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Contents

Foreword

This European Telecommunication Standard (ETS) has been produced by the Signalling Protocols & Switching (SPS) Technical Committee of the European Telecommunications Standards Institute (ETSI).

In accordance with CCITT Recommendation I.130 [1], the following three level structure is used to describe the supplementary telecommunications services as provided by European public telecommunications operators under the pan-European Integrated Services Digital Network (ISDN):

-       Stage 1: is an overall service description, from the user's stand-point;

-       Stage 2: identifies the functional capabilities and information flows needed to support the service described in stage 1; and

-       Stage 3: defines the signalling system protocols and switching functions needed to implement the service described in stage 1.

This ETS details the stage 2 aspects (functional capabilities and information flows) needed to support the Advice Of Charge (AOC) supplementary service. The stage 1 and stage 3 aspects are detailed in ETSs 300 178-180 (1992) and ETS 300 182 (1993), respectively.

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1   Scope

This standard defines the stage two of the Advice of Charge (AOC) supplementary service for the pan-European Integrated Services Digital Network (ISDN) as provided by the European public telecommunications operators. Stage two identifies the functional capabilities and the information flows needed to support the service description. The stage two description also identifies user operations not directly associated with a call (see CCITT Recommendation I.130 [1]).

This standard is defined according to the methodology specified in CCITT Recommendation Q.65 [2].

In addition this standard does not specify the requirements where the service is provided to the user via a private ISDN. This standard does not specify the requirements for the allocation of defined functional entities within a private ISDN, it defines which functional entities may be allocated to a private ISDN.

This standard does not specify the additional requirements where the service is provided to the user via a telecommunications network that is not an ISDN.

The AOC supplementary service provides the served user with usage based charging information.

The AOC supplementary service is applicable to all circuit switched telecommunication services.

This standard is applicable to the stage three standards for the ISDN AOC supplementary services. The term "stage three" is defined in CCITT Recommendation I.130 [1]. Where the text indicates the status of a requirement, i.e. as a strict command or prohibition, as authorisation leaving freedom, as a capability or possibility, this shall be reflected in the text of the relevant stage three standards.

Furthermore, conformance to this standard is met by conforming to the stage three standards with the field of application appropriate to the equipment being implemented. Therefore, no method of testing is provided for this standard.

This standard does not formally describe the relation between this supplementary service and the basic call, but where possible, this information is included for guidance.

2   Normative references

This standard 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 standard 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 characterisation of telecommunication services supported by an ISDN and network capabilities of an ISDN".

[2]   CCITT Recommendation Q.65 (1988): "Stage 2 of the method for the characterisation of services supported by an ISDN".

[3]   CCITT Recommendation I.112 (1988): "Vocabulary of terms for ISDNs".

[4]   CCITT Recommendation I.210 (1988): "Principles of telecommunication services supported by an ISDN and the means to describe them".

[5]   CCITT Recommendation E.164 (1988): "Numbering plan for the ISDN era".

[6]   CCITT Recommendation Z.100 (1988): "Functional Specification and Description Language (SDL)".

[7]   CCITT Recommendation Q.71 (1988): "ISDN 64 kbit/s circuit mode switched bearer service".

3 Definitions

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

Advice of Charge (AOC): information about usage based charging.

Charged number: the number which shall be charged for the call.

Dialled number: the destination for the charged call.

Integrated Services Digital Network (ISDN): see CCITT Recommendation I.112 [3], § 2.3, definition 308.

ISDN number: a number conforming to the numbering plan and structure specified in CCITT Recommendation E.164 [5].

Service; telecommunications service: see CCITT Recommendation I.112 [3], § 2.2, definition 201.

Supplementary service: see CCITT Recommendation I.210 [4], § 2.4.

4 Symbols and abbreviations

AOC   Advice of Charge

CD   Call Deflection

CFB   Call Forwarding Busy

CFNR   Call Forwarding No Reply

CFU   Call Forwarding Unconditional

CT   Call Transfer

FEA   Functional Entity Action

ISDN   Integrated Services Digital Network

LE   Local Exchange

PTNX   Private Telecommunications Network eXchange

SDL   Specification and Description Language

TE   Terminal Equipment

TP   Terminal Portability

5 Description

Advice of Charge (AOC) is a group of supplementary services allowing the served user to be informed of usage-based charging information.

These supplementary services are not meant to replace the charge metering inside the network which is considered to be the correct one in all cases.

The AOC group of supplementary services may include the following:

AOC-S   Charging information at call set-up time;

AOC-D   Charging information during the call;

AOC-E   Charging information at the end of a call.

6   Derivation of a functional model

6.1   Functional model description

The functional model for the AOC supplementary service is shown in figure 1.

```
        ra           rb           rc
┌────┐      ┌────┐      ┌────┐      ┌────┐
│FE1 │──────│FE2 │──────│FE3 │──────│FE4 │
└────┘      └────┘      └────┘      └────┘
```
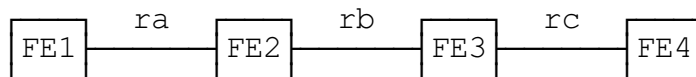
Figure 1

6.2   Description of the functional entities

FE1:   AOC served entity

FE2:   AOC information options check

FE3:   AOC controlling entity

FE4:   AOC information formatting

6.3   Relationship with a basic service

The relationship with a basic service is shown in figure 2.

> NOTE: The basic call model is defined in CCITT Recommendation Q.71 [7], § 2.1, with the
> exception that r1 represents an outgoing relationship from a CCA and r3 represents an
> incoming relationship to a CCA.

```
                                      ┌────┐
                                      │FE4 │
                                      └────┘
                                        │ rc
         ra           rb               │
┌────┐       ┌────┐       ┌────┐
│FE1 │───────│FE2 │───────│FE3 │
├────┤       ├────┤       ├────┤      ┌────┐           ┌────┐
│CCA │───────│ CC │───────│ CC │──────│ CC │───────────│CCA │
└────┘  r1   └────┘  r2   └────┘  r2  └────┘    r3     └────┘
```
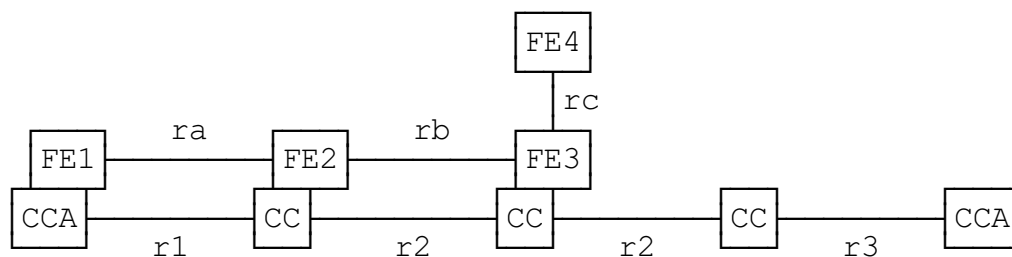
Figure 2

7 Information flows

7.1 Information flow diagrams

It is assumed that the coding of the AOC-Information is done in such a way that whenever this information is received by a FE1 the content shall be complete in itself.

The flows are intended to show the information flowing for the AOC supplementary service. These flows can in many cases be combined with the flows for the basic call, depending upon call state. Whether or not this can take place is considered to be a stage 3 matter.

7.1.1 Information flows for charging information at call set-up time (AOC-S)

7.1.1.1 Receipt of charging information on charging rates (AOC-S)

```
          FE1  - - - ra - - - -  FE2  - - - rb - - - -  FE3  - - - rc - - - -  FE4
   211       | 211    SETUP   221 |                    |                    |
   >>>>      | >>>>|- - - ->|>>>> |                    |                    |
            |        req.ind      |                    |                    |
       910  |    REQUEST1         |                    |                    |
            |--------------------->                    |                    |
            |      req.ind      920|                   |                    |
            |                   923|                   |                    |
            |                   921|   REQUEST2         |                    |
            |                     |--------------------->                   |
            |                     |      req.ind      930|                  |
            |                     |                   936|                  |
            |                     |                   931|                  |
            |                     |                   932|   REQUEST3        |
            |                     |                     |--------------------->
            |                     |                     |      req.ind    940|
            |                     |                     |                 941|
            |                     |                     |   REQUEST3      942|
            |                     |                   933|<-------------------|
            |                     |                   934|   resp.conf       |
            |                     |   REQUEST2          |                    |
            |                  924|<--------------------|                    |
            |                     |   resp.conf         |                    |
            |     SETUP      224  |                    |                    |
            ||<- - - -|<<<<       |                    |                    |
            |  resp.conf          |                    |                    |
            |     INFORM4         |                    |                    |
            |<--------------------|922                 |                    |
  INFORM4 911|      req.ind       |                    |                    |
  <         |                  925|   INFORM1          |                    |
    ind     |                     |--------------------->                   |
            |                     |      req.ind      935|                  |
```
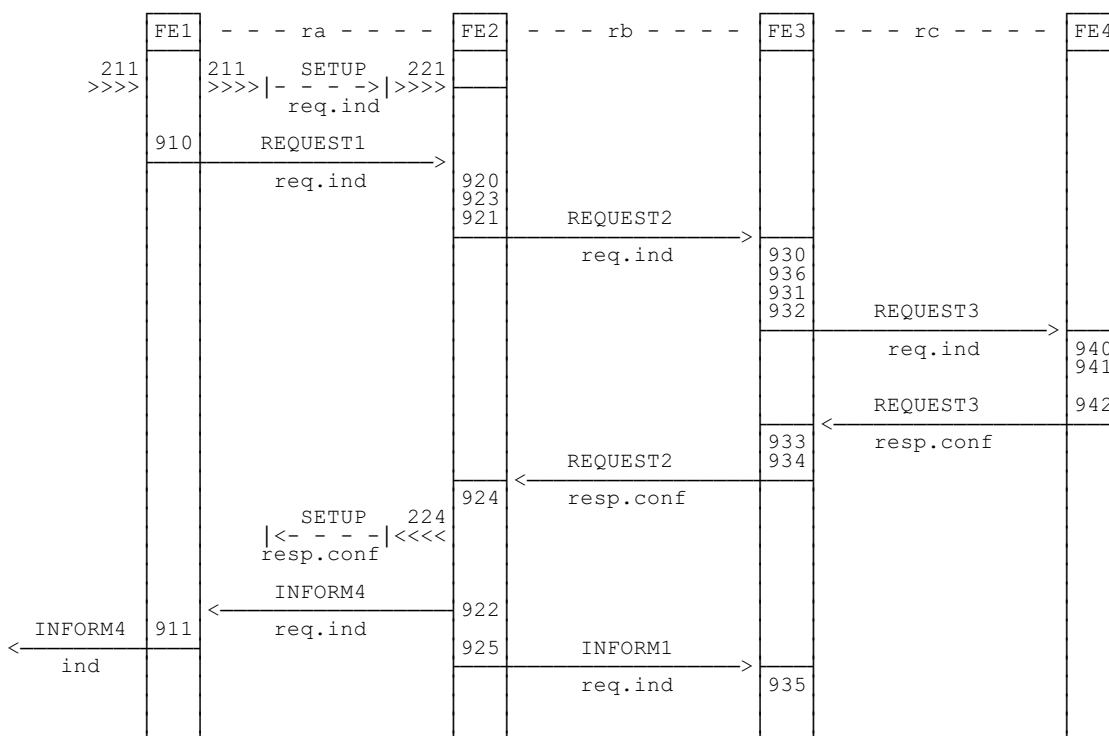
Figure 3

7.1.1.2 Change of charging rate during the active state of a call (AOC-S)

```
      FE1 │ - - - ra - - - - │FE2│ - - - rb - - - - │FE3│ - - - rc - - - - │FE4
          │                  │   │                  │937│                  │
          │                  │   │                  │931│                  │
          │                  │   │                  │932│   REQUEST3       │
          │                  │   │                  │   ──────────────────>│
          │                  │   │                  │   │      req.ind     │940
          │                  │   │                  │   │                  │941
          │                  │   │                  │   │   REQUEST3       │942
          │                  │   │                  │933│<─────────────────│
          │                  │   │                  │934│     resp.conf    │
          │                  │   │   INFORM3        │   │                  │
          │                  │924│<─────────────────│   │                  │
          │                  │922│      req.ind     │   │                  │
          │       INFORM4    │   │                  │   │                  │
          │<─────────────────│   │                  │   │                  │
INFORM4 │911│      req.ind   │   │                  │   │                  │
<─────────│                  │   │                  │   │                  │
   ind    │                  │   │                  │   │                  │
```
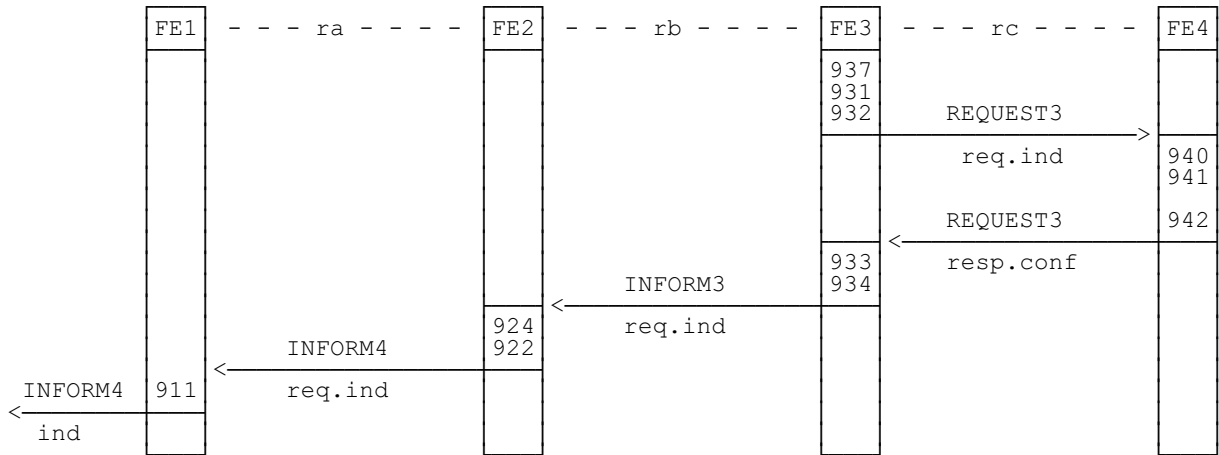
Figure 4

7.1.1.3 Receipt of charging rate after TP RETRIEVE (AOC-S)

```
      FE1 │ - - - ra - - - - │FE2│ - - - rb - - - - │FE3│ - - - rc - - - - │FE4
          │   TP RETRIEVE 922│   │                  │   │                  │
          │   - - - - ->│>>>>│925│                  │   │                  │
          │      req.ind     │921│   REQUEST2       │   │                  │
          │                  │   ──────────────────>│930│                  │
          │                  │   │      req.ind     │931│                  │
          │                  │   │                  │932│   REQUEST3       │
          │                  │   │                  │   ──────────────────>│
          │                  │   │                  │   │      req.ind     │940
          │                  │   │                  │   │                  │941
          │                  │   │                  │   │   REQUEST3       │942
          │                  │   │                  │933│<─────────────────│
          │                  │   │   REQUEST2       │934│     resp.conf    │
          │                  │924│<─────────────────│   │                  │
          │914 TP RETRIEVE 922│   │     resp.conf    │   │                  │
          │<<<<│<- - - - │<<<<│   │                  │   │                  │
          │      resp.conf   │   │                  │   │                  │
          │       INFORM4    │922│                  │   │                  │
          │<─────────────────│   │                  │   │                  │
INFORM4 │911│      req.ind   │   │                  │   │                  │
<─────────│                  │   │                  │   │                  │
   ind    │                  │   │                  │   │                  │
```

Figure 5

NOTE: The TP RETRIEVE function is a part of the Terminal Portability (TP) supplementary service, and the corresponding FEA numbers refer to this service.

7.1.2   Information flows for charging information during a call (AOC-D)

7.1.2.1   Transfer of charging information at call establishment (AOC-D)

```
              ┌───┐                  ┌───┐                  ┌───┐                  ┌───┐
              │FE1│ - - - ra - - - - │FE2│ - - - rb - - - - │FE3│ - - - rc - - - - │FE4│
    211       │   │211   SETUP    221│   │                  │   │                  │   │
    >>>>      │   │>>>>|- - - ->|>>>>│221│                  │   │                  │   │
              │   │       req.ind    │   │                  │   │                  │   │
              │910│    REQUEST1      │   │                  │   │                  │   │
              │   │──────────────────>│920│                 │   │                  │   │
              │   │       req.ind    │923│                  │   │                  │   │
              │   │                  │921│    REQUEST4      │   │                  │   │
              │   │                  │   │──────────────────>│930│                 │   │
              │   │                  │   │      req.ind     │936│                  │   │
              │   │                  │   │                  │931│                  │   │
              │   │                  │   │                  │932│   REQUEST5       │   │
              │   │                  │   │                  │   │──────────────────>│940│
              │   │                  │   │                  │   │      req.ind     │   │
              │   │                  │   │                  │   │                  │941│
              │   │                  │   │                  │   │   REQUEST5       │942│
              │   │                  │   │                  │933│<─────────────────│   │
              │   │                  │   │    REQUEST4      │934│   resp.conf      │   │
              │   │                  │924│<─────────────────│   │                  │   │
              │   │    SETUP     224 │   │     resp.conf    │   │                  │   │
              │   │<<<<|<- - - -|<<<<│   │                  │   │                  │   │
              │   │     resp.conf    │   │                  │   │                  │   │
              │   │    INFORM2       │   │                  │   │                  │   │
    INFORM    │911│<─────────────────│922│                 │   │                  │   │
    <─────────│   │    req.ind       │925│    INFORM1       │   │                  │   │
      ind     │   │                  │   │──────────────────>│   │                 │   │
              │   │                  │   │      req.ind     │935│                  │   │
              └───┘                  └───┘                  └───┘                  └───┘
```
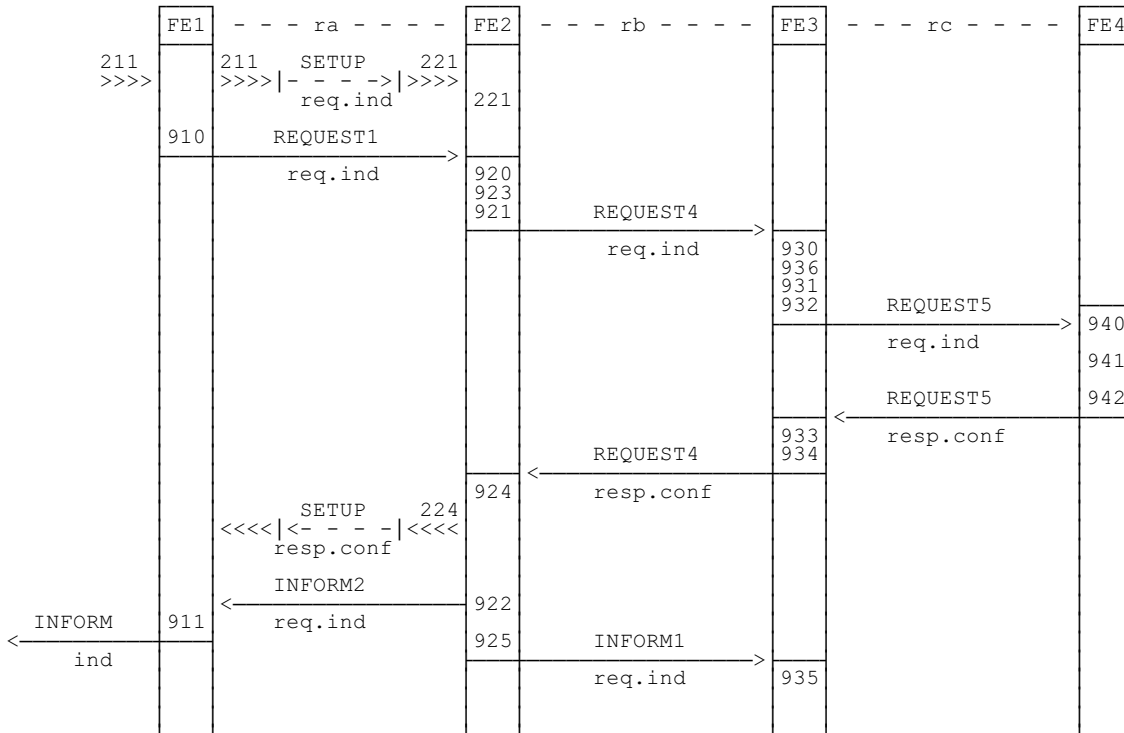
Figure 6

7.1.2.2   Transfer of charging information during the active state of a call (AOC-D)

```
              ┌───┐                  ┌───┐                  ┌───┐                  ┌───┐
              │FE1│ - - - ra - - - - │FE2│ - - - rb - - - - │FE3│ - - - rc - - - - │FE4│
              │   │                  │   │                  │937│                  │   │
              │   │                  │   │                  │931│                  │   │
              │   │                  │   │                  │932│   REQUEST5       │   │
              │   │                  │   │                  │   │──────────────────>│   │
              │   │                  │   │                  │   │      req.ind     │940│
              │   │                  │   │                  │   │                  │941│
              │   │                  │   │                  │   │   REQUEST5       │942│
              │   │                  │   │                  │933│<─────────────────│   │
              │   │                  │   │    INFORM5       │934│   resp.conf      │   │
              │   │                  │924│<─────────────────│   │                  │   │
              │   │    INFORM2       │922│    req.ind       │   │                  │   │
    INFORM2   │911│<─────────────────│   │                  │   │                  │   │
    <─────────│   │    req.ind       │   │                  │   │                  │   │
      ind     │   │                  │   │                  │   │                  │   │
              └───┘                  └───┘                  └───┘                  └───┘
```
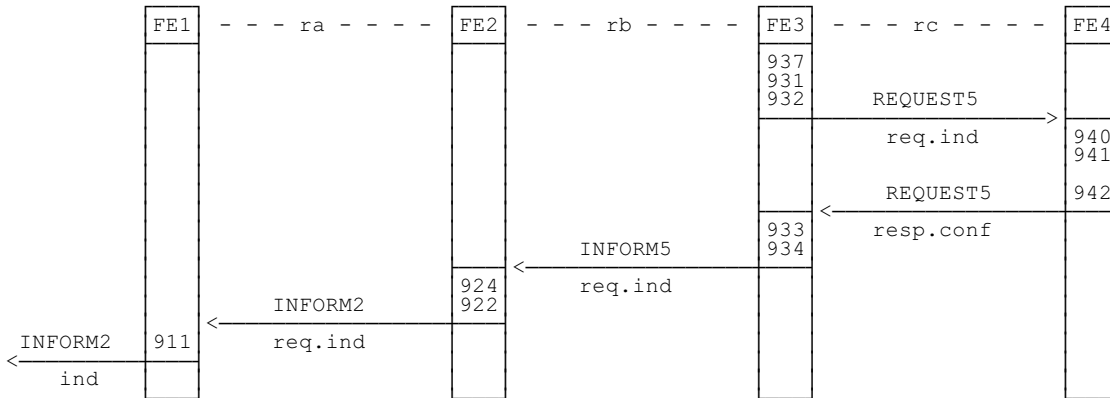
Figure 7

7.1.2.3   **Transfer of charging information at TP HOLD (AOC-D)**

```
┌───┐                    ┌───┐                   ┌───┐                   ┌───┐
│FE1│ - - - ra - - - -   │FE2│ - - - rb - - - -  │FE3│ - - - rc - - - -  │FE4│
│   │                    │   │                   │   │                   │   │
│   │    TP HOLD    921  │   │                   │   │                   │   │
│   │    - - - ->│>>>>    │   │                   │   │                   │   │
│   │      req.ind        │925│                   │   │                   │   │
│   │                     │   │                   │   │                   │   │
│   │                     │921│    REQUEST4       │   │                   │   │
│   │                     │   │──────────────────>│930│                   │   │
│   │                     │   │      req.ind      │931│                   │   │
│   │                     │   │                   │932│   REQUEST5        │   │
│   │                     │   │                   │   │──────────────────>│   │
│   │                     │   │                   │   │     req.ind       │940│
│   │                     │   │                   │   │                   │941│
│   │                     │   │                   │   │   REQUEST5        │942│
│   │                     │   │                   │933│<──────────────────│   │
│   │                     │   │    REQUEST4       │934│    resp.conf      │   │
│   │                     │924│<──────────────────│   │                   │   │
│   │                     │   │     resp.conf     │   │                   │   │
│   │  913  TP HOLD  921  │   │                   │   │                   │   │
│   │<<<<│<- - - -│<<<<    │   │                   │   │                   │   │
│   │      resp.conf      │   │                   │   │                   │   │
│   │      INFORM2        │922│                   │   │                   │   │
│   │<────────────────────│   │                   │   │                   │   │
│INFORM2│911│  req.ind     │   │                   │   │                   │   │
│<──────                   │   │                   │   │                   │   │
│  ind                     │   │                   │   │                   │   │
└───┘                    └───┘                   └───┘                   └───┘
```

Figure 8

NOTE: The TP HOLD function is a part of the Terminal Portability (TP) supplementary service, and the corresponding FEA numbers refer to this service.

7.1.2.4 **Transfer of charging information at TP RETRIEVE (AOC-D)**

```
  ┌───┐                       ┌───┐                     ┌───┐                   ┌───┐
  │FE1│ - - - ra - - - - -    │FE2│ - - - - rb  - - - - │FE3│ - - - - rc - - - -│FE4│
  │   │     TP RETRIEVE  922  │   │                     │   │                   │   │
  │   │     - - - - ->|>>>>    │   │                     │   │                   │   │
  │   │        req.ind        │925│                     │   │                   │   │
  │   │                       │   │                     │   │                   │   │
  │   │                       │921│     REQUEST4        │   │                   │   │
  │   │                       │   │ ─────────────────>  │930│                   │   │
  │   │                       │   │        req.ind      │931│                   │   │
  │   │                       │   │                     │932│     REQUEST5      │   │
  │   │                       │   │                     │   │ ───────────────>  │940│
  │   │                       │   │                     │   │        req.ind    │941│
  │   │                       │   │                     │   │                   │   │
  │   │                       │   │                     │   │     REQUEST5      │942│
  │   │                       │   │                     │   │ <───────────────  │   │
  │   │                       │   │                     │933│        resp.conf  │   │
  │   │                       │   │     REQUEST4        │934│                   │   │
  │   │                       │   │ <─────────────────  │   │                   │   │
  │   │                       │924│        resp.conf    │   │                   │   │
  │   │   914 TP RETRIEVE 922 │   │                     │   │                   │   │
  │   │   <<<<|<- - - - - |<<<<│202│                     │   │                   │   │
  │   │        resp.conf       │   │                     │   │                   │   │
  │   │        INFORM2        │922│                     │   │                   │   │
  │   │ <──────────────────   │   │                     │   │                   │   │
  │INFORM2│911│   req.ind      │   │                     │   │                   │   │
  │<──────│   │                │   │                     │   │                   │   │
  │  ind  │   │                │   │                     │   │                   │   │
  └───┘                       └───┘                     └───┘                   └───┘
```
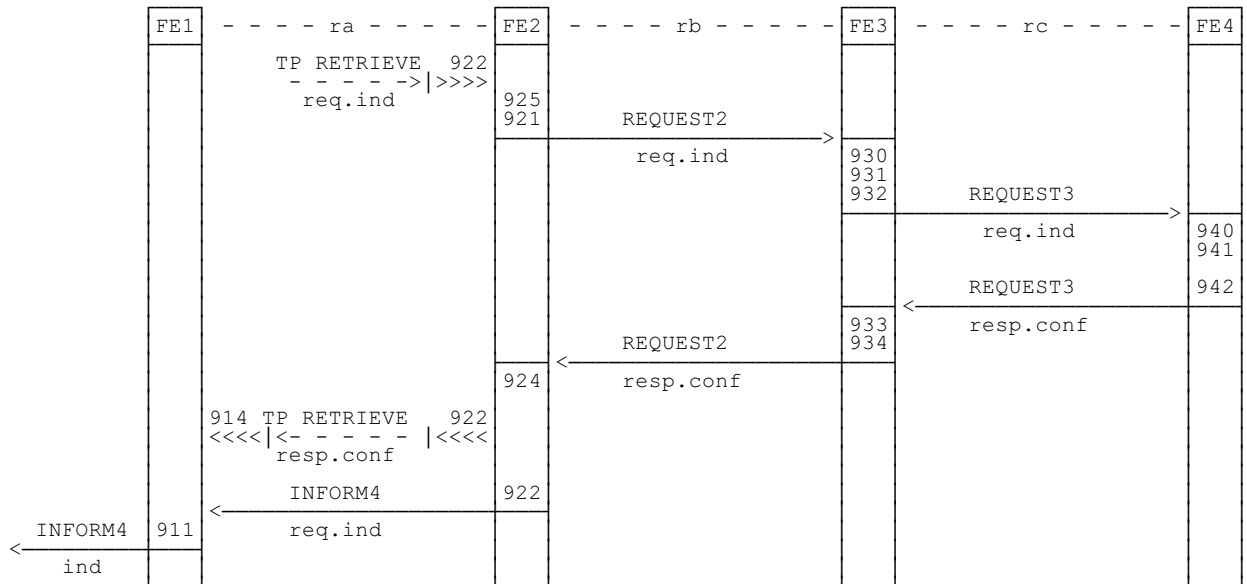
Figure 9

NOTE 1: The TP RETRIEVE function is a part of the Terminal Portability (TP) supplementary service, and the corresponding FEA numbers refer to this service.

NOTE 2: In the case that the called party clears the call during calling party TP-HOLD state, the INFORM2 shall be associated with the TP REJECT information flow.

7.1.2.5   **Transfer of charging information at call clearing (AOC-D)**

7.1.2.5.1   **Call clearing in forward direction**

```
        ┌───┐                   ┌───┐                   ┌───┐                   ┌───┐
        │FE1│ - - - ra - - - -  │FE2│ - - - rb - - - -  │FE3│ - - - rc - - - -  │FE4│
        │   │      DISC     321 │   │                   │   │                   │   │
        │   │    - - - ->│>>>>  │   │                   │   │                   │   │
        │   │      req.ind      │925│    REQUEST4       │   │                   │   │
        │   │                   │921│ ───────────────>  │   │                   │   │
        │   │                   │   │      req.ind      │931│    REQUEST5       │   │
        │   │                   │   │                   │932│ ───────────────>  │   │
        │   │                   │   │                   │   │      req.ind      │940│
        │   │                   │   │                   │   │                   │941│
        │   │                   │   │                   │   │    REQUEST5       │942│
        │   │                   │   │                   │933│ <──────────────── │   │
        │   │                   │   │    REQUEST4       │934│    resp.conf      │   │
        │   │                   │924│ <──────────────── │   │                   │   │
        │   │     INFORM2       │922│    resp.conf      │   │                   │   │
        │911│ <──────────────── │   │                   │   │                   │   │
 INFORM2│   │      req.ind      │   │                   │   │                   │   │
<────── │   │                   │   │                   │   │                   │   │
   ind  └───┘                   └───┘                   └───┘                   └───┘
```
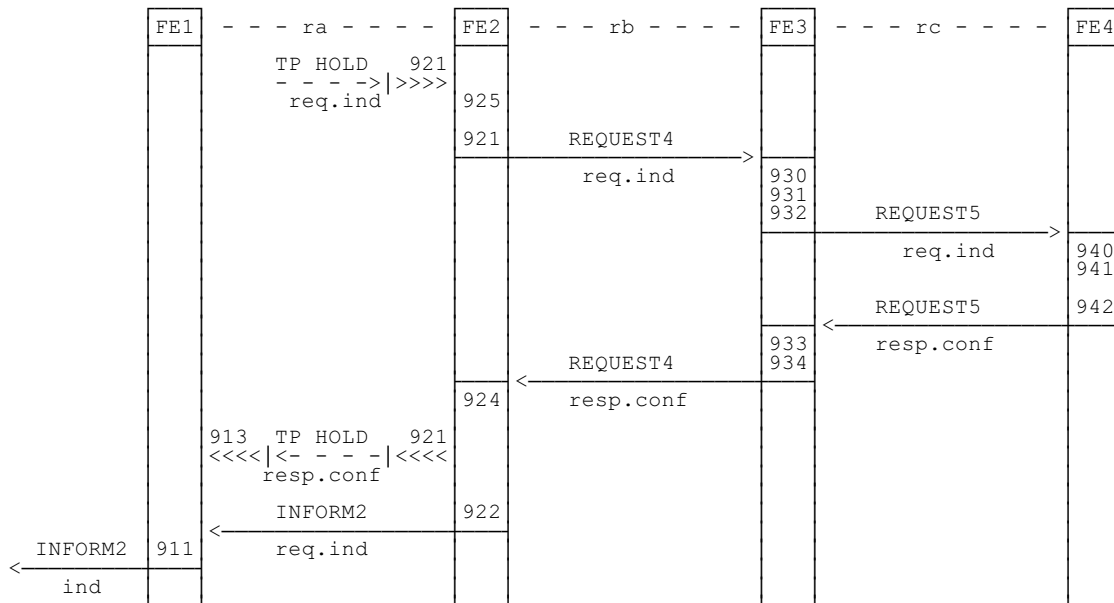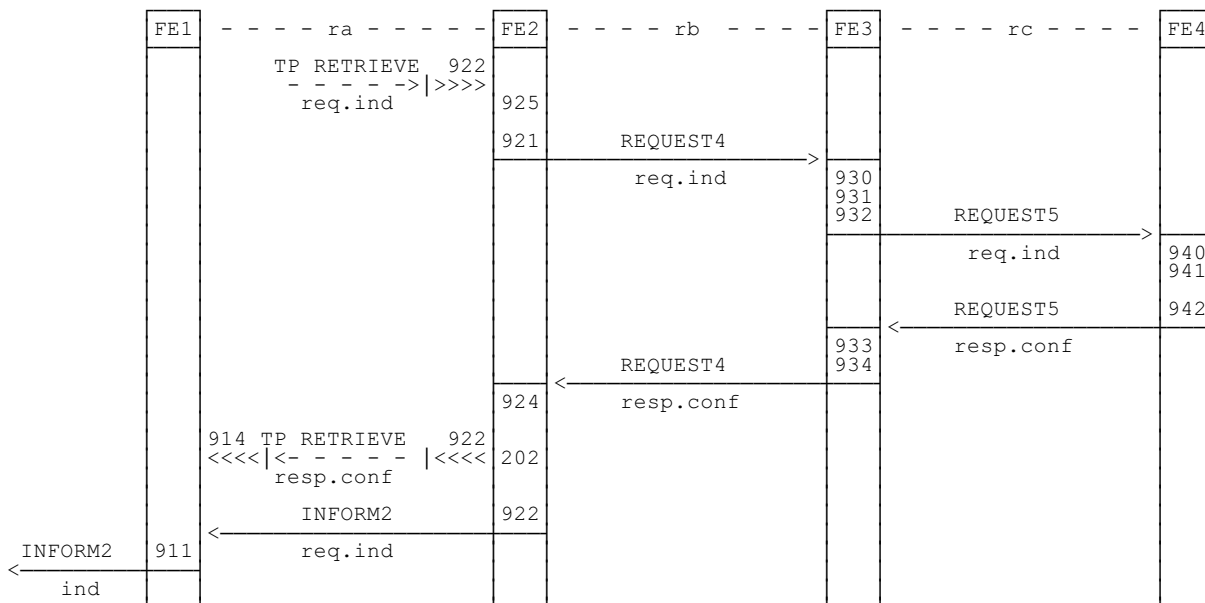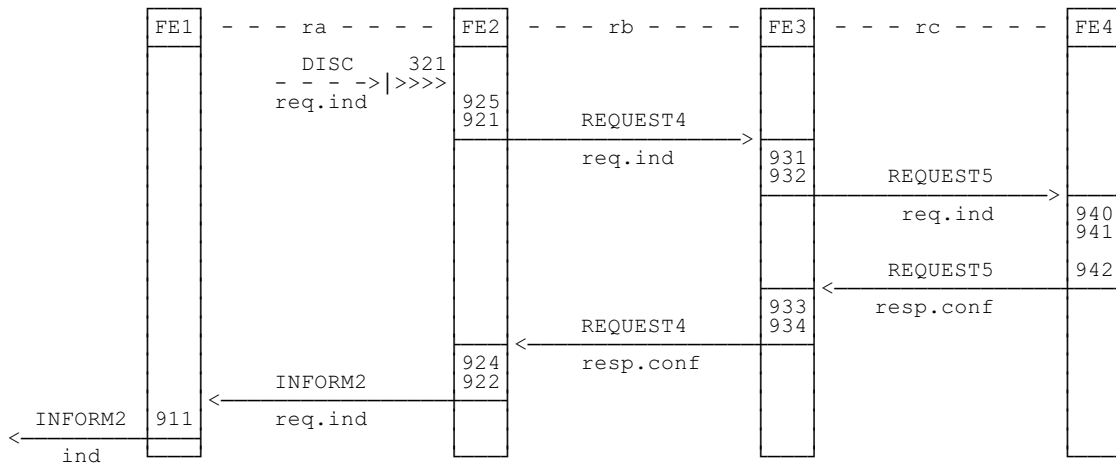
Figure 10

7.1.2.5.2   **Call clearing in backward direction**

```
        ┌───┐                   ┌───┐                   ┌───┐                   ┌───┐
        │FE1│ - - - ra - - - -  │FE2│ - - - rb - - - -  │FE3│ - - - rc - - - -  │FE4│
        │   │                   │421  RELEASE    431│   │                   │   │
        │   │                   │<<<<│<- - - -│<<<<  │   │                   │   │
        │   │                   │   │    req.ind      │   │                   │   │
        │   │                   │925│                 │   │                   │   │
        │   │                   │921│    REQUEST4     │   │                   │   │
        │   │                   │   │ ─────────────>  │   │                   │   │
        │   │                   │   │      req.ind    │931│                   │   │
        │   │                   │   │                 │932│    REQUEST5       │   │
        │   │                   │   │                 │   │ ───────────────>  │   │
        │   │                   │   │                 │   │      req.ind      │940│
        │   │                   │   │                 │   │                   │941│
        │   │                   │   │                 │   │    REQUEST5       │942│
        │   │                   │   │                 │933│ <──────────────── │   │
        │   │                   │   │    REQUEST4     │934│    resp.conf      │   │
        │   │                   │924│ <────────────── │   │                   │   │
        │   │     INFORM2       │922│    resp.conf    │   │                   │   │
        │911│ <──────────────── │   │                 │   │                   │   │
 INFORM2│   │      req.ind      │   │                 │   │                   │   │
<────── │   │                   │   │                 │   │                   │   │
   ind  └───┘                   └───┘                 └───┘                   └───┘
```
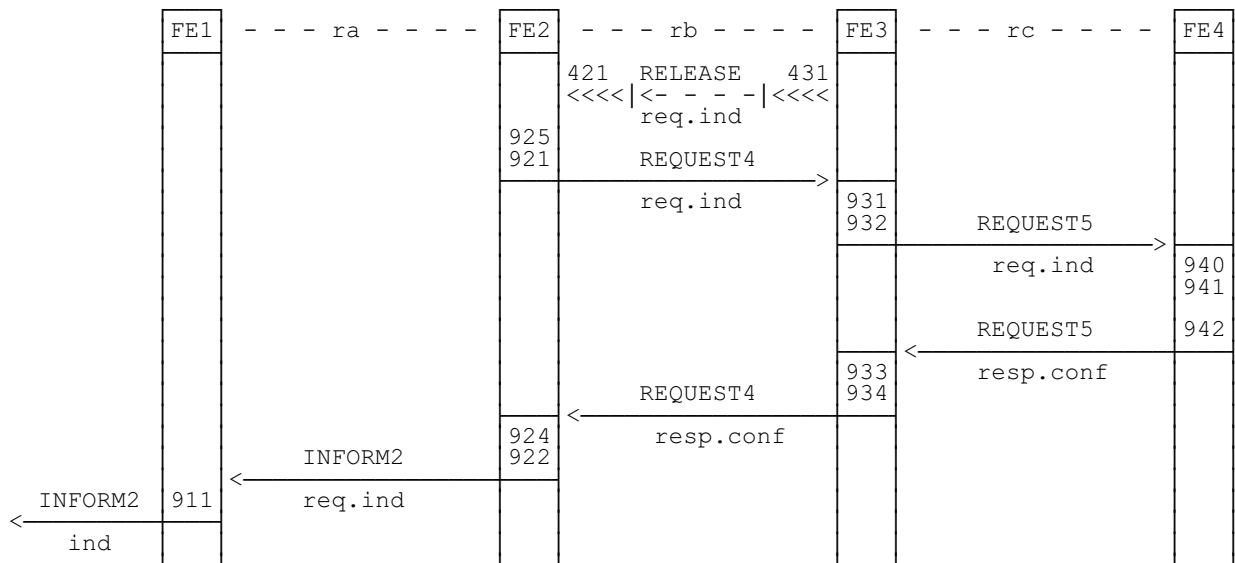
Figure 11

7.1.3 **Information flows for charging information at the end of a call (AOC-E)**

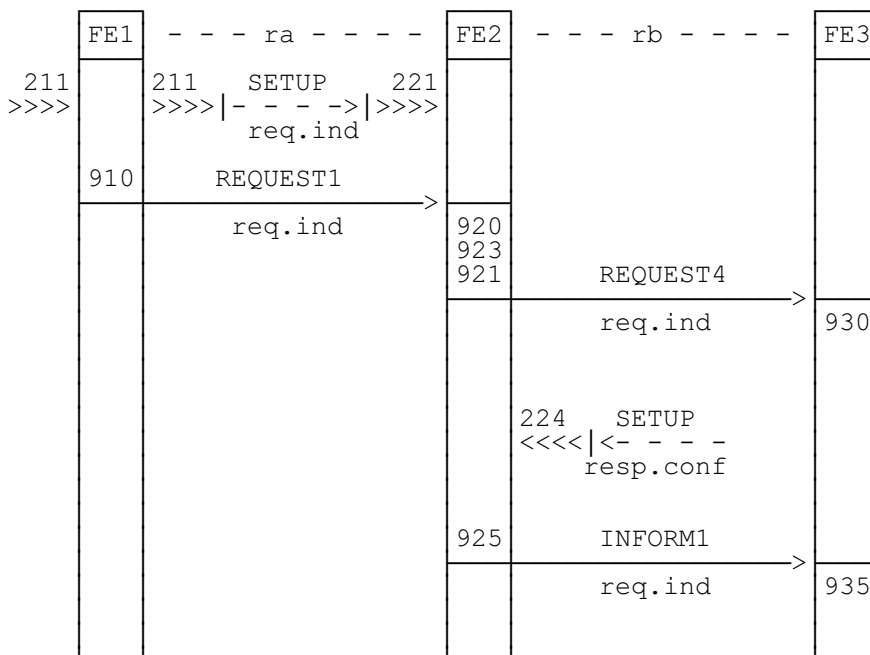**7.1.3.1** **Request for AOC-E at call set-up time (AOC-E)**

```
         ┌─────┐                          ┌─────┐                          ┌─────┐
         │ FE1 │  - - - ra - - - -        │ FE2 │  - - - rb - - - -        │ FE3 │
         │     │                          │     │                          │     │
   211   │     │  211    SETUP     221     │     │                          │     │
  >>>>   │     │ >>>>|- - - ->|>>>>        │     │                          │     │
         │     │       req.ind            │     │                          │     │
         │     │                          │     │                          │     │
   910   │     │      REQUEST1            │     │                          │     │
         │     │───────────────────────> │     │                          │     │
         │     │       req.ind            │ 920 │                          │     │
         │     │                          │ 923 │                          │     │
         │     │                          │ 921 │      REQUEST4            │     │
         │     │                          │     │───────────────────────> │     │
         │     │                          │     │       req.ind            │ 930 │
         │     │                          │     │                          │     │
         │     │                          │     │  224    SETUP            │     │
         │     │                          │     │ <<<<|<- - - -            │     │
         │     │                          │     │       resp.conf          │     │
         │     │                          │     │                          │     │
         │     │                          │ 925 │      INFORM1            │     │
         │     │                          │     │───────────────────────> │     │
         │     │                          │     │       req.ind            │ 935 │
         │     │                          │     │                          │     │
         └─────┘                          └─────┘                          └─────┘
```

Figure 12

7.1.3.2 **Information flows for AOC at call clearing (AOC-E)**

7.1.3.2.1 **Call clearing in forward direction (AOC-E)**

```
       ┌─────┐                    ┌─────┐                    ┌─────┐                    ┌─────┐
       │ FE1 │  - - - ra - - - -  │ FE2 │  - - - rb - - - -  │ FE3 │  - - - rc - - - -  │ FE4 │
       │     │    DISC    321     │     │                    │     │                    │     │
       │     │  - - - ->|>>>>     │ 925 │                    │     │                    │     │
       │     │   req.ind          │ 921 │    REQUEST4        │     │                    │     │
       │     │                    │     │──────────────────> │     │                    │     │
       │     │                    │     │    req.ind         │ 931 │                    │     │
       │     │                    │     │                    │ 932 │    REQUEST5        │     │
       │     │                    │     │                    │     │──────────────────> │     │
       │     │                    │     │                    │     │    req.ind         │ 940 │
       │     │                    │     │                    │     │                    │ 941 │
       │     │                    │     │                    │     │    REQUEST5        │ 942 │
       │     │                    │     │                    │ 933 │ <────────────────  │     │
       │     │                    │     │    REQUEST4        │ 934 │    resp.conf       │     │
       │     │                    │ 924 │ <────────────────  │     │                    │     │
       │     │    INFORM2         │ 922 │    resp.conf       │     │                    │     │
INFORM2│ 911 │ <────────────────  │     │                    │     │                    │     │
  <    │     │    req.ind         │     │                    │     │                    │     │
  ind  │     │                    │     │                    │     │                    │     │
       └─────┘                    └─────┘                    └─────┘                    └─────┘
```
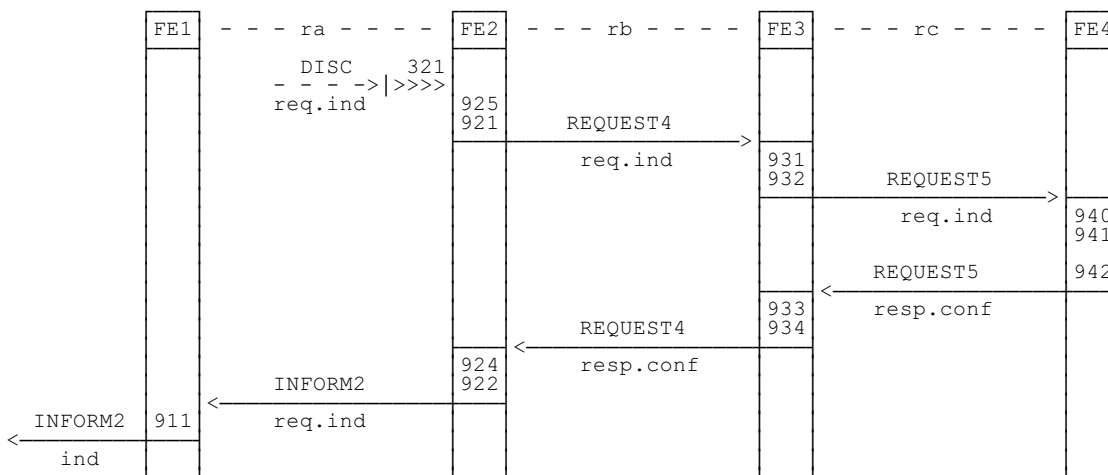
Figure 13

7.1.3.2.2 Call clearing in backward direction (AOC-E)

```
    FE1 - - - - ra - - - - - FE2 - - - - rb - - - - - FE3 - - - - rc - - - - - FE4
   ┌───┐                    ┌───┐                    ┌───┐                    ┌───┐
   │   │                    │   │ 421   RELEASE      │   │                    │   │
   │   │                    │   │<<<<│<- - - -        │   │                    │   │
   │   │                    │   │      req.ind        │   │                    │   │
   │   │                    │925│                     │   │                    │   │
   │   │                    │921│   REQUEST4          │   │                    │   │
   │   │                    │   │- - - - - - - - - ->│   │                    │   │
   │   │                    │   │      req.ind        │931│                    │   │
   │   │                    │   │                     │932│   REQUEST5          │   │
   │   │                    │   │                     │   │- - - - - - - - ->│   │
   │   │                    │   │                     │   │      req.ind        │940│
   │   │                    │   │                     │   │                     │941│
   │   │                    │   │                     │   │   REQUEST5          │942│
   │   │                    │   │                     │933│   resp.conf         │   │
   │   │                    │   │   REQUEST4          │934│<- - - - - - - -    │   │
   │   │                    │924│<- - - - - - - -     │   │                    │   │
   │   │                    │922│      resp.conf      │   │                    │   │
   │   │   INFORM2          │   │                     │   │                    │   │
INFORM2│911│<- - - - - - - -    │   │                     │   │                    │   │
<- -   │   │      req.ind        │   │                     │   │                    │   │
   ind │   │                     │   │                     │   │                    │   │
   └───┘                    └───┘                    └───┘                    └───┘
```
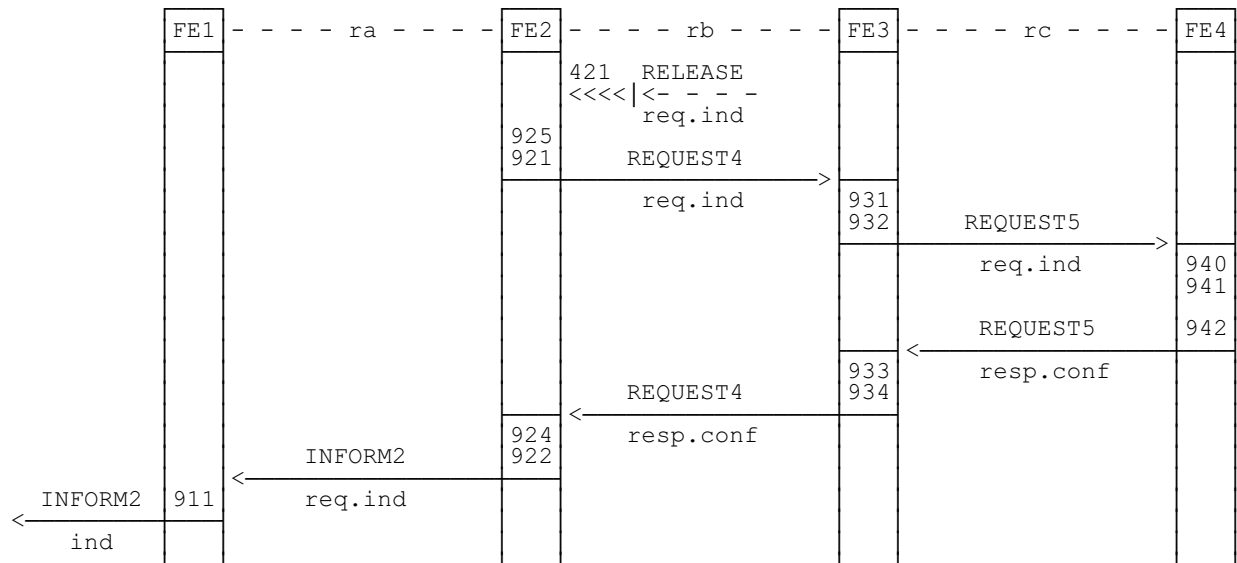
Figure 14

7.1.3.3 Information flows at immediate call diversions (AOC-E)

```
    FE1 - - - - ra - - - - - FE2 - - - - rb - - - - - FE3
   ┌───┐                    ┌───┐                    ┌───┐
   │   │                    │   │ 224   SETUP        │   │
   │   │          /*leg 1*/ │   │<<<<│<- - - -        │   │
   │   │                    │   │      req.ind        │   │
   │   │                    │   │ 221   SETUP    231  │   │
   │   │          /*leg 2*/ │   │>>>>│- - - ->│>>>>    │   │
   │   │                    │   │      req.ind        │   │
   │   │                    │923│                     │   │
   │   │                    │921│   REQUEST4          │   │
   │   │                    │   │- - - - - - - - - ->│   │
   │   │                    │   │      req.ind        │930│
   │   │                    │   │ 224   SETUP        │   │
   │   │          /*leg 2*/ │   │<<<<│<- - - -        │   │
   │   │                    │   │      resp.conf      │   │
   │   │                    │925│   INFORM1          │   │
   │   │                    │   │- - - - - - - - - ->│   │
   │   │                    │   │      req.ind        │935│
   └───┘                    └───┘                    └───┘
```
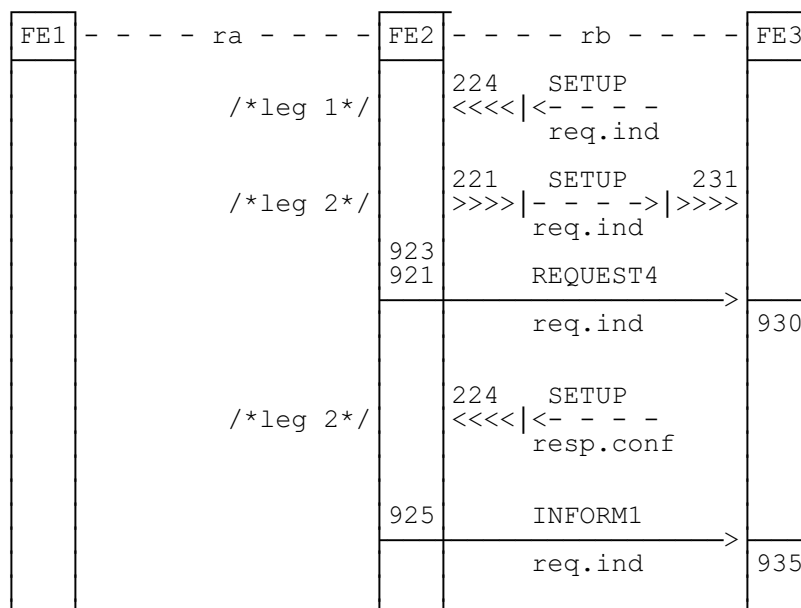
NOTE: Leg 1 refers to the leg between the calling and the forwarding user.

Leg 2 refers to the leg between the forwarding and the forwarded-to user.

Figure 15

Call clearing of the forwarded call in either direction as in subclause 7.1.3.2.

7.1.3.4   **Information flows when diversion of a call occurs after the call has been presented (AOC-E)**

```
┌────┐                      ┌────┐                      ┌────┐
│FE1 │- - - - ra - - - - - -│FE2 │- - - - - rb - - - - -│FE3 │
│    │                      │    │                      │    │
│    │ 251  REPORT(alert) 244│    │                     │    │
│    │>>>>|- - - - - ->|>>>> │    │                     │    │
│    │         req.ind       │    │                     │    │
│    │                      │    │                      │    │
│    │                      │    │ 241    SETUP         │    │
│    │      /*CFNR 945 >>>>  │    │>>>>| - - - - ->      │    │
│    │         leg 2*/       │    │         req.ind      │    │
│    │                      │    │ 921    REQUEST4      │    │
│    │                      │    │────────────────────>│    │
│    │                      │    │         req.ind      │930 │
│    │                      │    │ 245    SETUP         │    │
│    │      /*leg 2*/        │    │<<<<|<- - - - -       │    │
│    │                      │    │         resp.conf    │    │
│    │                      │    │                      │    │
│    │                      │    │ 925    INFORM1       │    │
│    │                      │    │────────────────────>│    │
│    │                      │    │         req.ind      │935 │
└────┘                      └────┘                      └────┘
```
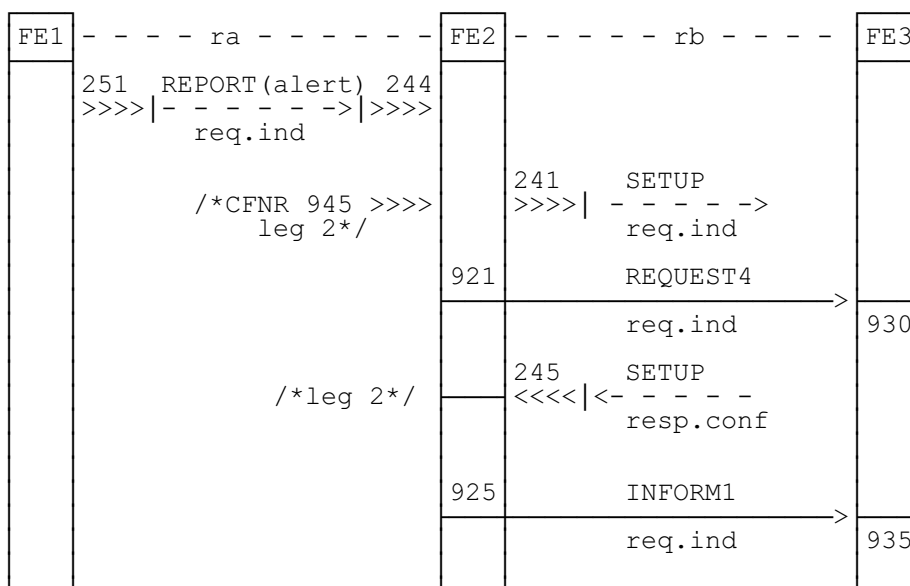
NOTE: Leg 1 refers to the leg between the calling and the forwarding users.

Leg 2 refers to the leg between the forwarding and the forwarded-to users.

Figure 16

Call clearing in either direction as in subclause 7.1.1.2.

Addressing information indicating the AOC-served user must be included in all cases where the FE1 is not located at a CCA, e.g. when CFU takes place and AOC is given to the user having invoked CFU.

When the AOC-served user is not a part of the basic charged call (i.e. at CFU, CFB, CFNR, CD) or the call has been transferred (CT has been invoked), then the charged number and the dialled number shall be given together with the AOC. The same requirement exists when the AOC-served user is a "third party" (e.g. in hotel PTNXs).

7.1.3.5 Information flows for AOC at call failure during call establishment (AOC-E)

```
          FE1   - - - ra - - - -  FE2   - - - - rb - - -  FE3   - - - rc - - - - -  FE4
   211   |   |                    |   |                   |   |                    |   |
  >>>>   |   |  SETUP       221   |   |                   |   |                    |   |
         |   |  >>>>|- - - ->|>>>> |   |                   |   |                    |   |
         |   |      req.ind        |   |                   |   |                    |   |
         |   |                     |   |                   |   |                    |   |
         | 910 |  REQUEST1         |   |                   |   |                    |   |
         |   |------------------->  | 920|                 |   |                    |   |
         |   |      req.ind        | 923|                  |   |                    |   |
         |   |                     | 921|  REQUEST4        |   |                    |   |
         |   |                     |   |--------------->   | 930|                   |   |
         |   |                     |   |      req.ind      |   |                    |   |
         |   |                     |   |                   |   |                    |   |
         |   |                     | 421|  RELEASE         |   |                    |   |
         |   |                     | <<<<|<- - - -          |   |                    |   |
         |   |                     |   |      req.ind      |   |                    |   |
         |   |                     | 921|  REQUEST4        |   |                    |   |
         |   |                     |   |--------------->   | 930|                   |   |
         |   |                     |   |      req.ind      | 931|                   |   |
         |   |                     |   |                   | 932|  REQUEST5         |   |
         |   |                     |   |                   |   |--------------->    | 940|
         |   |                     |   |                   |   |      req.ind       | 941|
         |   |                     |   |                   |   |  REQUEST5          | 942|
         |   |                     |   |                   |   |<---------------    |   |
         |   |                     |   |  REQUEST4         | 933|  resp.conf         |   |
         |   |                     |   |<---------------   | 934|                    |   |
         |   |                     | 924|  resp.conf       |   |                    |   |
         |   |      INFORM2        | 922|                  |   |                    |   |
   INFORM2| 911 |<---------------  |   |                   |   |                    |   |
  <-------|   |      req.ind       |   |                   |   |                    |   |
     ind  |   |                     |   |                   |   |                    |   |
```
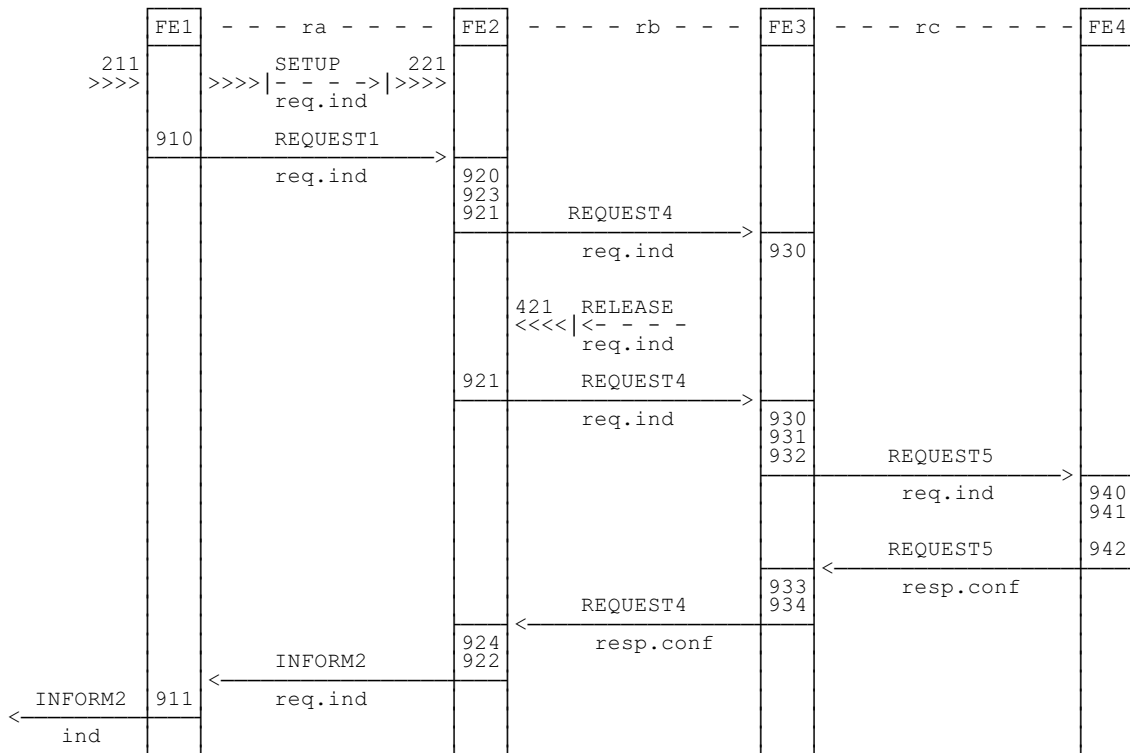
Figure 17

7.2 Definition of individual information flows

NOTE: In the following tables M = mandatory and O = optional.

7.2.1 Relationship ra

Table 1: Contents of REQUEST1 req.ind

Parameter	Allowed value	req.ind
REQUEST for AOC	AOC-S, and/or AOC-D, and/or AOC-E.	M
NOTE: REQUEST1 applies only in the case where AOC is requested on a per call basis.		

Table 2: Contents of INFORM2 req.ind

Parameter	Allowed value	req.ind
Type of AOC	AOC-D, or AOC-E.	M
Type of charging information	Subtotal charges (AOC-D), or Total charges (AOC-S, AOC-E), or Information not available.	M (NOTE 1)
Recorded charges	Charging units, or Currency units, or Free of charge, or Not available.	M (NOTE 2)
If Record charges = charging units Number of charging unit Type of charging units	 Integer value Integer 1-16	 M O
If Record charges = currency units Currency identifier Currency amount Multiplier (currency)	 Integer value 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M M
Billing identification	Normal charging (AOC-D,AOC-E), or Reverse charging (AOC-D,AOC-E), or Credit card charging (AOC-D,AOC-E), or Call forwarding unconditional (AOC-E),or Call forwarding busy (AOC-E), or Call forwarding no reply (AOC-E), or Call deflection (AOC-E), or Call transfer (AOC-E).	M
Charged number		O (NOTE 3)

NOTE 1:	Some networks may include charges incurred by the use of some supplementary services in "Total charges".
NOTE 2:	If different types of charging units apply, the recorded number of charging units for each type of charging unit may be given.
NOTE 3:	Charged number shall be included when the AOC is provided after the call.

Table 3: Contents of AOC REJECT req.ind

Parameter	Allowed value	req.ind
REJECT reason	Not subscribed	M

Table 4: Contents of INFORM4 req.ind

Parameter	Allowed value	req.ind
Type of AOC	AOC-S	M
Type of charging information	Charging Rate, or Information not available.	M
Charged item	Basic communication, and/or Call attempt, and/or Call setup, and/or User-to-user information, and/or Operation of supplementary services.	M (NOTE)
Special charging arrangements	Integer	M
Charging rate	Duration rate, or Specific rate, or Volume rate.	M
If Charging rate = Duration rate: Type of charging	Unit charging, or Continuous charging.	M

If Duration rate type = Currency rate:
  Currency identifier
  Currency amount
  Multiplier
	
	Integer
	0,001, or
	0,01, or
	0,1, or
	1,0, or
	10, or
	100, or
	1000.
		
		M
		M

Length of time unit Scale (time)	Integer 0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour, or 24 hours.	M M
Granularity Scale (granularity)	Integer 0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour, or 24 hours.	O
If Charging rate = Specific rate: Rate type	Free of charge, or Flat rate (currency units), or Special charging code N, or Not available.	M

Table 4: Contents of INFORM4 req.ind (concluded)

Parameter	Allowed value	req.ind
If Rate type = Flat rate 　　　　(Currency units): 　Current identifier 　Current amount 　Multiplier (currency)	 Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M
If Rate type = Special charging code: N	Integer (1-10)	M
If Charging rate = Volume rate : 　Type of charging 　Currency identifier 　Currency amount 　Multiplier (currency) 　Type of volume unit	 Unit charging, or Currency charging. Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000. Octet, or Segment, or Message.	 O M M M
NOTE:　　Each of these items will be accompanied by appropriate values from the rest of table 4.		

7.2.2　　　Relationship rb

Table 5: Contents of INFORM1 req.ind

Parameter	Allowed value	req.ind
Call State	Connected or disconnected.	M

Table 6: Contents of INFORM3 req.ind

Parameter	Allowed value	req.ind
Type of AOC	AOC-S	M
Type of charging information	Charging rate, or Information not available.	M
Charged item	Basic communication, or Call attempt, or Call setup, or User-to-user information, or Operation of supplementary services.	M
Special charging arrangements	Integer	M
Charging rate	Duration rate, or Specific rate, or Volume rate.	M
If Charging rate = Duration rate : Type of charging	Unit charging, or Continues charging.	M

If Duration rate type = Currency rate :
  Currency identifier
  Currency amount
  Multiplier
	
	Integer
	0,001, or
	0,01, or
	0,1, or
	1,0, or
	10, or
	100, or
	1000.
		M
		M

Length of time unit Scale (time)	Integer 0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour or 24 hours.	M M
Granularity Scale (granularity)	Integer 0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour, or 24 hours.	O
If Charging rate = Specific rate : rate type	Free of charge, or Flat rate (currency units), or Special charging code N, or Not available.	M

Table 6: Contents of INFORM3 req.ind (concluded)

Parameter	Allowed value	req.ind
If Rate type = Flat rate (currency units): Current identifier Current amount Multiplier (currency)	 Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M
If Rate type = Special charging code: N	Integer (1-10)	M
If Charging rate = Volume rate : Type of charging	 Unit charging, or Currency charging.	 M
If Volume rate type = Currency rate Currency identifier Currency amount Multiplier (currency)	 Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M
Type of volume unit	Octet, or Segment, or Message.	 M

Table 7: Contents of INFORM5 req.ind

Parameter	Allowed value	req.ind
Type of AOC	AOC-D.	M
Type of charging information	Subtotal charges, or Information not available.	M
Recorded charges	Charging units, or Currency units, or Free of charge, or Not available.	M
If Record charges = Charging units Number of charging unit Type of charging units	integer value integer 1-16	M 0
If Record charges = Currency units Currency identifier Currency amount Multiplier (currency)	Integer value 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000	M M M
Billing identification	Normal charging, or Reverse charging, or Credit card charging.	M
Charged number		O (NOTE)
NOTE: Charged number shall be included when the AOC is provided after the call.		

Table 8: Contents of REQUEST2 req.ind

Parameter	Allowed value	req.ind
Type of AOC	AOC-S	M
Call state	Establishment, or TP-Retrieve.	M

Table 9: Contents of REQUEST2 resp.conf

Parameter	Allowed value	req.ind
Type of AOC	AOC-S	M
Type of charging information	Charging rate, or Information not available.	M
Charged item	Basic communication, or	M
	Call attempt, or Call setup, or User-to-user information, or Operation of supplementary services, or Special charging arrangements.	
Charging rate	Duration rate, or Specific rate, or Volume rate.	M
If Charging rate = Duration rate : Type of charging	Unit charging, or Continuous charging.	M
If Duration rate type = Currency rate : Currency identifier Currency amount Multiplier	 Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M
Length of time unit Scale (time)	Integer 0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour, or 24 hour.	M M
Granularity Scale (granularity)	Integer 0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour, or 24 hour.	O
If Charging rate = Specific rate : rate type	Free of charge, or Flat rate (charging units), or Special charging code N, or Not available.	M

Table 9: Contents of REQUEST2 resp.conf (concluded)

Parameter	Allowed value	req.ind
If Rate type = Flat rate 　　　　　(Currency units): 　Current identifier 　Current amount 　Multiplier (currency)	 Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M
If Rate type = Special charging code: N	Integer (1-10)	M
If Charging rate = Volume rate : 　Type of charging	 Unit charging, or Currency charging.	 O
If Volume rate type = Currency rate 　Currency identifier 　Currency amount 　Multiplier (currency)	 Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M
Type of volume unit	Octet, or Segment, or Message.	M

Table 10: REQUEST4 req.ind

Parameter	Allowed value	req.ind
Type of AOC	AOC-D, or AOC-E.	M
Call state	Establishment, or Disconnected, or Failed, or Held, or Retrieved.	M

Table 11: Contents of REQUEST4 resp.conf

Parameter	Allowed value	req.ind
Type of AOC	AOC-D, or AOC-E.	M
Type of charging information	Subtotal charges (AOC-D), or Total charges (AOC-D, AOC-E), or Information not available.	M (NOTE 1)
Recorded charges	Charging units, or Currency units, or Free of charge, or Not available.	M (NOTE 2)
If Recorded charges = Charging units Number of charging unit Type of charging units	 Integer value Integer 1-16	 M O
If Record charges = Currency units Currency identifier Currency amount Multiplier (currency)	 Integer value 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M M
Billing identification	Normal charging (AOC-D,AOC-E), or Reverse charging (AOC-D,AOC-E), or Credit card charging (AOC-D,AOC-E), or Call forwarding unconditional (AOC-E),or Call forwarding busy (AOC-E), or Call forwarding no reply (AOC-E), or Call deflection (AOC-E), or Call transfer (AOC-E)	M
Charged number		O (NOTE 3)

NOTE 1:	Some networks may include charges incurred by the use of some supplementary services in "Total charges".
NOTE 2:	f different types of charging units apply, the recorded number of charging units for each type of charging unit may be given.
NOTE 3:	Charged number shall be included when the AOC is provided after the call.

7.2.3 Relationship rc

Table 12: Contents of REQUEST3 req.ind

Parameter	Allowed value	req.ind
Charging info to be formatted		M (NOTE)

NOTE:	The detailed specification of the content of this flow is outside the scope of this standard. The information transferred is the charging information received from the charging function of the basic call.

Table 13: Contents of REQUEST3 resp.conf

Parameter	Allowed value	req.ind
Type of AOC	AOC-S	M
Type of charging information	Charging Rate	M
Charged item	Basic communication, or Call attempt, or Call setup, or User-to-user information, or Operation of supplementary services, or Special charging arrangements.	M
Charging rate	Duration rate, or Specific rate, or Volume rate.	M
If Charging rate = Duration rate : Type of charging	Unit charging, or Continues charging.	M
If Duration rate type = Currency rate : Currency identifier Currency amount Multiplier	 Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M
Length of time unit Scale (time)	Integer 0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour, or 24 hour.	M M
Granularity Scale (granularity)	Integer 0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour, or 24 hour.	0
If Charging rate = Specific rate : Rate type	Free of charge, or Flat rate (currency units), or Special charging code N, or Not available.	M

Table 13: Contents of REQUEST3 resp.conf (concluded)

Parameter	Allowed value	req.ind
If Rate type = Flat rate (Currency units): Current identifier Current amount Multiplier (currency)	 Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M
If Rate type = Special charging code: N	Integer (1-10)	m
If Charging rate = Volume rate : Type of charging	 Unit charging, or Currency charging.	 O
If Volume rate type = Currency rate Currency identifier Currency amount Multiplier (currency) Type of volume unit	 Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000. Octet, or Segment, or Message.	 M M M

Table 14: Contents of REQUEST5 req.ind

Parameter	Allowed value	req.ind
Charging info to be formatted		M (NOTE)
NOTE: The detailed specifications of the content of this flow is outside the scope of this standard. The information transferred is the charging information received from the charging function of the basic call.		

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Table 15: Contents of REQUEST5 resp.conf

Parameter	Allowed value	req.ind
Type of AOC	AOC-D, or AOC-E.	M
Type of charging information	Subtotal charges (AOC-D), or Total charges (AOC-D, AOC-E).	M (NOTE 1)
Recorded charges	Charging units, or Currency units, or Free of charge, or Not available.	M (NOTE 2)
If Recorded charges = Charging units Number of charging unit Type of charging units	Integer value Integer 1-16	M O
If Record charges = Currency units Currency identifier Currency amount Multiplier (currency)	Integer value 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	M M M
Billing identification	Normal charging (AOC-D,AOC-E), or Reverse charging (AOC-D,AOC-E), or Credit card charging (AOC-D,AOC-E), or Call forwarding unconditional (AOC-E),or Call forwarding busy (AOC-E), or Call forwarding no reply (AOC-E), or Call deflection (AOC-E), or Call transfer (AOC-E).	M
Charged number		O (NOTE 3)

NOTE 1:	Some networks may include charges incurred by the use of some supplementary services in "Total charges".
NOTE 2:	If different types of charging units apply, the recorded number of charging units for each type of charging unit may be given.
NOTE 3:	Charged number shall be included when the AOC is provided after the call.

8 SDL diagrams for functional entities

The SDLs are provided according to the general principles of CCITT Recommendation Z.100 [6].

One instance of the described process shall exist for each AOC supplementary service requested. These instances of the described process shall operate independently of each other. Each request for an AOC supplementary service shall be handled by a separate process and multiple requests for AOC supplementary services can be included in a SETUP message.

8.1 FE1

The SDL for FE1 is shown in figure 18.

Process AOC_FE1   SE0181_F18(1)
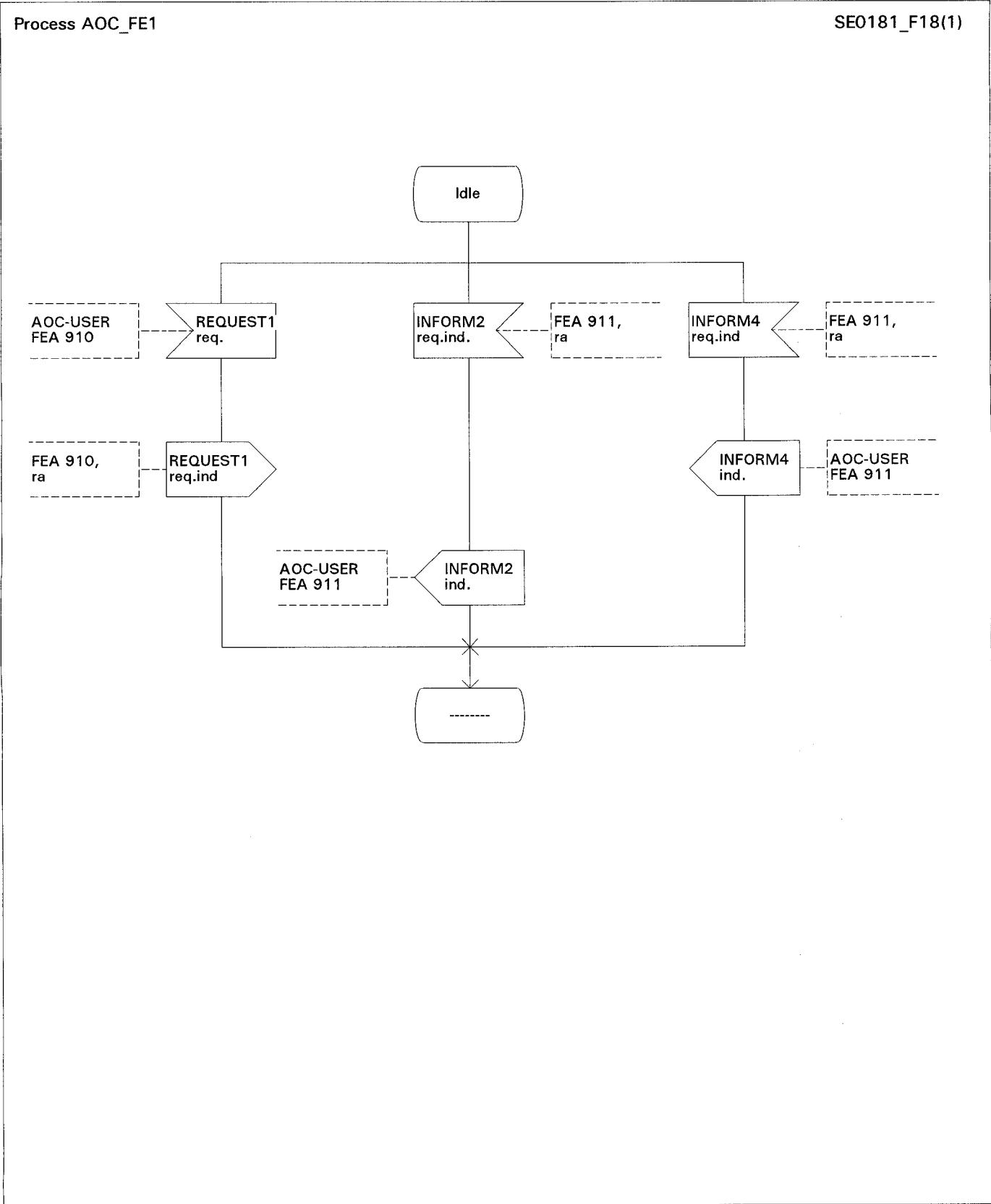
Figure 18

8.2 FE2

The SDL for FE2 is shown in figure 19.

Process AOC_FE2   SE0181_F19.1(5)

```
                              ┌──────────┐
                              │   Idle   │
                              └──────────┘
         ┌───────────────────────┴───────────────────────────────┐
┌─────────────┐      ┌──────┐            ┌─────────────┐      ┌───────────┐
│From basic   │─────▶│SETUP │            │FEA 920,     │─────▶│REQUEST1   │
│call         │      │      │            │ra           │      │req.ind    │
└─────────────┘      └──────┘            └─────────────┘      └───────────┘
┌─────────────┐       /\  NO                   NO   /\        ┌───────────┐
│FEA 923      │─ ─ ─ ⟨"Permanent│ ────┐      ┌──── ⟨ "AOC     ⟩─ ─ ┤FEA 923  │
└─────────────┘      ⟨AOC subscriber ?"      │    │ │subscriber ?"│
                       \/                 │   │       │    \/      └───────────┘
                    YES │            ┌─────────┐  ┌─────────┐    YES
                        │            │ ------- │  │ ------- │     │
                        │            └─────────┘  └─────────┘     │
                        └───────────────────┬──────────────────────┘
                                         ╱Type╲
                                        ╱ of AOC ╲
                        ┌──────────────────┼──────────────────────┐
                  < AOC-E >            < AOC-D >             < AOC-S >
┌─────────────┐  ┌───────────┐   ┌───────────┐ ┌─────────┐  ┌───────────┐ ┌─────────┐
│FEA 921,     │─▶│REQUEST4   ⟩   │REQUEST4   ⟩─│FEA 921, │  │REQUEST2   ⟩─│FEA 921, │
│rb           │  │req.ind    │   │req.ind    │ │rb       │  │           │ │rb       │
└─────────────┘  └───────────┘   └───────────┘ └─────────┘  └───────────┘ └─────────┘
                 ┌───────────┐          ( 2 )                   ( 1 )
                 │  AOC-E    │
                 │  Active   │
                 └───────────┘
```
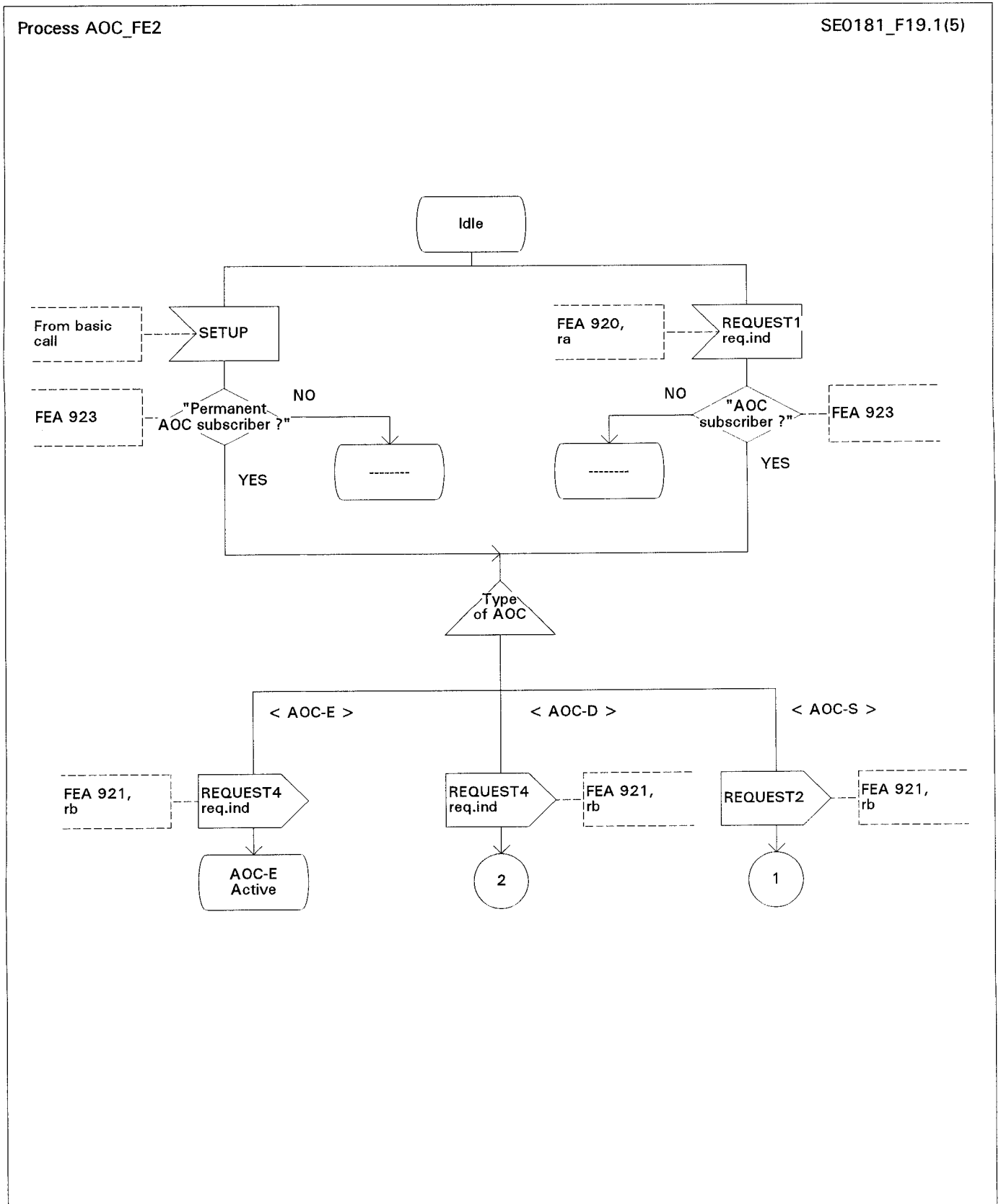
Figure 19 (sheet 1 of 5)

Process AOC_FE2   SE0181_F19.2(5)
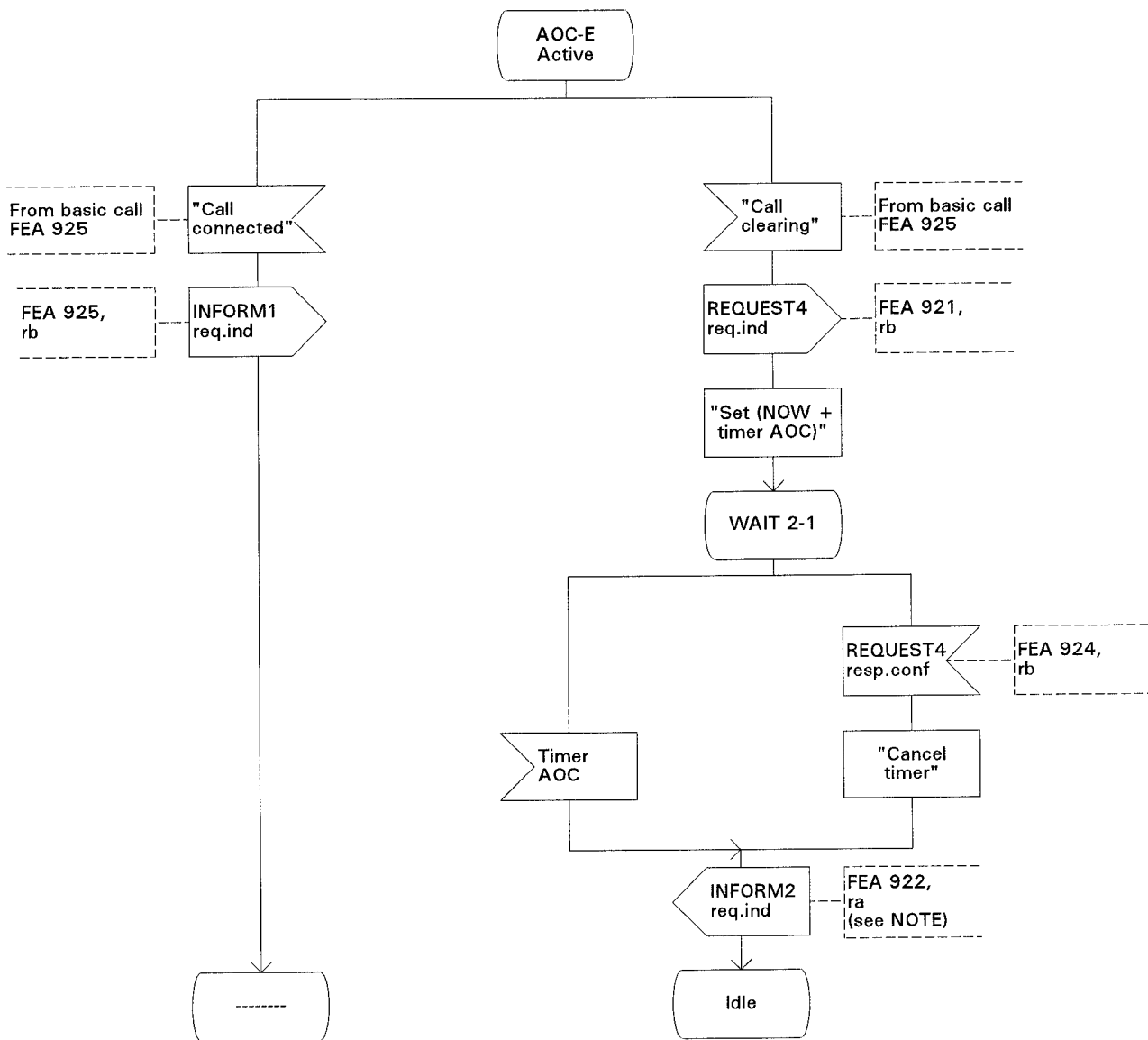
```
                                    ┌──────────┐
                                    │  AOC-E   │
                                    │  Active  │
                                    └────┬─────┘
         ┌───────────────────────────────┴──────────────────────────┐
┌ ─ ─ ─ ─ ┐   ╱───────╲                                  ╲───────╱   ┌ ─ ─ ─ ─ ┐
 From basic│  │ "Call  │                                  │ "Call │   From basic call
 call      ├──│connect-│                                  │clear- │───│FEA 925  
 FEA 925   │  │ ed"    │                                  │ ing"  │   └ ─ ─ ─ ─ ┘
└ ─ ─ ─ ─ ┘   ╲───────╱                                  ╱───────╲
┌ ─ ─ ─ ─ ┐   ╱───────╲                                  ╱───────╲   ┌ ─ ─ ─ ─ ┐
 FEA 925,  │  │INFORM1 │                                  │REQUEST4│   FEA 921,
 rb        ├──│req.ind │                                  │req.ind │───│rb
└ ─ ─ ─ ─ ┘   ╲───────╱                                  ╲───────╱   └ ─ ─ ─ ─ ┘
                                              ┌──────────┐
                                              │"Set (NOW+│
                                              │timer AOC)"│
                                              └────┬─────┘
                                              ┌──────────┐
                                              │ WAIT 2-1 │
                                              └────┬─────┘
                         ┌─────────────────────────┴──────────┐
                                                    ╲───────╱   ┌ ─ ─ ─ ─ ┐
                                                    │REQUEST4│   FEA 924,
                                                    │resp.conf│──│rb
                                                    ╱───────╲   └ ─ ─ ─ ─ ┘
               ╱───────╲                            ┌─────────┐
               │ Timer  │                           │ "Cancel │
               │  AOC   │                           │  timer" │
               ╲───────╱                            └────┬────┘
                    └──────────────┬──────────────────────┘
                                ╱───────╲   ┌ ─ ─ ─ ─ ┐
                                │INFORM2 │   FEA 922,
                                │req.ind │───│ra
                                ╲───────╱   │(see NOTE)
     ┌──────────┐               ┌──────────┐└ ─ ─ ─ ─ ┘
     │ ──────   │               │   Idle   │
     └──────────┘               └──────────┘
```

NOTE: In the case that the called party clears the call during calling party TP HOLD state, the INFORM2 shall be associated with the TP REJECT information flow.

Figure 19 (sheet 2 of 5)

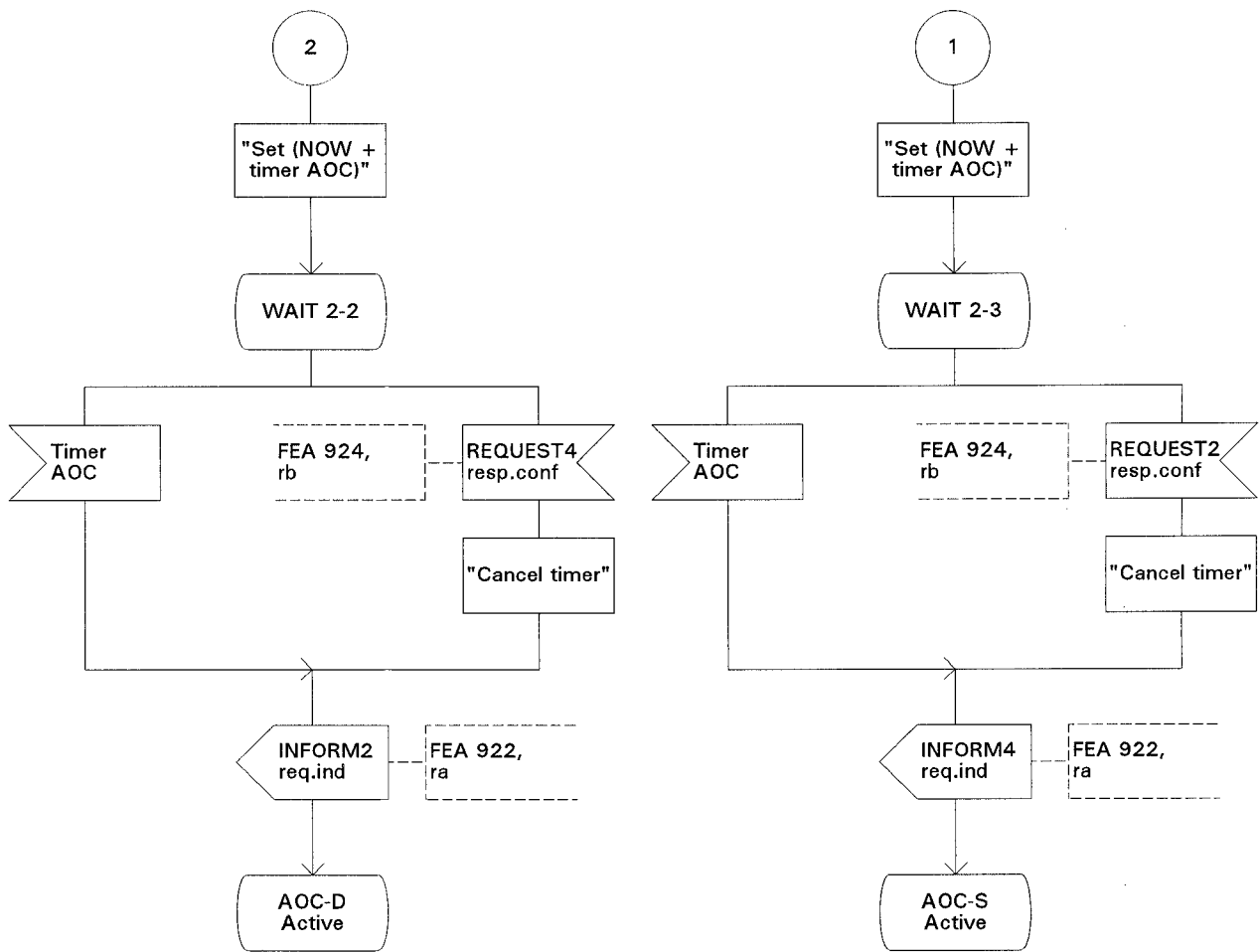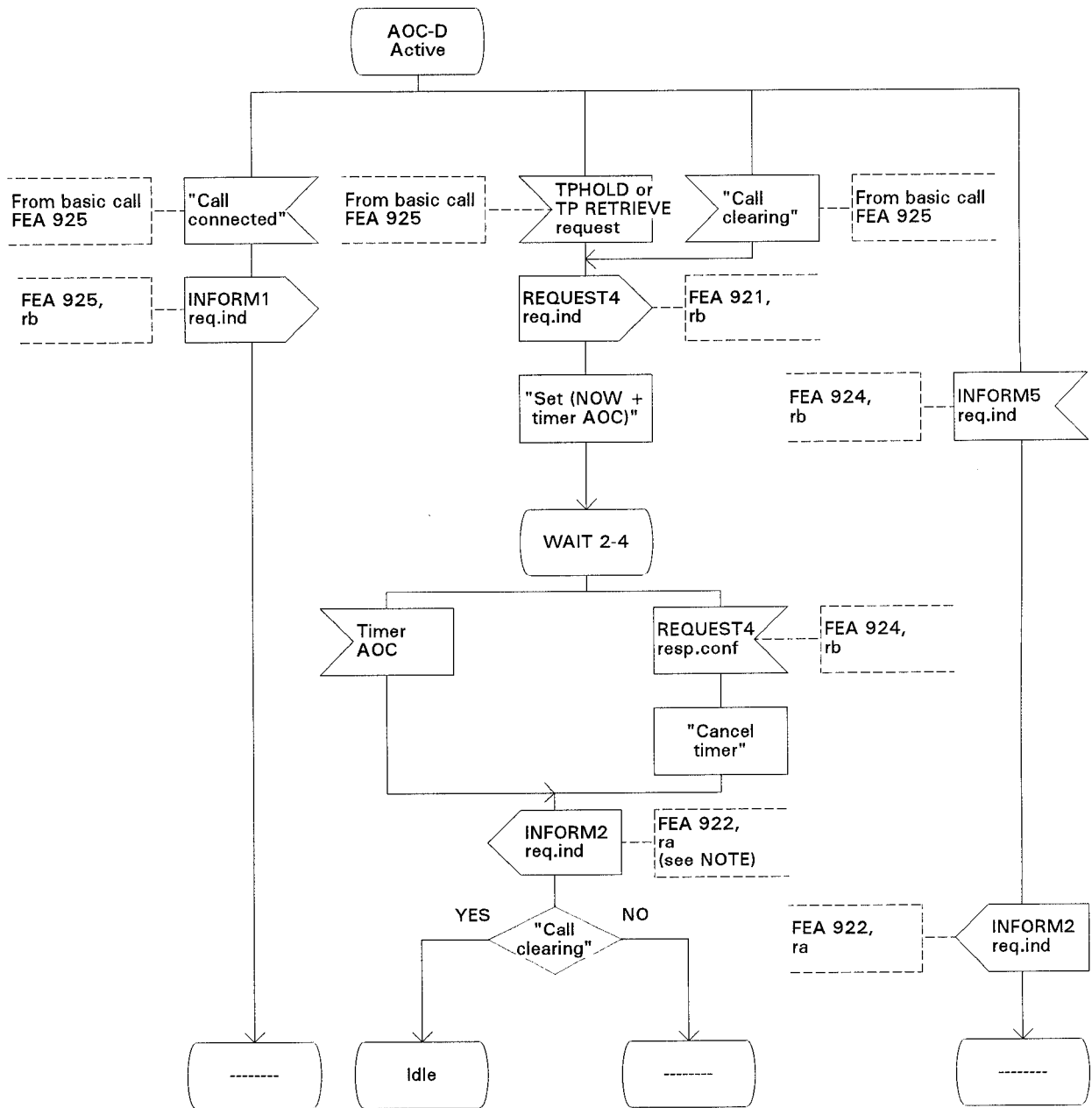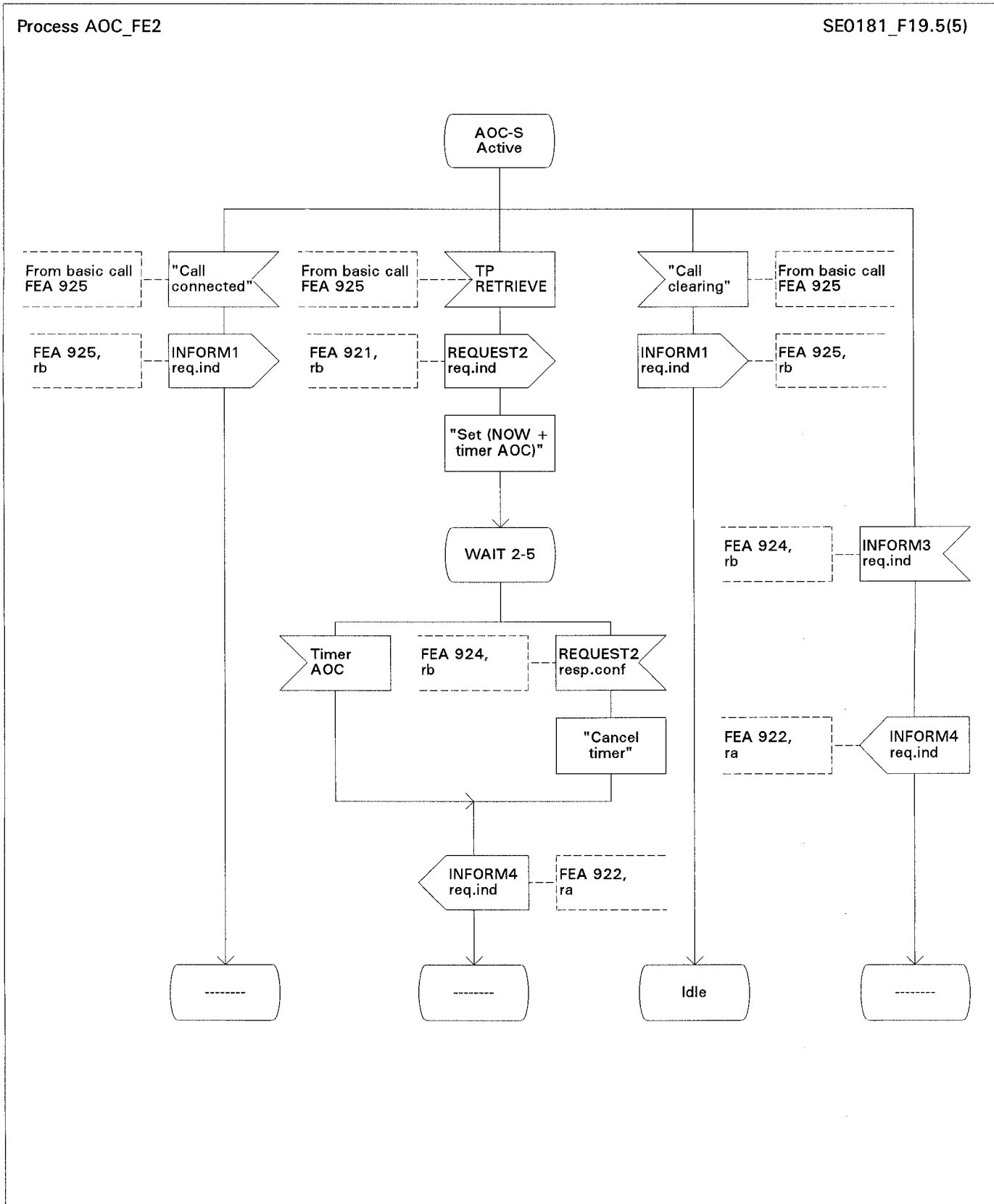Process AOC_FE2   SE0181_F19.3(5)

```
           ( 2 )                                              ( 1 )
             |                                                  |
    ┌────────────────┐                                 ┌────────────────┐
    │ "Set (NOW +    │                                 │ "Set (NOW +    │
    │ timer AOC)"    │                                 │ timer AOC)"    │
    └────────────────┘                                 └────────────────┘
             |                                                  |
    ┌────────────────┐                                 ┌────────────────┐
    │   WAIT 2-2     │                                 │   WAIT 2-3     │
    └────────────────┘                                 └────────────────┘
             |                                                  |
   ┌─────────┼──────────────────────┐              ┌────────────┼─────────────────────┐
   |         |                       |              |            |                      |
 ┌─────┐  ┌────────┐         ┌──────────┐        ┌─────┐    ┌────────┐         ┌──────────┐
 │Timer│  │FEA 924,│ ------- │REQUEST4  │        │Timer│    │FEA 924,│ ------- │REQUEST2  │
 │AOC  │  │rb      │         │resp.conf │        │AOC  │    │rb      │         │resp.conf │
 └─────┘  └────────┘         └──────────┘        └─────┘    └────────┘         └──────────┘
   |                              |                 |                               |
   |                       ┌──────────────┐         |                        ┌──────────────┐
   |                       │ "Cancel timer"│        |                        │ "Cancel timer"│
   |                       └──────────────┘         |                        └──────────────┘
   |                              |                 |                               |
   └──────────────────────────────┘                └───────────────────────────────┘
                    |                                                |
          ┌──────────────────┐  ┌─────────┐           ┌──────────────────┐  ┌─────────┐
          │ INFORM2          │--│FEA 922, │           │ INFORM4          │--│FEA 922, │
          │ req.ind          │  │ra       │           │ req.ind          │  │ra       │
          └──────────────────┘  └─────────┘           └──────────────────┘  └─────────┘
                    |                                                |
          ┌──────────────────┐                         ┌──────────────────┐
          │  AOC-D           │                         │  AOC-S           │
          │  Active          │                         │  Active          │
          └──────────────────┘                         └──────────────────┘
```

Figure 19 (sheet 3 of 5)

Process AOC_FE2   SE0181_F19.4(5)

AOC-D
Active

From basic call	"Call	From basic call	TPHOLD or	"Call	From basic call
FEA 925	connected"	FEA 925	TP RETRIEVE	clearing"	FEA 925
			request		

| FEA 925, | INFORM1 | | REQUEST4 | FEA 921, |
| rb | req.ind | | req.ind | rb |

"Set (NOW +
timer AOC)"

| FEA 924, | INFORM5 |
| rb | req.ind |

WAIT 2-4

Timer
AOC

| REQUEST4 | FEA 924, |
| resp.conf | rb |

"Cancel
timer"

INFORM2
req.ind

FEA 922,
ra
(see NOTE)

YES   NO

"Call
clearing"

| FEA 922, | INFORM2 |
| ra | req.ind |

Idle

NOTE: In the case that the called party clears the call
during calling party TP HOLD state, the INFORM2 shall be
associated with the TP REJECT information flow.

Figure 19 (sheet 4 of 5)

Process AOC_FE2   SE0181_F19.5(5)

AOC-S
Active

| From basic call
FEA 925 | --- | "Call
connected" | | From basic call
FEA 925 | --- | TP
RETRIEVE | | "Call
clearing" | --- | From basic call
FEA 925 |

| FEA 925,
rb | --- | INFORM1
req.ind | | FEA 921,
rb | | REQUEST2
req.ind | | INFORM1
req.ind | --- | FEA 925,
rb |

"Set (NOW +
timer AOC)"

WAIT 2-5

| FEA 924,
rb | --- | INFORM3
req.ind |

| Timer
AOC | | FEA 924,
rb | --- | REQUEST2
resp.conf |

"Cancel
timer"

| FEA 922,
ra | --- | INFORM4
req.ind |

| INFORM4
req.ind | --- | FEA 922,
ra |

(--------)   (--------)   (Idle)   (--------)

Figure 19 (sheet 5 of 5)

8.3 FE3

The SDL for FE3 is shown in figure 20.

Process AOC_FE3   SE0181_F20.1(4)

AOC-D Idle,
AOC-E Idle

FEA 930,
rb

REQUEST4
req.ind

Type
of AOC

AOC-D   AOC-E

FEA 936

"Start AOC
triggering
process"

From basic call
FEA 931

"Communicate
with charging
function"

AOC-E
Active

FEA 932,
rc

REQUEST5
req.ind

"Set (NOW +
timer AOC)"

WAIT 3-1

Timer
AOC

FEA 933,
rc

REQUEST5
resp.conf

"Cancel
timer"

REQUEST4
resp.conf

FEA 934,
rb

AOC-D
Active

AOC-S
Idle

FEA 930,
rb

REQUEST2
req.ind

From basic call
FEA 931

"Communicate
with charging
function"

FEA 932,
rc

REQUEST3
req.ind

"Set (NOW +
timer AOC)"

WAIT 3-2

Timer
AOC

FEA 933,
rc

REQUEST3
resp.conf

"Cancel
timer"

REQUEST2
resp.conf

FEA 934,
rb

AOC-S
Active

Figure 20 (Sheet 1 of 4)

Process AOC_FE3   SE0181_F20.2(4)

Figure 20 (Sheet 2 of 4)

Process AOC_FE3   SE0181_F20.3(4)

AOC-D
Active

FEA 930,
rb --- AOC
Trigger

REQUEST4
req.ind --- FEA 930,
rb

From basic call
FEA 931 --- "Communicate
with charging
function"

"Communicate
with charging
function" --- From basic call
FEA 931

FEA 932,
rc --- REQUEST5
req.ind

FEA 935,
rb --- INFORM1
req.ind

REQUEST5
req.ind --- FEA 932,
rc

"Set (NOW +
timer AOC)"

FEA 935 --- "Record
call state"

"Set (NOW +
timer AOC)"

WAIT 3-4

WAIT 3-5

Timer
AOC

FEA 933,
rc --- REQUEST5
resp.conf

Timer
AOC

FEA 933,
rc --- REQUEST5
resp.conf

"Cancel
timer"

"Cancel
timer"

INFORM5
req.ind --- FEA 934,
rb

REQUEST4
req.ind --- FEA 934,
rb

NO   "Call
clearing ?"   YES

--------   --------   --------   Idle

Figure 20 (Sheet 3 of 4)

Process AOC_FE3   SE0181_F20.4(4)
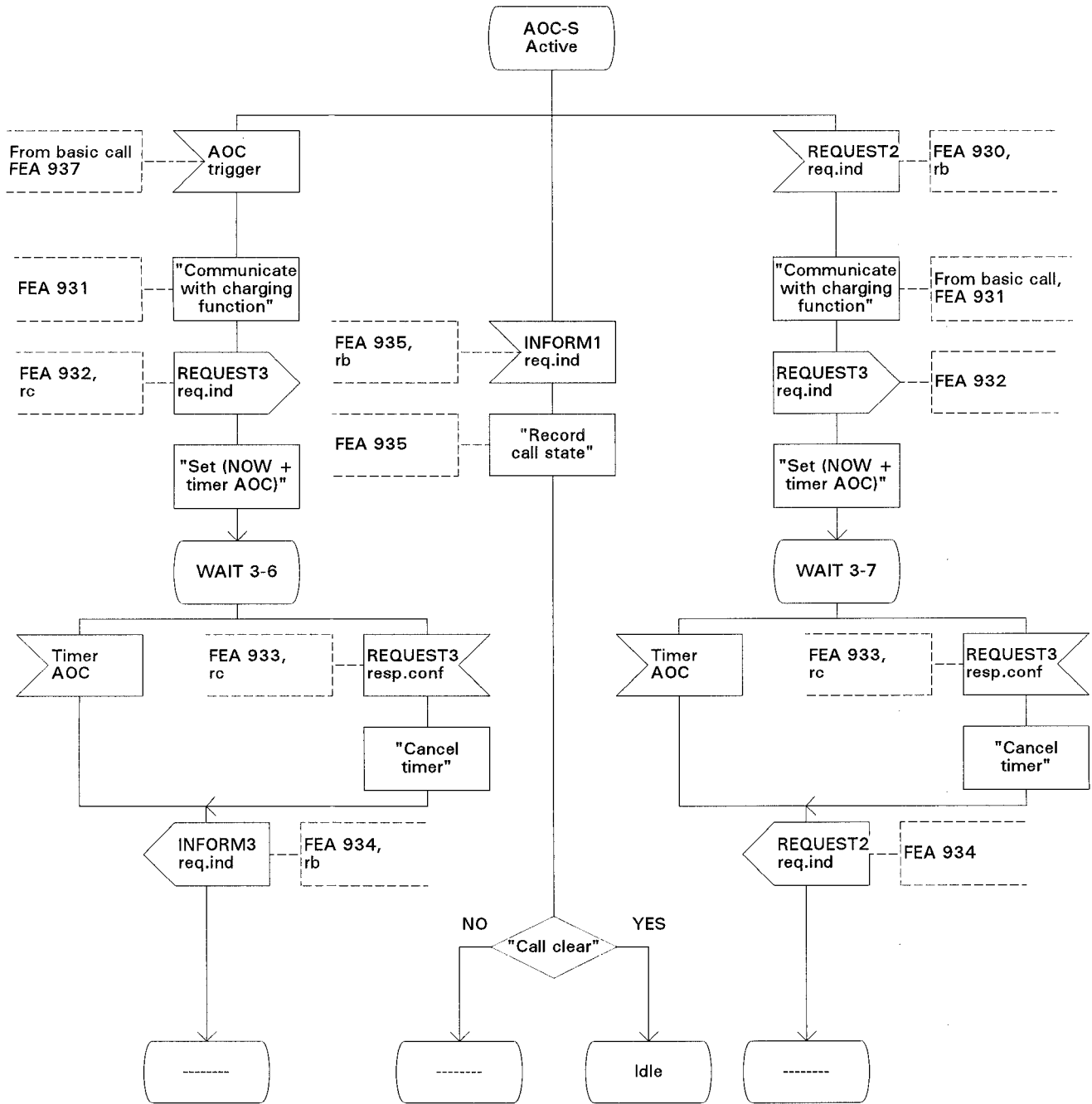
Figure 20 (Sheet 4 of 4)

8.4   FE4

The SDL for FE4 is shown in figure 21.

Process AOC_FE4   SE0181_F21(1)

```
          ┌─────────────┐                      ┌─────────────┐
          │  AOC-D Idle │                      │   AOC-S     │
          │  AOC-E Idle │                      │    Idle     │
          └──────┬──────┘                      └──────┬──────┘
                 │                                    │
┌─ ─ ─ ─ ─┐      │  ╲REQUEST5          ┌─ ─ ─ ─ ─┐    │  ╲REQUEST3
│FEA 940, ┆ ─ ─ ─▷  ╲req.ind           │FEA 940, ┆ ─ ─▷  ╲req.ind
│rc       ┆      │  ╱                  │rc       ┆    │  ╱
└─ ─ ─ ─ ─┘      │                     └─ ─ ─ ─ ─┘    │
                 │                                    │
┌─ ─ ─ ─ ─┐   ┌──┴──────┐              ┌─ ─ ─ ─ ─┐ ┌──┴──────┐
│FEA 941  ┆ ─ │"Prepare │              │FEA 941  ┆ │"Prepare │
│         ┆   │AOC info"│              │         ┆ │AOC info"│
└─ ─ ─ ─ ─┘   └──┬──────┘              └─ ─ ─ ─ ─┘ └──┬──────┘
                 │                                    │
┌─ ─ ─ ─ ─┐      │  ╱REQUEST5          ┌─ ─ ─ ─ ─┐    │  ╱REQUEST3
│FEA 942, ┆ ─ ─ ─◁  ╲resp.conf         │FEA 942, ┆ ─ ─◁  ╲resp.conf
│rc       ┆      │  ╲                  │rc       ┆    │  ╲
└─ ─ ─ ─ ─┘      │                     └─ ─ ─ ─ ─┘    │
                 ▼                                    ▼
          ┌─────────────┐                      ┌─────────────┐
          │   ───────   │                      │   ───────   │
          └─────────────┘                      └─────────────┘
```
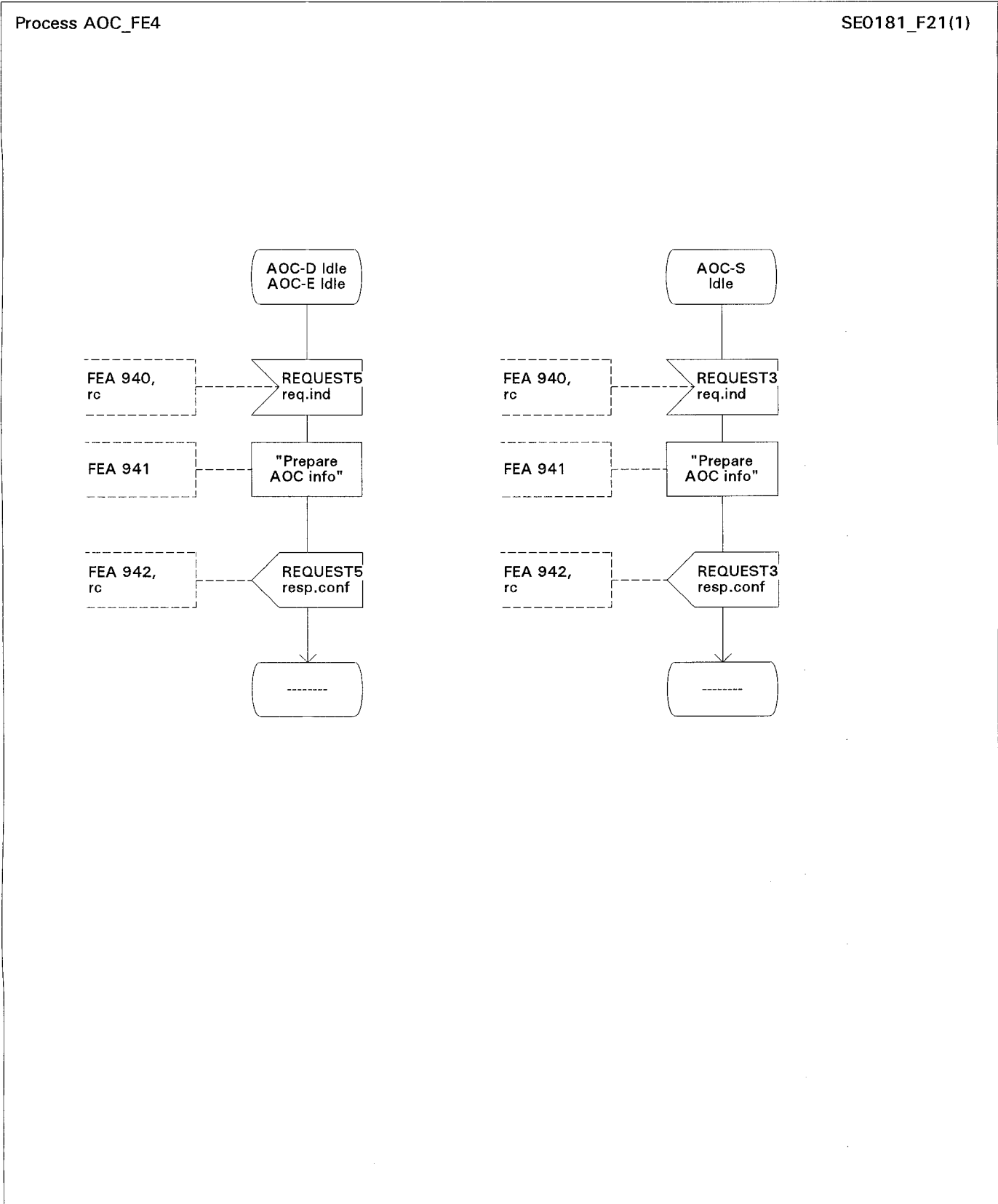
Figure 21

9 Functional Entity Actions (FEAs)

9.1 FEAs for FE1

910: The functional entity shall receive AOC request from the served user and forward the request to FE2.

911: The functional entity shall receive AOC information from FE2 and forward the AOC information to the AOC served user.

9.2 FEAs for FE2

920: The functional entity shall receive AOC requests from FE1.

921: The functional entity shall request AOC information from FE3.

922: The functional entity shall send AOC information to FE1.

923: The functional entity shall check subscription/request options of the service.

924: The functional entity shall receive AOC information from FE3.

925: The functional entity shall receive info on call state from basic call and send change of call state information to FE3.

926: The functional entity shall manage timers and react when they mature.

9.3 FEAs for FE3

930: The functional entity shall receive AOC requests from FE2.

931: The functional entity shall communicate with the charging function of the basic call.

932: The functional entity shall request FE4 to prepare the AOC-information.

933: The functional entity shall receive AOC information from FE4.

934: The functional entity shall send AOC information to FE2.

935: The functional entity shall receive call state information from FE2 and record the call state.

936: The functional entity shall start the appropriate triggering process for AOC during a call.

NOTE: This triggering process is a network option, e.g. AOC information may be sent every X seconds, or for every Y charge units.

937: The functional entity shall receive trigger inputs from the AOC triggering process.

938: The functional entity shall manage timers and react when they mature.

9.4   FEAs for FE4

940:                    The functional entity shall receive AOC requests from FE3.

941:                    The functional entity prepare the AOC information on the basis of the
                        received charging information from FE3.

942:                    The functional entity shall send AOC information to FE3.

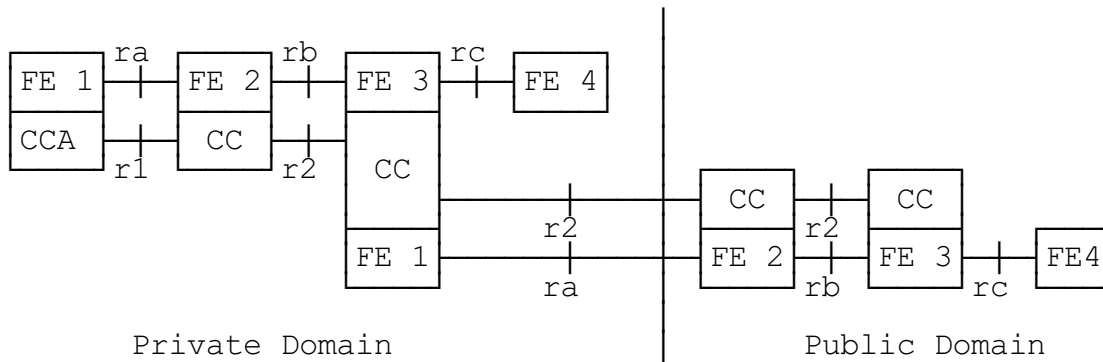# 10   Allocation of functional entities to physical locations

Table 16

Scenarios	FE1	FE2	FE3	FE4
1	TE	LE		
2	PTNX	LE		
3	TE	LE	TR	
4	PTNX	LE	TR	
5	TE	LE	Charging centre	
6	PTNX	LE	Charging centre	

NOTE: Scenarios 7, 8 and 9 show the cases where AOC is completely provided by private
          network.

Annex A (informative):   Interworking between two charging domains

Explanatory model for the interworking between two charging domains.

```
        ra          rb          rc
 ┌──────┐   ┌──────┐   ┌──────┐   ┌──────┐
 │ FE 1 │───│ FE 2 │───│ FE 3 │───│ FE 4 │
 │      │   │      │   │      │   └──────┘
 │ CCA  │   │ CC   │   │      │
 │      │   │      │   │ CC   │                    ┌──────┐   ┌──────┐
 └──────┘   └──────┘   │      │              ┌─────│ CC   │───│ CC   │
    r1         r2      │      │   r2         │      │      │r2 │      │
                       │ FE 1 │──────────────│─────│ FE 2 │───│ FE 3 │──│FE4│
                       └──────┘              │     └──────┘   └──────┘rc └───┘
                                 ra          │         rb
      Private Domain                         │        Public Domain
```

Figure A.1: Example basic model for interworking between public and private charging domains

> NOTE: This model is included for information on how the interworking between a public and a
> private charging domain takes place. It shows that the interworking between the public
> and the private domain takes place at the level of the basic call.

History

Document history	
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May 1996	Converted into Adobe Acrobat Portable Document Format (PDF)