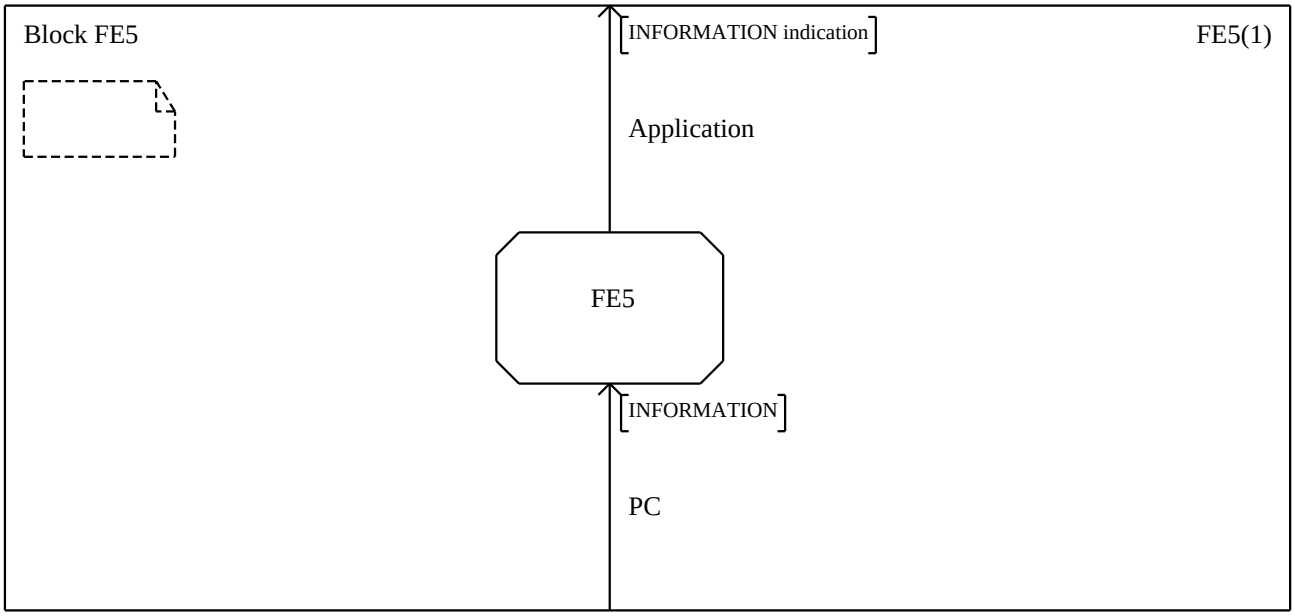


Figure 13: Service interaction for FE5

7.5.2 Process description of FE5 (SS entity in second listening party)

Process description of FE5(SS entity in Second Listening Party) in state IDLE is given in figure 14.

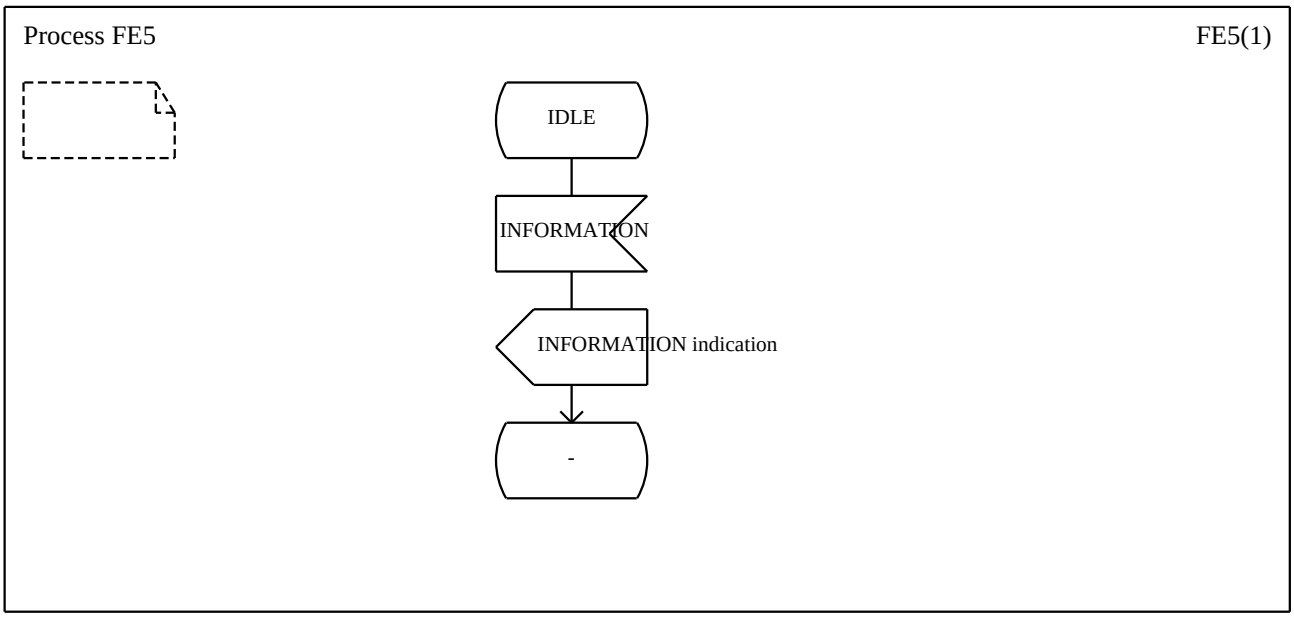


Figure 14: Process description of state IDLE of FE5

7.6 Inter-working considerations

In order to enable the SS-AL to extend to several TETRA systems over the ISI, the Functional entities (FE2s and FE4s) in different TETRA systems shall be able to send and receive call related and call unrelated supplementary service information flows over the ISI.

Annex A (informative): Examples of SS-FACILITY elements

A.1 Example of INTERROGATE SS-FACILITY element contents

Table A.1 shows an example of the elements in a SS-AL INTERROGATE facility element that FE1 constructs. It describes an interrogation request made to a list of three subscriber numbers, the first interrogated subscriber number is a SNA, the second number is a SSI and the third number is a TSI.

Table A.1: An example of the contents in a SS-AL INTERROGATE FACILITY element sent by FE1

SS-Type (~ SS-AL)
Action Type (~ Interrogation)
Interrogated subscriber type (~ list, 3)
Interrogated party type identifier (~ IPTI = 0 = SNA)
Interrogated party number (~ the SNA form of a subscriber number)
Interrogated party type identifier (~ IPTI = 1 = SSI)
Interrogated party number (~ the SSI form of a subscriber number)
Interrogated party type identifier (~ IPTI = 2 = SSI + Extension, TSI)
Interrogated party number (~ the SSI form of a subscriber number)
Interrogated party extension (~ Country Code + Network Code)

A.2 Example of INTERROGATE-ACK SS-FACILITY element contents

Table A.2 shows an example of the elements in a SS-AL INTERROGATE-ACK facility element that FE2 constructs. It describes an interrogation acknowledge to the interrogation request in table A.1. The first interrogated subscriber number has an AL call invoked, the second has no AL call invoked and the third is not recognized by FE2.

Table A.2: An example of the contents in a SS-AL INTERROGATE FACILITY element sent by FE1

SS-Type (~ SS-AL)
Action Type (~ Interrogation)
Interrogated subscriber type (~ list, 3)
Interrogated party type identifier (~ IPTI = 0 = SNA)
Interrogated party number (~ the SNA form of a subscriber number)
Result for interrogation (~ invoked)
Interrogated party type identifier (~ IPTI = 1 = SSI)
Interrogated party number (~ the SSI form of a subscriber number)
Result for interrogation (~ service not invoked for TETRA identity))
Interrogated party type identifier (~ IPTI = 2 = SSI + Extension, TSI)
Interrogated party number (~ the SSI form of a subscriber number)
Interrogated party extension (~ Country Code + Network Code)
Result for interrogation (~ unknown TETRA identity)

A.3 Example of INVOKE-REQUEST1 SS-FACILITY element contents

Table A.3 shows an example of the elements in a SS-AL INVOKE-REQUEST1 facility element that FE1 constructs. It describes an invocation request to FE2 for an affected user whose subscriber number is an SSI and includes a second listening party, whose subscriber number is also an SSI.

Table A.3: An example of the contents in a SS-AL INVOKE-REQUEST1 FACILITY element sent by FE1

SS-Type (~ SS-AL)
Action Type (~ Invocation)
Affected party type identifier (~ APTI = 1 = SSI)
Affected party number (~ the SSI form of a subscriber number)
Second listening party type identifier (~SLPTI = 1 = SSI)
Second listening party number (~ the SSI form of a subscriber number)

A.4 Example of INVOKE-RESULT SS-FACILITY element contents

Table A.4 shows an example of the elements in a SS-AL INVOKE-RESULT facility element that FE2 constructs. It describes the invocation response to FE1 from the invocation request in table A.4. The invocation has been accepted by the affected user.

Table A.4: An example of the contents in a SS-AL INVOKE-RESULT FACILITY element sent by FE2

SS-Type (~ SS-AL)
Action Type (~ Invocation)
Affected party type identifier (~ APTI = 1 = SSI)
Affected party number (~ the SSI form of a subscriber number)
Result for invocation (~ accepted)

History

Document history			
September 1996	Public Enquiry	PE 114:	1996-09-23 to 1997-01-17