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Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Specification, functional model and information flows — Advice of charge supplementary services

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseau privé à intégration de services — Spécification, modèle fonctionnel et flux d'informations — Orientation des services supplémentaires de charge

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 15049 was prepared by ECMA (as ECMA-211) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Annexes A, B and C form an integral part of this International Standard. Annex D is for information only.

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Introduction

This International Standard is one of a series of standards defining services and signalling protocols applicable to Private Integrated Services Networks. The series uses the ISDN concepts as developed by ITU-T (formerly CCITT) and is also within the framework of standards for open systems interconnection as defined by ISO.

This International Standard specifies the Advice of Charge supplementary services.

This International Standard is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO/IEC JTC 1, ITU-T, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

The services specified are compatible with the equivalent services specified by ITU-T for public ISDNs.

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Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Advice of charge supplementary services

1 Scope

This International Standard specifies the Supplementary Services Advice of Charge (SS-AOC), which are applicable to various basic services supported by Private Integrated Services Networks (PISN). Basic services are specified in ISO/IEC 11574.

SS-AOC is a set of supplementary services which enable a user to receive information about the charging of its calls that leave the PISN and enter another network.

AOC-S enables the user to receive information about the charging rates at call set-up time and also to receive further information during the call if there is a change of charging rates.

AOC-D enables the user to receive information on the recorded charges during the active phase of the call.

AOC-E enables the user to receive information on the recorded charges when the call is terminated.

The provision of charging information to the called user, the provision of charging information for calls that do not leave the PISN, and PISN accounting are outside the scope of this International Standard.

Charging assumptions which apply to the specification of SS-AOC in this International Standard are contained in annex D.

Service specifications are produced in three stages, according the method described in CCITT Rec. I.130. This International Standard contains the stage 1 and stage 2 specifications of SS-AOC. The stage 1 specifications (clauses 6, 7, 8) specify the supplementary services as seen by users of PISNs. The stage 2 specification (clause 9) identifies the functional entities involved in the supplementary services and the information flows between them.

2 Conformance

In order to conform to this International Standard, a Stage 3 standard shall specify signalling protocols and equipment behaviour that are capable of being used in a PISN which supports the supplementary services specified in this International Standard. This means that, to claim conformance, a Stage 3 standard is required to be adequate for the support of those aspects of clauses 6, 7 and 8 (stage 1) and clause 9 (stage 2) which are relevant to the interface or equipment to which the Stage 3 standard applies.

3 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 11574:1994, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit-mode 64 kbit/s bearer services - Service description, functional capabilities and information flows.*

ISO/IEC 11579-1:1994, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Part 1: Reference configuration for PISN Exchanges (PINX).*

ISO/IEC 13865:1995, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Call transfer supplementary service.*

ISO/IEC 13872:1995, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Call diversion supplementary services.*

CCITT Rec. I.112:1988, *Vocabulary of terms for ISDNs.*

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CCITT Rec. I.130:1988, *Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN.*

CCITT Rec. I.210:1988, *Principles of telecommunication services supported by an ISDN and the means to describe them.*

CCITT Rec. Z.100:1988, *Specification and description language.*

4 Definitions

For the purposes of this International Standard, the following definitions apply.

4.1 External definitions

This International Standard uses the following terms defined in other documents:

- Basic Service (CCITT Rec. I.210)
- Connection (CCITT Rec. I.112)
- Private Integrated Services Network (PISN) (ISO/IEC 11579-1)
- Private Integrated Services Network Exchange (PINX) (ISO/IEC 11579-1)
- Service (CCITT Rec. I.112)
- Signalling (CCITT Rec. I.112)
- Supplementary Service (CCITT Rec. I.210)
- User (ISO/IEC 11574)

For the description of the interaction with the supplementary service Call Transfer, the following terms are used, which are defined in ISO/IEC 13865:

- Primary call
- Secondary call
- User A (the transferring user)
- User B
- User C
- Transfer by join
- Transfer by rerouteing

For the description of the interaction with the Diversion supplementary services, the following terms are used, which are defined in ISO/IEC 13872:

- Diverting user
- Deflecting user

This International Standard refers to the following basic call functional entities (FEs) defined in ISO/IEC 11574:

- Call Control (CC)
- Call Control Agent (CCA)

This International Standard refers to the following basic call inter-FE relationships defined in ISO/IEC 11574:

- r1
- r2

This International Standard refers to the following basic call information flows defined in ISO/IEC 11574:

- SETUP request/indication
- SETUP response/confirmation
- CHANNEL ACKNOWLEDGE request/indication
- REPORT request/indication
- DISCONNECT request/indication
- RELEASE request/indication

This International Standard refers to the following Call Transfer functional entities (FEs) defined in ISO/IEC 13865:

- FE1
- FE2
- FE3

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- FE5
- FE6
- FE7

This International Standard refers to the following Call Transfer inter-FE relationship defined in ISO/IEC 13865:

- rr

This International Standard refers to the following Call Diversion functional entities (FEs) defined in ISO/IEC 13872:

- FE3
- FE4
- FE5
- FE6

This International Standard refers to the following Call Diversion inter-FE relationship defined in ISO/IEC 13872:

- rc
- rd
- re

This International Standard refers to the following Call Diversion information flows defined in ISO/IEC 13872:

- rc-DIVERT request/indication
- rc-DIVERT response/confirmation
- re-INFORM4 request/indication

4.2 Other definitions

Additional Network Feature : A capability, over and above that of a basic service, provided by a PISN, but not directly to a PISN user.

call, basic call : An instance of the use of a basic service.

charged call : A call that can potentially attract charges as a result of being routed to another network.

Note - A charged call can be found to be free of charge e.g. if it remains within the PISN or is not charged for by the network to which it was routed. A PISN can treat all calls or only certain classes of calls as charged calls (e.g. based on the number of the called user).

local currency unit : The currency unit of the country in which the served user's PINX is located.

served user : The charged user who is provided with advice of charge information.

5 List of acronyms

ANF	Additional Network Feature
AOC	Advice of Charge
AOC-S	Advice of Charge: charging information at call set-up time
AOC-D	Advice of Charge: charging information during the call
AOC-E	Advice of Charge: charging information at the end of the call
CC	Call Control (functional entity)
CCA	Call Control Agent (functional entity)
CT	Call Transfer
DIV	Call Diversion
FE	Functional Entity
PINX	Private Integrated Services Network Exchange
PISN	Private Integrated Services Network
PSTN	Public Switched Telephone Network
SDL	Specification and Description Language
SS	Supplementary Service
TE	Terminal Equipment

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6 SS-AOC-S stage 1 specification

6.1 Description

6.1.1 General description

SS-AOC-S provides the served user with information about the charging rates for its current call. This can be at the moment of call establishment or, if the request is made later, at a later moment during the call. In addition, the served user is informed if a change in charging rates takes place during the call. The information can be sent for all charged calls, or on a per call basis. The charge information given relates to the call charges incurred on the PISN by the (public) network with which the PISN interworks.

Note - In some cases, e.g. due to off-line processing of charges, or timing considerations, the charge calculated by the user or the user's equipment based on the charging rate information provided may not precisely reflect the actual cost incurred.

The structure, contents and application of charging information are given in annex A.

6.1.2 Qualifications on applicability to telecommunication services

SS-AOC-S is applicable to all circuit mode basic services defined in ISO/IEC 11574.

6.2 Procedures

6.2.1 Provision/withdrawal

SS-AOC-S shall either be provided after pre-arrangement with the service provider, or be generally available.

SS-AOC-S can be provided either for all charged calls automatically or on a per call basis.

Withdrawal shall be at the request of the user or for service provider reasons.

6.2.2 Normal procedures

6.2.2.1 Activation/deactivation/registration/interrogation

SS-AOC-S shall be activated on provision, and deactivated on withdrawal.

SS-AOC-S requires no registration, and interrogation is not applicable.

6.2.2.2 Invocation and operation

If SS-AOC-S is provided on a per call basis, the user shall be able to invoke this service when originating a call or at any time during a call.

If SS-AOC-S is invoked for all charged calls automatically or if the served user invokes it when originating a call, the charging information shall be provided by the PISN during call establishment. This can occur, at the latest, when the calling user is informed that the called user has accepted the call.

If the served user invokes SS-AOC-S after originating a call, but prior to release of the call, the charging information shall be provided by the PISN as soon as possible after this invocation.

When there is a change in the charging rate during a call for which SS-AOC-S has been successfully invoked, the PISN shall send information about the new charging rate to be applied for the remainder of the call.

If a call for which SS-AOC-S has been successfully invoked is free of charge, or becomes free of charge during the active phase for the remainder of the call (e.g. in case of reverse charging), the specific rate "free of charge" shall be given.

If a call for which SS-AOC-S has been successfully invoked becomes free of charge for the user during the active phase for the whole call (i.e. from the beginning of the active phase of the call), the specific rate "free of charge from the beginning" shall be given.

The structure, contents and application of charging information are given in annex A.

6.2.3 Exceptional procedures

6.2.3.1 Activation/deactivation/registration/interrogation

Not applicable.

6.2.3.2 Invocation and operation

If a user who is not provided with SS-AOC-S on a per-call basis attempts to invoke SS-AOC-S, then the attempt shall be rejected by the PISN and the user shall be informed of the reason.

Note - An invocation for all calls automatically may proceed successfully.

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If a user attempts to invoke SS-AOC-S for a call which is not a charged call, then the attempt shall be rejected by the PISN and the user shall be informed of the reason.

If the charging information related to a call for which SS-AOC-S has been successfully invoked is not available, this shall be indicated to the served user using the specific rate "not available".

If the PISN recognises that the information for a particular charged item is incomplete, the specific rate "not available" shall be used for that charged item.

Note - If for any reason, no charging information is provided at all on a call for which SS-AOC-S has been successfully invoked, then the user should assume that the information is not available. The user should not assume that the call is free of charge.

6.3 Interactions with other supplementary services and ANFs

Interactions with other supplementary services and ANFs for which PISN standards were available at the time of publication of this International Standard are specified below.

6.3.1 Advice of charge: charging information during the call (AOC-D)

No interaction.

6.3.2 Advice of charge: charging information at the end of the call (AOC-E)

No interaction.

6.3.3 Calling Line Identification Presentation (CLIP)

No interaction.

6.3.4 Connected Line Identification Presentation (COLP)

No interaction.

6.3.5 Calling/Connected Line Identification restriction (CLIR)

No interaction.

6.3.6 Calling Name Identification presentation (CNIP)

No interaction.

6.3.7 Connected Name Identification Presentation (CONP)

No interaction.

6.3.8 Calling/Connected Name Identification restriction (CNIR)

No interaction.

6.3.9 Call Diversion (CFU/CFB/CFNR/CD)

If a call is subject to diversion, then the diverted call can be a charged call.

The invocation of SS-AOC-S at the time of the original call establishment by or on behalf of the calling user shall apply to the diverted call.

SS-AOC-S shall not be applicable to the diverting user.

Note - An SS-AOC-S request by or on behalf of the calling user will be rejected if the diverting user is the charged user for the diverted call.

6.3.10 Call Interception (CINT)

If a call is subject to interception, then the intercepted call can be a charged call.

The invocation of SS-AOC-S at the time of the call establishment by or on behalf of the calling user shall apply to the intercepted call.

6.3.11 Call Intrusion (CI)

No interaction.

6.3.12 Call Offer (CO)

No interaction.

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6.3.13 Call Transfer (CT)

If, prior to transfer, user A was receiving AOC-S information for the primary call, at the time of transfer, SS-AOC-S shall be stopped. If at the time of the transfer it is decided that user A will not be charged for the call prior to transfer, then the specific rate "free of charge from the beginning" shall be given to user A prior to stopping SS-AOC-S. The same applies for the secondary call if user A was receiving AOC-S information for that call.

User A shall not be allowed to invoke SS-AOC-S on a call resulting from transfer.

After transfer, SS-AOC-S may be invoked for user B (or C) either automatically or on request from the user. If user C has not answered at the time of transfer, it shall not be possible to invoke SS-AOC-S until after user C has answered. If the user for which SS-AOC-S is invoked is to be charged for the call resulting from transfer, AOC-S information in that case may contain charges incurred prior to transfer (as specific rate "flat rate").

6.3.14 Completion of Calls to Busy Subscribers (CCBS)

If SS-AOC-S is invoked for a call and the call encounters a busy called user, then SS-AOC-S shall apply to a call resulting from the use of SS-CCBS.

6.3.15 Completion of Calls on No Reply (CCNR)

If SS-AOC-S is invoked for a call and the call fails to be answered, then SS-AOC-S shall apply to a call resulting from the use of SS-CCNR.

6.3.16 Do Not Disturb (DND)

No interaction.

6.3.17 Do Not Disturb Override (DNDO)

No interaction.

6.3.18 Path replacement (ANF-PR)

The invocation and operation of ANF-PR shall not affect the delivery of AOC-S information to the served user.

6.3.19 Recall (RE)

After recall, SS-AOC-S may be invoked for user A either automatically or on request from the user.

6.4 Interworking considerations

6.4.1 Interworking with public ISDN

For calls to a public ISDN, the PISN shall relate the charging rate delivered to the served user of SS-AOC-S with the charges that the public ISDN will account the PISN for.

6.4.2 Interworking with PSTN

For calls to a PSTN, the PISN shall relate the charging rate delivered to the served user of SS-AOC-S with the charges that the PSTN will account the PISN for.

6.5 Overall SDL

Figure 1 contains the dynamic description of SS-AOC-S using the Specification and Description Language (SDL) defined in CCITT Rec. Z.100 (1988). The SDL process represents the behaviour of the network in providing SS-AOC-S to a served user.

Input signals from the left and output signals to the left represent primitives from and to the calling user.

Input signals from the right represent inputs from the basic call process or from an internal process.

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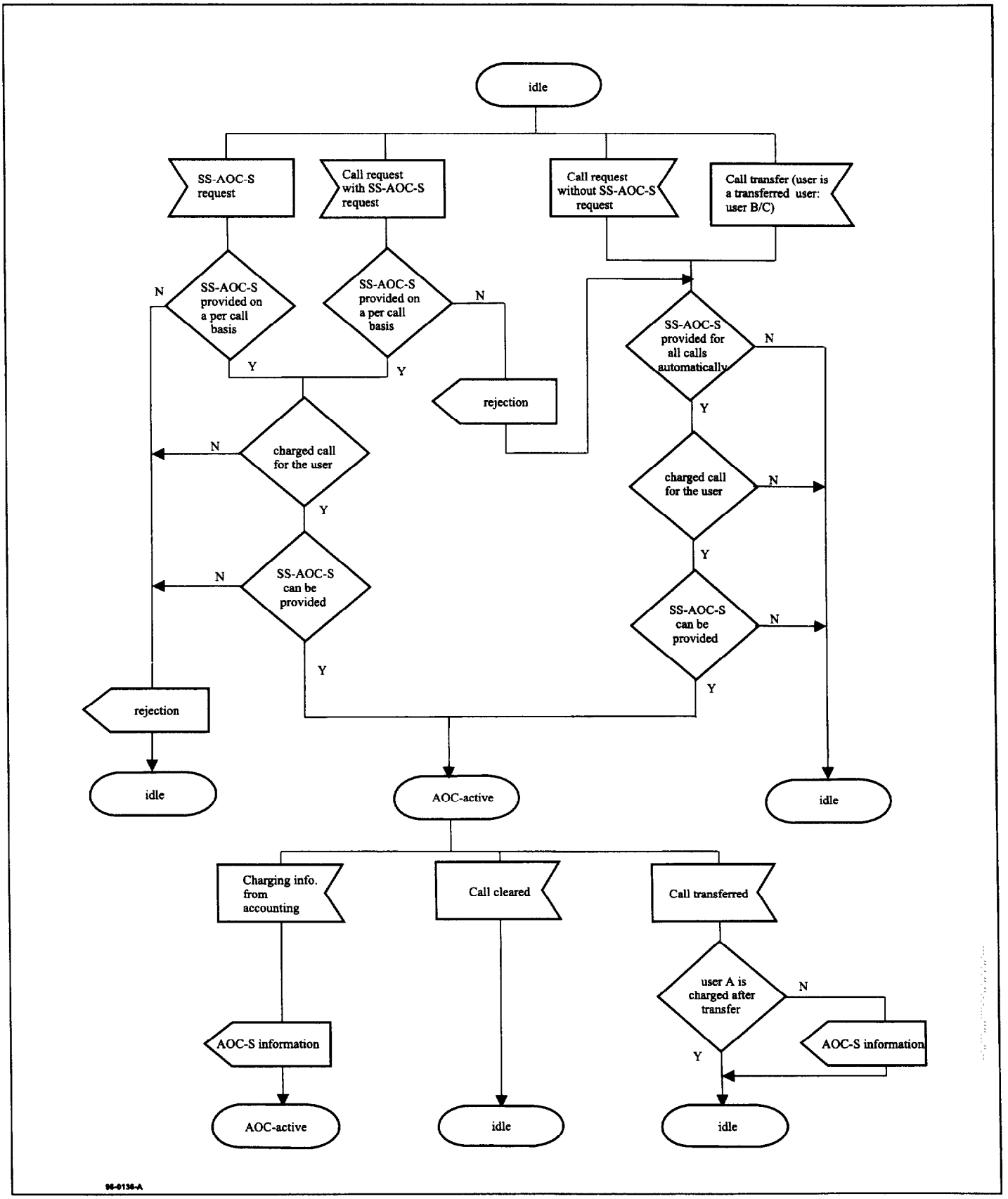

Figure 1 - SS-AOC-S, overall SDL

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7 SS-AOC-D stage 1 specification

7.1 Description

7.1.1 General description

SS-AOC-D provides the served user with cumulative charging information on its account and for its current call during the active phase of the call. The information can be sent for all charged calls, or on a per call basis. The charge information given relates to the call charges incurred on the PISN by the (public) network with which the PISN interworks.

The structure, contents and application of charging information are given in annex B.

7.1.2 Qualifications on applicability to telecommunication services

SS-AOC-D is applicable to all circuit mode basic services defined in ISO/IEC 11574.

7.2 Procedures

7.2.1 Provision/withdrawal

SS-AOC-D shall either be provided after pre-arrangement with the service provider, or be generally available.

SS-AOC-D can be provided either for all charged calls automatically or on a per call basis.

Charging information shall be given in local currency units.

The PISN may also provide the option of delivering the charging information in charging units of the type(s) used in the country of the served user, instead of in local currency units.

Withdrawal shall be at the request of the user or for service provider reasons.

7.2.2 Normal procedures

7.2.2.1 Activation/deactivation/registration/interrogation

SS-AOC-D shall be activated on provision, and deactivated on withdrawal.

SS-AOC-D requires no registration, and interrogation is not applicable.

7.2.2.2 Invocation and operation

If SS-AOC-D is provided on a per call basis, the user shall be able to invoke this service when originating a call or at any time during a call.

If SS-AOC-D is provided for all charged calls automatically, it shall be invoked on behalf of the calling user when a charged call is established.

If SS-AOC-D has been successfully invoked, the PISN shall transfer charging information to the served user when an appropriate cost increment occurs.

The rate of sending information can be limited such that information is not sent more frequently than every t seconds, i.e. information is sent every t seconds, or when the increment occurs, whichever is later. The value of t is an implementation option.

If a call for which SS-AOC-D has been successfully invoked is or becomes free of charge to the served user, this shall be indicated to the served user, either by the value "0", or by "free of charge". This indication shall not be repeated periodically.

When a call for which SS-AOC-D has been successfully invoked is terminated, the overall charge for the call, even if it was free of charge, shall be sent to the served user.

The structure, contents and application of charging information are given in annex B.

7.2.3 Exceptional procedures

7.2.3.1 Activation/deactivation/registration/interrogation

Not applicable.

7.2.3.2 Invocation and operation

If a user who is not provided with SS-AOC-D on a per-call basis attempts to invoke SS-AOC-D, then the attempt shall be rejected by the PISN and the user shall be informed of the reason.

Note - An invocation for all calls automatically may proceed successfully.

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If a user attempts to invoke SS-AOC-D for a call which is not a charged call, then the attempt shall be rejected by the PISN and the user shall be informed of the reason.

If the charging information related to a call for which SS-AOC-D has been successfully invoked is not available, this shall be indicated to the served user using the type of charging information "not available" and shall not be repeated periodically.

If at the end of the call, the PISN recognises that the information for a particular recorded charge is incomplete, then the recorded charge "not available" shall be included in the type of charging information relating to "total charges".

Note - If for any reason, no charging information is provided at all on a call for which SS-AOC-D has been successfully invoked, then the user should assume that the information is not available. The user should not assume that the call is free of charge.

7.3 Interactions with other supplementary services and ANFs

Interactions with other supplementary services and ANFs for which PISN Standards were available at the time of publication of this International Standard are specified below.

7.3.1 Advice of charge: charging information at call set-up time (AOC-S)

No interaction.

7.3.2 Advice of charge: charging information at the end of the call (AOC-E)

If both SS-AOC-D and SS-AOC-E have been invoked, when the call is terminated, no information related to SS-AOC-D shall be given.

7.3.3 Calling Line Identification Presentation (CLIP)

No interaction.

7.3.4 Connected Line Identification Presentation (COLP)

No interaction.

7.3.5 Calling/Connected Line Identification restriction (CLIR)

No interaction.

7.3.6 Calling Name Identification presentation (CNIP)

No interaction.

7.3.7 Connected Name Identification Presentation (CONP)

No interaction.

7.3.8 Calling/Connected Name Identification restriction (CNIR)

No interaction.

7.3.9 Call Diversion (CFU/CFB/CFNR/CD)

If a call is subject to diversion, then the diverted call can be a charged call.

The invocation of SS-AOC-D at the time of the original call establishment by or on behalf of the calling user A shall apply to the diverted call.

SS-AOC-D shall not be applicable to the diverting user.

Note - An SS-AOC-D request by or on behalf of the calling user will be rejected if the diverting user is the charged user for the diverted call.

7.3.10 Call Interception (CINT)

If a call is subject to interception, then the intercepted call can be a charged call.

The invocation of SS-AOC-D at the time of the call establishment by or on behalf of the calling user shall apply to the intercepted call.

7.3.11 Call Intrusion (CI)

No interaction.

7.3.12 Call Offer (CO)

No interaction.

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7.3.13 Call Transfer (CT)

If, prior to transfer, user A was receiving AOC-D information for the primary call, then at the time of transfer, the (sub)total charges shall be sent to user A and SS-AOC-D shall be stopped. If at the time of the transfer it is decided that user A will not be charged for the call prior to transfer, then the (sub)total charges sent to user A will have value "0" or "free of charge". The same applies for the secondary call if user A was receiving AOC-D information for that call.

Note - The charges will be total charges if user A is not charged for the call resulting from transfer and sub-total charges otherwise.

User A shall not be allowed to invoke SS-AOC-D on a call resulting from transfer.

After transfer SS-AOC-D may be invoked for user B (or C) either automatically or on request from the user. If user C has not answered at the time of transfer, it shall not be possible to invoke SS-AOC-D until after user C has answered. If the user for which SS-AOC-D is invoked is to be charged for the call resulting from transfer, AOC-D information in that case may contain charges incurred prior to transfer.

7.3.14 Completion of Calls to Busy Subscribers (CCBS)

If SS-AOC-D is invoked for a call and the call encounters a busy called user, then SS-AOC-D shall apply to a call resulting from the use of SS-CCBS.

7.3.15 Completion of Calls on No Reply (CCNR)

If SS-AOC-D is invoked for a call and the call fails to be answered, then SS-AOC-D shall apply to a call resulting from the use of SS-CCNR.

7.3.16 Do Not Disturb (DND)

No interaction.

7.3.17 Do Not Disturb Override (DNDO)

No interaction.

7.3.18 Path replacement (ANF-PR)

The invocation and operation of ANF-PR shall not affect the delivery of AOC-D information to the served user.

7.3.19 Recall (RE)

After recall, SS-AOC-D may be invoked for user A either automatically or on request from the user.

7.4 Interworking considerations

7.4.1 Interworking with public ISDN

For calls to a public ISDN, the PISN shall relate the cumulative charging information delivered to the served user of AOC with the charges that the public ISDN will account the PISN for.

7.4.2 Interworking with PSTN

For calls to a PSTN, the PISN shall relate the cumulative charging information delivered to the served user of AOC with the charges that the PSTN will account the PISN for.

7.5 Overall SDL

Figure 2 contains the dynamic description of SS-AOC-D using the Specification and Description Language (SDL) defined in CCITT Rec. Z.100 (1988). The SDL process represents the behaviour of the network in providing SS-AOC-D to a served user.

Input signals from the left and output signals to the left represent primitives from and to the calling user.

Input signals from the right represent inputs from the basic call process or from an internal process.

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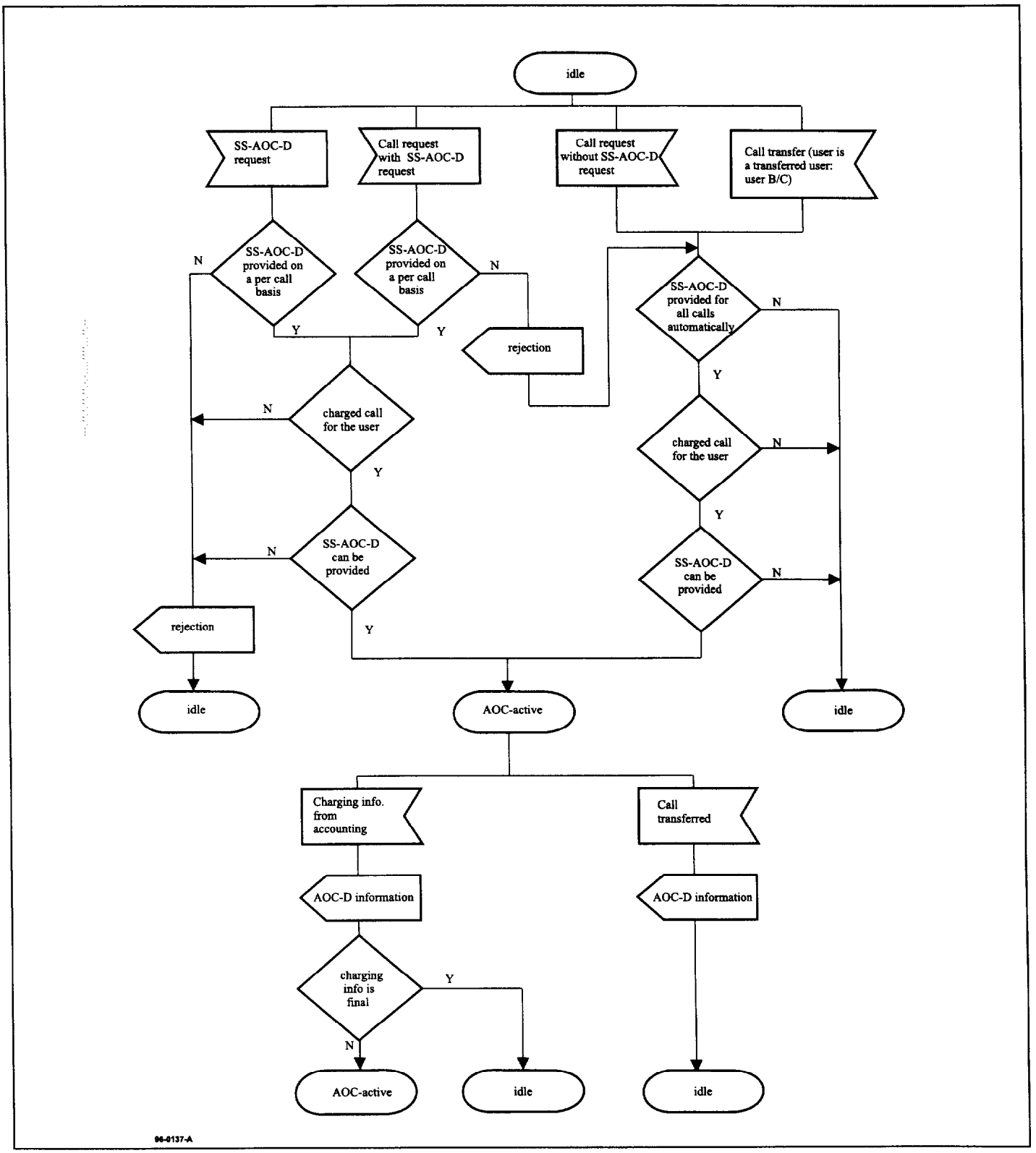

Figure 2 - SS-AOC-D, overall SDL

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8 SS-AOC-E stage 1 specification

8.1 Description

8.1.1 General description

SS-AOC-E provides the served user with the final charging information on its account for a call when that call is terminated. The information can be sent for all charged calls, or on a per call basis. The charge information given relates to the call charges incurred on the PISN by the (public) network with which the PISN interworks.

The structure, contents and application of charging information are given in annex C.

8.1.2 Qualifications on applicability to telecommunication services

SS-AOC-E is applicable to all circuit mode basic services defined in ISO/IEC 11574.

8.2 Procedures

8.2.1 Provision/withdrawal

SS-AOC-E shall either be provided after pre-arrangement with the service provider, or be generally available.

SS-AOC-E can be offered either for all charged calls automatically or on a per call basis.

Charging information shall be given in local currency units.

The PISN may provide the option of delivering the charging information in charging units of the type(s) used in the country of the served user instead of in local currency units.

Withdrawal shall be at the request of the user or for service provider reasons.

8.2.2 Normal procedures

8.2.2.1 Activation/deactivation/registration/interrogation

SS-AOC-E shall be activated on provision, and deactivated on withdrawal.

SS-AOC-E requires no registration, and interrogation is not applicable.

8.2.2.2 Invocation and operation

If SS-AOC-E is provided on a per call basis, the user shall be able to invoke this service when originating a call or at any time during a call.

If SS-AOC-E is provided for all charged calls automatically, it shall be invoked on behalf of the calling user when a charged call is established.

If SS-AOC-E has been successfully invoked, the charging information shall be provided by the PISN when the call is terminated.

If a call for which SS-AOC-E has been successfully invoked is free of charge, this shall be indicated (either by the value "0" or by "free of charge").

The structure, contents and application of the charging information are given in annex C.

8.2.3 Exceptional procedures

8.2.3.1 Activation/deactivation/registration/interrogation

Not applicable.

8.2.3.2 Invocation and operation

If a user who is not provided with SS-AOC-E on a per-call basis attempts to invoke SS-AOC-E, then the attempt shall be rejected by the PISN and the user shall be informed of the reason.

Note - An invocation for all calls automatically may proceed successfully.

If a user attempts to invoke SS-AOC-E for a call which is not a charged call, then the attempt shall be rejected by the PISN and the user shall be informed of the reason.

If the charging information related to a call for which SS-AOC-E has been successfully invoked is not available, this shall be indicated to the served user using the recorded charges "not available".

If the PISN recognises that the information for a particular recorded charge is incomplete, then the type of charging information "not available" shall be included.

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Note - If for any reason, no charging information is provided at all on a call for which SS-AOC-E has been successfully invoked, then the user should assume that the information is not available. The user should not assume that the call is free of charge.

8.3 Interactions with other supplementary services and ANFs

Interactions with other supplementary services and ANFs for which PISN Standards were available at the time of publication of this International Standard are specified below.

8.3.1 Advice of charge: charging information at call set-up time (AOC-S)

No interaction.

8.3.2 Advice of charge: charging information during the call (AOC-D)

If both SS-AOC-D and SS-AOC-E have been invoked, when the call is terminated, no information related to SS-AOC-D shall be given.

8.3.3 Calling Line Identification Presentation (CLIP)

No interaction.

8.3.4 Connected Line Identification Presentation (COLP)

No interaction.

8.3.5 Calling/Connected Line Identification restriction (CLIR)

No interaction.

8.3.6 Calling Name Identification presentation (CNIP)

No interaction.

8.3.7 Connected Name Identification Presentation (CONP)

No interaction.

8.3.8 Calling/Connected Name Identification restriction (CNIR)

No interaction.

8.3.9 Call Diversion (CFU/CFB/CFNR/CD)

If a call is subject to diversion, then the diverted call can be a charged call.

The invocation of SS-AOC-E at the time of the original call establishment by or on behalf of the calling user shall apply to the diverted call.

As an implementation option, SS-AOC-E may be invoked on behalf of the diverting user if this user is provided with SS-AOC-E for all charged calls automatically. In this case the diverting user is the served user of SS-AOC-E.

In the case of SS-CD, as an implementation option, SS-AOC-E may be invoked by the deflecting user at the time of the SS-CD request, if this user is provided with SS-AOC-E on a per call basis.

Note - An SS-AOC-E request by or on behalf of the diverting user would be rejected if the calling user is the charged user for the diverted call.

With the invocation of SS-CD, the deflecting user may provide an identifier. If the deflecting user is to receive AOC-E information for the diverted call, then together with the AOC-E information, this identifier shall be returned by the PISN to the deflecting user.

8.3.10 Call Interception (CINT)

If a call is subject to interception, then the intercepted call can be a charged call.

The invocation of SS-AOC-E at the time of the call establishment by or on behalf of the calling user shall apply to the intercepted call.

8.3.11 Call Intrusion (CI)

No interaction.

8.3.12 Call Offer (CO)

No interaction.

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8.3.13 Call Transfer (CT)

If, prior to transfer, user A was due to receive AOC-E information for the primary call, and if user A continues to be charged for the call resulting from transfer, then at the time of transfer, as an implementation option, SS-AOC-E for user A may remain in progress. If SS-AOC-E remains in progress when the call resulting from transfer is released, AOC-E information (i.e. the total charges incurred for the call prior to transfer and for the call resulting from transfer) shall be sent to user A and AOC-E shall be stopped. If SS-AOC-E does not remain in progress, then at the time of transfer, user A shall be advised that final charge information is not available. The same applies for the secondary call.

With the invocation of Call Transfer, user A may provide an identifier. If user A is to receive AOC-E information then, together with the AOC-E information, this identifier shall be returned by the PISN to user A. If in this situation user A is to receive AOC-E information for both the primary and secondary calls, then in both cases the same identifier shall be used.

If, prior to transfer, user A was due to receive AOC-E information for the primary call, and if user A does not continue to be charged for the call resulting from transfer, then at the time of transfer, (i.e. when the call to user A is cleared) SS-AOC-E for user A shall be stopped and AOC-E information shall be sent to user A. The same applies for the secondary call.

Note - AOC-E information sent in this situation to user A can be either:
- the total charges incurred for the call prior to transfer (if user A is charged for that part of the call);
- total charges with value "0" or "free of charge" if at the time of the transfer the PISN decides that user B or user C is to be charged for the part of the call prior to transfer also.

User A shall not be allowed to invoke AOC-E only for the call resulting from transfer.

After transfer AOC-E may be invoked for user B (or C) either automatically or on request from the user. If user C has not answered at the time of transfer, it shall not be possible to invoke SS-AOC-E until after user C has answered. If the user for which SS-AOC-E is invoked is to be charged for the call resulting from transfer, AOC-E information at the end of the call to user B (or C) may contain charges incurred prior to transfer.

8.3.14 Completion of Calls to Busy Subscribers (CCBS)

If SS-AOC-E is invoked for a call and the call encounters a busy called user, then SS-AOC-E shall apply to a call resulting from the use of SS-CCBS.

8.3.15 Completion of Calls on No Reply (CCNR)

If SS-AOC-E is invoked for a call and the call fails to be answered, then SS-AOC-E shall apply to a call resulting from the use of SS-CCNR.

8.3.16 Do Not Disturb (DND)

No interaction.

8.3.17 Do Not Disturb Override (DNDO)

No interaction.

8.3.18 Path replacement (ANF-PR)

The invocation and operation of ANF-PR shall not affect the delivery of AOC-E information to the served user.

8.3.19 Recall (RE)

After recall, SS-AOC-E may still be active for user A. If not still active, SS-AOC-E may be invoked for user A either automatically or on request from the user.

8.4 Interworking considerations

8.4.1 Interworking with public ISDN

For calls to a public ISDN, the PISN shall relate the final charges delivered to the served user of AOC with the charges that the public ISDN will account the PISN for.

8.4.2 Interworking with PSTN

For calls to a PSTN, the PISN shall relate the final charges delivered to the served user of AOC with the charges that the PSTN will account the PISN for.

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8.5 Overall SDL

Figure 3 contains the dynamic description of SS-AOC-E using the Specification and Description Language (SDL) defined in CCITT Rec. Z.100 (1988). The SDL process represents the behaviour of the network in providing SS-AOC-E to a served user.

Input signals from the left and output signals to the left represent primitives from and to the calling user.

Input signals from the right represent inputs from the basic call process or from an internal process.

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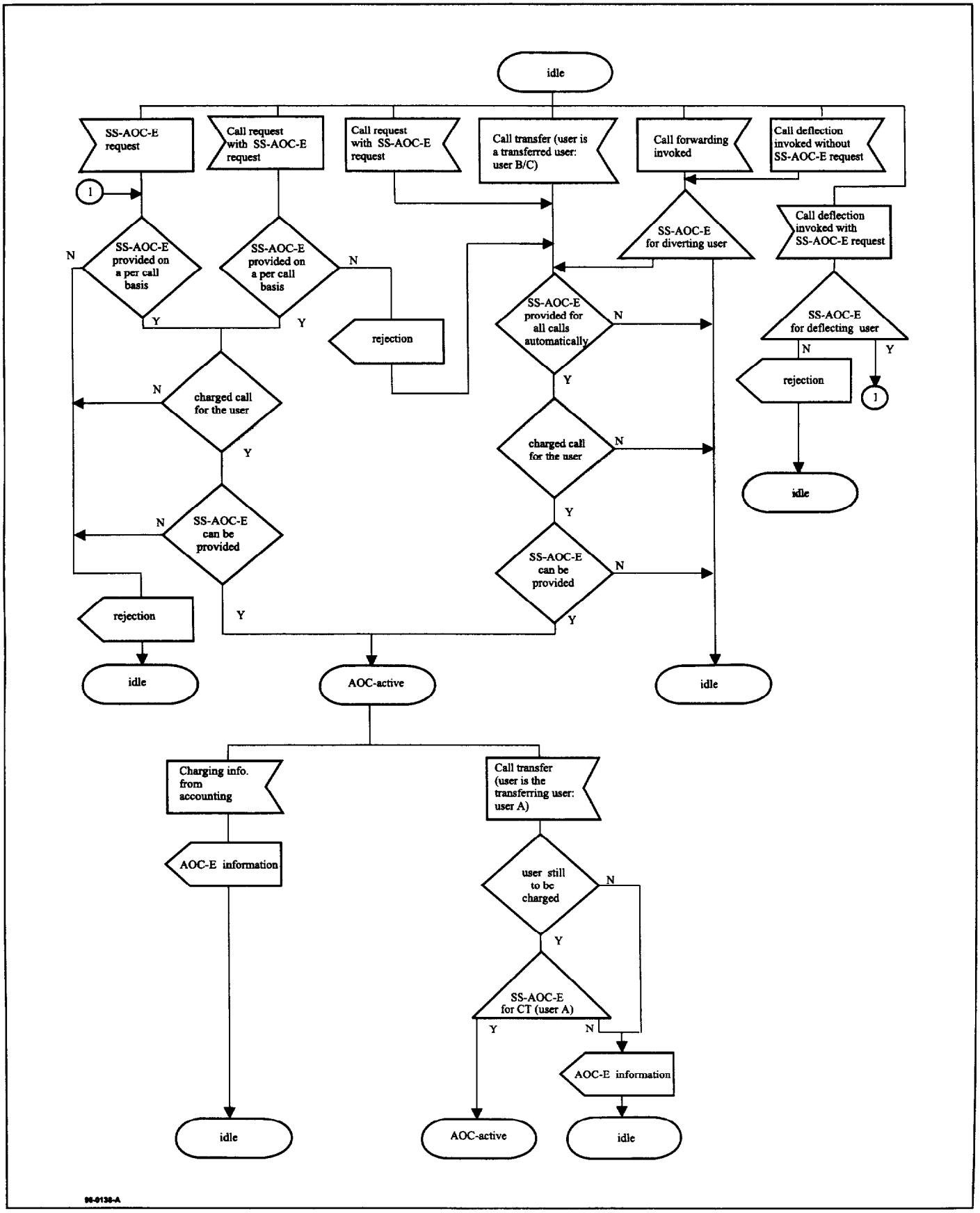

Figure 3 - SS-AOC-E, overall SDL

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9 SS-AOC stage 2 specification

9.1 Functional model

9.1.1 Functional model description

The functional model shall comprise the following functional entities (FEs):

FE1 AOC served user agent

FE2 Charging information collector

FE3 Charge component generator

The following functional relationships shall exist between these FEs:

ra between FE1 and FE2

rb between FE2 and FE3

Figure 4 shows these FEs and relationships.

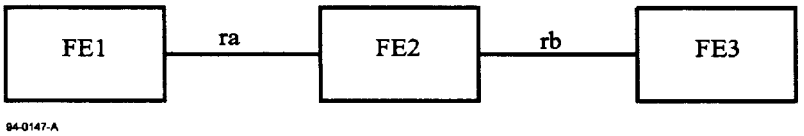

Figure 4 - Functional Model for SS-AOC

9.1.2 Description of functional entities

9.1.2.1 AOC served user agent functional entity, FE1

This functional entity:

- accepts requests for SS-AOC from the served user and passes these to FE2,
- receives AOC information from FE2 and presents it to the user.

9.1.2.2 Charging information collector functional entity, FE2

This functional entity:

- invokes SS-AOC, either on receipt of a valid request from FE1 if invocation on a per call basis applies, or automatically on behalf of the served user when a charged call is to be set up;
- requests from FE3 the appropriate type(s) of charging information and receives the response;
- receives from FE3 any charging information generated;
- performs any necessary conversions and calculations on the received information and indicates the charging information to FE1, as required by the user;
- induces the delay of basic call release, if necessary, in order to receive final charging information;
- rejects unauthorized SS-AOC requests from FE1.

9.1.2.3 Charge component generator functional entity, FE3

This functional entity:

- receives from FE2 requests for charging information and sends a positive or a negative response to FE2, as appropriate;
- obtains from the collocated accounting entity charge components and sends the information to FE2 in the form used within the PISN;
- induces the release of the basic call after having received from FE2 a request for final charges and having obtained the final charge component;
- if required, sends a final charge component to the transferring user either at call transfer time or when a transferred call is released; or to the diverting user when a diverted call is released.

Note - The diverting user or the transferring user does not participate in the call and therefore receives the final charges in a call independent manner.

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9.1.3 Relationship of functional model to basic call functional model

An example of relationship between the FEs for SS-AOC and FEs for the basic call is shown in figure 5.

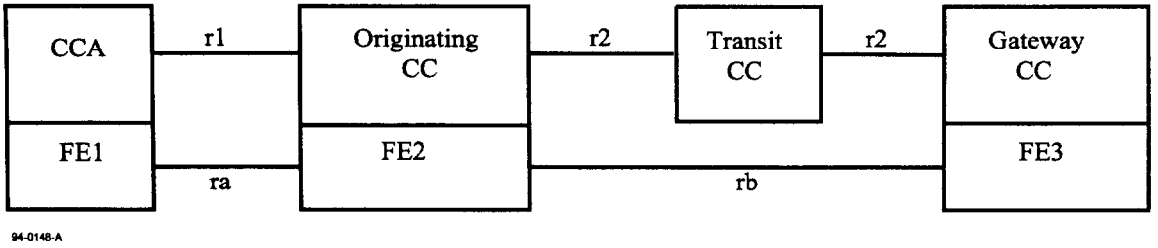

Figure 5 - Example relationship between model for SS-AOC and Basic Call

9.2 Information flows

9.2.1 Definition of information flows

In the tables listing the elements in informations flows, the column headed "Request" indicates which of these elements are mandatory (M) and which are optional (O) in a request/indication information flow and the column headed "Confirm" (confirmed information flows only) indicates which of these elements are mandatory (M) and which are optional (O) in a response/confirmation information flow.

9.2.1.1 ra-REQUEST

ra-REQUEST is an unconfirmed information flow across ra from FE1 to FE2 which is used to request the provision of charging information.

Note - ra-REQUEST applies only in the case where AOC is requested on a per call basis.

Table 1 lists the elements within the ra-REQUEST information flow.

Table 1 - Content of ra-REQUEST

Element	Allowed value	Request	Note
REQUEST for AOC	AOC-S, and/or AOC-D, and/or AOC-E	M	

9.2.1.2 ra-INFORM1

ra-INFORM1 is an unconfirmed information flow across ra from FE2 to FE1 which is used to convey charge rate information (AOC-S) at the start of the call when it has been requested at the call establishment time, or following a request placed later, and whenever the rate changes.

Table 2 lists the elements within the ra-INFORM1 information flow.

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Table 2 - Content of ra-INFORM1

Element	Allowed value	Request	Note
Type of charging information	Charging rate, or Information not available.	M	
If Type of charging information = Charging rate			
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	1
Charging rate	Duration rate, or Specific rate, or Volume rate.	M	
If Charging rate = Duration rate:			
Type of charging	Step function charging, or Continuous charging.	M	
Currency identifier	Character string	M	
Currency amount	Integer	M	
Multiplier	0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	M	
Length of time unit	Integer	M	
Scale (time)	0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour or 24 hours.	M	
Granularity	Integer	O	2
Scale (granularity)	0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour, or 24 hours.	O	2
If Charging rate = Specific rate:			
Rate type	Free of charge, or Free of charge from the beginning, or Flat rate (currency units) or, Special charging code, or Not available.	M	3

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Table 2 *(continued)*

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

Note 1 - Each of these items will be accompanied by appropriate values for the remaining elements in this table.

Note 2 - These elements shall be included if the granularity is known.

Note 3 - Free of charge shall be used if the associated charged item is or becomes free of charge from the reception of this charging rate information. Free of charge from the beginning shall be reserved for an associated charged item with the value "Basic communication" and shall be used if the call is or becomes free of charge from the beginning of the call.

9.2.1.3 ra-INFORM2

ra-INFORM2 is an unconfirmed information flow across ra from FE2 to FE1 which is used to provide subtotal charging information at intervals during a call (AOC-D), and final charging information (AOC-D or AOC-E).

Table 3 lists the elements within the ra-INFORM2 information flow.

Table 3 - Content of ra-INFORM2

Element	Allowed value	Request	Note
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	1
If Type of charging information = Subtotal charges or Total Charges Recorded charges	Charging units, or Currency units, or Free of charge.	M	2

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Table 3 *(continued)*

If Recorded charges = charging units Number of charging units Type of charging units	 Integer value Integer 1-16	 M O	
If Recorded charges = currency units Currency identifier Currency amount Multiplier (currency)	 Character string 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 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)	O	3
Charged number	PISN number	O	4
Charge identifier	Integer value, or PISN number	O	5

Note 1 - Some PISNs 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 - This element may be omitted in the case of normal charging.

Note 4 - Charged number may be included when the AOC is provided after the call and is needed to identify the served user where an MSN arrangement exists.

Note 5 - Included when AOC is provided after the call and a charge identifier has been made available via ra-CHARGE-ID.

9.2.1.4 ra-AOC-REJECT

ra-AOC-REJECT is an unconfirmed information flow across ra from FE2 to FE1 which is used to indicate a rejection of the AOC request.

Table 4 lists the elements within the ra-AOC-REJECT information flow.

Table 4 - Content of ra-AOC-REJECT

Element	Allowed value	Request	Note
REJECT reason	Not subscribed	M	

9.2.1.5 ra-CHARGE-ID

ra-CHARGE-ID is an unconfirmed information flow across ra from FE1 to FE2. It is used to convey a user provided identifier, which is to be associated with final charge information towards that user when that user is no longer involved in the call.

Table 5 lists the elements within the ra-CHARGE-ID information flow.

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Table 5 - Content of ra-CHARGE-ID

Element	Allowed value	Request	Note
Charge identifier	Integer value, or PISN number	M	1

Note 1- Charge identifier has a meaning only to the user. If the PISN number format is chosen, the number is not evaluated but treated as an arbitrary value.

9.2.1.6 rb-CHARGE-REQUEST

rb-CHARGE-REQUEST is a confirmed information flow across rb from FE2 to FE3 which is used to request the provision of charging information.

The response indicates the acceptance or the rejection of the request.

Table 6 lists the elements within the rb-CHARGE-REQUEST information flow.

Table 6 - Content of rb-CHARGE-REQUEST

Element	Request	Confirm	Note
Charging information request mode	M	-	1
List of charging info. type(s) requested	O	-	2
Result	-	M	3
Charging information type provided	-	O	4

Note 1 - This takes the values:
- No preference
- Exclusive type
- Preferred types

Note 2 - This contains a list of the following charging information types: rate, interim, final, rate_and_interim, rate_and_final, where:
- rate = request for charging rates at the time of the request and whenever there is a change of charging rates during the call.
- interim = request for receiving information on the recorded charges during the active phase of the call, when appropriate cost increments occur (subject to a limitation of no more than one message every "t" seconds) and when the call is terminated.
- final = request for receiving information on the recorded charges when the call is terminated.
- rate_and_interim = request of both "rate" and "interim"
- rate_and_final = request of both "rate" and "final"
- interim_and_final = request of both "interim" and "final"
- rate_and_interim_and_final = request of "rate", "interim" and "final"

For charging information request mode "No preference", this element is not present.
For "Exclusive type", this contains the charging information type requested.
For "Preferred types", this contains an ordered list of charging information types (in which the first one is the preferred).

Note 3 - This takes the values "accepted", "free of charge" or "not available".

Note 4 - This is present in the confirmation if and only if the result is "accepted". This contains the charging information type provided, as defined in note 2.

9.2.1.7 rb-CHARGE-RATE

rb-CHARGE-RATE is an unconfirmed information flow across rb from FE3 to FE2 which is used to convey charge rate information at the start of the call when it has been requested while the call is originating, or following a request placed later, during the call. It shall then be sent whenever the rate changes.

Table 7 lists the elements within the rb-CHARGE-RATE information flow.

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Table 7 - Content of rb-CHARGE-RATE

Element	Allowed value	Request	Note
Type of charging information	Charging rate, or Information not available.	M	
If Type of charging information = Charging rate			
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	1
Charging rate	Duration rate, or Specific rate, or Volume rate.	M	
If Charging rate = Duration rate:			
Type of charging	Step function charging, or Continuous charging.	M	
Currency identifier	Character string	M	
Currency amount	Integer	M	
Multiplier	0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	M	
Length of time unit	Integer	M	
Scale (time)	0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour or 24 hours.	M	
Granularity	Integer	O	2
Scale (granularity)	0,01 s, or 0,1 s, or 1,0 s, or 10 s, or 1 min, or 1 hour, or 24 hours.	O	2

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Table 7 *(continued)*

If Charging rate = Specific rate: Rate type	Free of charge, or Free of charge from the beginning, or Flat rate (currency units) or, Special charging code, or Not available.	M	3
If Rate type = Flat rate (currency units): Currency identifier Currency amount Multiplier (currency)	 Character string Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M M	
If Rate type = Special charging code: N	Integer (1-10)	M	
If Charging rate = Volume rate: Currency identifier Currency amount Multiplier (currency)	 Character string Integer 0,001, or 0,01, or 0,1, or 1,0, or 10, or 100, or 1000.	 M M M	
Type of volume unit	Octet, or Segment, or Message.	M	

Note 1 - Each of these items will be accompanied by appropriate values for the remaining elements in this table.

Note 2 - These elements shall be included if the granularity is known.

Note 3 - Free of charge shall be used if the associated charged item is or becomes free of charge from the reception of this charging rate information. Free of charge from the beginning shall be reserved for an associated charged item with the value "Basic communication" and shall be used if the call is or becomes free of charge from the beginning of the call.

9.2.1.8 rb-INTERIM-CHARGE

rb-INTERIM-CHARGE is an unconfirmed information flow across rb from FE3 to FE2 which is used to provide the subtotal charging information at intervals during a call.

Table 8 lists the elements within the rb-INTERIM-CHARGE information flow.

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Table 8 - Content of rb-INTERIM-CHARGE

Element	Allowed value	Request	Note
Type of charging information	Subtotal charges, or Information not available.	M	
If Type of charging information = Subtotal charges Recorded charges	Currency units, or Free of charge.	M	
If Recorded charges = currency units Currency identifier Currency amount Multiplier (currency)	Character string 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 Credit card charging.	O	1

Note 1 - This element may be omitted in the case of normal charging.

9.2.1.9 rb-FINAL-CHARGE

rb-FINAL-CHARGE is an unconfirmed information flow across rb from FE3 to FE2 which is used to provide the final charging information (at the end of a call).

Table 9 lists the elements within the rb-FINAL-CHARGE information flow.

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Table 9 - Content of rb-FINAL-CHARGE

Element	Allowed value	Request	Note
Type of charging information	Total charges, or Information not available.	M	1
If Type of charging information = Total charges Recorded charges	 Currency units, or Free of charge.	 M	
If Recorded charges = currency units Currency identifier Currency amount Multiplier (currency)	 Character string 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 Credit card charging, or Call forwarding unconditional, or Call forwarding busy, or Call forwarding no reply, or Call deflection, or Call transfer.	O	2
Charged number	PISN number	O	3
Charge identifier	Integer value, or PISN number	O	4

Note 1 - Some PISNs may include charges incurred by the use of some supplementary services in "Total charges".

Note 2 - This element may be omitted in the case of normal charging.

Note 3 - Charged number shall be included when the AOC is provided after the call.

Note 4 - Included when AOC is provided after the call and a charge identifier has been made available via rb-CHARGE-COMPLETE-AT-TRANSFER req/ind or rb-DIVERSION-CHARGE-REQUEST req/ind.

9.2.1.10 rb-GET-FINAL-CHARGE

rb-GET-FINAL-CHARGE is an unconfirmed information flow across rb from FE2 to FE3 which is used to obtain the final charging information when the served user releases first.

There are no elements within the rb-GET-FINAL-CHARGE information flow.

9.2.1.11 rb-CHARGE-COMPLETE-AT-TRANSFER

rb-CHARGE-COMPLETE-AT-TRANSFER is a confirmed information flow across rb from FE2 to FE3.

The request indicates to FE3 that the served user has invoked call transfer and is thus about to withdraw from the call.

The response gives information on the charging policy in the case of transfer, so that FE2 can decide to either stop or continue AOC upon transfer.

Table 10 lists the elements within the rb-CHARGE-COMPLETE-AT-TRANSFER.

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Table 10 - Content of rb-CHARGE-COMPLETE-AT-TRANSFER

Element	Allowed value	Request	Confirm	Note
Charged number	PISN number	M		1
Charge identifier	Integer value, or PISN number	O		2
Result	User charged only for call prior to transfer, or User charged neither before nor after transfer, or User charged both before and after transfer.		M	

Note 1 - This element is the PISN number of user A.

Note 2 - Included when a charge identifier has been made available via ra-CHARGE-ID.

9.2.1.12 rb-DIVERSION-CHARGE-REQUEST

rb-DIVERSION-CHARGE-REQUEST is an unconfirmed information flow across rb from FE2 to FE3. It is used to request the final charging information for a diverting user.

Table 11 lists the elements within the rb-DIVERSION-CHARGE-REQUEST.

Table 11 - Content of rb-DIVERSION-CHARGE-REQUEST

Element	Allowed value	Request	Note
Charged number	PISN number	M	1
Charge identifier	Integer value, or PISN number	O	2
Type of diversion	Call forwarding unconditional, or Call forwarding busy, or Call forwarding no reply, or Call deflection.	M	

Note 1 - This element is the PISN number of the diverting user.

Note 2 - Included when a charge identifier has been made available via ra-CHARGE-ID (call deflection).

9.2.2 Relationship of information flows to basic call information flows

ra-REQUEST request/indication shall be sent:

- with r1-SETUP request/indication,
- or related to a basic call but independently of any basic call information flow.

ra-INFORM1 request/indication shall be sent:

- with r1-SETUP response/confirmation,
- or with r1-REPORT request/indication,
- or with r1-DISCONNECT request/indication,
- or related to a basic call but independently of any basic call information flow.

ra-INFORM2 request/indication shall be sent:

- with r1-DISCONNECT request/indication,
- or with r1-RELEASE request/indication,
- or related to a basic call but independently of any basic call information flow,
- or independently of a basic call.

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ra-AOC-REJECT request/indication shall be sent:

- with r1-SETUP response/confirmation,
- or with r1-CHANNEL-ACKNOWLEDGE request/indication,
- or with r1-REPORT request/indication,
- or with r1-DISCONNECT request/indication,
- or related to a basic call but independently of any basic call information flow,

ra-CHARGE-ID request/indication shall be sent related to a basic call but independently of any basic call information flow.

rb-CHARGE-REQUEST request/indication shall be sent:

- with r2-SETUP request/indication,
- or related to a basic call but independently of any basic call information flow.

rb-CHARGE-REQUEST response/confirmation shall be sent:

- with r2-SETUP response/confirmation,
- with r2-REPORT request/indication,
- or related to a basic call but independently of any basic call information flow.

rb-CHARGE-RATE request/indication shall be sent:

- with r2-SETUP response/confirmation,
- or with r2-REPORT request/indication,
- or related to a basic call but independently of any basic call information flow.

rb-INTERIM-CHARGE request/indication shall be sent:

- with r2-SETUP response/confirmation,
- or related to a basic call but independently of any basic call information flow.

rb-FINAL-CHARGE request/indication shall be sent:

- with r2-RELEASE request/indication,
- or independently of a basic call.

rb-GET-FINAL-CHARGE request/indication shall be sent related to a basic call but independently of any basic call information flow.

rb-CHARGE-COMPLETE-AT-TRANSFER request/indication shall be sent related to a basic call but independently of any basic call information flow.

rb-CHARGE-COMPLETE-AT-TRANSFER response/confirmation shall be sent related to a basic call but independently of a basic call information flow.

rb-DIVERSION-CHARGE-REQUEST request/indication shall be sent:

- with r2-SETUP request/indication
- or related to a basic call but independently of any basic call information flow.

9.2.3 Examples of information flow sequences

A stage 3 standard for SS-AOC shall provide signalling procedures in support of the information flow sequences specified below. In addition, signalling procedures should be provided to cover other sequences arising from error situations, interactions with basic call, interactions with other supplementary services, different topologies, etc..

In the figures, SS-AOC information flows are represented by solid arrows and basic call information flows are represented by broken arrows. An ellipse embracing two information flows indicates that the two information flows occur simultaneously. Within a column representing an SS-AOC functional entity, the numbers refer to functional entity actions listed in 9.3.

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Note - To simplify the diagrams, some basic call information flows (r2-REPORT req/ind, ...) have been omitted in the following figures. Moreover, in all the following diagrams except figures 15 and 16, only straight forward combinations between AOC request from FE1 and charging information request from FE2 are shown, i.e. AOC-S across ra and charging rate across rb, AOC-D across ra and interim charging across rb, AOC-E across ra and final charging across rb.

9.2.3.1 Normal operation of SS-AOC

Figure 6 shows the information flow sequence for normal operation of SS-AOC with charging rate request when originating a call to another network. In this particular information flow, the charging rate is modified later during the active phase of the call.

Figure 7 shows the information flow sequence for normal operation of SS-AOC with charging rate request later during the establishment phase of a call to another network.

Figure 8 shows the information flow sequence for normal operation of SS-AOC with charging rate request later during the active phase of a call to another network.

Figure 9 shows the information flow sequence for normal operation of SS-AOC with interim charge request when originating a call to another network (the other user releases first).

Figure 10 shows the information flow sequence for normal operation of SS-AOC with interim charge request later during the active phase of a call to another network (the other user releases first).

Figure 11 shows the information flow sequence for normal operation of SS-AOC with interim charge request for a call to another network (the served user releases first).

Figure 12 shows the information flow sequence for normal operation of SS-AOC with final charge request when originating a call to another network (the other user releases first).

Figure 13 shows the information flow sequence for normal operation of SS-AOC with final charge request later during the active phase of a call to another network (the other user releases first).

Figure 14 shows the information flow sequence for normal operation of SS-AOC with final charge request for a call to another network (the served user releases first).

Figure 15 shows the information flow sequence for normal operation of SS-AOC with rate_and_final charge request when originating a call to another network (the other user releases first). In this particular information flow, the user requests AOC-D, and rate_and_final is actually the provided charging information.

Figure 16 shows the information flow sequence for normal operation of SS-AOC with a preferred request for rate_and_final with fallback to rate when originating a call to another network (the other user releases first). In this particular information flow, the user requests AOC-S and AOC-E, and rate is actually the provided charging information.

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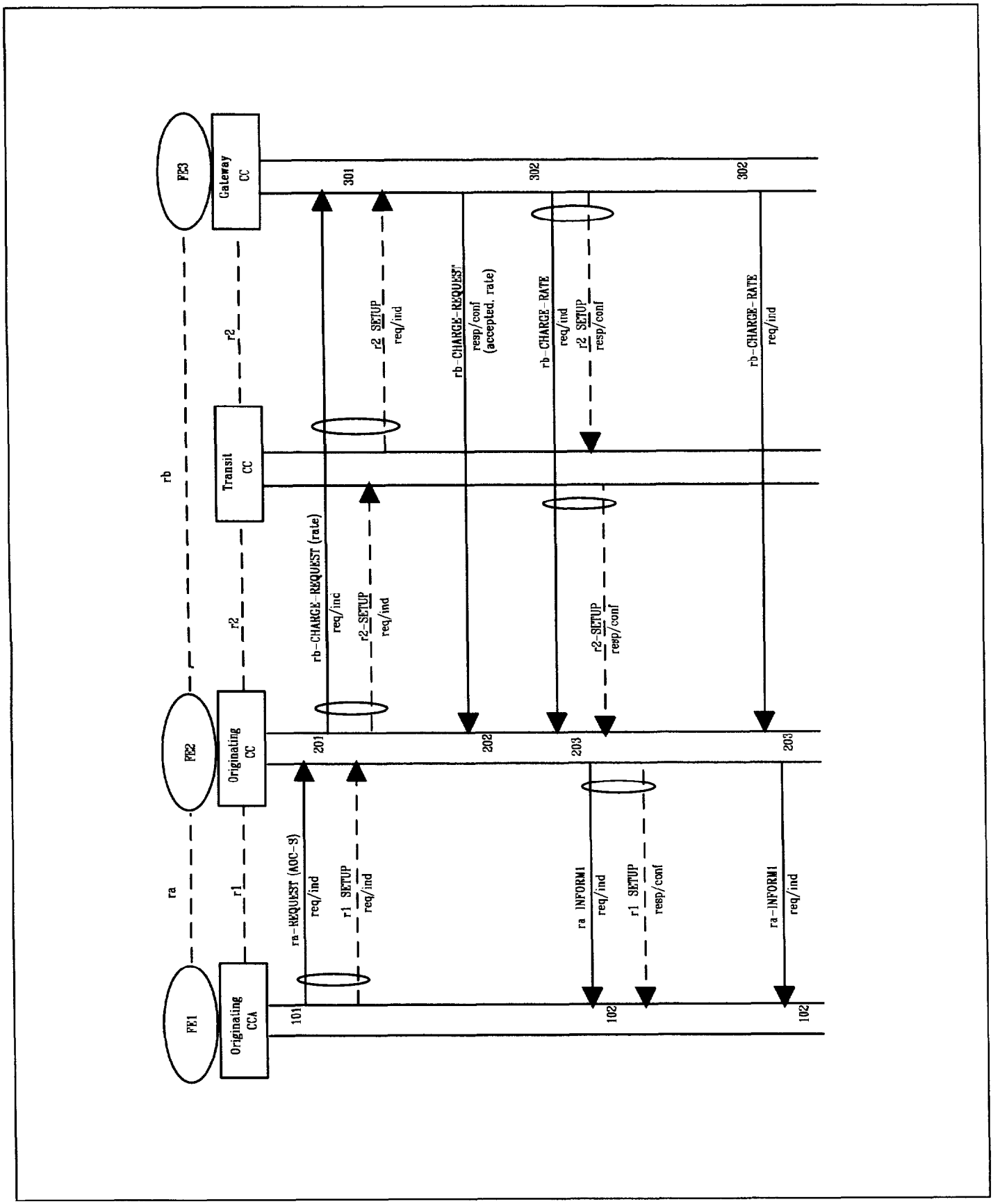

Figure 6 - Information flow sequence - Normal operation of SS-AOC with charging rate request when originating a call to another network

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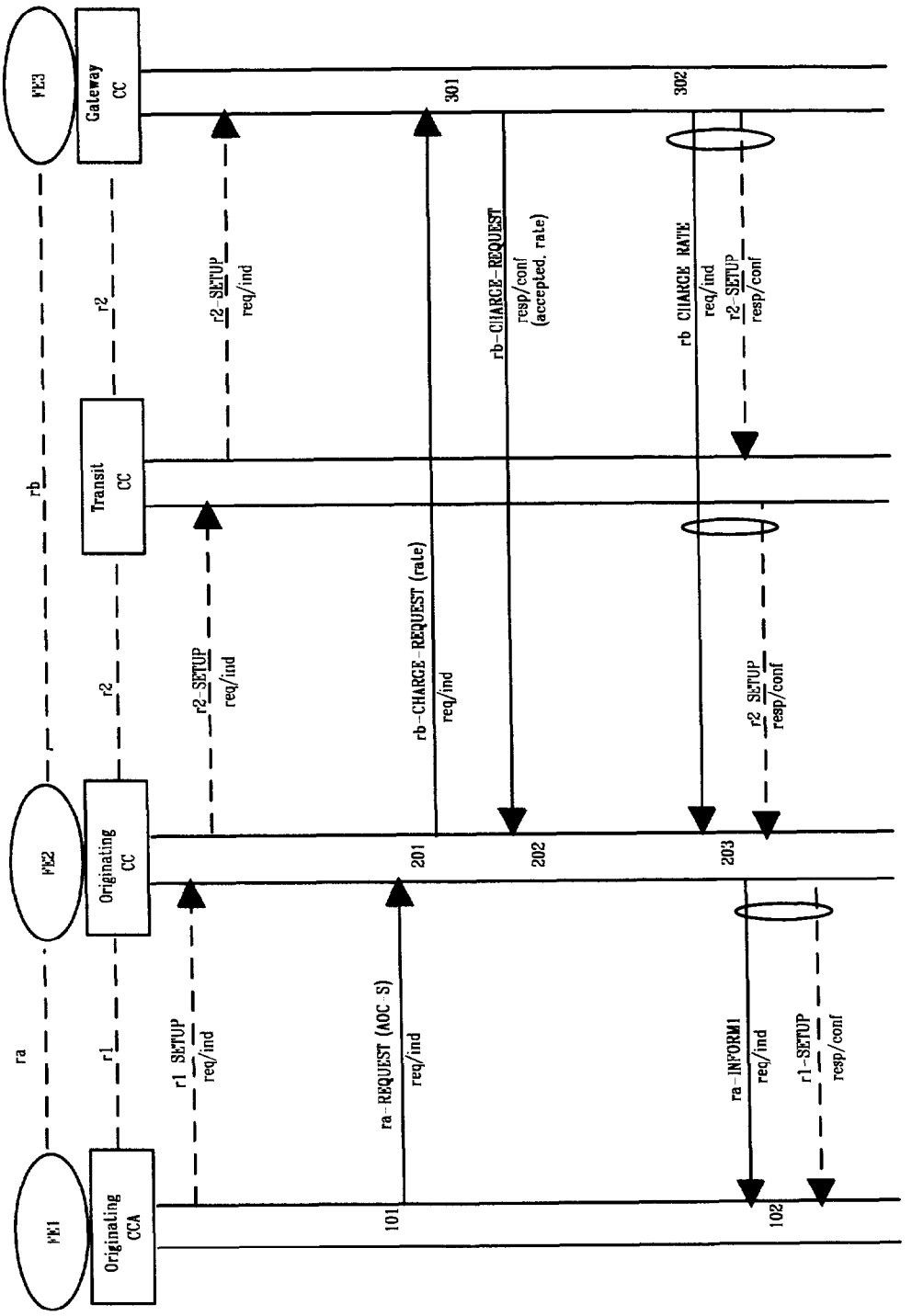

Figure 7 - Information flow sequence - Normal operation of SS-AOC with charging rate request later during the establishment phase of a call to another network

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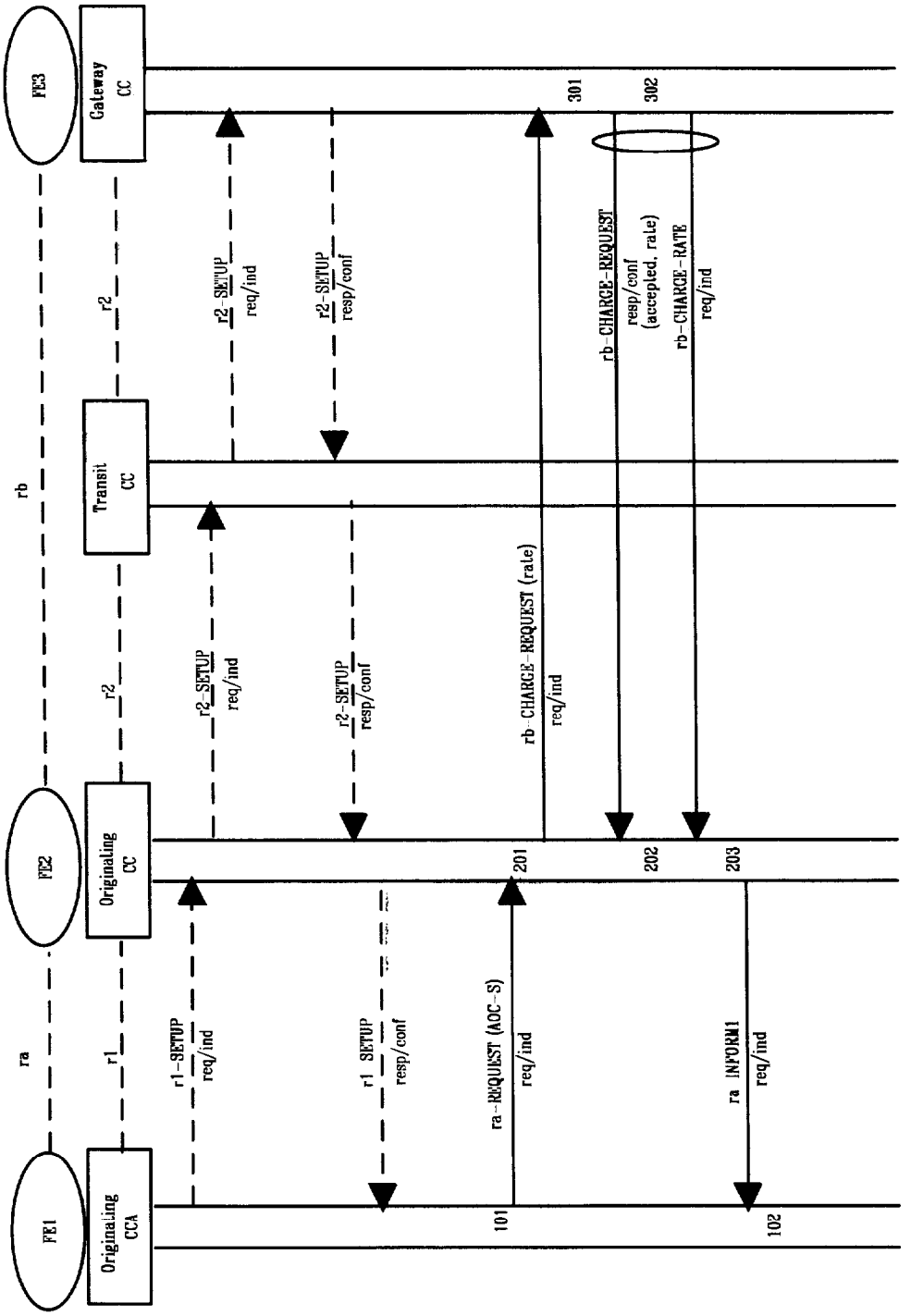

Figure 8 - Information flow sequence - Normal operation of SS-AOC with charging rate request later during the active phase of a call to another network

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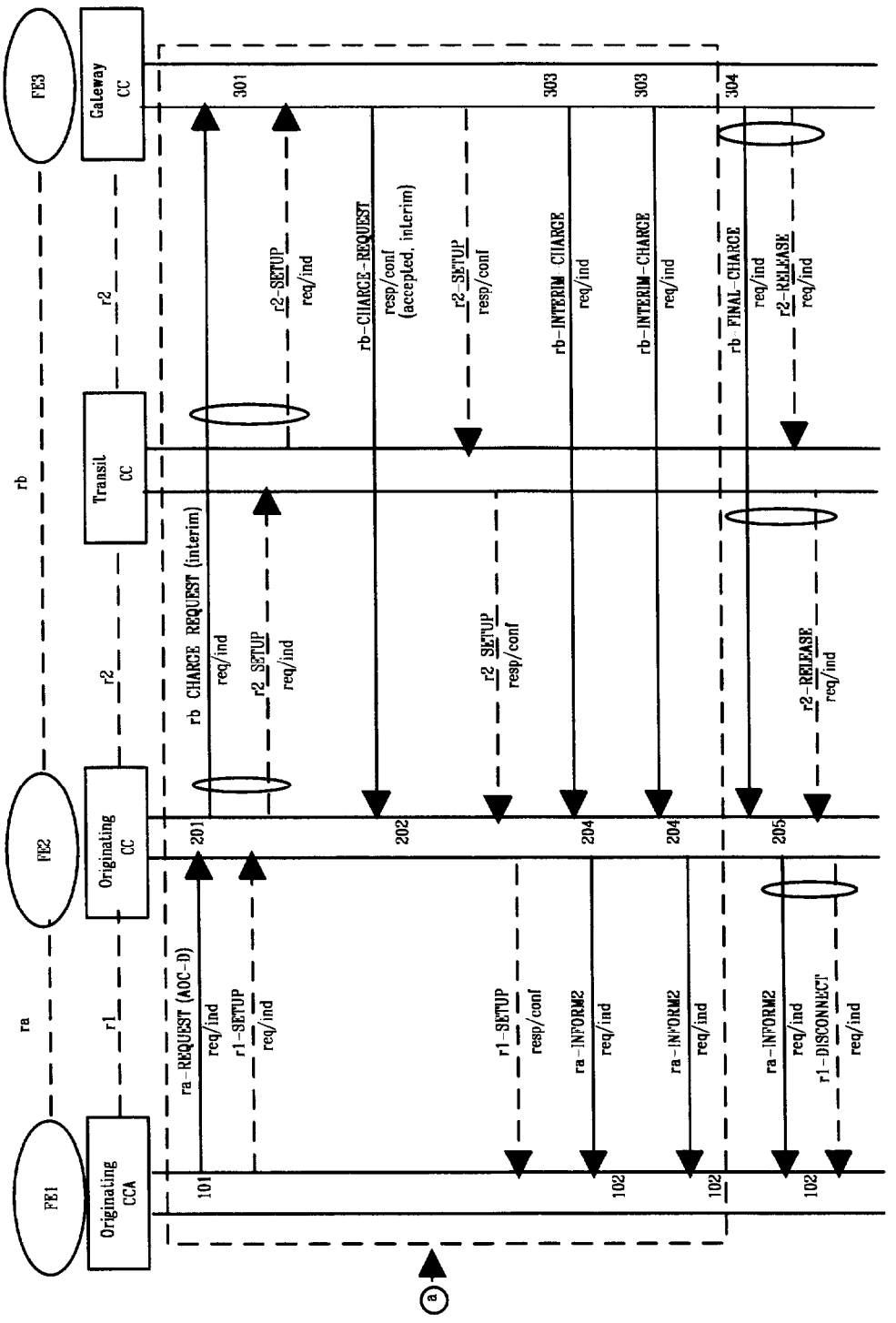

Figure 9 - Information flow sequence - Normal operation of SS-AOC with interim charging request when originating a call to another network (the other user releases first)

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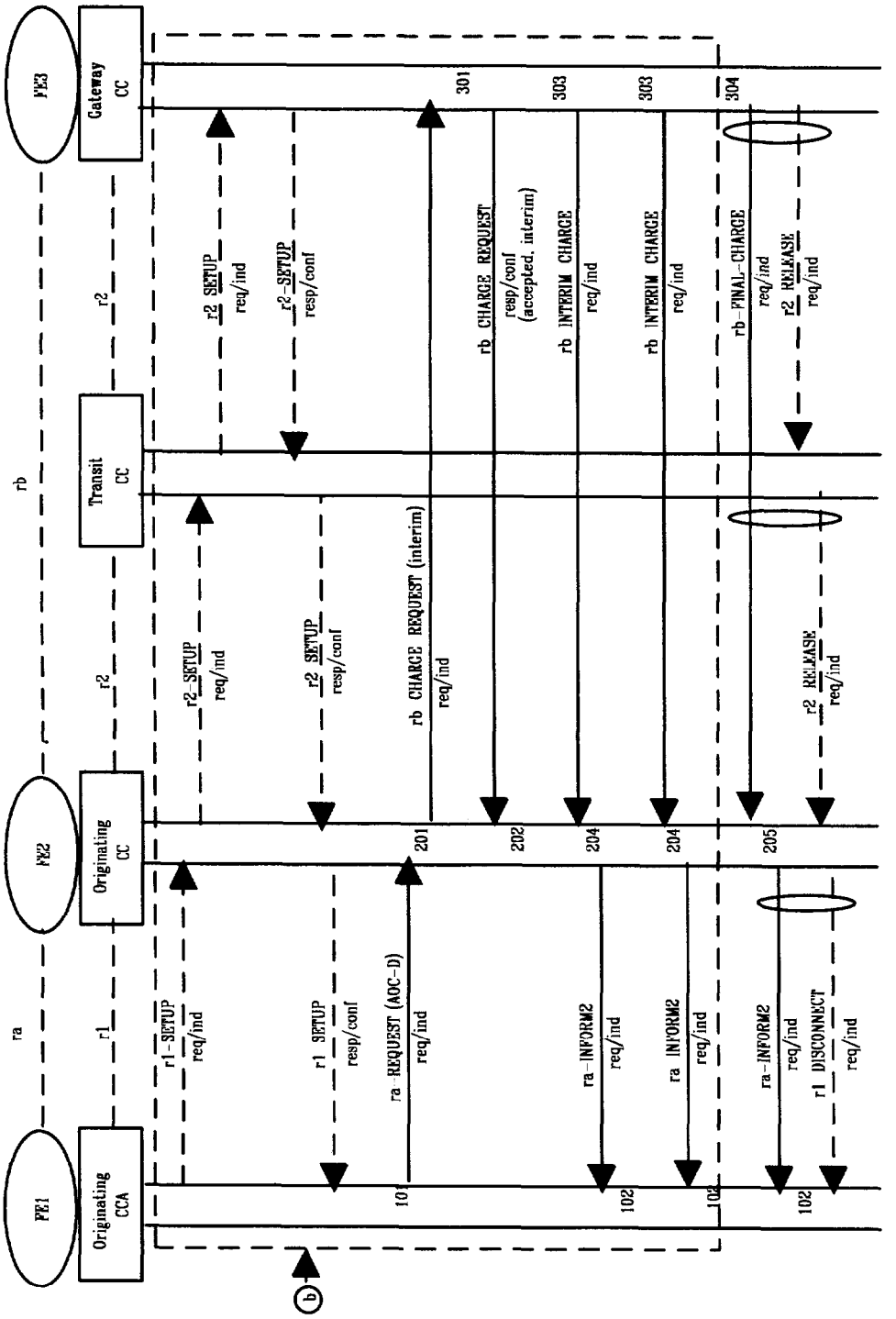

Figure 10 - Information flow sequence - Normal operation of SS-AOC with interim charging request later during the active phase of a call to another network (the other user releases first)

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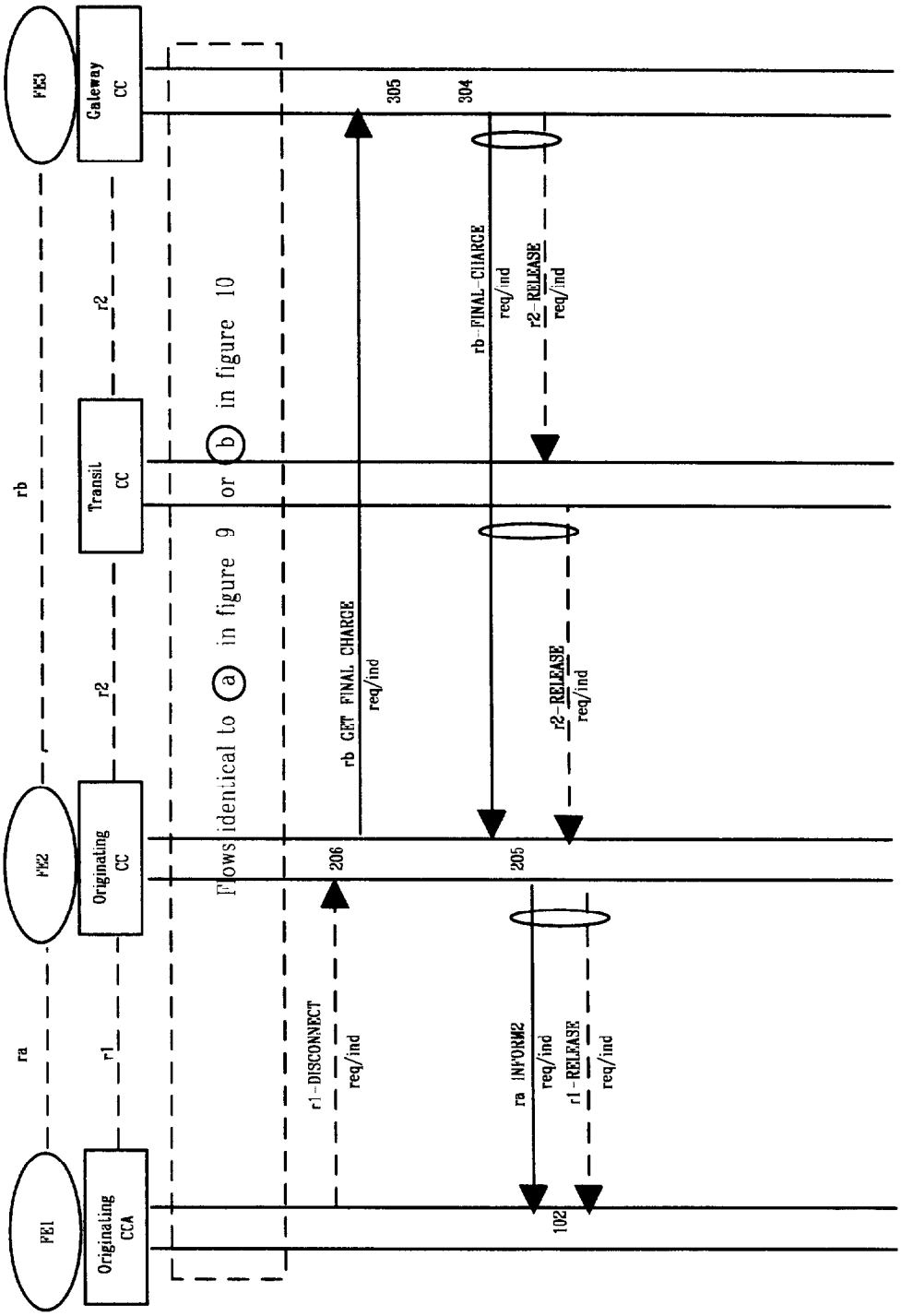

Figure 11 - Information flow sequence - Normal operation of SS-AOC with interim charging request for a call to another network (the served user releases first)

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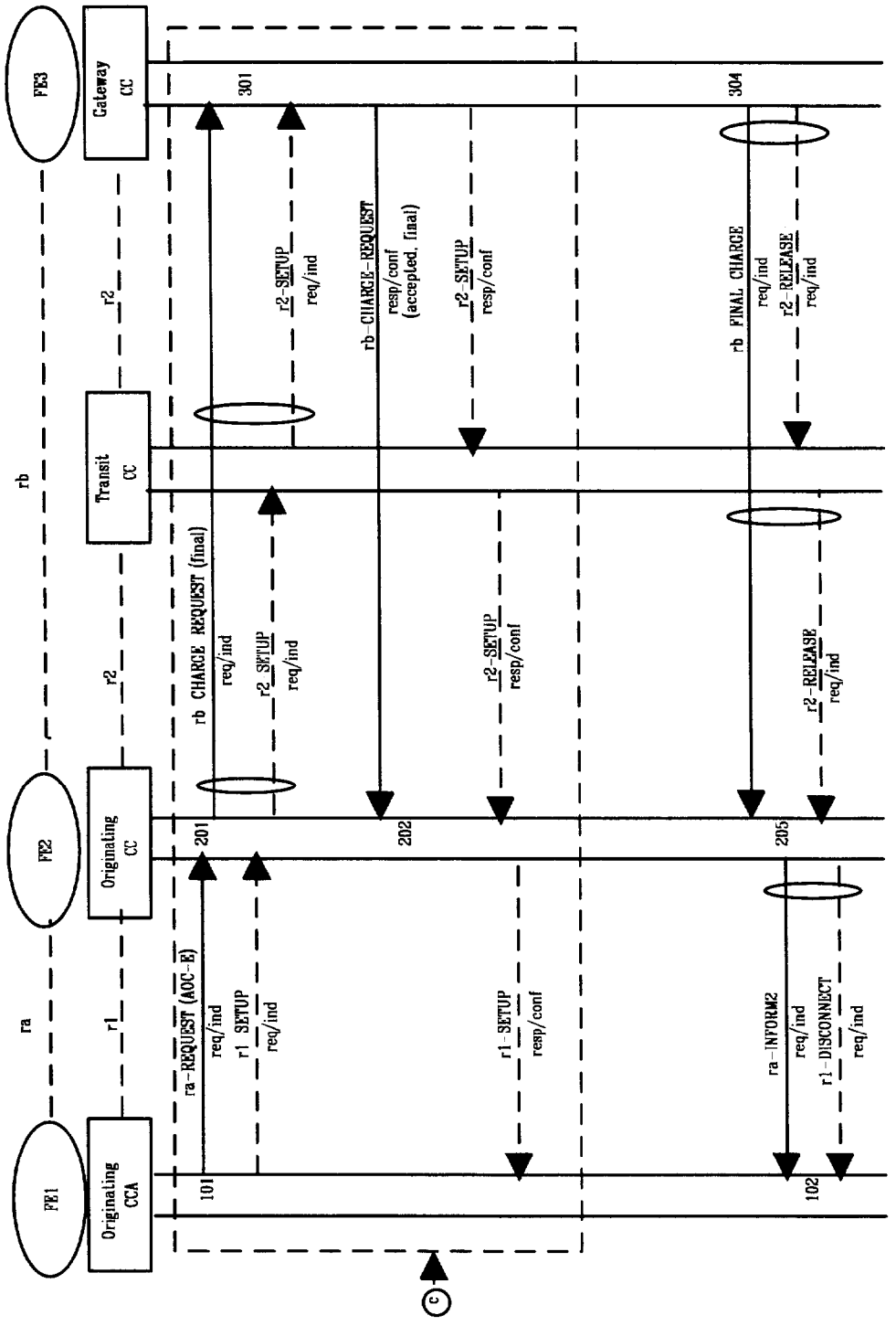

Figure 12 - Information flow sequence - Normal operation of SS-AOC with final charging request when originating a call to another network (the other user releases first)

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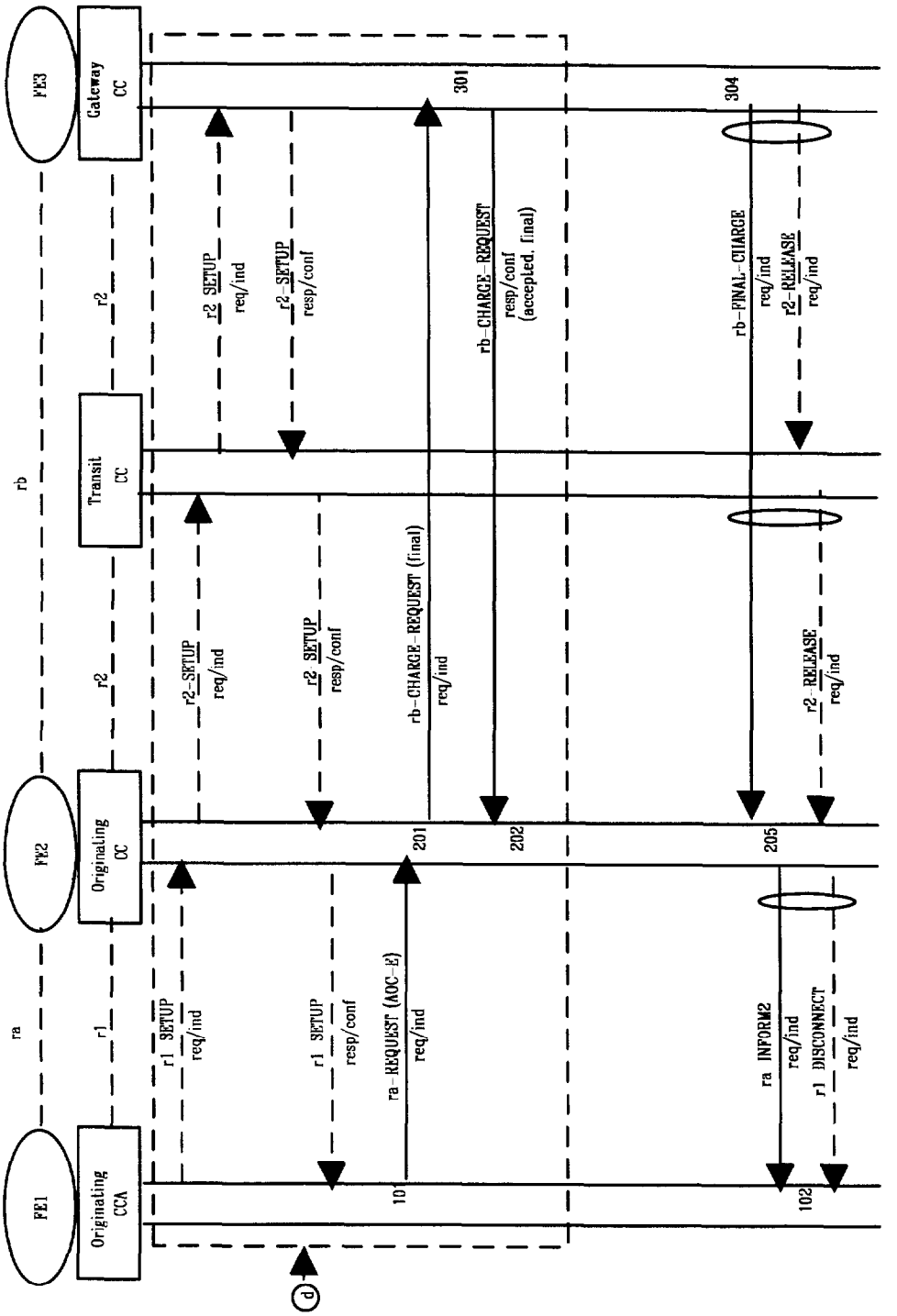

Figure 13 - Information flow sequence - Normal operation of SS-AOC with final charging request later during the active phase of a call to another network (the other user releases first)

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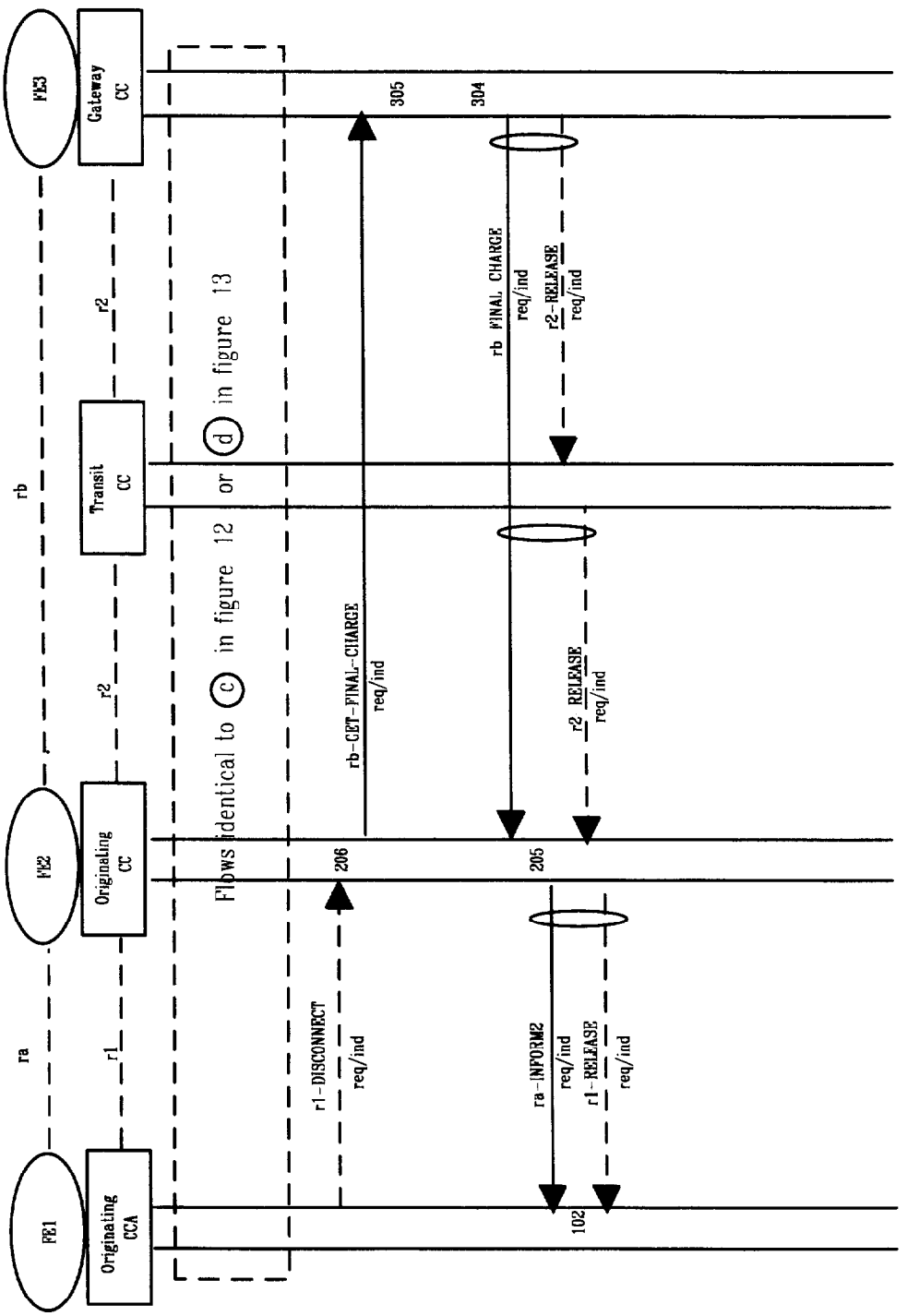

Figure 14 - Information flow sequence - Normal operation of SS-AOC with final charging request for a call to another network (the served user releases first)

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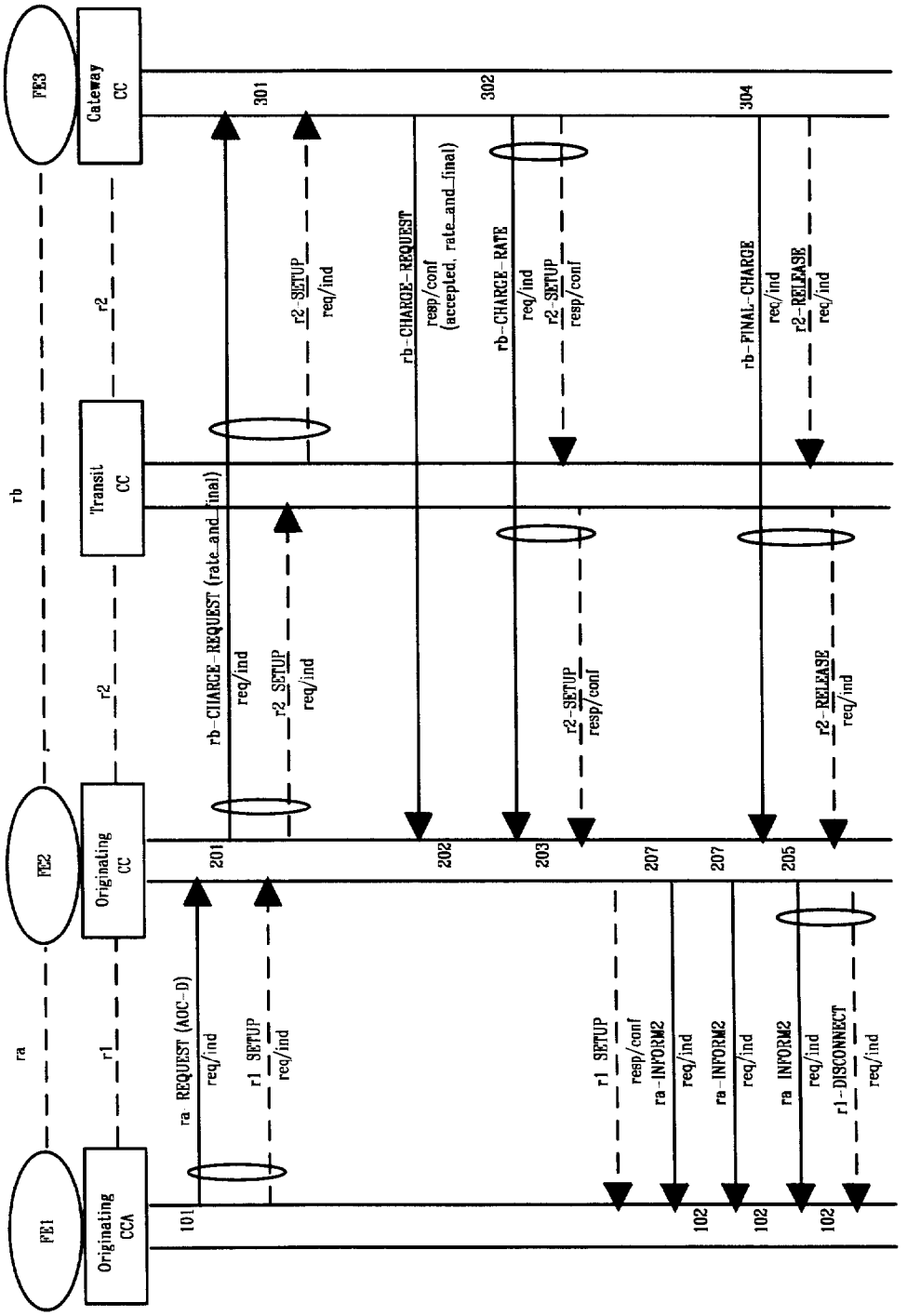

Figure 15 - Information flow sequence - Normal operation of SS-AOC-D with rate_and_final charging request when originating a call to another network (the other user releases first)

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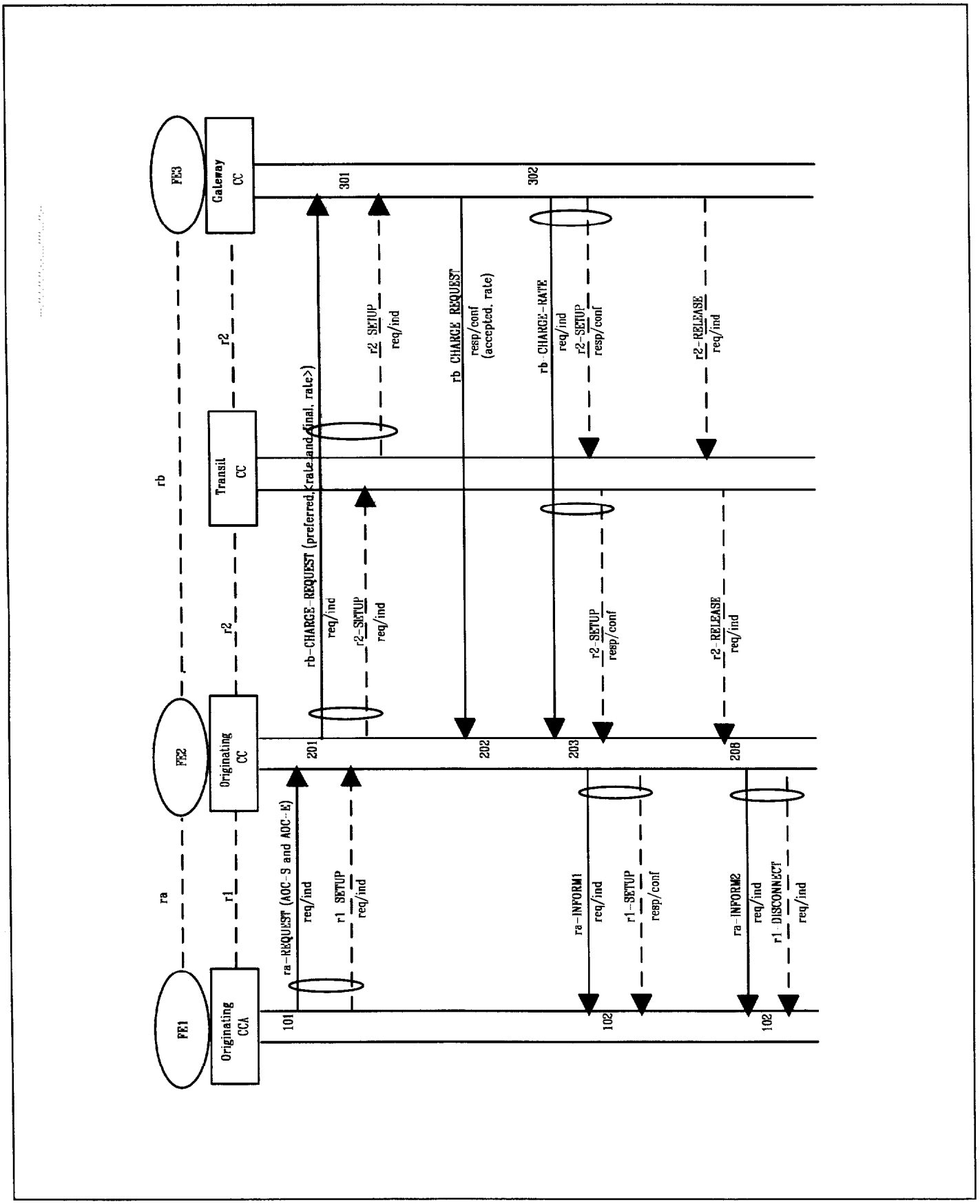

Figure 16 - Information flow sequence - Normal operation of SS-AOC-S and SS-AOC-E with rate_and_final charging as a preferred request (fallback: rate) when originating a call to another network (the other user releases first)

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9.2.3.2 Normal operation of SS-AOC with Call Transfer

Figure 17 shows the information flow sequence for normal operation of SS-AOC-S with call transfer when the user A is an AOC served user for the call (primary and/or secondary) prior to transfer, for whom charging rate has been requested.

Figure 18 shows the information flow sequence for normal operation of SS-AOC-D with call transfer when the user A is an AOC served user for the call (primary and/or secondary) prior to transfer, for whom interim charging has been requested.

Figure 19 shows the information flow sequence for normal operation of SS-AOC-E with call transfer when the user A is an AOC served user for the call (primary and/or secondary) prior to transfer, for whom final charging has been requested.

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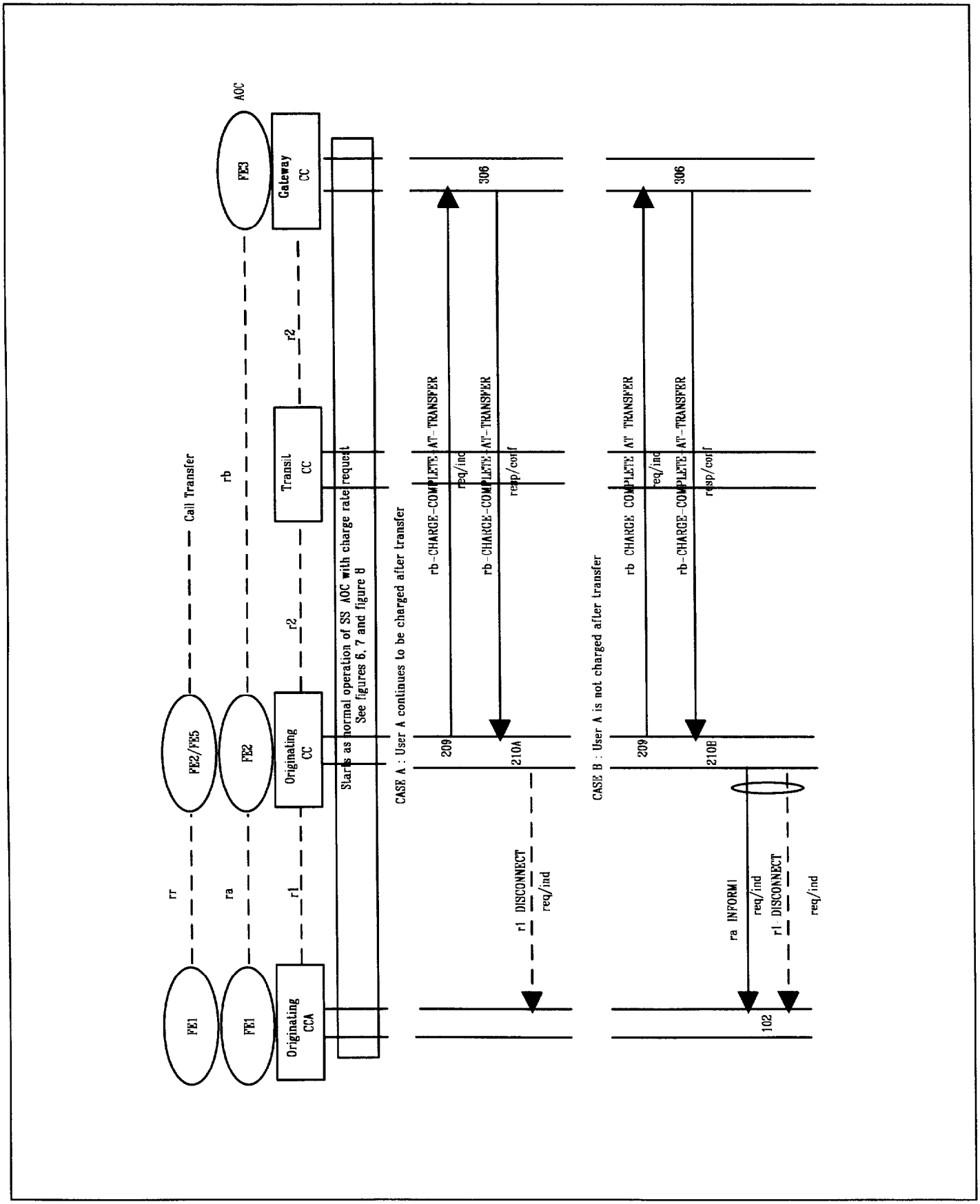

Figure 17 - Information flow sequence - Normal operation of SS-AOC-S with Call Transfer; charging rate has been requested for user A prior to transfer

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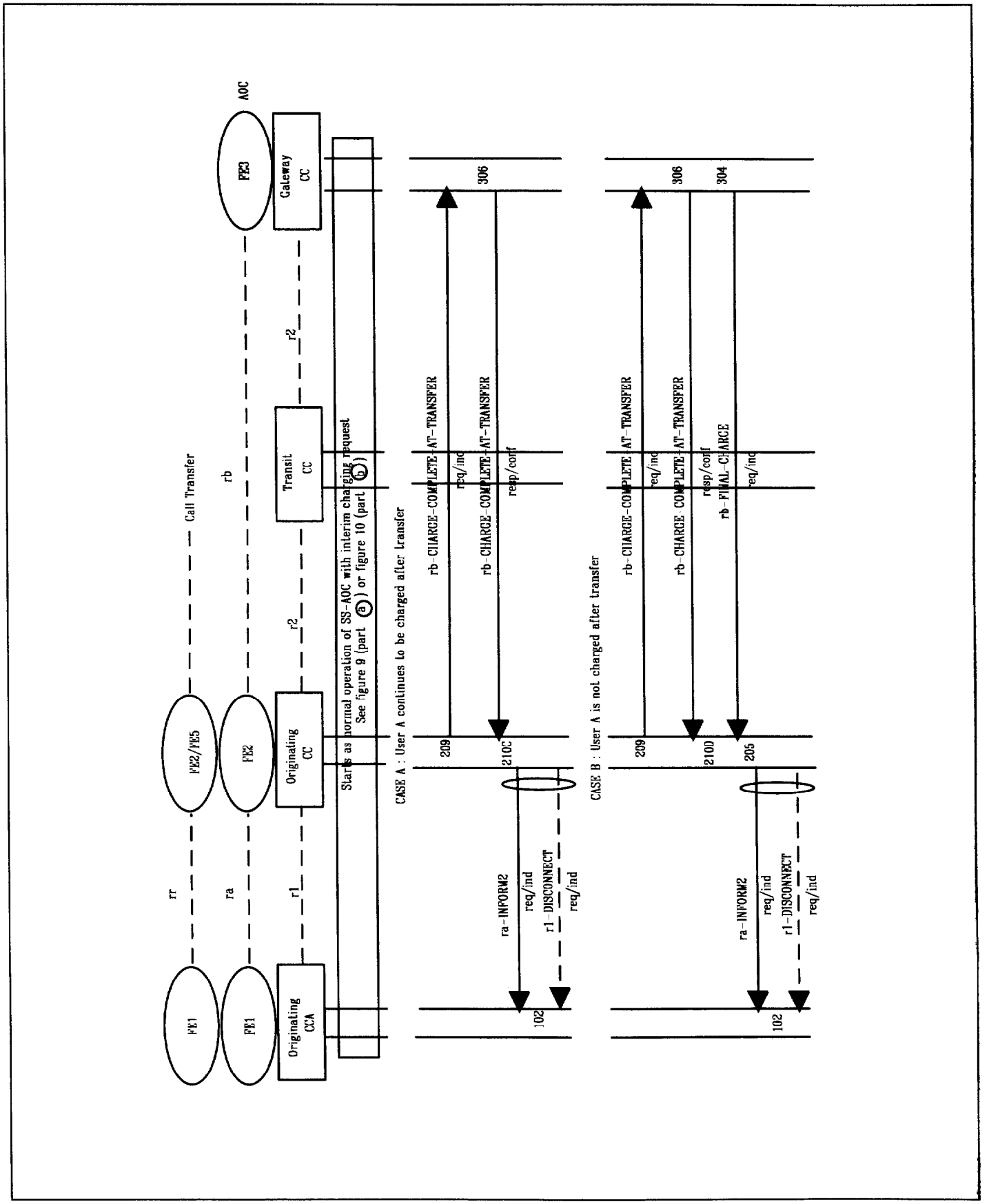

Figure 18 - Information flow sequence - Normal operation of SS-AOC-D with Call Transfer; interim charging has been requested for user A prior to transfer

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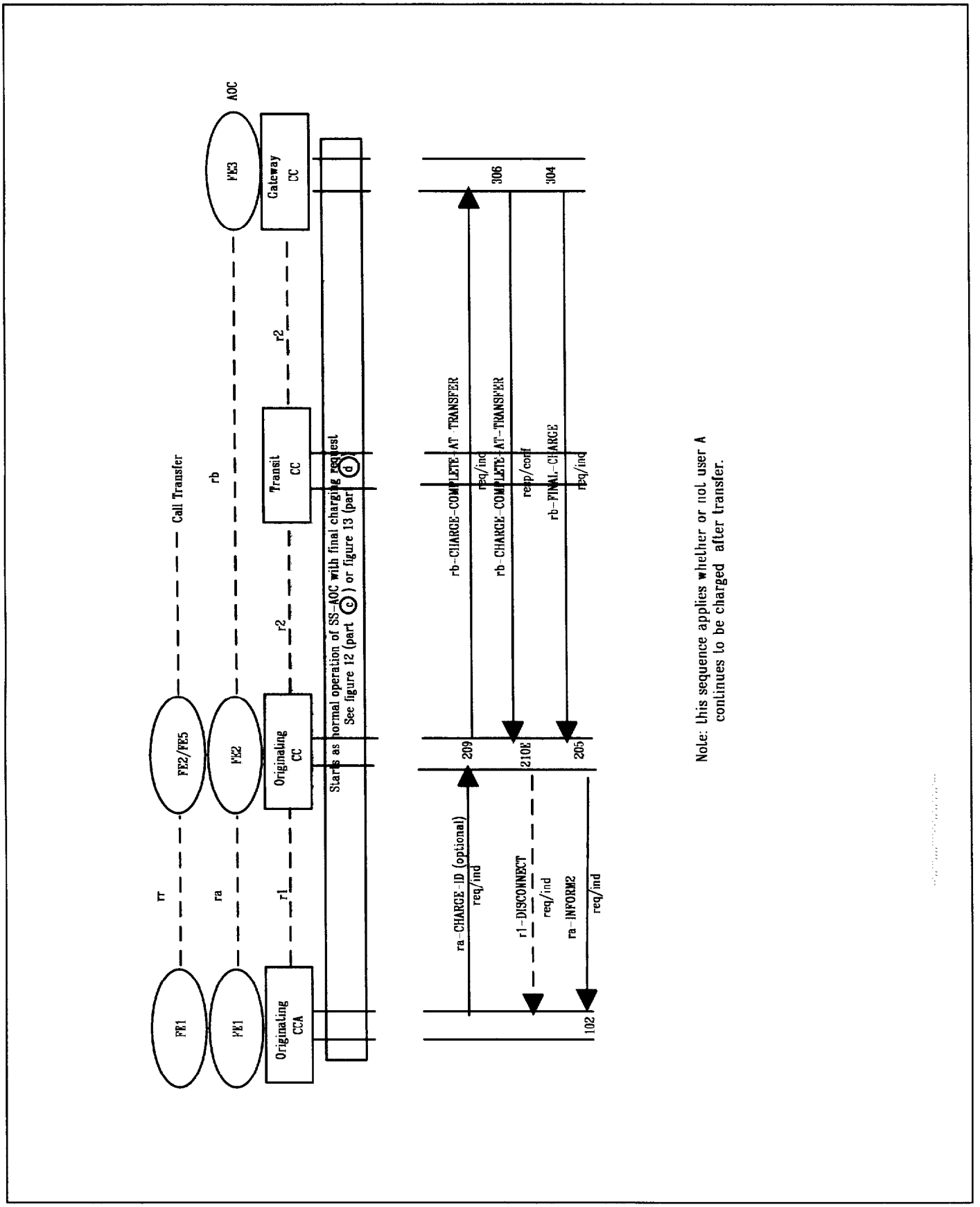

Figure 19 - Information flow sequence - Normal operation of SS-AOC-E with Call Transfer; final charging has been requested for user A prior to transfer

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9.2.3.3 Normal operation of SS-AOC with Call Diversion

Figure 20 shows the information flow sequence for normal operation of SS-AOC with call diversion when the diverting user is an AOC-E served user.

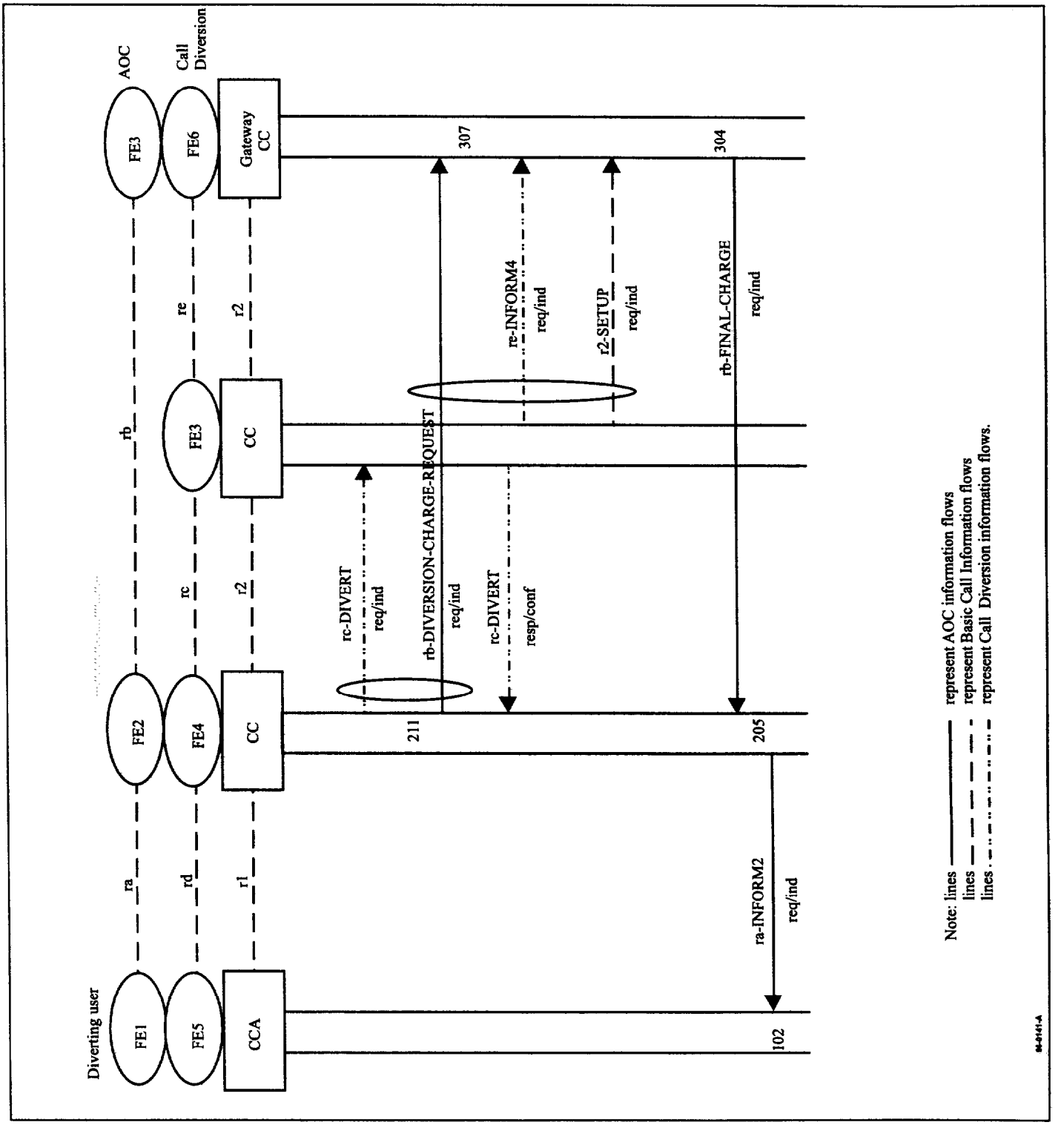

Figure 20 - Information flow sequence - Normal operation of SS-AOC with Call Diversion; the diverting user is provided with SS-AOC-E

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9.3 Functional entity actions

The following FE actions shall occur at the points indicated in the figures of 9.2.3.

9.3.1 Functional entity actions of FE1

101 Receive AOC request from the user and forward the request to FE2.

102 Receive AOC information from FE2 and forward the AOC information to the AOC served user.

9.3.2 Functional entity actions of FE2

201 Receive and check the validity of an SS-AOC invocation from FE1 on a per call basis. At call setup time for the originating user, or at indication that transfer is completed for a transferred user B or C, determine if SS-AOC applies to all charged calls automatically. If the call is a charged call and SS-AOC is invoked, send rb-CHARGE-REQUEST req/ind to FE3 with the appropriate charging information type request.

202 On receipt of rb-CHARGE-REQUEST resp/conf from FE3, record the type of charge information that would be provided.

203 On receipt of rb-CHARGE-RATE req/ind from FE3, take account of the charge rate information. If the served user is due to receive AOC-S information, pass on to the served user the charging rate information in an ra-INFORM1 req/ind.

204 On receipt of rb-INTERIM-CHARGE req/ind from FE3, take account of the interim charge information. If the served user is due to receive AOC-D information, pass on to the served user the interim charging information in an ra-INFORM2 req/ind.

205 On receipt of rb-FINAL-CHARGE req/ind from FE3, take account of the final charge information. If the served user is due to receive AOC-D or AOC-E information, pass on to the served user the final charging information in an ra-INFORM2 req/ind. Also the collocated CC is instructed to release the basic call to user A if this has not been done before.

206 Upon information from the collocated CC that the served user is releasing the call, send rb-GET-FINAL-CHARGE req/ind to FE3 and instruct the collocated CC not to extend the release of the call to the user until further information from the accounting entity has been received (via FE3).

207 On the basis of charging rate information provided by FE3, if interim charging information is not provided by FE3 and the served user is due to receive AOC-D information, generate interim charging information and convey towards that user in an ra-INFORM2 req/ind.

208 On the basis of charging rate information provided by FE3, if neither interim nor final charging information is provided by FE3 and the served user is due to receive AOC-D or AOC-E information, generate final charging information and convey towards that user in an ra-INFORM2 req/ind upon information from the collocated CC that the basic call is to release.

209 Upon indication of transfer from the collocated Call Transfer FE2 (transfer by join) or FE5 (transfer by rerouteing), send an rb-CHARGE-COMPLETE-AT-TRANSFER req/ind towards FE3. If simultaneously with the indication from the Call Transfer FE also an ra-CHARGE-ID has been received, the rb-CHARGE-COMPLETE-AT-TRANSFER req/ind may include a Charge Identifier. Suspend operation of call transfer until further information from the accounting entity has been received (via FE3).

210A On receipt of rb-CHARGE-COMPLETE-AT-TRANSFER resp/conf from FE3, stop AOC-S and complete call transfer.

210B On receipt of rb-CHARGE-COMPLETE-AT-TRANSFER resp/conf from FE3, stop AOC-S and send ra-INFORM1 req/ind indicating either "free of charge" or, if user A is not charged for the call prior to transfer, "free of charge from beginning". Complete call transfer.

210C On receipt of rb-CHARGE-COMPLETE-AT-TRANSFER resp/conf from FE3, stop AOC-D and send ra-INFORM2 req/ind indicating the subtotal charge (i.e., the latest charge known to FE2). Complete call transfer.

210D On receipt of rb-CHARGE-COMPLETE-AT-TRANSFER resp/conf from FE3, complete call transfer except for the release of the call to user A.

210E On receipt of rb-CHARGE-COMPLETE-AT-TRANSFER resp/conf from FE3, complete call transfer.

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211 Upon indication of call diversion from the collocated Call Diversion FE4, as an implementation option, determine if SS-AOC-E applies to all charged calls automatically. If the diverted call is a charged call and SS-AOC-E is invoked, send rb-DIVERSION-CHARGE-REQUEST req/ind to FE3.

9.3.3 Functional entity actions of FE3

301 On receipt of rb-CHARGE-REQUEST req/ind from FE2, determine with the collocated accounting entity if the request can be accepted. In case of a preferred list of charging information requests, try to serve the first request possible in the list. Send rb-CHARGE-REQUEST resp/conf to FE2 with the provided charging information type if the request is accepted, or with an indication that the call is free of charge, or with an indication that the request for this charging information type is not available.

302 Upon information from the collocated accounting entity, send a rb-CHARGE-RATE req/ind to FE2 containing the charging rate information.

303 Upon information from the collocated accounting entity, send a rb-INTERIM-CHARGE req/ind to FE2 containing the interim charging information.

304 Upon information from the collocated accounting entity, send rb-FINAL-CHARGE req/ind to FE2 containing the final charging information. Also the collocated CC is instructed to release the call towards the served user, if applicable.

305 On receipt of rb-GET-FINAL-CHARGE req/ind from FE2, send a request to the collocated accounting entity for the total charge component, and instruct the collocated CC to release the call towards the other network.

306 On receipt of rb-CHARGE-COMPLETE-AT-TRANSFER req/ind from FE2, check with the collocated accounting entity if user A is:

- charged only for the call prior to transfer;
- charged neither before nor after transfer;
- charged both before and after transfer,

and send rb-CHARGE-COMPLETE-AT-TRANSFER resp/conf with the appropriate result to FE2. After having sent this confirmation information flow, no more interim charges shall be sent to FE2.

307 On receipt of rb-DIVERSION-CHARGE-REQUEST req/ind from FE2, determine if the request can be accepted. If yes, store all the needed information in order to send rb-FINAL-CHARGE req/ind to FE2 at the end of the diverted call.

9.4 Functional entity behaviour

The FE behaviours shown below are intended to illustrate typical FE behaviour in terms of information flows sent and received.

The behaviour of each FE is shown using the Specification and Description Language (SDL) defined in CCITT Rec. Z.100 (1988).

9.4.1 Behaviour of FE1

Figure 21 shows the normal behaviour of FE1. Input signals from the left and output signals to the left represent primitives from and to the user. Input signals from the right and output signals to the right represent information flows from and to FE2.

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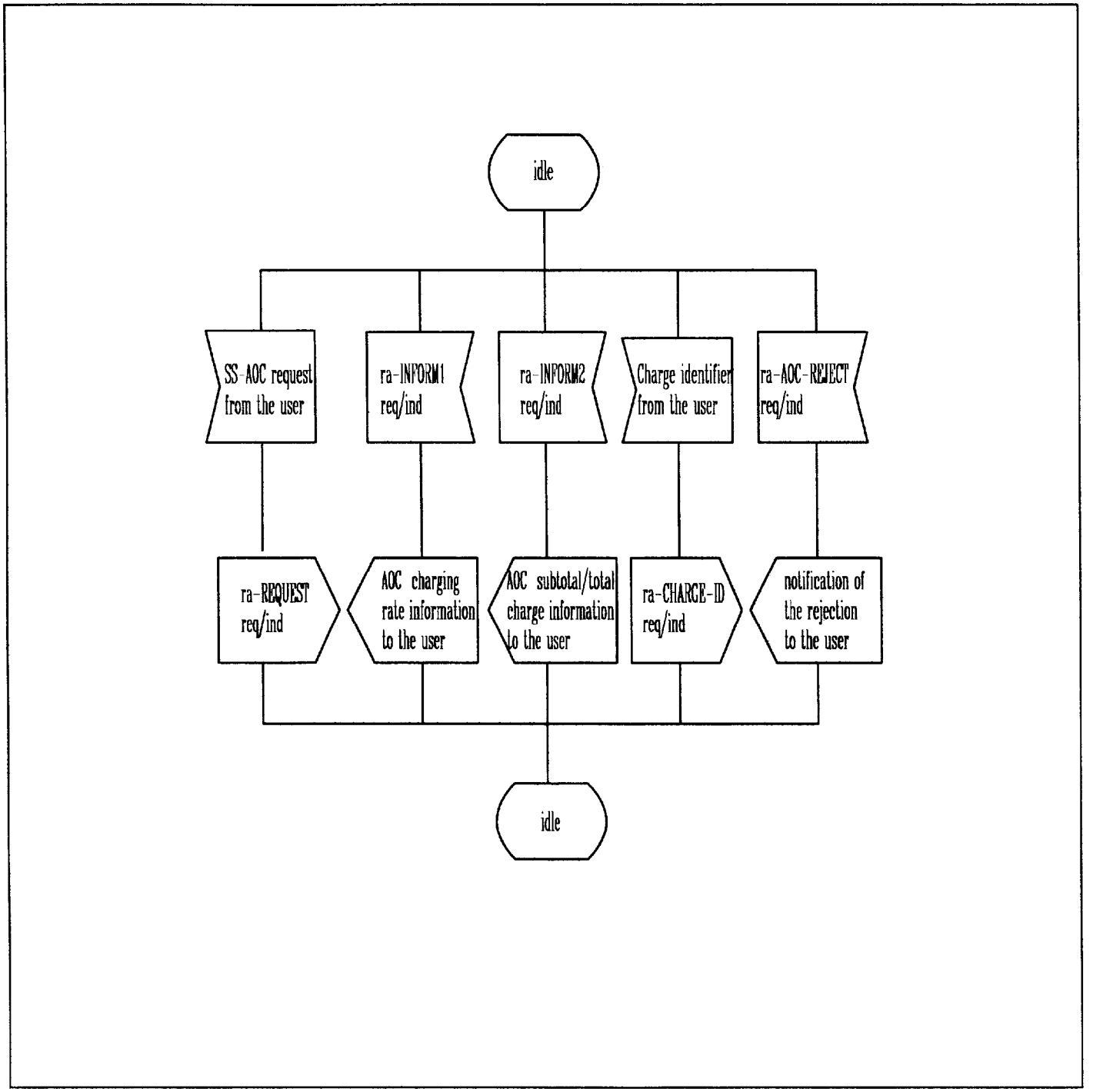

Figure 21 - SS-AOC, SDL for functional entity FE1

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9.4.2 Behaviour of FE2

Figure 22 shows the normal behaviour of FE2. Input signals from the left and output signals to the left represent information flows from and to FE1. Input signals from the right represent information flows from FE3, input signals from the collocated CC, input signals from a collocated SS-CT FE and input signals from a collocated SS-CF FE. Output signals to the right represent information flows to FE3.

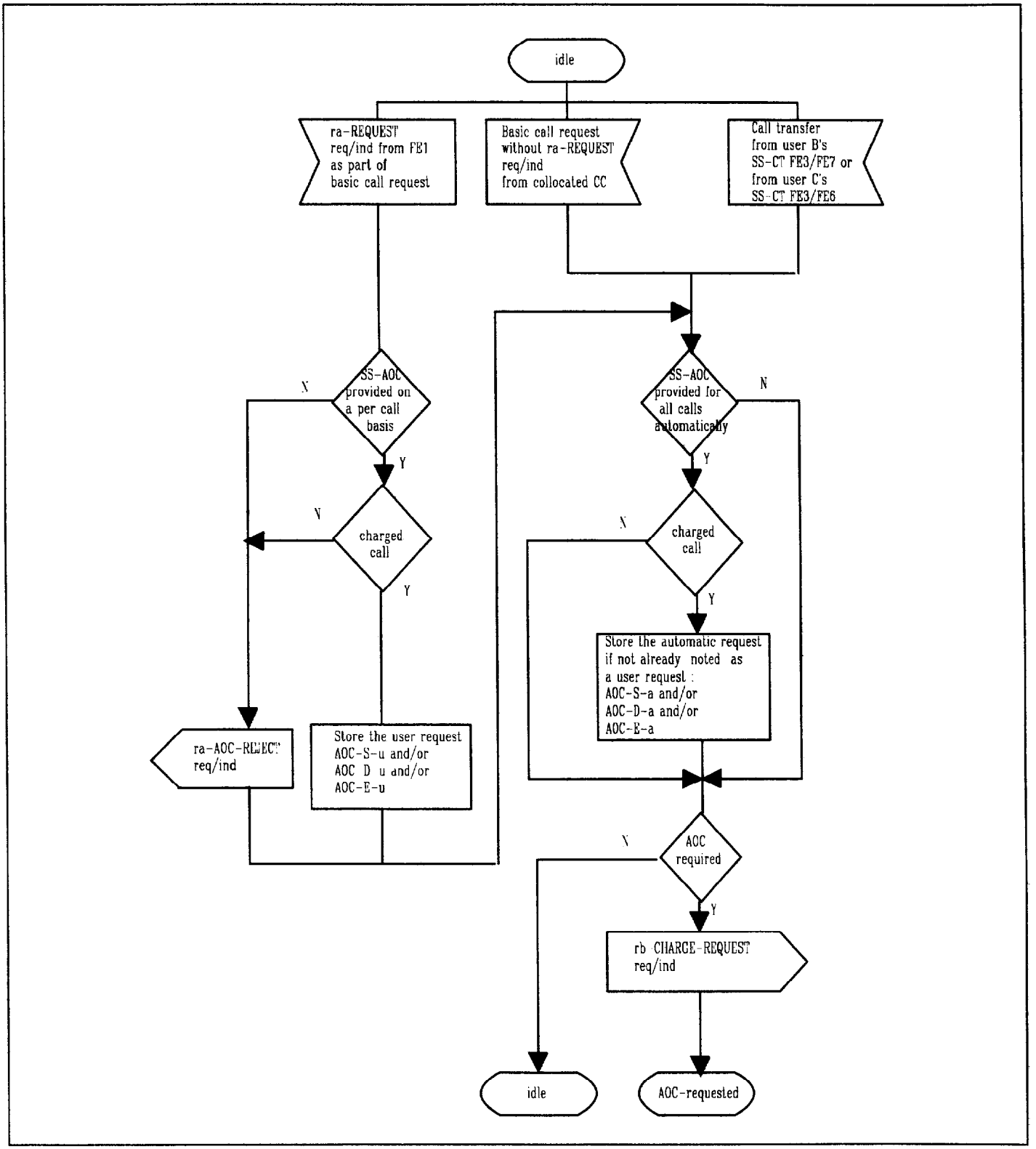

Figure 22 (part 1) - SS-AOC, SDL for functional entity FE2

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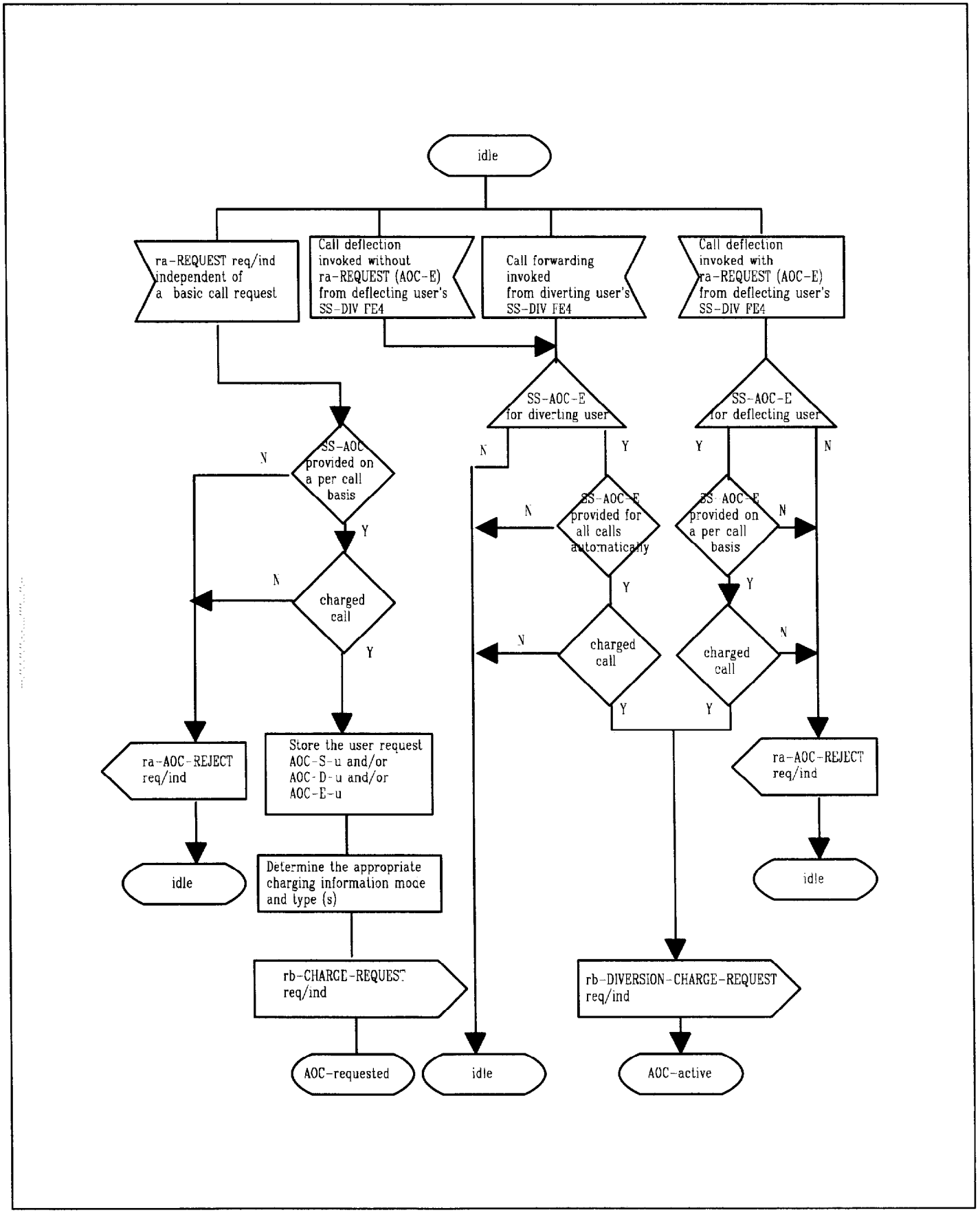

Figure 22 (part 2) - SS-AOC, SDL for functional entity FE2

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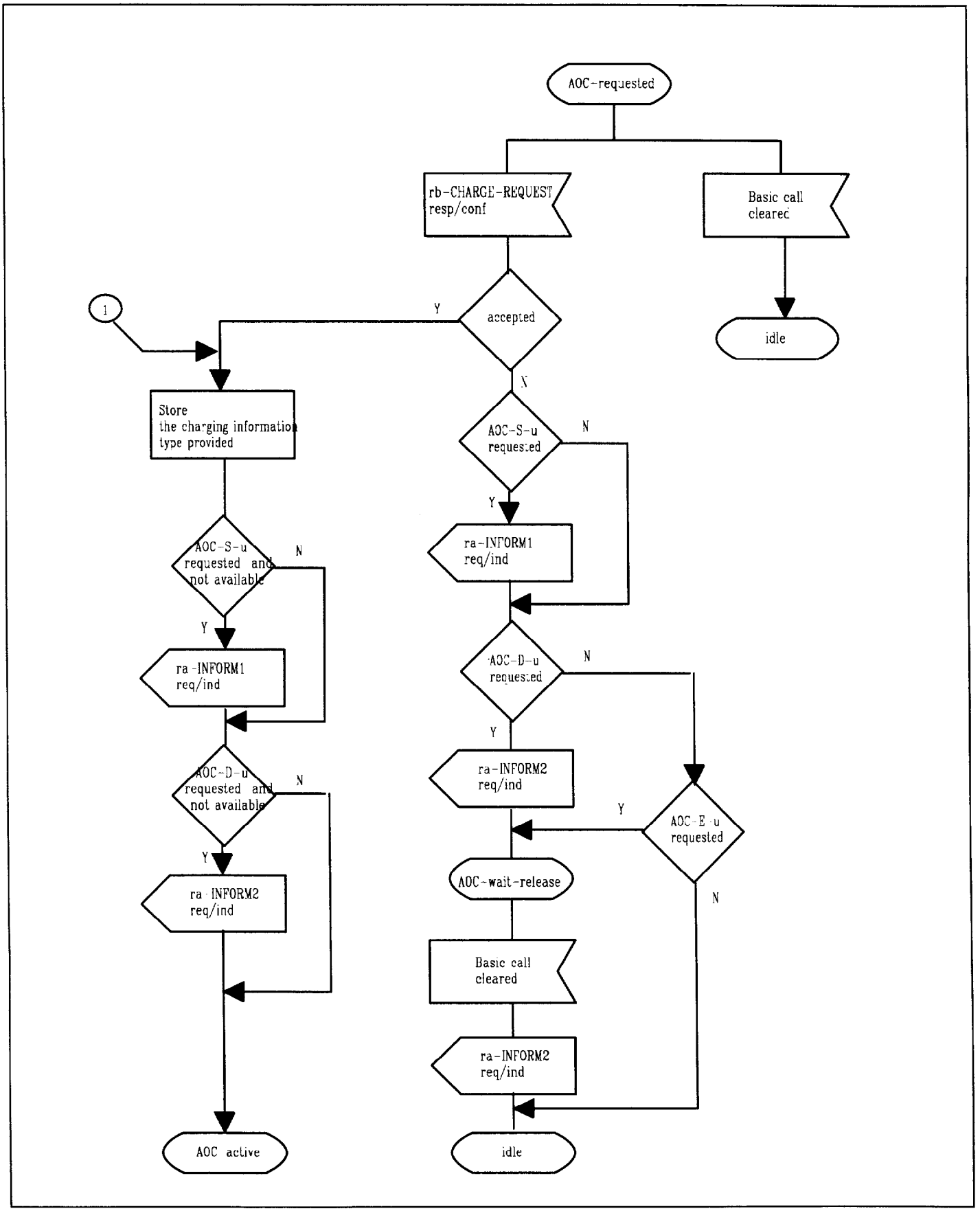

Figure 22 (part 3) - SS-AOC, SDL for functional entity FE2

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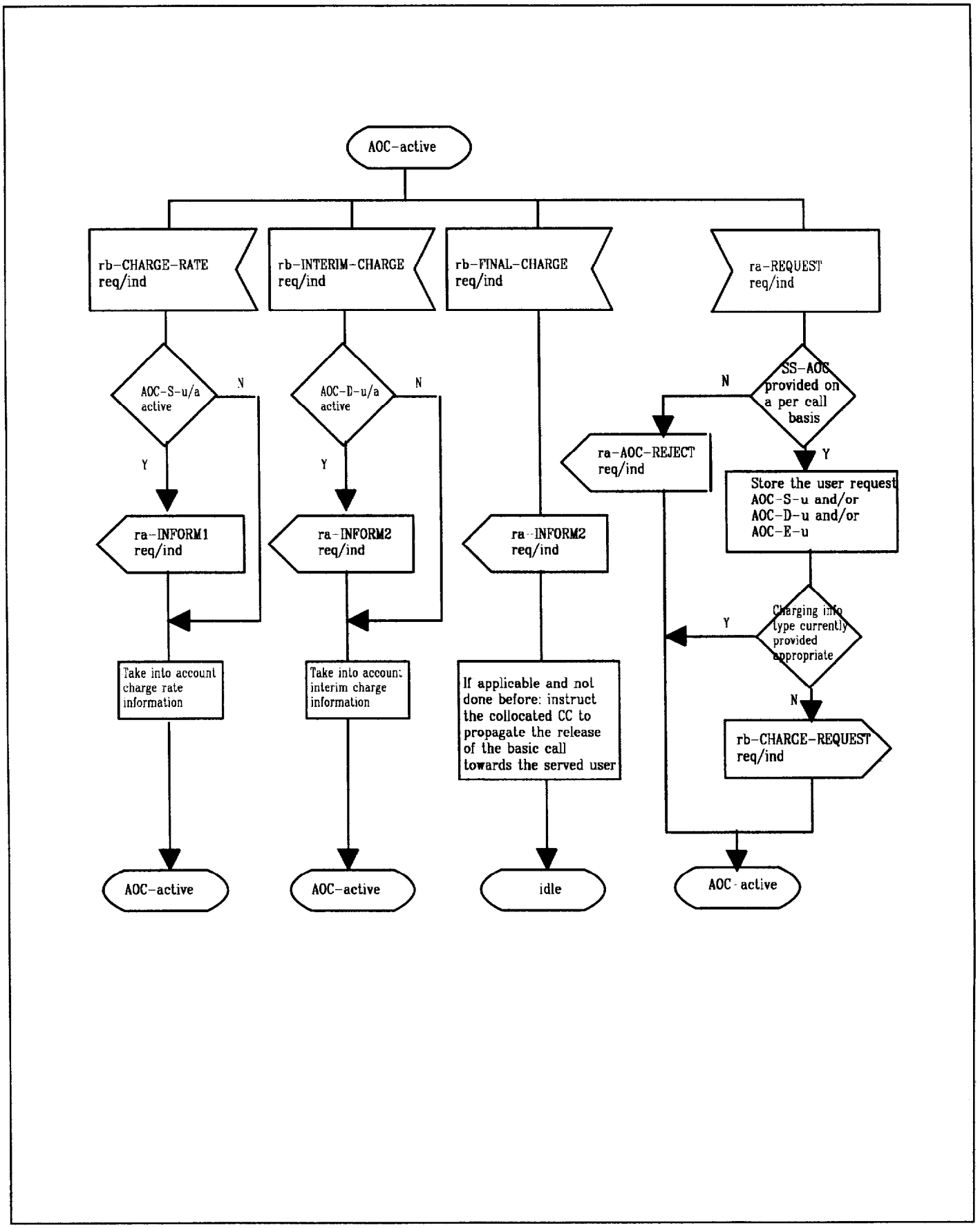

Figure 22 (part 4) - SS-AOC, SDL for functional entity FE2

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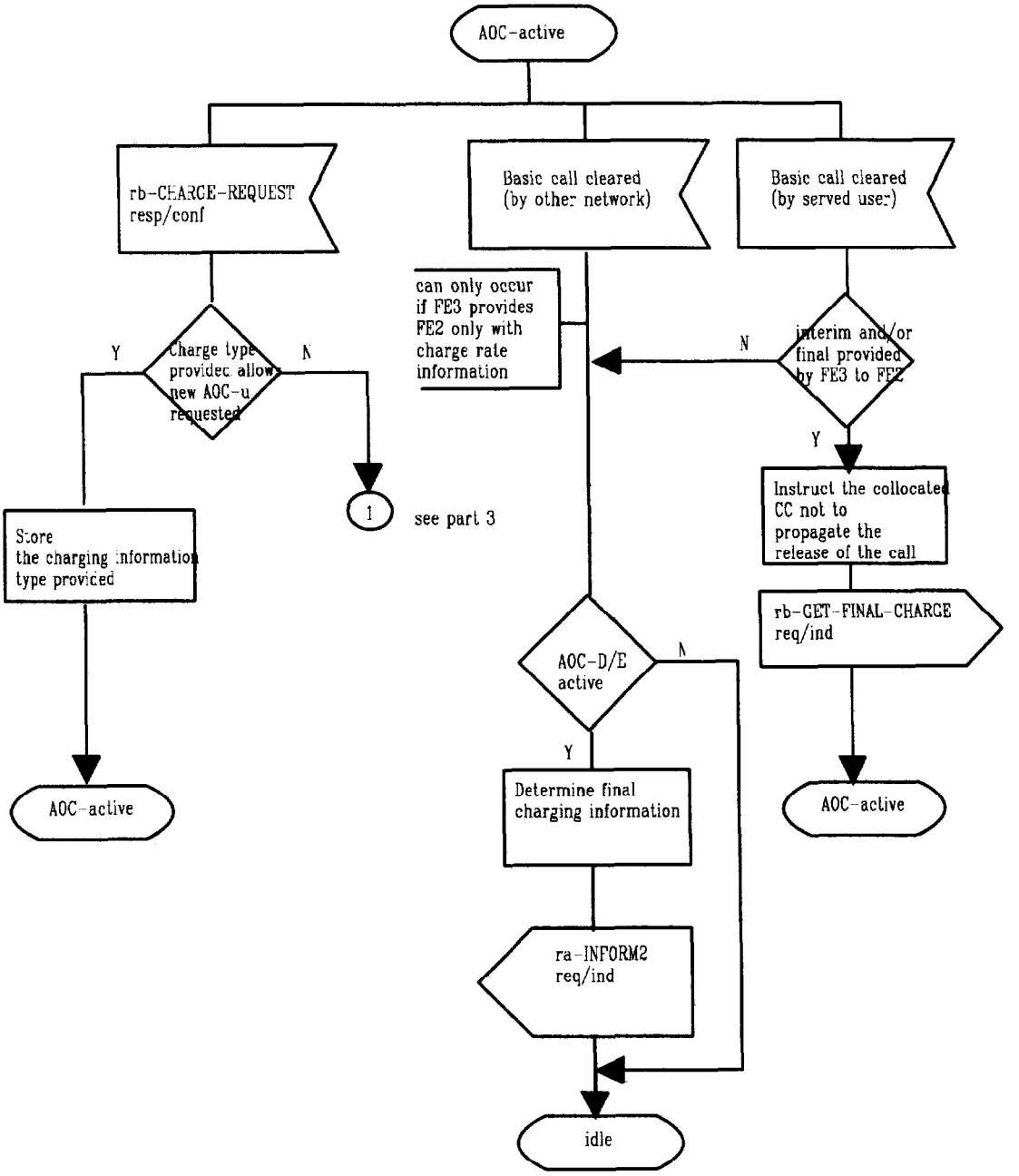

Figure 22 (part 5) - SS-AOC, SDL for functional entity FE2

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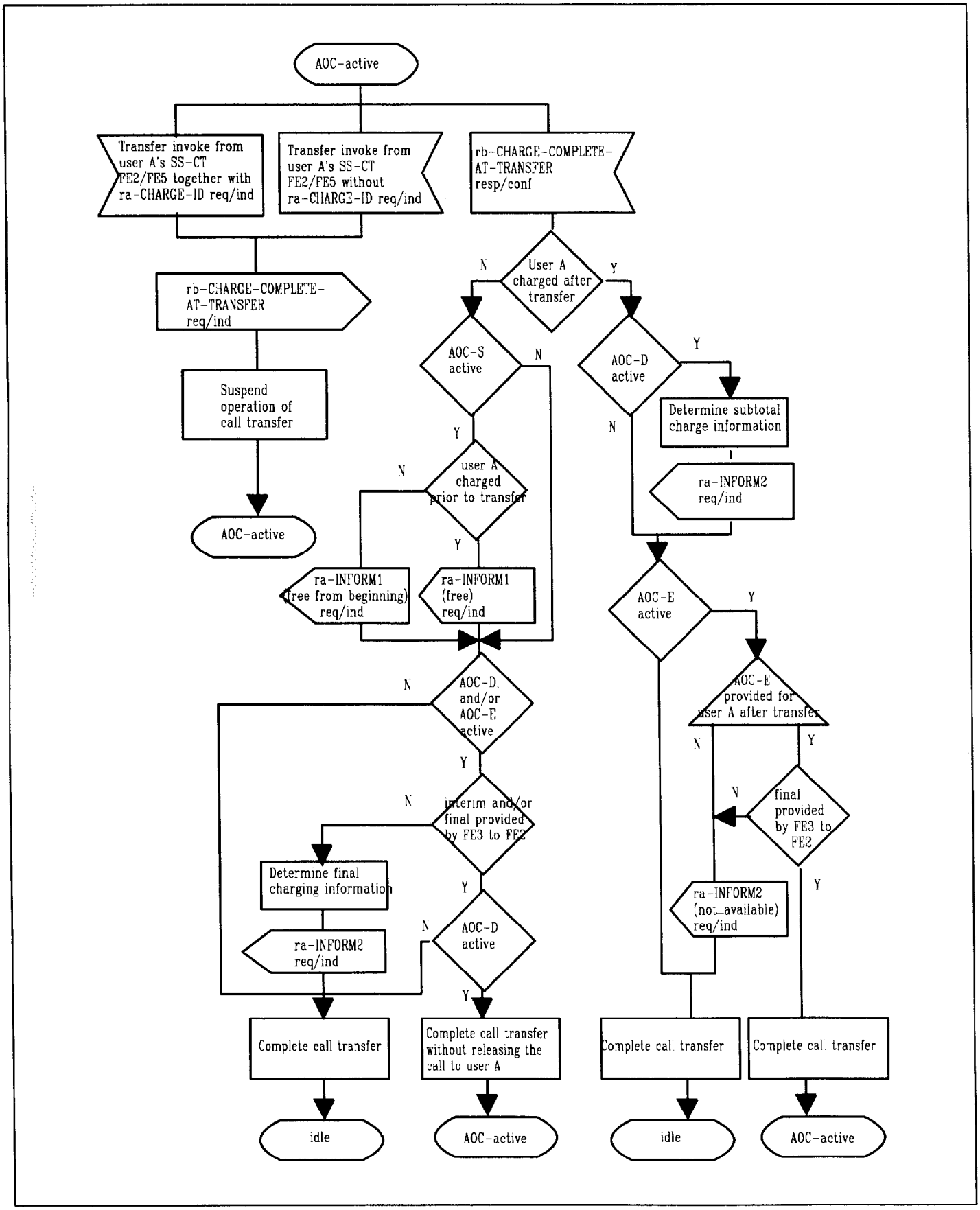

Figure 22 (part 6) - SS-AOC, SDL for functional entity FE2

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9.4.3 Behaviour of FE3

Figure 23 shows the normal behaviour of FE3. Input signals from the left and output signals to the left represent information flows from and to FE2. Input signals from the right represent input signals from a collocated accounting entity and input signals from the collocated CC.

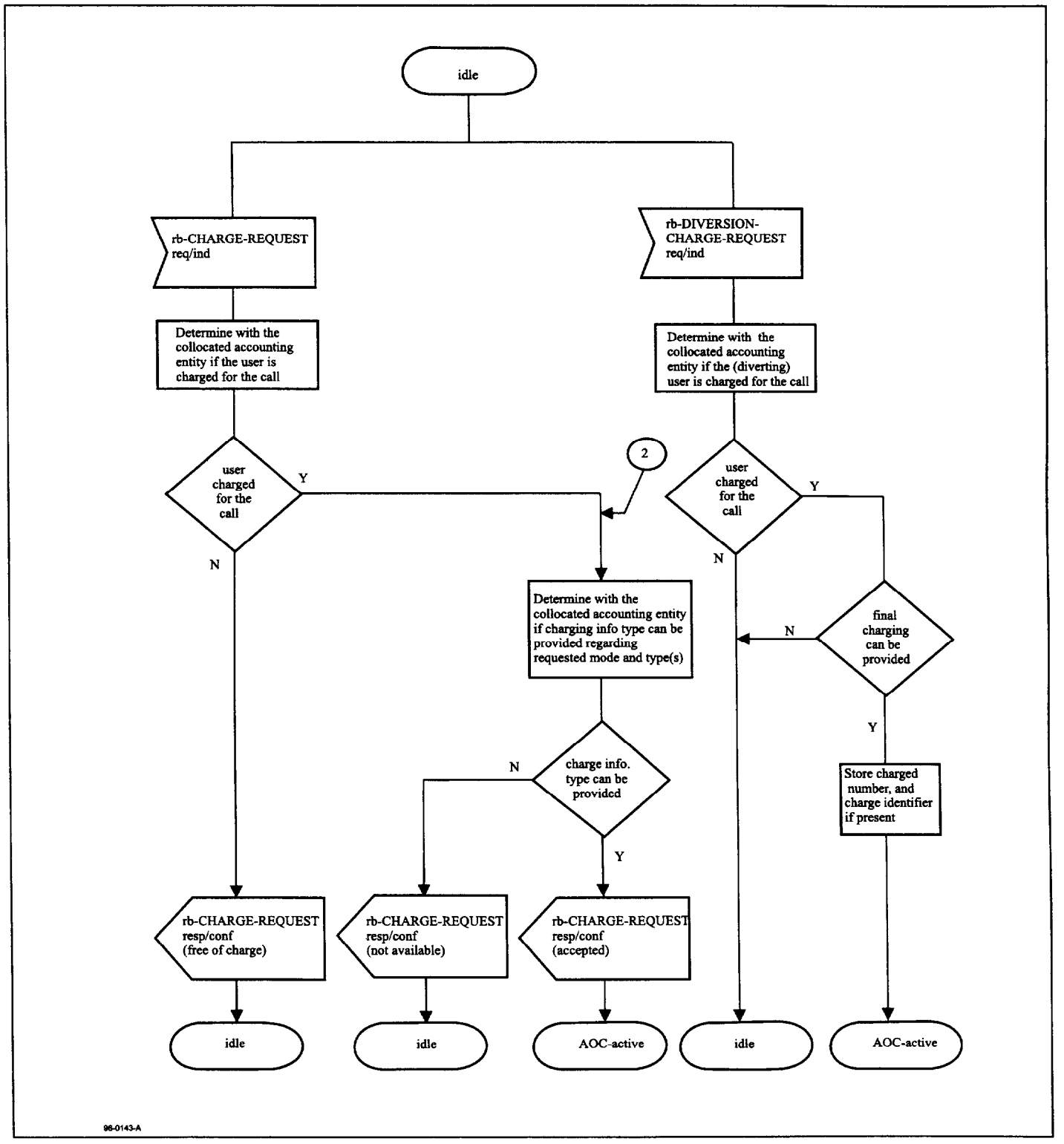

Figure 23 (part 1) - SS-AOC, SDL for functional entity FE3

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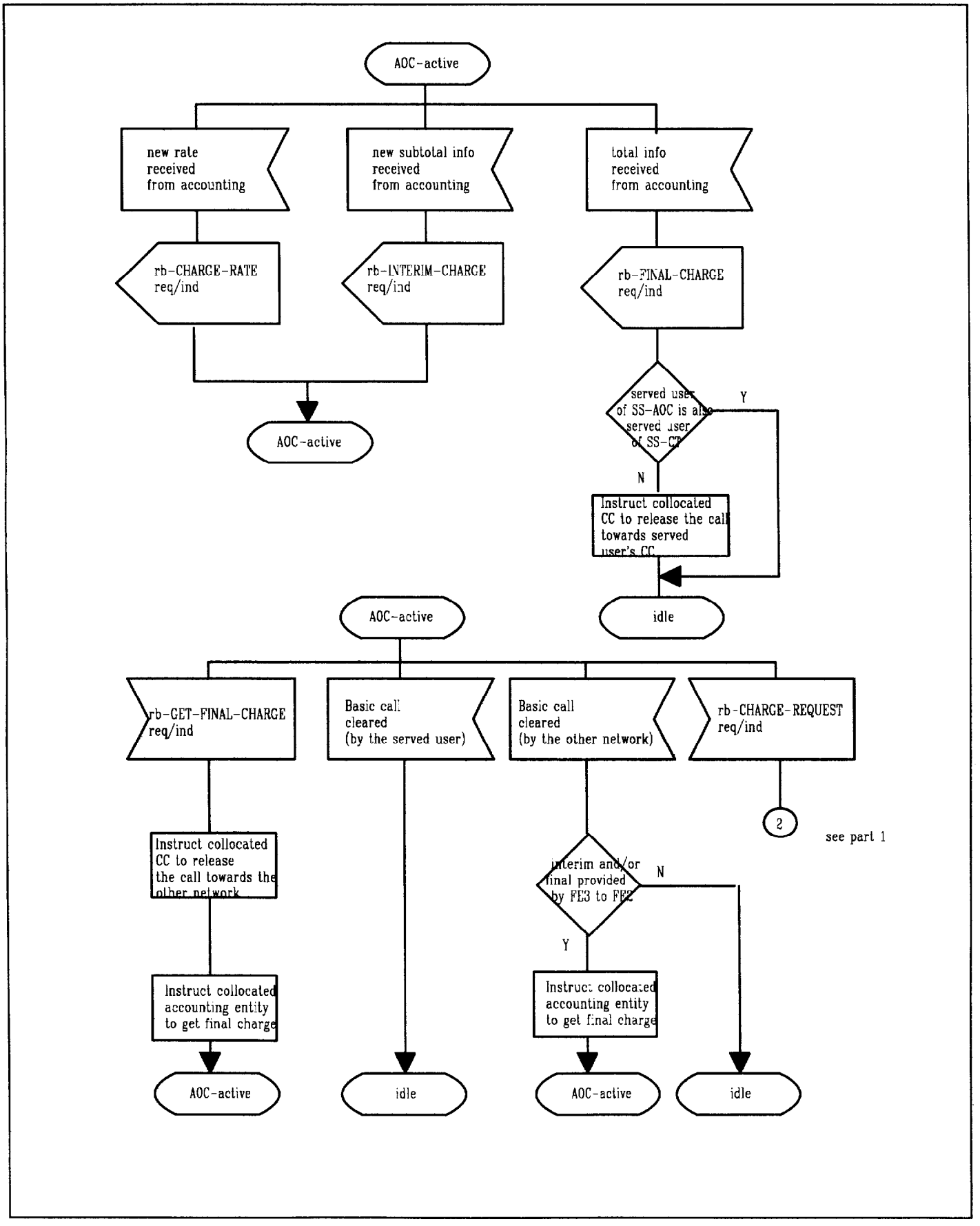

Figure 23 (part 2) - SS-AOC, SDL for functional entity FE3

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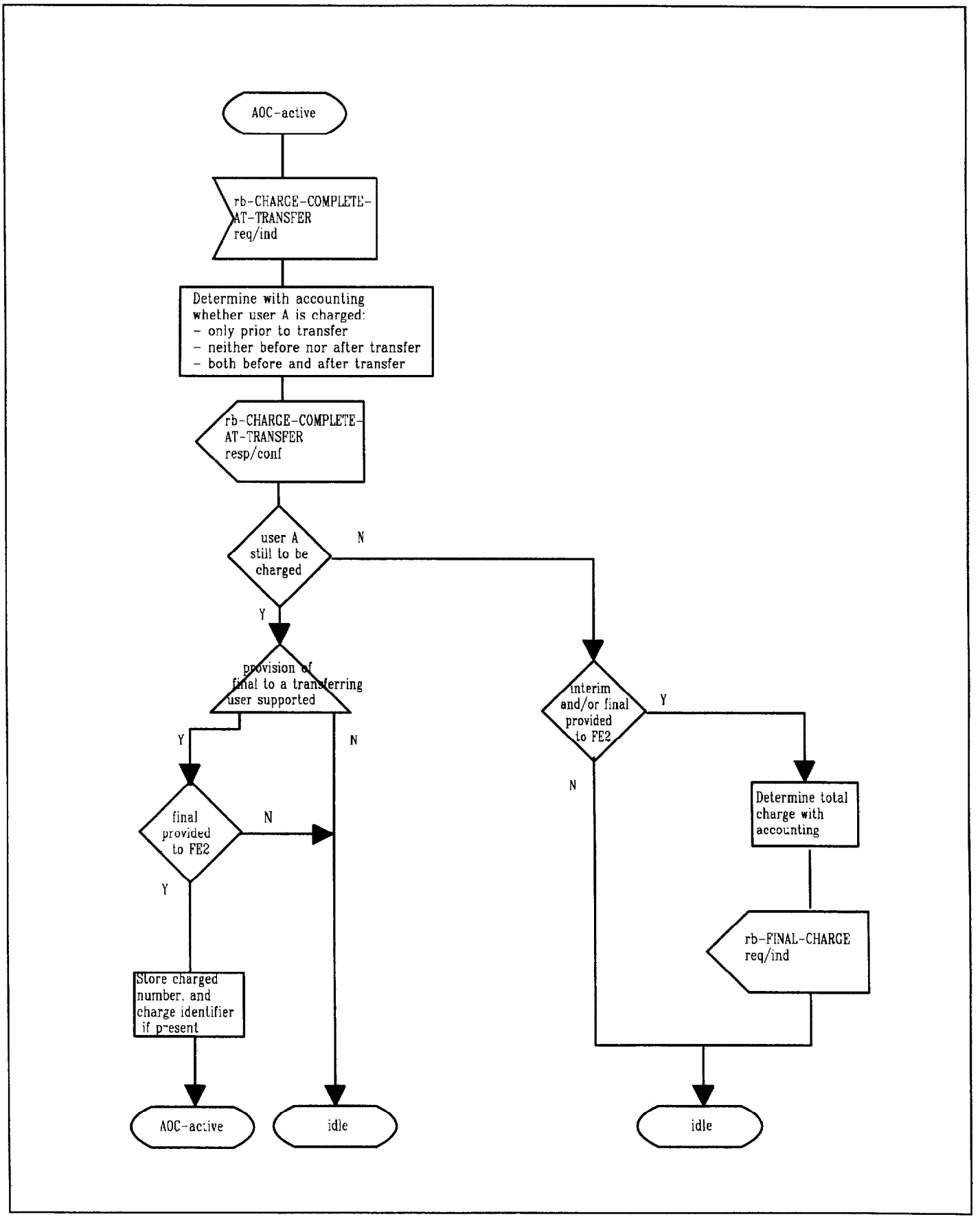

Figure 23 (part 3) - SS-AOC, SDL for functional entity FE3

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9.5 Allocation of functional entities to physical equipment

The allocation of FEs to physical equipment shown in table 12 shall apply. In the table, "TE" represents a TE attached to a PISN. When a terminal involved is stimulus with respect to SS-AOC, any FE shown as residing in the corresponding user's TE shall reside instead in that user's PINX.

Table 12 - Scenarios for the allocation of FEs to physical equipment

	FE1	FE2	FE3
Scenario 1	Originating TE	Originating PINX	Gateway PINX
Scenario 2	Originating TE	Originating PINX	Terminating PINX

The allocation of FEs to physical equipment shown in table 13 shall apply when SS-AOC is provided to a user for a transferred call. In the table, "TE" represents a TE attached to a PISN. When a terminal involved is stimulus with respect to SS-AOC, any FE shown as residing in the corresponding user's TE shall reside instead in that user's PINX.

Table 13 - Scenarios for the allocation of FEs to physical equipment (after Call Transfer)

	FE1	FE2	FE3
Scenario 3	User B/C TE	User B/C PINX	Gateway PINX
Scenario 4	User A TE	User A PINX	Gateway PINX

The allocation of FEs to physical equipment shown in table 14 shall apply when SS-AOC is provided to a user for a diverted call. In the table, "TE" represents a TE attached to a PISN. When a terminal involved is stimulus with respect to SS-AOC, any FE shown as residing in the corresponding user's TE shall reside instead in that user's PINX.

Table 14 - Scenarios for the Allocation of FEs to Physical Equipment (after Call Diversion)

	FE1	FE2	FE3
Scenario 5	Originating TE	Originating PINX	Gateway PINX
Scenario 6	Diverting user TE	Diverting user PINX	Gateway PINX

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Annex A

(normative)

Structures, contents and application of charging information given by AOC-S

A.1 Structure and contents of charging information

A.1.1 Type of charging information

The following types of charging information can be supplied:

- charging rate information,
- charge rate information not available.

A.1.2 Charged items

The following charged items can be included. A charged item shall only be included if that item contains information concerning the charging applied to the call.

Note - PISNs will only use those charged items which are appropriate to that service provider's charging mechanism. Thus, in some PISNs, users may/may not receive some of these items or combinations of items. Different PISNs may give information about the same call in different ways.

- "basic communication":

  This charged item indicates the rate to be applied to the basic communication between the users. If the rate changes, the served user shall be informed by a repetition of this charged item indicating the new rate.

- "call attempt"

  This charged item indicates the cost applied for a successful call attempt before the called user accepts the call.

- "call setup"

  This charged item indicates the cost applied when the connection between the users is established, including any charges incurred prior to transfer to the user concerned and passed on to that user.

- "user-to-user information transfer"

  This charged item indicates the rate to be applied to the transfer of user-to-user information. If the rate changes, the served user shall be informed by a repetition of this charged item indicating the new rate.

- "operation of supplementary services"

  This charged item indicates the cost applied for the operation of requested supplementary services.

A.1.3 Charging rate

The charging rates contained in this subclause can be associated with the above charged items. Further information is given in Clause C.2.

In the subclauses below, the multiplier in the currency amount shall have one of the following values: 0,001; 0,01; 0,1; 1; 10; 100; or 1000.

A.1.3.1 Duration rate

The duration rate gives the currency value for a particular time unit, together with the length of the time unit.

- price per time unit, and time unit.

  The following sub-units shall be included:

  - currency identifier;
  - currency amount (integer value and a multiplier);
  - length of time unit (integer value and a scale);

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- type of charging (step function or continuous).

  Note - "Step function" means that a charge is incurred for the time unit, or part thereof, i.e. a charge is incurred at the start of each time unit. "Continuous" means that charges are incurred evenly throughout.

The following sub-unit can be included:

- granularity (integer value and a scale); this specifies the time unit applied for calculation of charges by the PISN.

The scale of time units shall have one of the following values: 0,01 s; 0,1 s; 1 s; 10 s; 1 min; 1 hour; or 24 hours.

A.1.3.2 Volume rate

The volume rate gives the currency value for a particular volume unit, together with the type of volume unit.

- price per volume unit and volume unit.

  The following sub-units shall be included:

  - currency identifier;
  - currency amount (integer value and a multiplier);
  - type of volume unit.

The type of volume unit shall have one of the following values: octet; segment; or message to which user-to-user information has been attached.

A.1.3.3 Specific rate

The specific rate gives the specific charge value. The following specific rates can be given:

- free of charge

  This specific rate indicates that there is no further charge to the served user for the associated charged item.

- free of charge from the beginning

  This specific rate indicates that there is no charge to the served user for the associated charged item even if charging information was sent previously for that item.

- flat rate (a fixed currency value per event)

  This specific rate indicates a fixed currency value per event. The following sub-units shall be included:

  - currency identifier;
  - currency amount (integer value and multiplier).

- special charging code

  This specific rate indicates a code which can identify a charging algorithm. The following sub-unit shall be included:

  - N (integer value from 1 to 10).

- not available

  This specific rate indicates that the charging rate is not available. The PISN shall not give a reason.

A.2 Application of charging information

The charged item relating to "basic communication" shall be associated with a charging rate having one of the following values:

- price per time unit and time unit;
- flat rate (a fixed currency value per event);
- free of charge;
- free of charge from the beginning;
- special charging code;
- not available.

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The charged item relating to "call attempt" and "call setup" shall only be included in the initial charging information sent to the served user. These charged items shall be associated with a charging rate having one of the following values:

- flat rate (a fixed currency value per event);

  Note - Flat rate with a currency amount shall be used when the served user is a transferred user who incurs charges prior to transfer.

- free of charge;
- special charging code;
- not available.

The charged item relating to "operation of supplementary services" shall only be included if the served user has requested a supplementary service. This charged item shall be associated with a charging rate having one of the following values:

- price per time unit and time unit;
- flat rate (a fixed currency value per event);
- free of charge;
- special charging code;
- not available.

The charged item relating to "user-to-user information transfer" shall only be included if the served user has requested the user-to-user signalling supplementary service. This charged item shall be associated with a charging rate having one of the following values:

- price per volume unit and volume unit;
- flat rate;
- free of charge;
- special charging code;
- not available.

If a charged item is not included, the default value shall be interpreted as "free of charge".

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Annex B

(normative)

Structures, contents and application of charging information given by AOC-D

B.1 Structure and contents of charging information

B.1.1 Type of charging information

The following types of charging information can be supplied:

- subtotal charges

  This type of charging information is sent to the served user during the call and indicates charges recorded for the call so far;

- total charges

  This type of charging information is sent to the served user when the call is terminated, and indicates the charges recorded for the call;

  Note - Some PISNs may not include some charges, e.g. charges incurred by the use of some supplementary services in the subtotal charges and/or the total charges.

- charge information not available.

B.1.2 Recorded charges

The following types of recorded charges listed in this subclause can be included:

- recorded number of charging units

  This information indicates the number of charging units incurred for the call.

  The following sub-unit shall be included:

  - number of charging units (integer value).

  The following sub-unit can be included:

  - type of charge unit.

  Note - If different types of charging units apply, the recorded number of charging units for each type of charging unit may be given.

  The type of charging unit shall be indicated by an integer value between 1 and 16. Each service provider shall specify their use and significance of these values (e.g. the values may correspond to different currency amounts);

- recorded number of currency units

  This information indicates the number of currency units incurred for the call.

  The following sub-units shall be included:

  - currency identifier;
  - currency amount (integer value and a multiplier).

    The multiplier shall have one of the following values: 0,001; 0,01; 0,1; 1; 10; 100; or 1000;

- free of charge

  This information indicates that there is no charge to the served user for this call.

B.1.3 Billing identification

Only one of the following types of billing identification shall be included:

- normal charging

  This billing identification indicates that charges are incurred due to normal charging, i.e. the calling user is charged;

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– credit card charging

This billing identification indicates that charges are paid by means of a credit card.

B.2 Application of charging information

Charging information shall be given either in currency units or in charging units. The recorded charges that give the charging applied for the call shall be covered. The information can be accompanied by a billing identification. If the billing identification is not included, the default value shall be interpreted as "normal charging".

The type of charging information "total charges" indicates the recorded charges for the call. The information shall only be given to a served user involved in a call when the call is terminated. The final value of the charge given by the type of recorded charges associated with the call shall be included.

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Annex C

(normative)

Structures, contents and application of charging information given by AOC-E

C.1 Structure and contents of charging information

C.1.1 Type of charging information

The following types of charging information can be supplied:

- total charges

  This type of charging information is sent to the served user when the call is terminated, and indicates the charges recorded for the call;

  Note - Some PISNs may not include some charges, e.g. charges incurred by the use of some supplementary services, in the total charges.

- charge information not available.

C.1.2 Recorded charges

The following types of recorded charges can be included:

- recorded number of charging units

  This information indicates the number of charging units incurred for the call.

  The following sub-unit shall be included:

  - number of charging units (integer value).

  The following sub-unit can be included:

  - type of charge unit.

  Note - If different types of charging units apply, the recorded number of charging units for each type of charging unit may be given.

  The type of charging unit shall be indicated by an integer value between 1 and 16. Each service provider shall specify their use and significance of these values (e.g. the values may correspond to different currency amounts);

- recorded number of currency units

  This information indicates the number of currency units incurred for the call.

  The following sub-units shall be included:

  - currency identifier;
  - currency amount (integer value and a multiplier).

    The multiplier shall have one of the following values: 0,001; 0,01; 0,1; 1; 10; 100; or 1000;

- free of charge

  This information indicates that there is no charge to the served user for this call.

C.1.3 Billing identification

Only one of the following types of billing identification shall be included:

- normal charging

  This billing identification indicates that charges are incurred due to normal charging, i.e. the calling user is charged;

- credit card charging

  This billing identification indicates that charges are paid by means of a credit card.

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- call forwarding unconditional

  This billing identification indicates that charges are incurred by a diverting user for a call resulting from the invocation of the call forwarding unconditional supplementary service;

- call forwarding busy

  This billing identification indicates that charges are incurred by a diverting user for a call resulting from the invocation of the call forwarding busy supplementary service;

- call forwarding no reply

  This billing identification indicates that charges are incurred by a diverting user for a call resulting from the invocation of the call forwarding no reply supplementary service;

- call deflection

  This billing identification indicates that charges are incurred by a diverting user for a call resulting from the invocation of the call deflection supplementary service;

- call transfer

  This billing identification indicates that charges are incurred by user A for a call that has been transferred.

C.2 Application of charging information

Charging information shall be given either in currency units or in charging units. The recorded charges that give the charging applied for the call shall be covered. The information can be accompanied by a billing identification. If the billing identification is not included, the default value shall be interpreted as "normal charging".

The type of charging information "total charges" indicates the recorded charges for the call. The information shall only be given to a served user involved in a call when the call is terminated. The final value of the charge given by the type of recorded charges associated with the call shall be included.

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Annex D

(informative)

Charging assumptions for advice of charge in PISNs

This International Standard makes the following assumptions about the operation of charging in a PISN.

D.1 PISN accounting entity

An Outgoing Gateway PINX includes an accounting entity that is able to determine charges incurred in the other network (e.g., by counting meter pulses, by use of a public ISDN AOC service, or by calculation). At least for the duration of the connection to the other network, the history of the connection charges is retained, which will allow for a change of the charged user during the life of the connection.

The PISN accounting entity has an interaction with the PISN's AOC-service. On request of the AOC-service the PISN accounting entity provides the AOC-service with charging information.

This entity also has an interaction with the Call Transfer service. If the connection to the other network is transferred from one user to another, then this entity will be notified and is able to determine the amounts of charges to be accounted for by each of the users involved.

This entity also has an interaction with the Call Diversion services. If the connection to the other network is established as a result of call diversion, it determines whether the calling user or the diverting user is to be accountable for the charges incurred.

D.1.1 Interworking with a public ISDN

For calls to a public ISDN, the accounting entity determines the charges incurred in the public ISDN either by calculation from known tariff information or by use of one or more AOC supplementary services of the public ISDN. The particular public ISDN AOC service need not correspond to the AOC service provided to the PISN user. For example, the public ISDN AOC-S service could be used to provide AOC-S, AOC-D or AOC-E to the PISN user, with the PISN accounting entity using the charge rate information provided by the public ISDN to calculate charge information for AOC-D or AOC-E.

If a public ISDN AOC service is provided to the PISN with invocation on a per call basis, the PISN accounting entity can request the service only at the time of establishment of the connection to the public ISDN. The accounting entity can choose to request the service for all connections automatically, only for those connections where a PISN AOC service is being invoked at the time of connection establishment, or according to some other algorithm. However, if a public ISDN AOC service is not requested at the time of connection establishment, a susbsequent request for a PISN AOC service (e.g., during the call or after transfer) may have to be rejected.

D.1.2 Interworking with a PSTN

For calls to a PSTN, the accounting entity determines the charges incurred in the PSTN either by calculation from known tariff information or by use of an appropriate supplementary service of the PSTN, e.g., meter pulses.

D.2 Charged User

The charged user for a call is the user that is determined by the PISN administration as being accountable for that call. Only the charged user may receive AOC information.

This part of the annex indicates, for various call situations, which user can be a charged user and as a result be able to use one or more of the AOC supplementary services.

D.2.1 Basic call

For a basic call that is not free of charge, it is assumed that the calling user is the charged user. Reverse charging, whereby the called user is charged for the call, is outside the scope of AOC.

A call originated by a PISN user can be charged to that user only when it leaves the PISN (thereby incurring charges from another network).

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A call originating in another network will be free of charge as far as the PISN is concerned unless it is routed through the PISN and out to another network, in which case the originating network will be the charged user.

D.2.2 Interaction with the Call Transfer Supplementary Service

When a user invokes call transfer, it applies to two calls in which the transferring user is involved. Following transfer a single call exists between the two transferred users. AOC is applicable only if one or both of the original calls uses an outgoing connection to another network and incurs charges from that network. The PISN charging entity in the Outgoing Gateway PINX for one of the original calls will apply the charges in one of the following three ways. The term "transferred-to" user denotes the user that, from the point of view of the Outgoing Gateway PINX, is involved in the call resulting from transfer in place of the transferring user. The transferred-to user can be another PISN user or a third network.

1. The transferring user is charged for the original call and the transferred-to user is charged for the call resulting from transfer.
2. The transferred-to user is charged for the original call and for the call resulting from transfer.
3. The transferring user is charged for the original call and for the call resulting from transfer.

In case 2, if the transferring user is using an AOC service for the original call, then at the time of transfer the user will be advised that the entire call has become free of charge.

In case 3, the transferring user can use AOC-E to determine the total combined cost of the original call and the call resulting from transfer when the call resulting from transfer finishes. If both of the original calls are outgoing to other networks and AOC-E is in use on both, then the transferring user will receive two separate final charges when the call resulting from transfer finishes. These indicate separately the charges incurred in the two other networks.

D.2.3 Interaction with Call Diversion Supplementary Services

When a call is diverted from a PISN user to another network in which charges are incurred, it is assumed that the PISN will apply one of the following two charging methods to the resulting call.

1. The calling user is charged for the connection to the other network, and therefore may be able to receive AOC information.
2. The diverting user is charged for the connection to the other network, and therefore may be able to receive AOC information (AOC-E only).

Note - The second method is in line with the method of charging in public ISDNs.

D.2.4 Interaction with Call Interception Additional Network Feature

When a call is intercepted to another network in which charges are incurred, the calling user can be charged for the connection to the other network.

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