EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 695

March 1996

Source: ETSI TC-BTC

Reference: DE/BTC-01036

ICS: 35.120

Key words: PISN, CTM, mobility, ANF, stage 2, PTN

Private Integrated Services Network (PISN); Cordless Terminal Mobility (CTM); Call handling additional network features; Functional capabilities and information flows

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

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

Contents

Foreword

This European Telecommunication Standard (ETS) has been produced by the Business Telecommunications (BTC) Technical Committee of the European Telecommunications Standards Institute (ETSI).

Transposition dates	
Date of adoption of this ETS:	15 March 1996
Date of latest announcement of this ETS (doa):	30 June 1996
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 December 1996
Date of withdrawal of any conflicting National Standard (dow):	31 December 1996

Blank page

1 Scope

This European Telecommunication Standard (ETS) describes the stage two of the Cordless Terminal Mobility (CTM) call handling services for Private Integrated Services Networks (PISNs). It comprises two related but distinct service descriptions, CTM Incoming Call Handling Additional Network Feature (ANF–CTMI) and CTM Outgoing Call Handling Additional Network Feature (ANF-CTMO).

ANF-CTMI directs incoming calls to a CTM user within a PISN regardless of the CTM user's geographical location within the PISN, provided the CTM user's location is known.

ANF-CTMO detects an outgoing call or request for a supplementary service from a CTM user and establishes it as a basic call or signalling connection, respectively, regardless of the user's geographical location within the PISN. It also provides the CTM user's service profile for use by outgoing call control, or alternatively passes the call to the CTM user's home location for processing.

These ANFs are applicable to all circuit-mode basic services as defined in ETS 300 171 [1].

This ETS contains the stage 2 specifications of ANF-CTMI and ANF-CTMO. It identifies the functional entities involved in the feature and the information flows between them. The specification of information flows between the PISN and cordless terminals is beyond the scope of this ETS. ANF specifications are produced in three stages according to the method specified in ETS 300 387 [4].

The purpose of the stage 2 specification is to guide and constrain the work on signalling protocols at stage 3, while fulfilling the requirements of stage 1. Stage 1 and stage 3 are defined in separate standards.

Conformance to this ETS is met by conforming to a stage 3 standard which fulfils the requirements of this ETS that are relevant to the equipment for which the stage 3 standard applies. Therefore, no method of testing is provided for this ETS.

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 only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ETS 300 171 (1992): "Private Telecommunication Network (PTN); Specification, functional models and information flows; Control aspects of circuit mode basic services".

[2] ETS 300 415 (1995): "Private Telecommunication Network (PTN); Terms and definitions".

[3] ETS 300 237 (1993): "Private Telecommunication Network (PTN) – Specification, functional model and information flows - Name identification supplementary services".

[4] ETS 300 387 (1994): "Private Telecommunication Network (PTN); Method for the specification of basic and supplementary services ".

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

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

[7] ISO/IEC 11579-1 (1994): "Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Part 1: Reference configurations for PISN exchanges (PINX)".

[8] ISO/IEC 11571 (1994): "Information technology - Telecommunications and information exchange between systems - Numbering and Sub-addressing in Private Integrated Services Network".

3 Definitions and abbreviations

3.1 Definitions

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

Additional Network Feature (ANF): See ETS 300 415 [2].

address: See ETS 300 415 [2].

call; basic call: See ETS 300 171 [1].

calling user's name: See ETS 300 237 [3]

Cordless Terminal Mobility (CTM): The ability of a cordless terminal to be in continuous motion whilst accessing and using the telecommunications services offered by the PISN as well as the capability of the network to keep track of the location of the cordless terminal within the coverage area of the radio system used.

CTM user: A PISN user whose calls are processed by either or both of the CTMI and CTMO ANFs.

fixed part: A physical grouping of some or all of the fixed component parts of mobile radio system. These would include one or more items of radio equipment attached to an antenna system. It could also include common control functions and interfaces to the PTNX.

Home Data Base (HDB): See ETS 300 415 [2].

home PINX: The PINX which has direct access to the HDB entry for a particular CTM user.

Private Integrated Services Network (PISN): See ISO/IEC 11579-1 [7] .

Private Integrated Services Network Exchange (PINX): See ISO/IEC 11579-1 [7].

PISN number: See ISO/IEC 11571 [8].

signalling connection: A means of conveying supplementary service requests, independent of a basic call.

supplementary service: See ITU-T Recommendation I.210 [5].

Visitor Data Base (VDB): See ETS 300 415 [2].

visitor PINX: The PINX which has direct access to the VDB currently associated with a particular CTM user.

This ETS Refers To The Following Functional Entities (FES) Defined For Basic Call Control (see ETS 300 171 [1]):

Call Control (CC);
Call Control Agent (CCA).

This ETS refers to the following inter-FE relationships defined for basic call control (see ETS 300 171 [1]):

r1;
r2;
r3.

This ETS refers to the following service elements defined for basic call control (see ETS 300 171 [1]):

- call history;
- connection type;
- destination number;
- destination subaddress;
- originating category;
- originating number;
- originating subaddress.

3.2 Abbreviations

For the purposes of this ETS the following abbreviations apply:

ANF-xxx	"xxx" Additional Network Feature
CC	Call Control functional entity
CCA	Call Control Agent functional entity
CTM	Cordless Terminal Mobility
CTMI	CTM Incoming Call Handling
CTMO	CTM Outgoing Call Handling
FE	Functional Entity
FEA	Functional Entity Action
FP	Fixed Part
HDB	Home Data Base
PINX	Private Integrated Services Network Exchange
PISN	Private Integrated Services Network
SDL	Specification and Description Language
VDB	Visitor Data Base

4 ANF-CTMI

4.1 Description

ANF-CTMI enables calls to be directed to a CTM user within the PISN. As there is no predetermined access for the connection of a CTM user to the PISN, the directing of such calls requires that information regarding the location of the user is available.

4.2 Derivation of the functional model

4.2.1 Functional model description

The functional model for ANF-CTMI shall be as shown in figure 1.

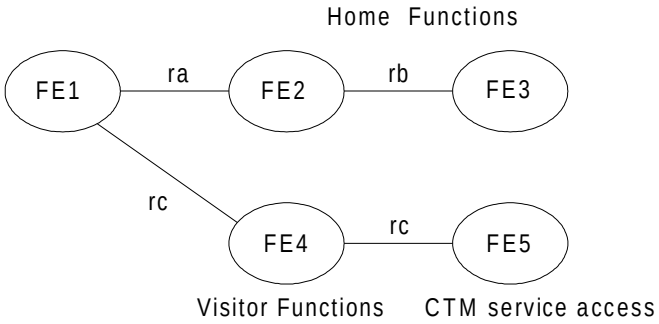

Figure 1: Functional model for ANF-CTMI

The functional model for ANF-CTMI shall comprise the following Functional Entities (FEs):

FE1: CTM incoming call execution;
FE2: CTM incoming call detection and control;
FE3: Routing information provision;
FE4: Visited location control and execution;
FE5: CTM service access agent.

The following functional relationships shall exist between these FEs:

ra: between FE1 and FE2;
rb: between FE2 and FE3;
rc: between FE1 and FE4 and between FE4 and FE5.

4.2.2 Description of functional entities

4.2.2.1 CTM incoming call execution, FE1

On request from FE2, this FE directs an incoming call to the CTM user by initiating a new call establishment towards the CTM user's location and passing the CTM user's identity.

4.2.2.2 CTM incoming call detection and control, FE2

This FE detects an incoming call to a CTM user and requests FE1 to redirect the call to the CTM user's location on the basis of information obtained from FE3.

4.2.2.3 Routing information provision, FE3

This FE provides details of the CTM user's location within the PISN to FE2 on request.

4.2.2.4 Visited location control and execution, FE4

This FE detects the incoming call and directs it to the CTM user's indicated PISN access.

4.2.2.5 CTM service access agent, FE5

This FE extends the incoming call to the appropriate CTM user using the identity provided by FE4.

4.2.3 Relationship with a basic service

An example of the relationship between the functional model and a basic service is shown in figure 2. This example is used as the basis for the information flow sequence diagrams in subclause 4.3.1.

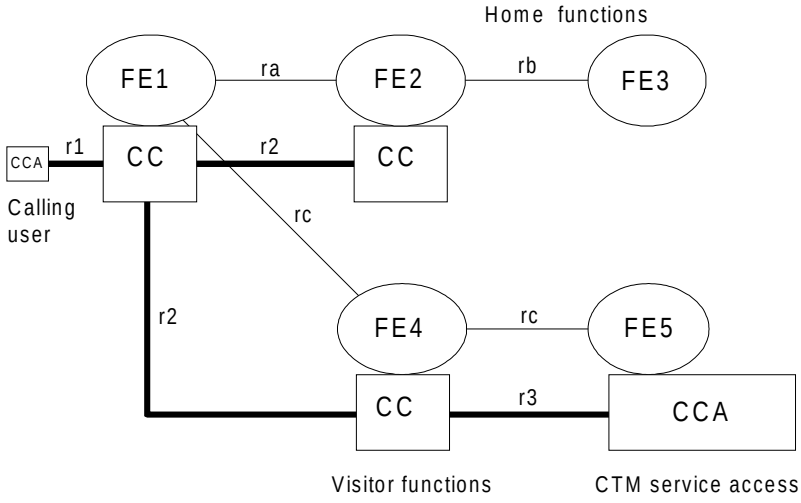

Figure 2: Functional entity model relationship

4.3 Information flows

4.3.1 Information flow sequences

A stage 3 standard shall be capable of providing the information flows shown in figures 3 to 7. It can specify further information flows, e.g. to deal with additional exceptional conditions.

ANF-CTMI information flows are shown as solid arrows and basic call information flows are represented by broken arrows. An ellipse embracing two information flows indicates that these flows occur together. Within a column representing an ANF-CTMI functional entity, the numbers refer to functional entity actions listed in subclause 4.5.

The information flow sequence for successful CTMI operation is shown in figure 3.

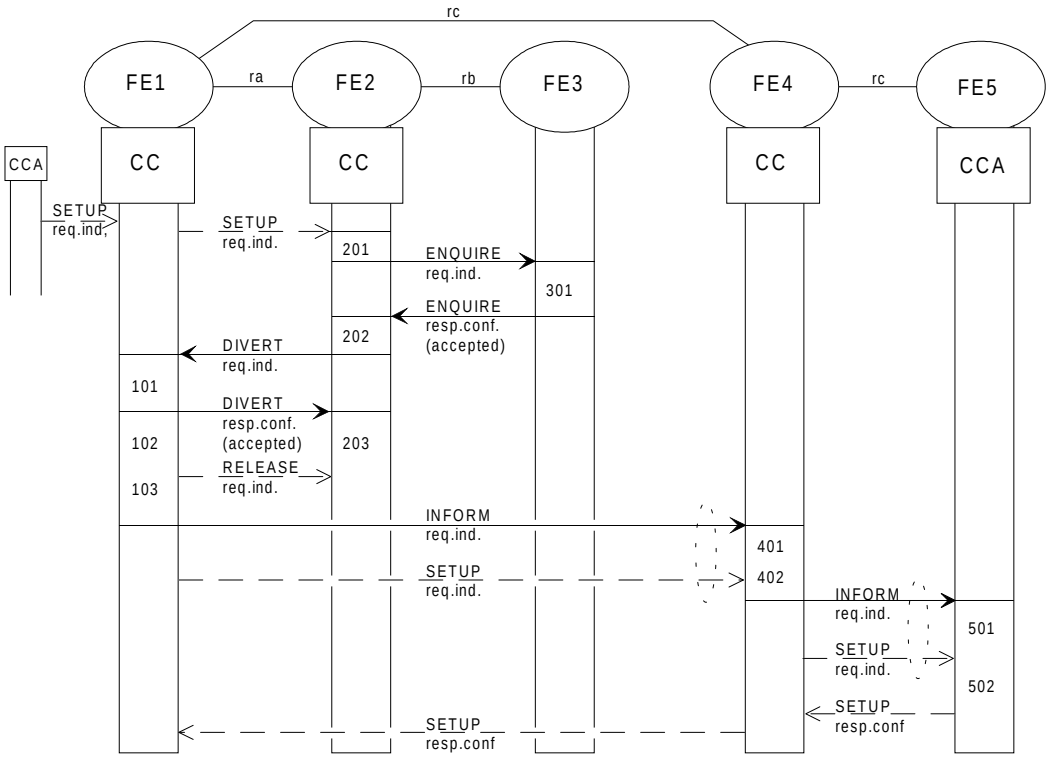

Figure 3: Information flow sequence for successful CTMI operation

Information flow sequences for unsuccessful CTMI operations are shown in figures 4 to 7.

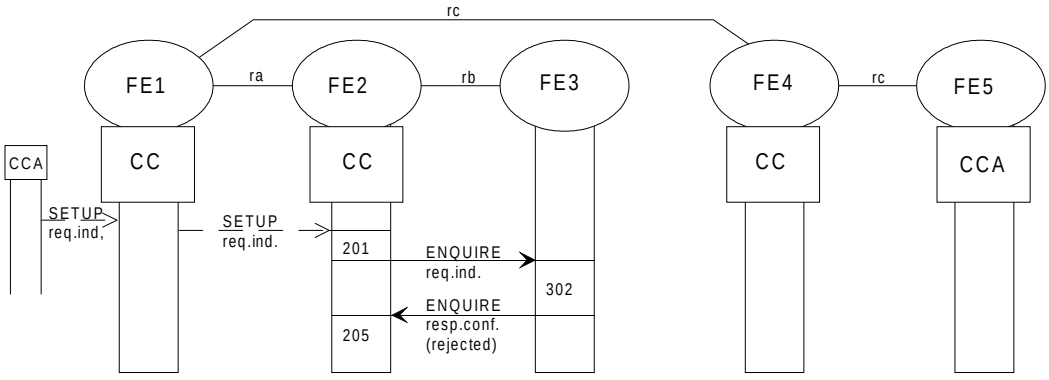

Figure 4: Information flow sequence for unsuccessful CTMI operation: CTM user not known at home PINX

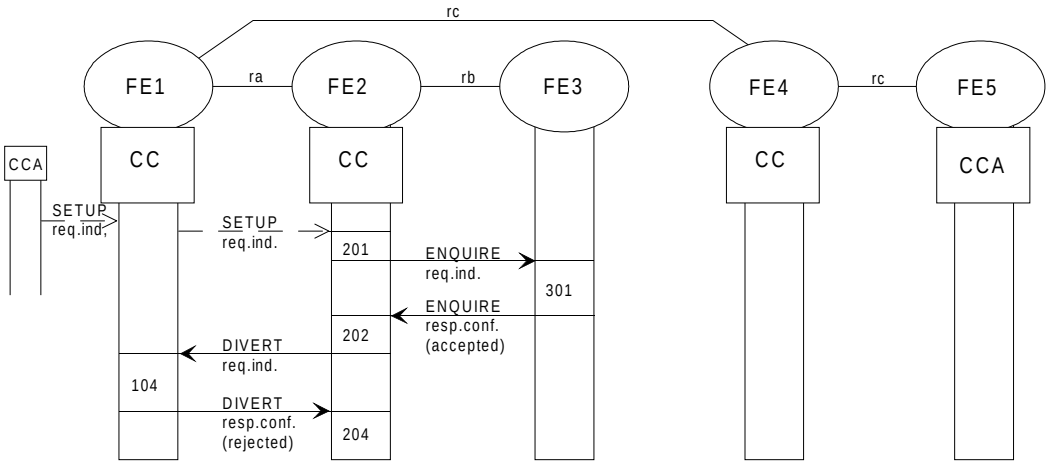

Figure 5: Information flow sequence for unsuccessful CTMI operation: rejection of diversion

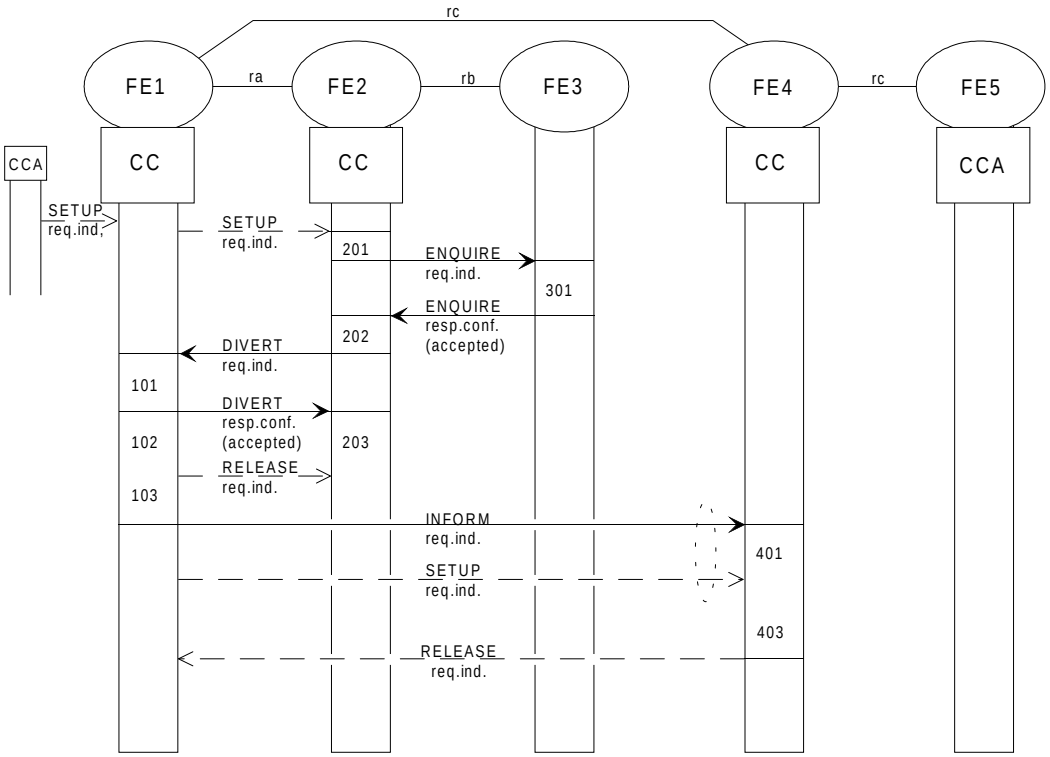

**Figure 6: Information flow sequence for unsuccessful CTMI operation:
CTM user not known at visitor PINX**

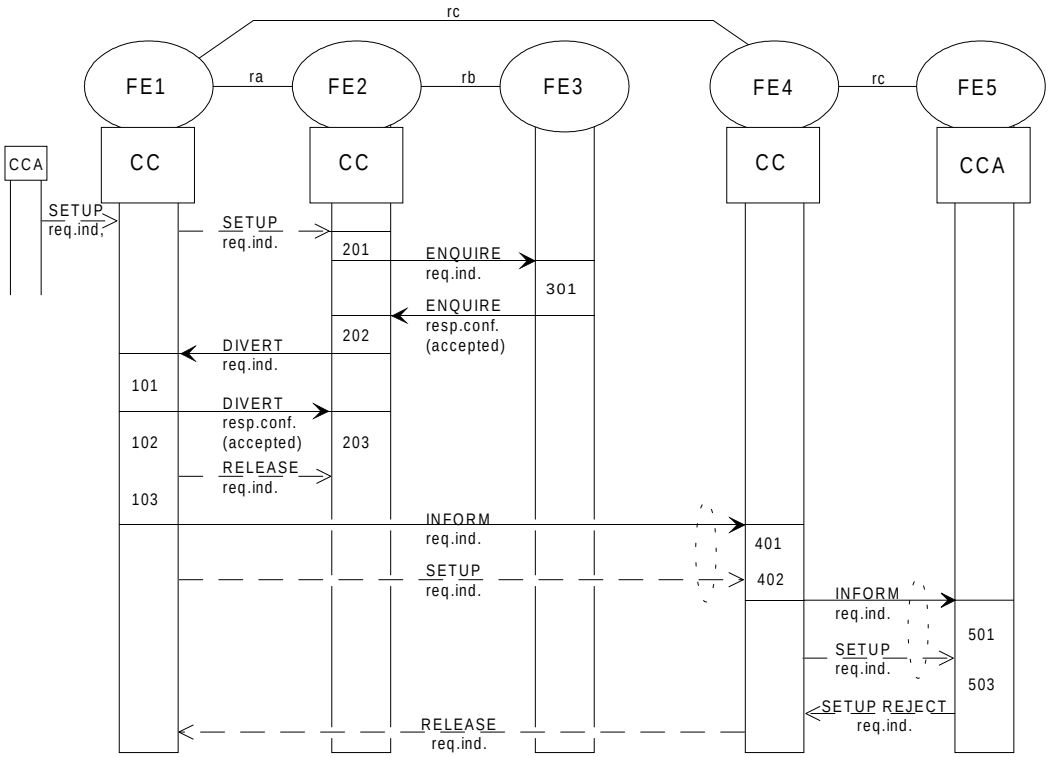

Figure 7: Information flow sequence for unsuccessful CTMI operation: CTM user not accessible

4.3.2 Definition of information flows

4.3.2.1 DIVERT

This confirmed information flow is used to cause FE1 to direct an incoming call to a CTM user. It shall be sent across relationship ra from FE2 to FE1 and shall contain the service elements listed in table 1.

NOTE: The elements of the DIVERT information flow shown in table 1 are only those required by ANF-CTMI. For the successful operation of other supplementary services and ANFs, it may be necessary to include additional elements.

Table 1: Contents of DIVERT

Service elements	Allowed value	Request	Confirm
Visitor PINX	PISN number	M	
Connection type		M (note)	
Calling user's PISN number		M (note)	
Calling user's subaddress (Originating subaddress)		O (note)	
Calling user's name		O	
CTM user's PISN Number		M	
CTM user's subaddress (Destination subaddress)		O (note)	
Call History		O (note)	
Originating Category		O (note)	
Divert result	Accepted or Rejected		M
NOTE: This service element shall be obtained from the basic call SETUP request/indication information flow.			

4.3.2.2 ENQUIRE

This confirmed information flow conveys a request to provide information regarding the current location of the CTM user from FE2 to FE3. It shall be sent across relationship rb and shall contain the service elements listed in table 2.

NOTE: The elements of the ENQUIRE information flow shown in table 2 are only those required by ANF-CTMI. For the successful operation of other supplementary services and ANFs, it may be necessary to include additional elements, such as capability and protection levels for Call Intrusion and Do Not Disturb Override.

Table 2: Contents of ENQUIRE

Service element	Allowed value	Request	Confirm
CTM user's destination number		M	
CTM user's PISN Number			O (note 1)
Connection type		M	
Enquiry result	- Visitor area known - CFU activated - CTM user deregistered - Collision with Location Update - CTM user unknown - CTM user's location not known - Incompatible basic services		M
Visitor PINX	PISN number		O (note 1)
CTM user's diverted-to address			O (note 2)
CTM user's diversion subscription options			O (note 2)
CTM user's name			O (note 2)
NOTE 1: If the Enquiry result contains visitor area known this service element shall be included. NOTE 2: This optional service element shall be included if the Enquiry result is "Call Forward Unconditional activated" and if the information is available.			

4.3.2.3 INFORM

This unconfirmed information flow conveys the CTM user's identity from FE1 to FE4 and from FE4 to FE5. It shall be sent across relationship rc and shall contain the service elements listed in table 3.

Table 3: Contents of INFORM

Service element	Allowed value	Request
CTM user's PISN number		M

4.4 SDL diagrams for functional entities

The figures in this subclause are intended to illustrate typical FE behaviour in terms of information flows sent and received.

The behaviour of each FE is shown using Specification and Description Language (SDL) according to ITU-T Recommendation Z.100 [6]. Each input and output symbol is labelled to show the source FE of input signals or the destination FE of output signals.

4.4.1 Behaviour of FE1

Figure 8 shows the SDL diagram for FE1.

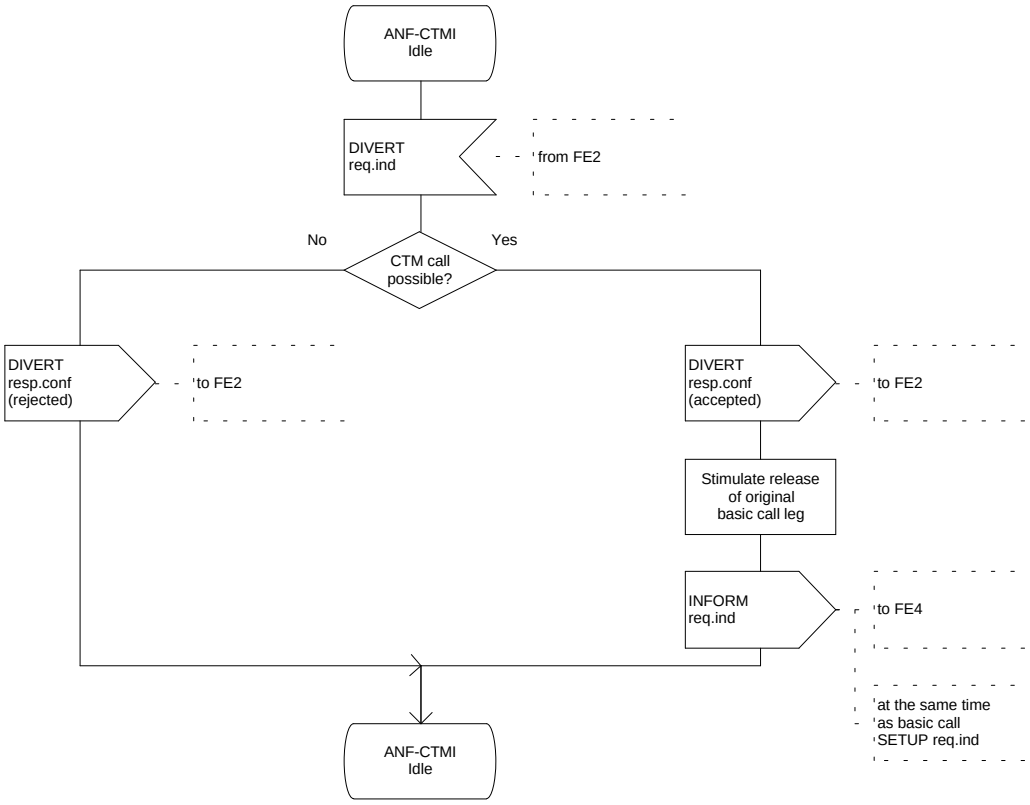

Figure 8: SDL diagram for FE1

4.4.2 Behaviour of FE2

Figure 9 shows the SDL diagram for FE2.

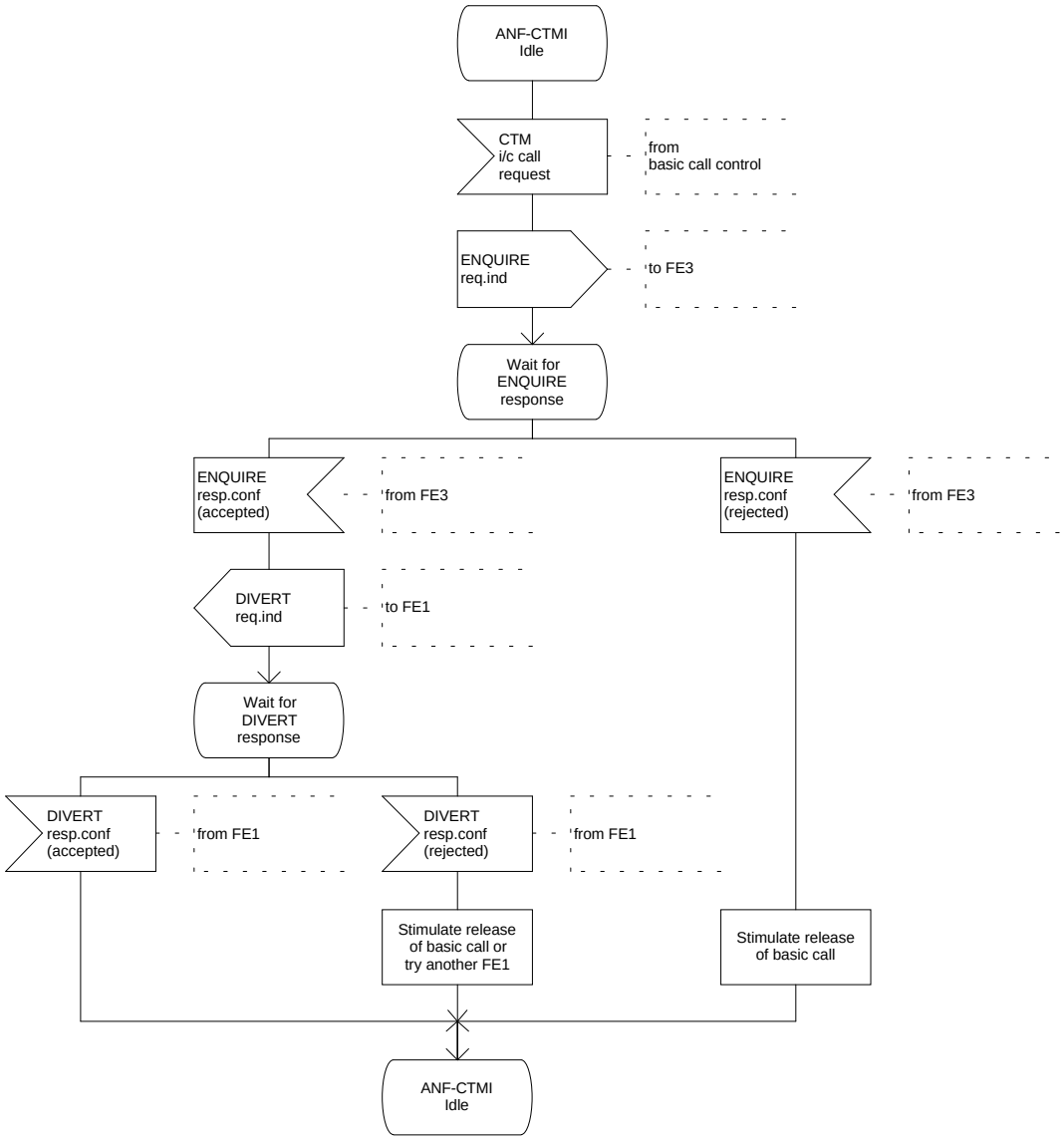

Figure 9: SDL diagram for FE2

4.4.3 Behaviour of FE3

Figure 10 shows the SDL diagram for FE3.

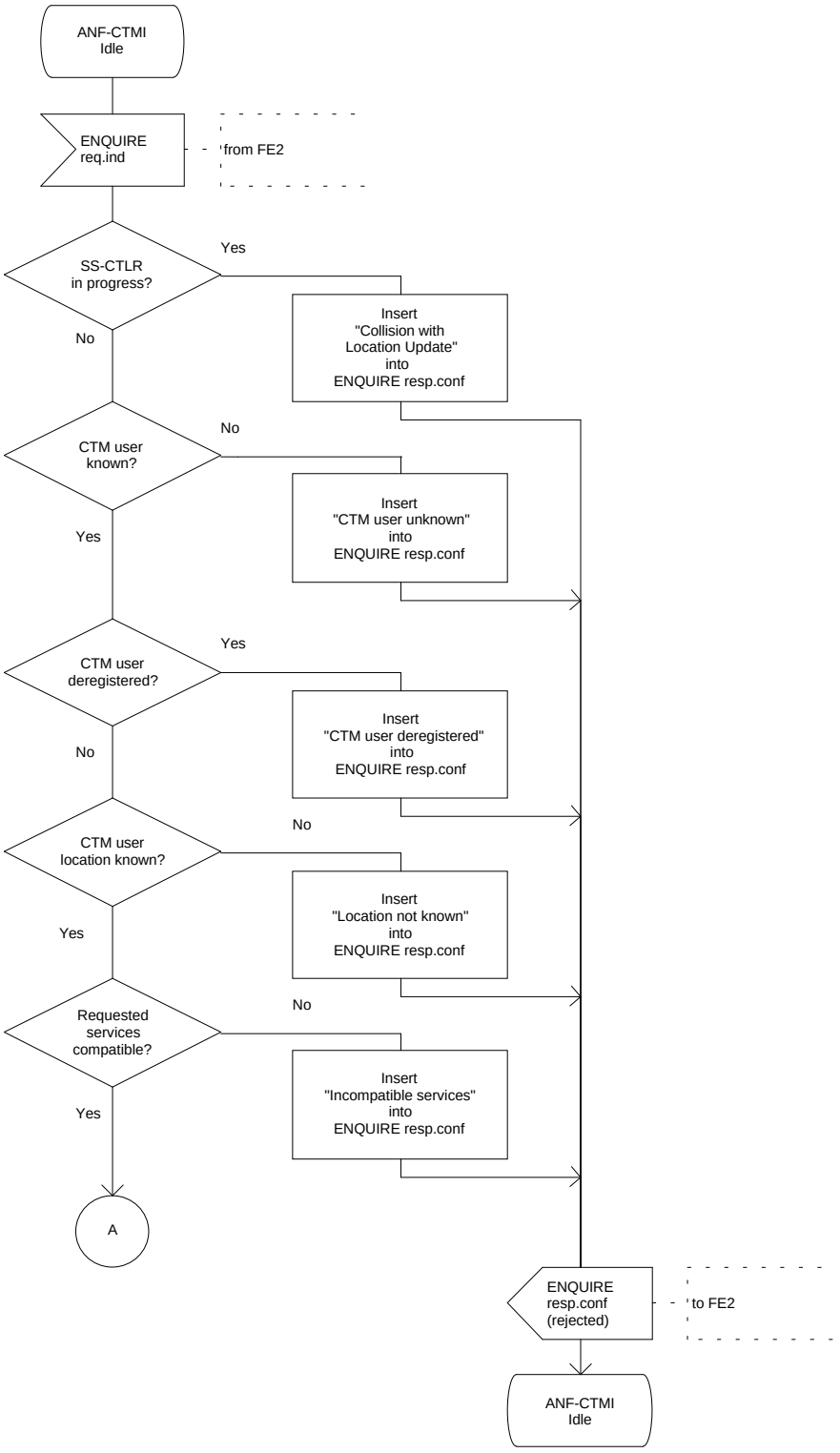

Figure 10: SDL diagram for FE3 (page 1 of 2)

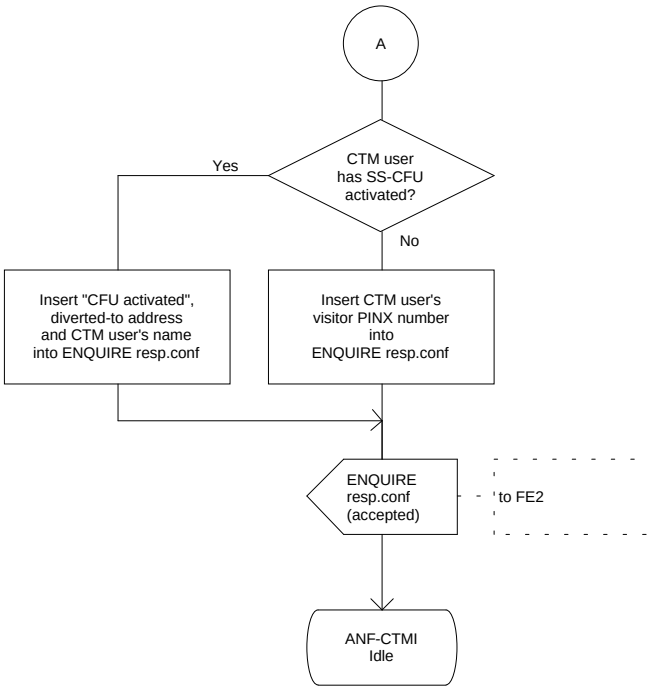

Figure 10: SDL diagram for FE3 (page 2 of 2)

4.4.4 Behaviour of FE4

Figure 11 shows the SDL diagram for FE4.

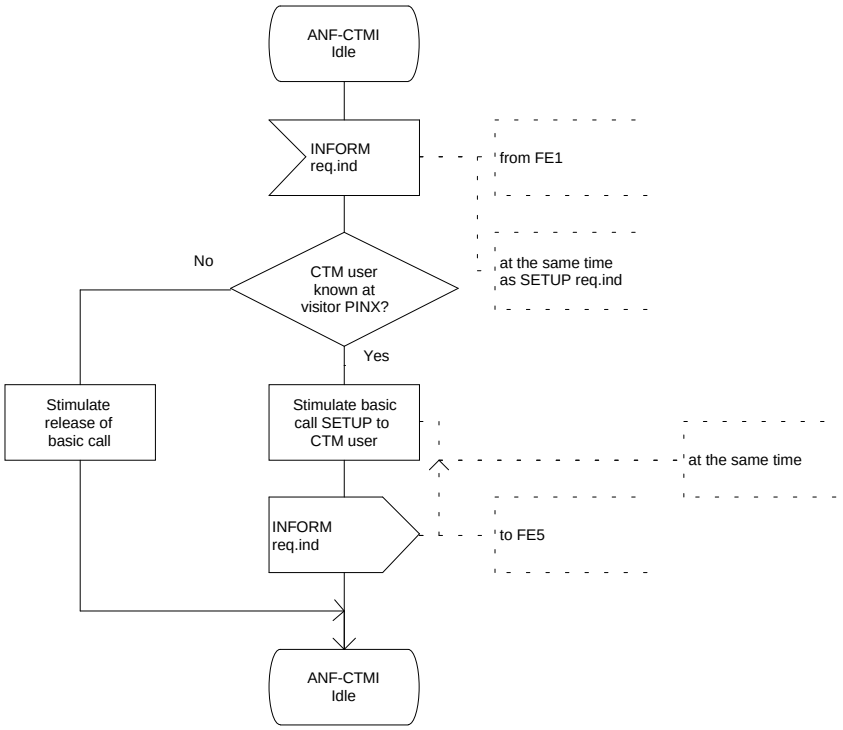

Figure 11: SDL diagram for FE4

4.4.5 Behaviour of FE5

Figure 12 shows the SDL diagram for FE5.

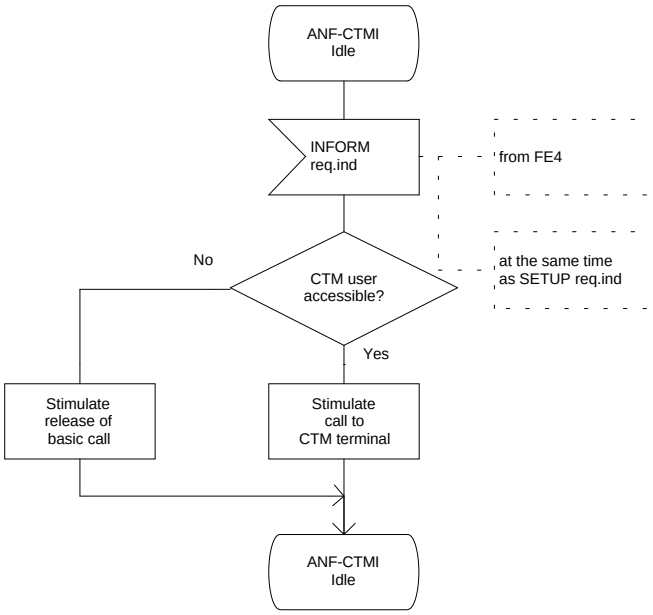

Figure 12: SDL diagram for FE5

4.5 Functional Entity Actions (FEAs)

The following FEAs shall take place at the points indicated in the information flow sequences in subclause 4.3.1.

4.5.1 FEAs of FE1

101 Receive DIVERT req.ind from FE2. Formulate positive DIVERT resp.conf and send it to FE2.

102 Stimulate release of original basic call towards the CTM user.

103 Stimulate new call setup using the PISN number of the Visitor PINX. Use CTM user's identity already provided in the DIVERT req.ind to generate INFORM req.ind and send it to FE4 with the basic call SETUP req.ind.

104 Receive DIVERT req.ind from FE2. Formulate negative DIVERT resp.conf and send it to FE2.

4.5.2 FEAs of FE2

201 Detect an incoming call to a CTM user and send ENQUIRE req.ind to FE3.

202 Receive positive ENQUIRE resp.conf from FE3. Use contents of ENQUIRE to construct DIVERT and send DIVERT req.ind to FE1.

203 Receive positive DIVERT resp.conf from FE1.

204 Receive Negative DIVERT resp.conf from FE1 and stimulate the release of the original basic call or try another FE1.

205 Receive Negative ENQUIRE resp.conf from FE3 and stimulate the release of the original basic call.

4.5.3 FEAs of FE3

301 Receive ENQUIRE req.ind from FE2. Get the PISN number of the Visitor PINX from the HDB. Formulate positive ENQUIRE resp.conf and send to FE2.

302 Receive ENQUIRE req.ind from FE2. Formulate negative ENQUIRE resp.conf, insert the reason and send to FE2.

4.5.4 FEAs of FE4

401 Receive INFORM req.ind with the basic call SETUP req.ind from FE1.

402 If the CTM user is registered in the VDB, stimulate basic call establishment to the CTM service access and send INFORM req.ind with the SETUP req.ind.

403 If the CTM user is not registered in the VDB, stimulate the release of basic call.

4.5.5 FEAs of FE5

501 Receive INFORM req.ind from FE4 with the basic call SETUP req.ind.

502 If the CTM user is accessible, stimulate basic call establishment to the CTM user's terminal.

503 If the CTM user is not accessible (e.g. out of range), stimulate the release of basic call.

4.6 Allocation of functional entities to physical locations

The allocation of FEs to physical locations is shown in table 4.

Within the context of table 4:

- the originating PINX is the PINX to which the calling user is attached;
- the terminating PINX is the PINX to which the FP is connected;
- a transit PINX is any other PINX through which the call passes.

For the purposes of this ETS, the visitor PINX shall be the terminating PINX.

Table 4: Allocation of FEs to physical locations

	FE1	FE2	FE3	FE4	FE5
Scenario 1	Originating PINX	Home PINX	Home PINX	Visitor PINX	Terminating PINX
Scenario 2	Originating PINX	Home PINX	Home PINX	Visitor PINX	FP
Scenario 3	Originating PINX	Transit PINX	Home PINX	Visitor PINX	Terminating PINX
Scenario 4	Originating PINX	Transit PINX	Home PINX	Visitor PINX	FP
Scenario 5	Originating PINX	Originating PINX	Home PINX	Visitor PINX	Terminating PINX
Scenario 6	Originating PINX	Originating PINX	Home PINX	Visitor PINX	FP
Scenario 7	Home PINX	Home PINX	Home PINX	Visitor PINX	Terminating PINX
Scenario 8	Home PINX	Home PINX	Home PINX	Visitor PINX	FP
Scenario 9 (note)	Transit PINX	Transit PINX	Home PINX	Visitor PINX	Terminating PINX
Scenario 10 (note)	Transit PINX	Transit PINX	Home PINX	Visitor PINX	FP
NOTE: In scenarios where FE1 and FE2 are both allocated to a transit PINX, this shall be the same transit PINX.					

4.7 Interworking considerations

Not applicable.

5 ANF-CTMO

5.1 Description

ANF-CTMO permits the PISN to verify the identity of a CTM user when initiating a call or requesting a supplementary service, and to provide access to the CTM user's service profile. The call or supplementary service request is further processed either locally or from the home location, if more appropriate.

NOTE: The criteria to be used in determining whether the call or supplementary service request should be processed locally or at the home location are beyond the scope of this ETS but could include the following:

- service not supported at visitor location;
- all CTMO calls are processed at the home location;
- service profile details not complete at visitor location.

5.2 Derivation of the functional model

5.2.1 Functional model description

The functional model for ANF-CTMO shall be as shown in figure 13.

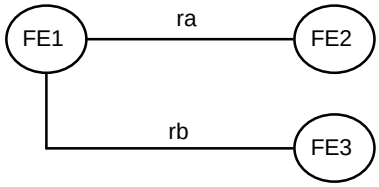

Figure 13: Functional model for ANF-CTMO

5.2.2 Description of functional entities

5.2.2.1 CTM outgoing call detection and control, FE1

This functional entity controls the actions of ANF-CTMO and interacts with outgoing call control. If required, it will use the originating number (i.e. the CTM user's PISN number) to redirect the call to the home location for processing.

5.2.2.2 Visited location information provision, FE2

This functional entity retrieves data from the visitor data base and verifies the originating number when requested by FE1.

5.2.2.3 Home location CTM call control, FE3

This functional entity receives a CTM call for further processing when it is redirected by FE1 to the home PINX of the CTM user.

5.2.3 Relationship with a basic service

FE1 shall be co-located with the originating CC.

FE3, if present, shall be co-located with the CC representing the CTM user's home PINX.

Figure 14 shows an example of the relationship between the functional model and a basic call. This example is used as the basis for the information flow diagrams in subclause 5.3.1.

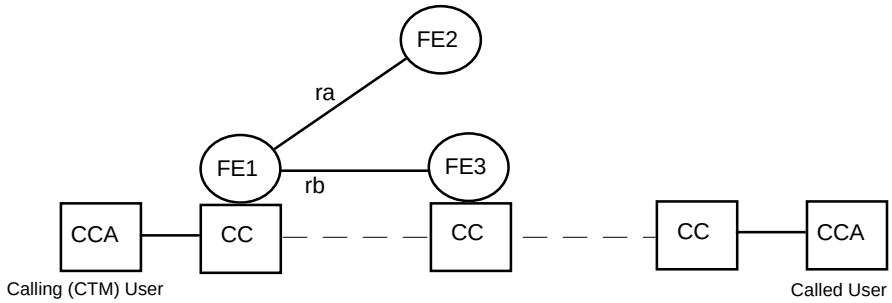

Figure 14: Functional entity model relationship

5.3 Information flows

5.3.1 Information flow sequences

A stage 3 standard shall be capable of providing the information flows shown in figures 15 to 17. It can specify further information flows, e.g. to deal with additional exceptional conditions.

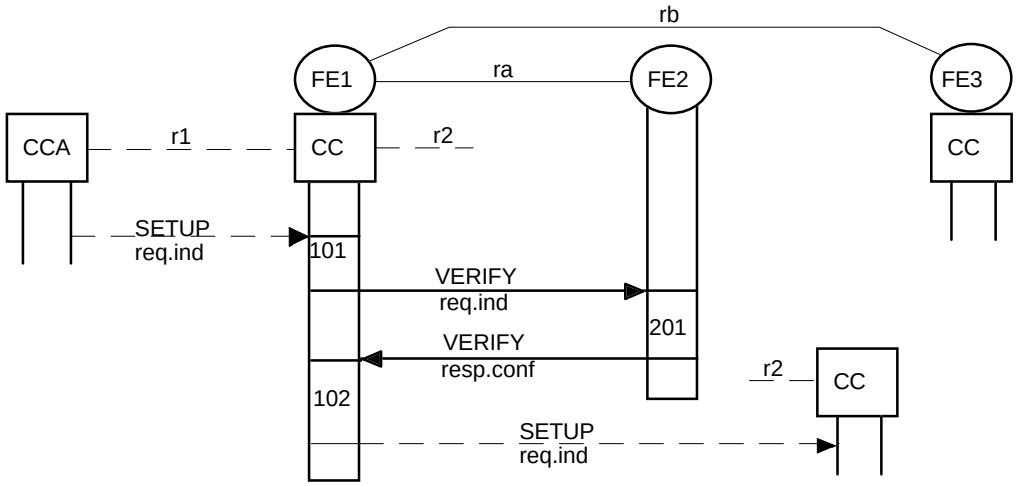

Figure 15: Information flow sequence for successful CTMO operation: no redirection

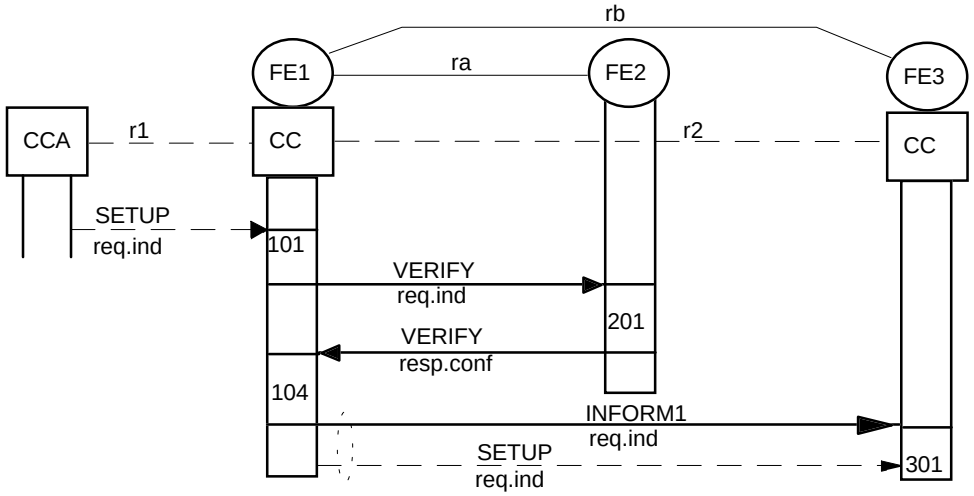

Figure 16: Information flow sequence for successful CTMO operation: redirection to home location

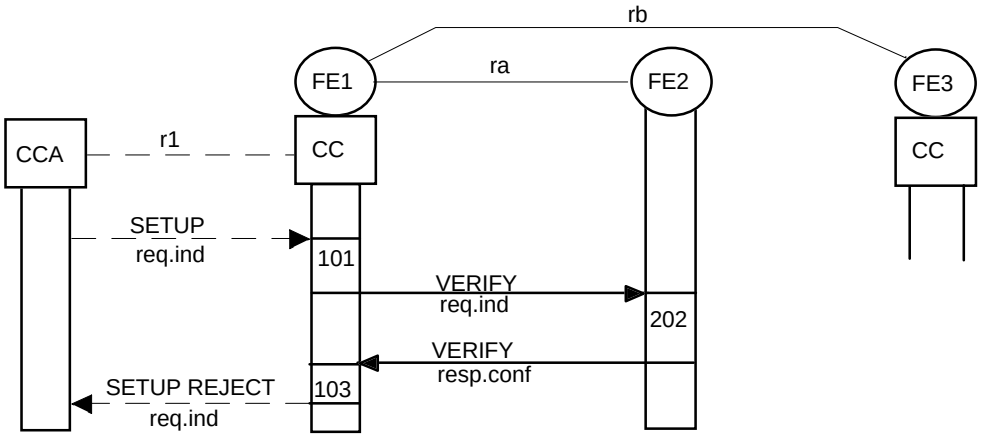

Figure 17: Information flow sequence for unsuccessful CTMO operation: no matching VDB record found

5.3.2 Definition of information flows

5.3.2.1 INFORM1

This unconfirmed information flow shall be sent across relationship rb from FE1 to FE3 if the call is redirected to the home location for remote processing. Table 5 shows the information content of the INFORM1 information flow.

Table 5: Contents of INFORM1

Service element	Allowed value	Request
Original destination number		O (note)
NOTE: In the case that en-bloc basic call procedures apply, this element shall contain the complete destination number. In the case of overlap sending, this element may contain the digits of the destination number so far available. The remaining part of the destination number will be sent using normal basic call procedures or by repeating the INFORM1 flow.		

5.3.2.2 VERIFY

This confirmed information flow shall be sent across relationship ra from FE1 to FE2 to look up the VDB record associated with the calling user. Table 6 shows the information content of the VERIFY information flow.

Table 6: Contents of VERIFY

Service element	Allowed value	Request	Confirm
Originating number		M	O (note 1)
Service profile			O (note 2)
Result	- number verified - user not known		M
NOTE 1: Shall be included if the number is different from that in the request. NOTE 2: May be included in the case of successful verification.			

5.4 SDL diagrams for functional entities

Figures 18 to 20 are intended to illustrate typical FE behaviour in terms of information flows sent and received.

The behaviour of each FE is shown using SDL according to ITU-T Recommendation Z.100 [6]. Each input and output symbol is labelled to show the source of input signals or the destination of output signals.

5.4.1 Behaviour of FE1

Figure 18 shows the SDL diagram for the normal behaviour of FE1.

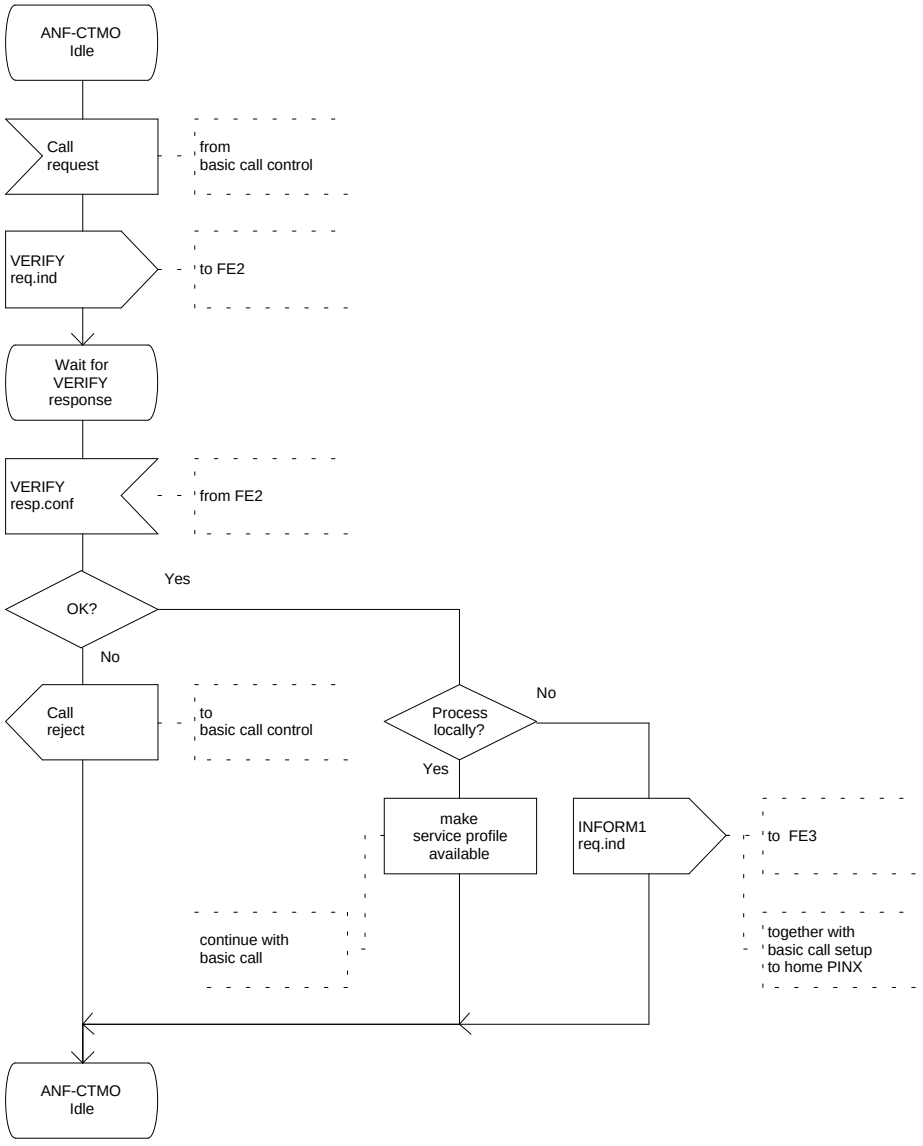

Figure 18: SDL diagram for FE1

5.4.2 Behaviour of FE2

Figure 19 shows the SDL diagram for the normal behaviour of FE2.

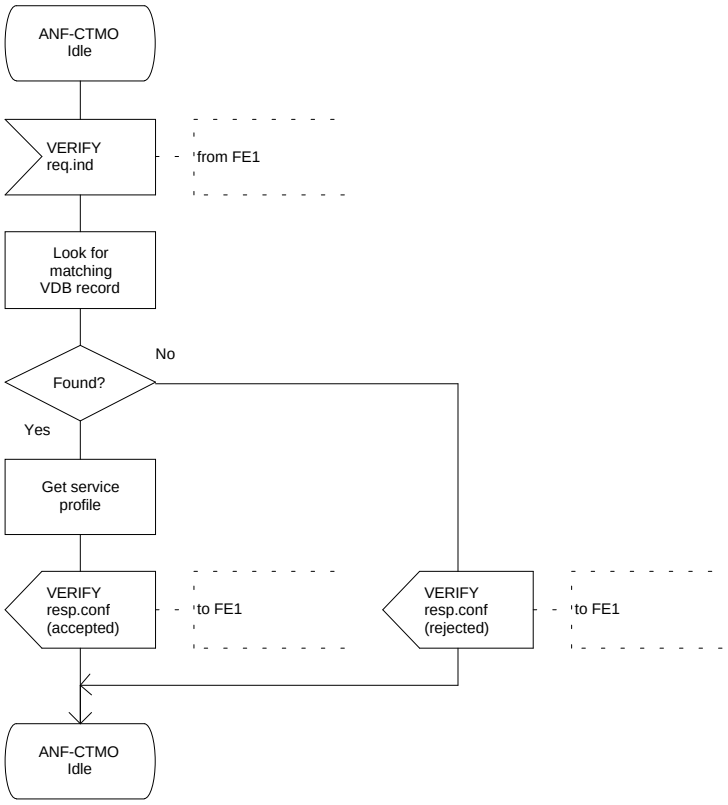

Figure 19: SDL diagram for FE2

5.4.3 Behaviour of FE3

Figure 20 shows the SDL diagram for the normal behaviour of FE3.

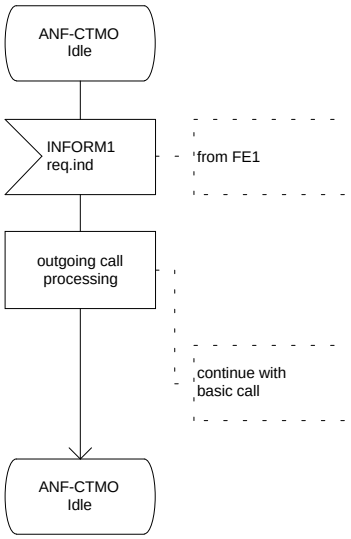

Figure 20: SDL diagram for FE3

5.5 Functional Entity Actions (FEAs)

The following FEAs shall take place at the points indicated in the information flow sequences in subclause 5.3.1.

5.5.1 FEAs of FE1

101 Send a VERIFY request with the calling user's number to FE2 and wait for the response.

102 Receive a positive VERIFY resp.conf from FE2. Choose local processing, make service profile available to call control; continue with basic call setup.

103 Receive a negative VERIFY resp.conf from FE2. Reject the basic call request.

104 Receive a positive VERIFY resp.conf from FE2. Choose remote processing, redirect the call to the home location (FE3), using the address of the home PINX as destination number, and include an INFORM1 flow, with (part of) the original destination number if available.

5.5.2 FEAs of FE2

201 Receive a VERIFY req.ind from FE1. Get the VDB record associated with the calling user and verify the originating number. Return a positive VERIFY resp.conf to FE1.

202 Receive a VERIFY req.ind from FE1. If no matching VDB record is found return a VERIFY confirmation with a failure indication to FE1.

5.5.3 FEAs of FE3

301 Receive an INFORM1 req.ind from FE1. Reinsert the original destination number, if contained in INFORM1, and process the call, using normal outgoing call control procedures.

5.6 Allocation of functional entities to physical locations

The allocation of FEs to physical locations is shown in table 7.

Within the context of table 7, the originating PINX is the PINX to which the FP is attached.

For the purposes of this ETS, the visitor PINX shall be the originating PINX.

Table 7: Allocation of FEs to physical locations

	FE1	FE2	FE3
Scenario 1	Originating PINX	Visitor PINX	Home PINX

5.7 Interworking considerations

Not applicable.

History

Document history			
May 1995	Public Enquiry	PE 84:	1995-05-22 to 1995-09-15
January 1996	Vote	V 96:	1996-01-08 to 1996-03-01
March 1996	First Edition		

ISBN 2-7437-0578-7
Dépôt légal : Mars 1996