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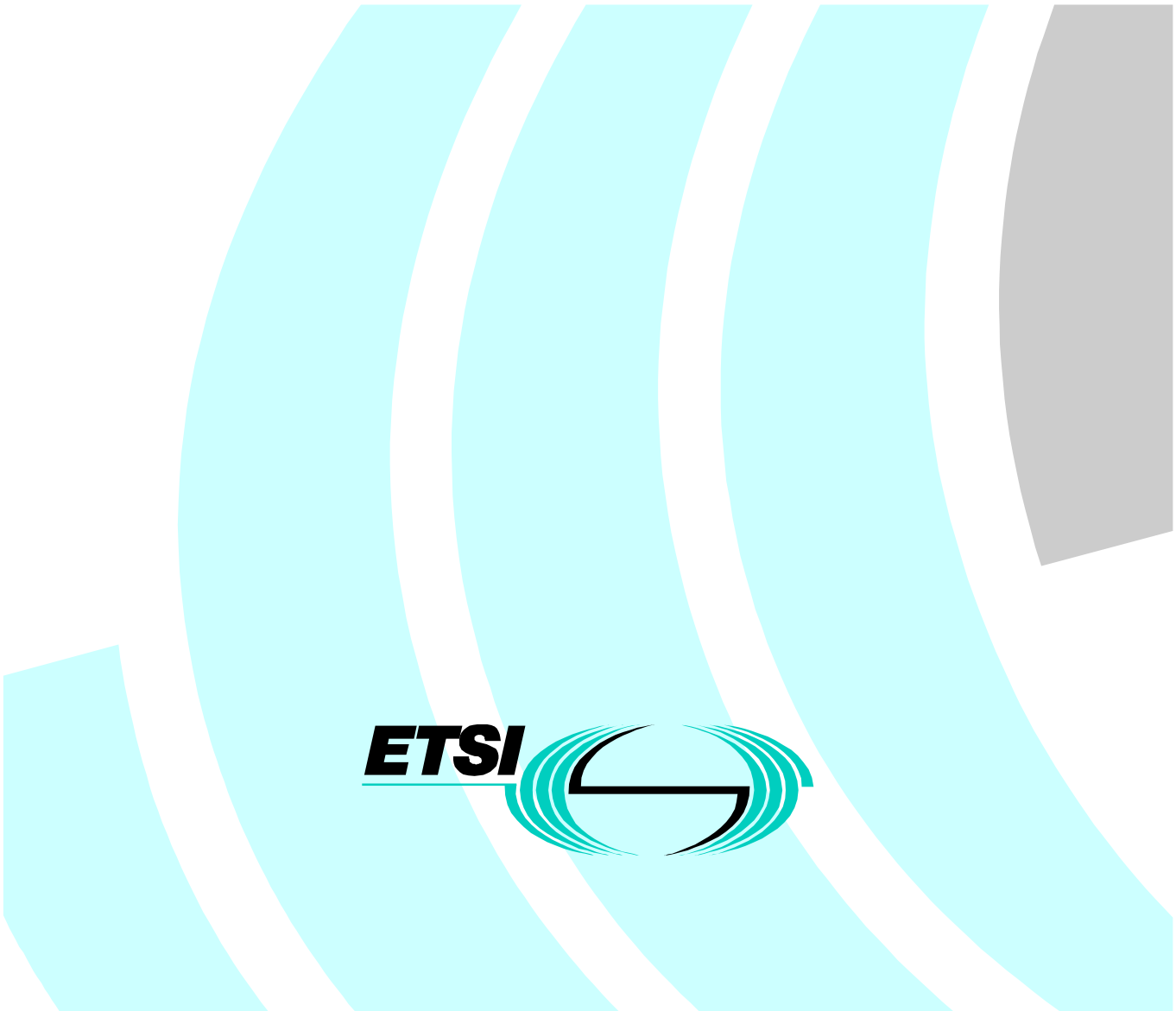
European Standard (Telecommunications series)

Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification



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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Signalling Protocols and Switching (SPS).

The present document is part 1 of a multi-part standard covering the Digital Subscriber Signalling System No. one (DSS1) protocol specification for the Integrated Services Digital Network (ISDN) Completion of Calls to Busy Subscriber (CCBS) supplementary service, as described below:

Part 1: "Protocol specification";

Part 2: "Protocol Implementation Conformance Statement (PICS) proforma specification";

Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification for the user";

Part 4: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user";

Part 5: "Test Suite Structure and Test Purposes (TSS&TP) specification for the network";

Part 6: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".

In accordance with CCITT Recommendation I.130, the following three level structure is used to describe the supplementary telecommunication services as provided by European public telecommunications operators under the pan-European ISDN:

- Stage 1: is an overall service description, from the user's standpoint;
- Stage 2: identifies the functional capabilities and information flows needed to support the service described in stage 1; and
- Stage 3: defines the signalling system protocols and switching functions needed to implement the service described in stage 1.

The present document details the stage 3 aspects (signalling system protocols and switching functions) to support the CCBS supplementary service. The stage 1 and stage 2 aspects are detailed in ETS 300 357 and ETS 300 358, respectively.

The present version updates the references to the basic call specifications.

National transposition dates	
Date of adoption of this EN:	19 June 1998
Date of latest announcement of this EN (doa):	30 September 1998
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 1999
Date of withdrawal of any conflicting National Standard (dow):	31 March 1999

1 Scope

This first part of EN 300 359 specifies the stage three of the Completion of Calls to Busy Subscriber (CCBS) supplementary service for the pan-European Integrated Services Digital Network (ISDN) as provided by European public telecommunications operators at the T reference point or coincident S and T reference point (as defined in ITU-T Recommendation I.411 [6]) by means of the Digital Subscriber Signalling System No. one (DSS1) protocol. Stage three identifies the protocol procedures and switching functions needed to support a telecommunication service (see CCITT Recommendation I.130 [3]).

In addition, the present document specifies the protocol requirements at the T reference point where the service is provided to the user via an intermediate private ISDN.

The present document does not specify the additional protocol requirements where the service is provided to the user via a telecommunications network that is not an ISDN.

The CCBS supplementary service enables user A, encountering a busy destination B, to have the call completed without having to make a new call attempt when the busy destination B becomes not busy.

The CCBS supplementary service is applicable to all circuit-switched telecommunication services, except the video telephony teleservice involving a second connection.

Further parts of EN 300 359 specify the method of testing required to identify conformance to the present document.

The present document is applicable to equipment supporting the CCBS supplementary service, to be attached at either side of a T reference point or coincident S and T reference point when used as an access to the public ISDN.

2 Normative references

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] CCITT Recommendation E.164: "Numbering plan for the ISDN era".

[2] ITU-T Recommendation I.112: "Vocabulary of terms for ISDNs".

[3] CCITT Recommendation I.130 (1988): "Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN".

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

[5] ITU-T Recommendation I.221 (1993): "Common specific characteristics of services".

[6] ITU-T Recommendation I.411 (1993): "ISDN user-network interfaces - Reference configurations".

[7] CCITT Recommendation Q.9 (1988): "Vocabulary of switching and signalling terms".

[8] CCITT Recommendation X.208 (1988): "Specification of Abstract Syntax Notation One (ASN.1)".

[9] CCITT Recommendation X.219 (1988): "Remote Operations: Model, notation and service definition".

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

[11] EN 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".

[12] EN 300 403-2: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 2: Specification and Description Language (SDL) diagrams".

[13] EN 300 195-1: "Integrated Services Digital Network (ISDN); Supplementary service interactions; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[14] EN 300 196-1: "Integrated Services Digital Network (ISDN); Generic functional protocol for the support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[15] EN 300 267-1: "Integrated Services Digital Network (ISDN); Telephony 7 kHz and videotelephony teleservices; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".

[16] ETS 300 358: "Integrated Services Digital Network (ISDN); Completion of Calls to Busy Subscriber (CCBS) supplementary service; Functional capabilities and information flows".

3 Definitions

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

busy: See ITU-T Recommendation I.221 [5], subclause 2.1.5.

call: See CCITT Recommendation Q.9 [7], definition 2201.

call information retention: A procedure of network A to store the call information of a specific call so that it can be used for that call.

call state: A state as defined in EN 300 403-1 [11], subclause 2.1 for either the user or the network as appropriate. A call state may exist for each call reference value (and for each additional responding CEI in the incoming call states).

CCBS busy: Any one of the following conditions will cause a CCBS busy condition:

- maximum number of calls reached at user A (see ITU-T Recommendation I.221 [5], subclause 2.1.3, item 2));
- no B-channels available at user A;
- CCBS recall pending on user A.

CCBS call: A call which is established under the control of the CCBS supplementary service.

CCBS recall: The procedure where user A is requested to complete the communication when user B ceases to be busy.

CCBS request retention: If an attempt to establish a CCBS call fails because the destination is busy again, then the network provider option "CCBS request retention" defines whether the CCBS supplementary service shall continue or not, i.e. if the "CCBS request retention" is supported, the original CCBS request shall retain its position in the queue B, and monitoring of user B shall continue. Otherwise the CCBS request will be deactivated.

destination B: The entity addressed in the original call.

existing service: The basic telecommunication service associated with speech, 3,1 kHz audio and 64 kbit/s unrestricted bearer capabilities.

Integrated Services Digital Network (ISDN): See ITU-T Recommendation I.112 [2], definition 308.

invoke component: See EN 300 196-1 [14], subclause 8.2.2.1. Where reference is made to an "xxxx" invoke component, an invoke component is meant with its operation value set to the value of the operation "xxxx".

ISDN number: A number conforming to the numbering plan and structure specified in CCITT Recommendation E.164 [1].

network: The DSS1 protocol entity at the network side of the user-network interface.

network A: The network, at the coincident S and T reference point, to which user A is attached.

network B: The network, at the coincident S and T reference point, which is identified as destination B.

private network: The DSS1 protocol entity at the user side of the user-network interface at the T reference point.

public network: The DSS1 protocol entity at the network side of the user-network interface at the T reference point.

queue A: A buffer at network A for the control of CCBS requests associated with user A, provided on a per-ISDN number basis.

queue B: A buffer at network B for the control of CCBS requests associated with destination B. Resource is provided in the buffer for each ISDN number, but the buffer is processed on a per-access basis. The buffer is used to support the monitoring of user B to become not busy.

reject component: See EN 300 196-1 [14], subclause 8.2.2.4.

return error component: See EN 300 196-1 [14], subclause 8.2.2.3. Where reference is made to an "xxxx" return error component, a return error component is meant which is related to an "xxxx" invoke component.

return result component: See EN 300 196-1 [14], subclause 8.2.2.2. Where reference is made to an "xxxx" return result component, a return result component is meant which is related to an "xxxx" invoke component.

service; telecommunication service: See ITU-T Recommendation I.112 [2], definition 201.

supplementary service: See ITU-T Recommendation I.210 [4], subclause 2.4.

user: The DSS1 protocol entity at the user side of the user-network interface.

user A: The user, at the coincident S and T reference point, who originated the call and to whom the CCBS supplementary service is provided.

user B: The user, at the coincident S and T reference point, which is identified as destination B.

4 Abbreviations

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

ASN.1	Abstract Syntax Notation One
CCBS	Completion of Calls to Busy Subscriber
DCR	Dummy Call Reference
DSS1	Digital Subscriber Signalling System No. one
ISDN	Integrated Services Digital Network

5 Description

The CCBS supplementary service enables user A, encountering a busy destination B, to have the call completed without having to make a new call attempt when the destination B becomes not busy.

When user A requests the CCBS supplementary service, the network B will monitor destination B for becoming not busy.

When the destination B becomes not busy, (i.e. access resources e.g. one B-channel are not busy) then the network will wait a short time in order to allow the resources to be reused for originating a call. If the resources are not reused within this time by destination B, then the network B will automatically recall user A.

When user A accepts the CCBS recall, then network A will automatically generate a CCBS call to destination B.

6 Operational requirements

6.1 Provision and withdrawal

CCBS may be provided to subscribers by the service provider on a subscription basis or may be generally available. Withdrawal may happen on subscriber's request or for administrative reasons.

As a service provider option, the CCBS supplementary service can be offered with a subscription option which shall apply to the whole access of user A.

Table 1 summarizes the subscription options for the CCBS supplementary service.

Table 1: Subscription option

Subscription option	Value	Meaning
Recall mode	Global recall	CCBS recall offered to all compatible terminals.
	Specific recall	CCBS recall offered to the terminal which has activated the CCBS supplementary service.

If the subscription option is not offered, one of the two values shall be chosen by the network provider.

Table 2 summarizes the network options which apply to the CCBS supplementary service.

Table 2: Network options

Network option	Value	Meaning
Check for identical calls	Yes	The network checks if CCBS is requested for a call identical to a call for which CCBS is already activated.
	No	The network does not check if CCBS is requested for a call identical to a call for which CCBS is already activated.
CCBS request retention	Yes	User A's CCBS request is continued if user B is busy again.
	No	User A's CCBS request does not continue if user B is busy again. User A can activate CCBS again.

6.2 Requirements on the network A side

The network A side shall register whether the CCBS supplementary service specific functions have to be performed in network A or in an attached private ISDN.

6.3 Requirements on the network B side

The network B side shall register whether the CCBS supplementary service specific functions have to be performed in the network B or in an attached private ISDN.

7 Coding requirements

Tables 3 and 4 show the definition of the operations and errors required for the CCBS supplementary service using ASN.1 as defined in CCITT Recommendation X.208 [8] and using the OPERATION and ERROR macro as defined in figure 4/X.219 of CCITT Recommendation X.219 [9].

The formal definition of the component types to encode these operations is provided in EN 300 196-1 [14], clause D.1.

The inclusion of components in Facility information elements is defined in EN 300 196-1 [14], subclause 11.2.

Table 3: ASN.1 description of CCBS operations and errors used at the coincident S and T reference point

```
CCBS-Operations-and-Errors {ccitt identified-organization etsi(0) 359 operations-and-errors(1)}

DEFINITIONS EXPLICIT TAGS ::=

BEGIN

EXPORTS             CallInfoRetain, EraseCallLinkageID,
                    CCBSRequest, CCBSDeactivate, CCBSInterrogate, CCBSErase,
                    CCBSRemoteUserFree, CCBSCall, CCBSStatusRequest, CCBSBFree,
                    CCBSStopAlerting,
                    InvalidCallLinkageID, InvalidCCBSReference, LongTermDenial, ShortTermDenial,
                    CCBSIsAlreadyActivated, AlreadyAccepted, OutgoingCCBSQueueFull,
                    CallFailureReasonNotBusy, NotReadyForCall;

IMPORTS             OPERATION, ERROR
                    FROM Remote-Operation-Notation
                        {joint-iso-ccitt remote-operations(4) notation(0)}

                    notSubscribed, supplementaryServiceInteractionNotAllowed
                    FROM General-Errors
                        {ccitt identified-organization etsi(0) 196 general-errors(2)}

                    Address, PartyNumber, PartySubaddress
                    FROM Addressing-Data-Elements
                        {ccitt identified-organization etsi(0) 196 addressing-data-elements(6)}

                    Q931InformationElement
                    FROM Embedded-Q931-Types
                        {ccitt identified-organization etsi(0) 196 embedded-q931-types(7)};

CallInfoRetain              ::= OPERATION
                                ARGUMENT    callLinkageID       CallLinkageID

EraseCallLinkageID          ::= OPERATION
                                ARGUMENT    callLinkageID       CallLinkageID

CCBSRequest                 ::= OPERATION
                                ARGUMENT    callLinkageID       CallLinkageID
                                RESULT SEQUENCE {
                                            recallMode          RecallMode,
                                            cCBSReference       CCBSReference}
                                ERRORS     {notSubscribed, InvalidCallLinkageID, ShortTermDenial,
                                            LongTermDenial, CCBSIsAlreadyActivated,
                                            supplementaryServiceInteractionNotAllowed,
                                            OutgoingCCBSQueueFull, CallFailureReasonNotBusy}

CCBSInterrogate             ::= OPERATION
                                ARGUMENT SEQUENCE {
                                            cCBSReference       CCBSReference OPTIONAL,
                                            partyNumberOfA      PartyNumber OPTIONAL}
                                RESULT SEQUENCE {
                                            recallMode          RecallMode,
                                            callDetails         CallDetails OPTIONAL}
                                ERRORS     {InvalidCCBSReference, notSubscribed}

CCBSDeactivate              ::= OPERATION
                                ARGUMENT    cCBSReference       CCBSReference
                                RESULT
                                ERRORS {InvalidCCBSReference}
```

Table 3 (continued): ASN.1 description of CCBS operations and errors used at the coincident S and T reference point

```
CCBSErase                   ::= OPERATION
                                ARGUMENT SEQUENCE {
                                           recallMode          RecallMode,
                                           cCBSReference       CCBSReference,
                                           addressOfB          Address,
                                           q931InfoElement     Q931InformationElement,
                                           eraseReason         CCBSEraseReason}

-- The Bearer capability, High layer compatibility (optional) and Low layer compatibility
-- (optional) information elements shall be embedded in q931InfoElement.

CCBSRemoteUserFree          ::= OPERATION
                                ARGUMENT SEQUENCE {
                                           recallMode          RecallMode,
                                           cCBSReference       CCBSReference,
                                           addressOfB          Address,
                                           q931InfoElement     Q931InformationElement}

-- The Bearer capability, High layer compatibility (optional) and Low layer compatibility
-- (optional) information elements shall be embedded in q931InfoElement.

CCBSBFree                   ::= OPERATION
                                ARGUMENT SEQUENCE {
                                           recallMode          RecallMode,
                                           cCBSReference       CCBSReference,
                                           addressOfB          Address,
                                           q931InfoElement     Q931InformationElement}

-- The Bearer capability, High layer compatibility (optional) and Low layer compatibility
-- (optional) information elements shall be embedded in q931InfoElement.

CCBSCall                    ::= OPERATION
                                ARGUMENT    cCBSReference       CCBSReference
                                ERRORS     {InvalidCCBSReference, AlreadyAccepted,
                                            NotReadyForCall}

CCBSStatusRequest           ::= OPERATION
                                ARGUMENT SEQUENCE {
                                           recallMode          RecallMode,
                                           cCBSReference       CCBSReference,
                                           q931InfoElement     Q931InformationElement}
                                RESULT BOOLEAN -- free=TRUE, busy=FALSE

-- The Bearer capability, High layer compatibility (optional) and Low layer compatibility
-- (optional) information elements shall be embedded in q931InfoElement.

CCBSStopAlerting            ::= OPERATION
                                ARGUMENT    cCBSReference       CCBSReference

CallDetails                 ::= SEQUENCE SIZE(1..5) OF CallInformation

CallInformation             ::= SEQUENCE {
                                    addressOfB          Address,
                                    q931InfoElement     Q931InformationElement,
                                    cCBSReference       CCBSReference,
                                    subAddressOfA       PartySubaddress OPTIONAL}

-- The Bearer capability, High layer compatibility (optional) and Low layer compatibility
-- (optional) information elements shall be embedded in q931InfoElement.

InvalidCallLinkageID        ::= ERROR
InvalidCCBSReference        ::= ERROR
LongTermDenial              ::= ERROR
ShortTermDenial             ::= ERROR
CCBSIsAlreadyActivated      ::= ERROR
AlreadyAccepted             ::= ERROR
OutgoingCCBSQueueFull       ::= ERROR
CallFailureReasonNotBusy    ::= ERROR
NotReadyForCall             ::= ERROR

CallLinkageID               ::= INTEGER (0..127)
CCBSReference               ::= INTEGER (0..127)
```

Table 3 (concluded): ASN.1 description of CCBS operations and errors used at the coincident S and T reference point

```
CCBSEraseReason             ::= ENUMERATED {
                                    normal-unspecified (0),
                                    t-CCBS2-timeout    (1),
                                    t-CCBS3-timeout    (2),
                                    basic-call-failed  (3)}

RecallMode                  ::= ENUMERATED {
                                    globalRecall   (0),
                                    specificRecall (1)}

cCBSOID OBJECT IDENTIFIER   ::= {ccitt identified-organization etsi(0) 359
                                 operations-and-errors(1)}

callInfoRetain              CallInfoRetain              ::= globalValue {cCBSOID 1}
cCBSRequest                 CCBSRequest                 ::= globalValue {cCBSOID 2}
cCBSDeactivate              CCBSDeactivate              ::= globalValue {cCBSOID 3}
cCBSInterrogate             CCBSInterrogate             ::= globalValue {cCBSOID 4}
cCBSErase                   CCBSErase                   ::= globalValue {cCBSOID 5}
cCBSRemoteUserFree          CCBSRemoteUserFree          ::= globalValue {cCBSOID 6}
cCBSCall                    CCBSCall                    ::= globalValue {cCBSOID 7}
cCBSStatusRequest           CCBSStatusRequest           ::= globalValue {cCBSOID 8}
cCBSBFree                   CCBSBFree                   ::= globalValue {cCBSOID 9}
eraseCallLinkageID          EraseCallLinkageID          ::= globalValue {cCBSOID 10}
cCBSStopAlerting            CCBSStopAlerting            ::= globalValue {cCBSOID 11}
invalidCallLinkageID        InvalidCallLinkageID        ::= globalValue {cCBSOID 20}
invalidCCBSReference        InvalidCCBSReference        ::= globalValue {cCBSOID 21}
longTermDenial              LongTermDenial              ::= globalValue {cCBSOID 22}
shortTermDenial             ShortTermDenial             ::= globalValue {cCBSOID 23}
cCBSIsAlreadyActivated      CCBSIsAlreadyActivated      ::= globalValue {cCBSOID 24}
alreadyAccepted             AlreadyAccepted             ::= globalValue {cCBSOID 25}
outgoingCCBSQueueFull       OutgoingCCBSQueueFull       ::= globalValue {cCBSOID 26}
callFailureReasonNotBusy    CallFailureReasonNotBusy    ::= globalValue {cCBSOID 27}
notReadyForCall             NotReadyForCall             ::= globalValue {cCBSOID 28}


END -- of CCBS-Operations-and-Errors
```

Table 4: ASN.1 description of CCBS operations and errors for interworking with private ISDNs

```
CCBS-private-networks-Operations-and-Errors {ccitt identified-organization etsi(0) 359
                                             private-networks-operations-and-errors(2)}

DEFINITIONS EXPLICIT TAGS ::=

BEGIN

EXPORTS             CCBS-T-Request, CCBS-T-Call, CCBS-T-Suspend, CCBS-T-Resume,
                    CCBS-T-RemoteUserFree, CCBS-T-Available, LongTermDenial, ShortTermDenial;

IMPORTS             OPERATION, ERROR
                    FROM Remote-Operation-Notation
                        {joint-iso-ccitt remote-operations(4) notation (0)}

                    notSubscribed
                    FROM General-Errors
                        {ccitt identified-organization etsi(0) 196 general-errors(2)}

                    Address
                    FROM Addressing-Data-Elements
                        {ccitt identified-organization etsi(0) 196 addressing-data-elements(6)}
                    Q931InformationElement
                    FROM Embedded-Q931-Types
                        {ccitt identified-organization etsi(0) 196 embedded-q931-types(7)};
```

Table 4 (concluded): ASN.1 description of CCBS operations and errors for interworking with private ISDNs

```
CCBS-T-Request              ::= OPERATION
                                ARGUMENT SEQUENCE {
                                           destinationAddress           Address,
                                           q931InfoElement              Q931InformationElement,
                                           -- contains HLC, LLC and BC information
                                           retentionSupported           [1] IMPLICIT BOOLEAN
                                                                            DEFAULT FALSE,
                                           presentationAllowedIndicator [2] IMPLICIT BOOLEAN
                                                                            OPTIONAL,
                                           -- The use of this parameter is specified in
                                           -- EN 300 195-1 for interaction of CCBS with CLIP
                                           originatingAddress           Address OPTIONAL}
                                           -- The use of this parameter is specified in
                                           -- EN 300 195-1 for interaction of CCBS with CLIP
                                RESULT     retentionSupported BOOLEAN   -- Default False
                                ERRORS    {ShortTermDenial, notSubscribed, LongTermDenial}

CCBS-T-Call                 ::= OPERATION
CCBS-T-Suspend              ::= OPERATION
CCBS-T-Resume               ::= OPERATION
CCBS-T-RemoteUserFree       ::= OPERATION
CCBS-T-Available            ::= OPERATION

ShortTermDenial             ::= ERROR
LongTermDenial              ::= ERROR

cCBS-T-OID OBJECT IDENTIFIER   ::= {ccitt identified-organization etsi(0) 359
                                    private-networks-operations-and-errors(2)}

cCBS-T-Request              CCBS-T-Request          ::= globalValue {cCBS-T-OID 1}
cCBS-T-Call                 CCBS-T-Call             ::= globalValue {cCBS-T-OID 2}
cCBS-T-Suspend              CCBS-T-Suspend          ::= globalValue {cCBS-T-OID 3}
cCBS-T-Resume               CCBS-T-Resume           ::= globalValue {cCBS-T-OID 4}
cCBS-T-RemoteUserFree       CCBS-T-RemoteUserFree   ::= globalValue {cCBS-T-OID 5}
cCBS-T-Available            CCBS-T-Available        ::= globalValue {cCBS-T-OID 6}

longTermDenial              LongTermDenial          ::= globalValue {cCBS-T-OID 20}
shortTermDenial             ShortTermDenial         ::= globalValue {cCBS-T-OID 21}


END -- of CCBS-private-networks-operations-and-errors
```

8 State definitions

8.1 User A states

The following states have been defined for user A:

CCBS Idle: The CCBS supplementary service is not activated.
CCBS Requested: The user has sent a CCBS request to network A and is waiting for a response.
CCBS Activated: The CCBS supplementary service has been activated.
CCBS Free: The user has received a B free indication.
CCBS Call Init: The user has accepted the recall.
CCBS Interrogation Requested: The user has requested interrogation and is waiting for a response.
CCBS DeactivationRequested: The user has requested deactivation and is waiting for a response.

8.2 User B states

No additional states are defined for user B.

8.3 Network A states

The following states have been defined for network A:

CCBS Idle:	The CCBS supplementary service is not activated.
CCBS Requested:	The network A has sent a CCBS request to network B and is waiting for a response.
CCBS Activated:	The CCBS supplementary service has been activated.
CCBS Free:	The network A has received a B free indication and has informed user A.
CCBS Suspended:	The CCBS supplementary service has been suspended.
CCBS Call Init:	The network A has initiated the CCBS call.
CCBS Check A:	Waiting for a response from user A to the CCBS status request procedure.

8.4 Network B states

The following states have been defined for network B:

CCBS Idle:	There are no outstanding requests.
CCBS Await Processing:	The request is in the queue B, user B is being monitored.
CCBS Await Status:	Idle Waiting for a response from user B to the status request procedure.
WAIT T-CCBS4:	Waiting for idle guard timer to expire.
CCBS Free:	User B is free, awaiting CCBS call.

9 Signalling procedures at the coincident S and T reference point

9.1 Activation

9.1.1 Normal operation

In order that a user A who has subscribed to the CCBS supplementary service may utilize the service when a busy destination B is encountered it is necessary for network A to utilize the call information retention procedure.

Network A shall provide the call information retention procedure, according to the procedures in subclause 9.6, when the following set of conditions apply:

- CCBS is subscribed to;
- the call failure reason is "busy", i.e. cause value #17 (user busy) or #34 (no circuit/channel available);
- CCBS is available (as determined by network B);
- the user A CCBS queue limit has not been exceeded;
- CCBS has not been activated for an identical call (network option); and
- there are no supplementary service interactions that preclude CCBS.

However, these conditions shall not prevent network A from providing the call information retention procedure in other circumstances.

Call information retained by network A in support of CCBS shall be the following basic call information from the initial call, if available, in order to enable an identical basic call to be made:

- Bearer capability information;
- High layer compatibility information;
- Low layer compatibility information;
- Calling party address information; and,
- Called party address information.

NOTE 1: This information may be derived from user A provided information or may be network A provided, e.g. the calling party number may be user or network A provided. For some basic services the information may be derived from more than one information element, e.g. for the 7 kHz telephony teleservice the bearer capability information may include information from two Bearer capability information elements and details on the priority of this information.

Furthermore, network A shall retain the following information, determined by network B, in order to decide whether CCBS is permitted:

- call failure reason; and
- CCBS available indication.

NOTE 2: When interacting with other supplementary services, retention of further information may be mandatory. Furthermore, the retention of addresses is independent of any supplementary service, although the address information retained may be influenced by other supplementary services. Refer to EN 300 195-1 [13] for details on supplementary service interactions.

To activate the CCBS supplementary service, user A shall send a CCBSRequest invoke component including the callLinkageID parameter to network A, using the procedures in subclause 10.2.2.1 of EN 300 196-1 [14]. The callLinkageID parameter is determined according to the procedures in subclause 9.6. On receiving this invoke component, network A shall request activation of the CCBS supplementary service at network B.

On receiving confirmation that the CCBS supplementary service has been activated at network B, network A shall select a new value for the cCBSReference parameter, send a CCBSRequest return result component to user A including the cCBSReference parameter and the recallMode parameter, as described in subclause 10.2.2.1 of EN 300 196-1 [14], place the CCBS request in queue A, and start timer T-CCBS2. The status notification procedure does not apply. The recallMode parameter shall be set according to the value of the subscription option "recall mode". The cCBSReference parameter shall have significance on the whole access, i.e. a cCBSReference parameter value shall not be reused for subsequent CCBS requests on an access before it is released.

If user A receives a correctly encoded CCBSRequest return result component, then user A shall follow the procedure described in subclause 10.2.2.1 of EN 300 196-1 [14]. If the recallMode parameter indicates "specificRecall", then user A shall retain the cCBSReference parameter.

If the recallMode parameter indicates "globalRecall", then on receipt of the CCBSRequest return result component, user A may retain the cCBSReference parameter, e.g. for the purpose of interrogation and deactivation.

9.1.2 Exceptional procedures

If network A cannot accept the CCBS request because user A has not subscribed to the CCBS supplementary service, then network A shall send a CCBSRequest return error component indicating "notSubscribed" to user A, using the procedure in subclause 10.2.2.2 of EN 300 196-1 [14].

If network A cannot accept the CCBS request because user A has provided an invalid callLinkageID parameter then network A shall send a CCBSRequest return error component indicating "invalidCallLinkageID" to user A, using the procedure in subclause 10.2.2.2 of EN 300 196-1 [14].

If network A cannot accept the CCBS request because the call failure reason of the call identified by the callLinkageID parameter was not "busy", then network A shall send a CCBSRequest return error component indicating "callFailureReasonNotBusy" to user A, using the procedure in subclause 10.2.2.2 of EN 300 196-1 [14].

NOTE 1: The error "callFailureReasonNotBusy" can occur if the call information retention procedure in subclause 9.6 is used by supplementary services other than the CCBS supplementary service.

If network A cannot accept the CCBS request because queue A is full, then network A shall send a CCBSRequest return error component indicating "outgoingCCBSQueueFull" to user A, using the procedure in subclause 10.2.2.2 of EN 300 196-1 [14].

If network A cannot accept the CCBS request because user A has already activated the CCBS supplementary service for the call identified by the callLinkageID parameter, then network A shall send a CCBSRequest return error component indicating "cCBSIsAlreadyActivated" to user A, using the procedure in subclause 10.2.2.2 of EN 300 196-1 [14].

If the network A option "check for identical calls" is set to "yes", network A shall check if the call for which CCBS is requested and a call in queue A are identical. If network A cannot accept the CCBS request because user A has already activated the CCBS supplementary service for an identical call placed in queue A, then network A shall send a CCBSRequest return error component indicating "cCBSIsAlreadyActivated" to user A, using the procedure in subclause 10.2.2.2 of EN 300 196-1 [14].

To determine whether the call indicated by the callLinkageID parameter and a call in queue A are identical, the following basic call information shall be compared, if available:

- Bearer capability information;
- High layer compatibility information;
- Low layer compatibility information;
- Called party address information; and
- Calling party address information.

If network A cannot accept the CCBS request because there are invalid supplementary service interactions between the CCBS supplementary service and the call identified by the callLinkageID parameter, then network A shall send a CCBSRequest return error component indicating "supplementaryServiceInteractionNotAllowed" to user A, using the procedure in subclause 10.2.2.2 of EN 300 196-1 [14].

If network A cannot accept the CCBS request identified by the callLinkageID parameter because CCBS is not available to the destination, then network A shall send a CCBSRequest return error component indicating "longTermDenial" to user A, using the procedure in subclause 10.2.2.2 of EN 300 196-1 [14].

NOTE 2: This includes the case that network B did not indicate that CCBS was available when the call failed, and the case that the request for CCBS was rejected by network B.

If network A cannot accept the CCBS request identified by the callLinkageID parameter because the CCBS supplementary service is not available to the destination at this time, then network A shall send a CCBSRequest return error component indicating "shortTermDenial" to user A, using the procedure in subclause 10.2.2.2 of EN 300 196-1 [14].

If timer T-CCBS2 expires, network A shall deactivate the CCBS supplementary service activation according to the procedures in subclause 9.4.4. The cCBSEraseReason parameter shall indicate "t-CCBS2-timeout".

On expiration of timer T-ACTIVATE and user A has not received any response to the CCBSRequest invoke component, then user A shall consider that this request for the CCBS supplementary service has failed.

On receipt of a CCBSRequest return error component indicating "invalidCallLinkageID", then user A shall remove knowledge of this callLinkageID parameter.

If the return error component indicates any other reason, then user A shall take no action.

If a reject component is received and the invoke identifier is included, user A shall ignore the received component.

Subsequent procedures for network A and user A are as specified in subclause 10.2.2.2 of EN 300 196-1 [14] for terminating the transaction.

9.2 User initiated deactivation procedure

9.2.1 Normal operation

To deactivate a CCBS supplementary service activation, user A shall send a CCBSDeactivate invoke component including the cCBSReference parameter to network A using the procedure described in subclause 10.2.3.1 of EN 300 196-1 [14].

On receipt of the CCBSDeactivate invoke component, network A shall send a CCBSDeactivate return result component to user A using the procedure described in subclause 10.2.3.1 of EN 300 196-1 [14], and the CCBS supplementary service shall be deactivated according to the procedures in subclause 9.4.4. The cCBSEraseReason parameter shall indicate "normal-unspecified". The status notification does not apply.

If user A receives a correctly encoded CCBSDeactivate return result component, then user A shall follow the procedure described in subclause 10.2.3.1 of EN 300 196-1 [14] and shall remove knowledge of the CCBS deactivation identified by the cCBSReference parameter.

To deactivate all CCBS requests, user A shall perform a CCBS deactivation for each outstanding CCBS activation.

NOTE: The user can obtain details on active CCBS requests via the interrogation procedures in subclause 9.3.

9.2.2 Exceptional procedures

If network A cannot accept the request because user A has provided an invalid cCBSReference parameter, or user A has not subscribed to the CCBS supplementary service, then network A shall send a CCBSDeactivate return error component, indicating "invalidCCBSReference" to user A using the procedure described in subclause 10.2.3.2 of EN 300 196-1 [14].

On receipt of this return error component, user A shall remove knowledge of the CCBS request identified by the cCBSReference parameter.

On expiration of timer T-DEACTIVATE and user A has not received any response to the CCBSDeactivate invoke component, then user A shall consider that this attempt to deactivate the CCBS supplementary service has failed and that the CCBS supplementary service may still be activated.

Subsequent procedures for network A and user A are as specified in subclause 10.2.3.2 of EN 300 196-1 [14] for terminating the transaction.

If a reject component is received and the invoke identifier is included, user A shall retain knowledge of the CCBS request identified by the cCBSReference parameter.

9.3 Interrogation

9.3.1 General interrogation

9.3.1.1 Normal operation

To perform an interrogation of all CCBS requests, user A shall send a CCBSInterrogate invoke component without a cCBSReference parameter to network A using the procedure described in subclause 10.2.4.1 of EN 300 196-1 [14]. User A may provide the partyNumberOfA parameter in the CCBSInterrogate invoke component.

On receiving this invoke component, network A shall send a CCBSInterrogate return result component to user A according to the procedure defined in subclause 10.2.4.1 of EN 300 196-1 [14]. The return result component shall contain as arguments the recallMode parameter and a list in chronological order of the CCBS requests for this access, if any. The recallMode parameter shall be set according to the value of the subscription option "recall mode".

For each request, network A shall provide the cCBSReference parameter, and according to the procedures in subclause 9.7, the addressOfB parameter, q931InfoElement parameter, and, if available, the subAddressOfA parameter. If no requests exist the callDetails parameter shall not be included. Network A shall ignore the partyNumberOfA parameter, if provided by the user.

NOTE 1: Other uses of the partyNumberOfA parameter e.g. the interaction with multiple subscriber number supplementary service are specified in EN 300 195-1 [13].

On receipt of this return result component, user A shall follow the procedure described in subclause 10.2.4.1 of EN 300 196-1 [14] and shall discard details of those requests that are not compatible with user A's service compatibility information according to the procedure in subclause 9.7.

NOTE 2: In the case of "globalRecall" any cCBSReference parameter may be retained by a user e.g. for the purpose of deactivation.

9.3.1.2 Exceptional procedures

If network A cannot accept the request because user A has not subscribed to the CCBS supplementary service, then network A shall send a CCBSInterrogate return error component, indicating "notSubscribed" to user A using the procedure described in subclause 10.2.4.2 of EN 300 196-1 [14].

On receipt of this return error component, user A shall remove knowledge of all CCBS requests, if any.

Subsequent procedures for network A and user A are as specified in subclause 10.2.4.2 of EN 300 196-1 [14] for terminating the transaction.

If user A receives a reject component and the invoke identifier is included, then user A shall take no protocol action.

On expiration of timer T-INTERROGATE and user A has not received any response to the CCBSInterrogate invoke component, then user A shall consider that this attempt to interrogate the CCBS supplementary service has failed.

9.3.2 Specific interrogation

9.3.2.1 Normal operation

To perform an interrogation of a specific active CCBS request, user A shall send a CCBSInterrogate invoke component with the cCBSReference parameter of the request to be interrogated to network A using the procedure described in subclause 10.2.4.1 of EN 300 196-1 [14].

On receiving this invoke component, network A shall send a CCBSInterrogate return result component to user A using the procedure described in subclause 10.2.4.1 of EN 300 196-1 [14]. The return result component shall contain as arguments the recallMode parameter, the cCBSReference parameter and according to the procedures in subclause 9.7, the addressOfB parameter, the q931InfoElement parameter, and, if available, the subaddressOfA parameter. The recallMode parameter shall be set according to the value of the subscription option "recall mode".

On receipt of this return result component, user A shall follow the procedure described in subclause 10.2.4.1 of EN 300 196-1 [14] and shall take no further protocol actions.

9.3.2.2 Exceptional procedures

If network A cannot accept the request because user A has not subscribed to the CCBS supplementary service, then network A shall send a CCBSInterrogate return error component indicating "notSubscribed" to user A using the procedure described in subclause 10.2.4.2 of EN 300 196-1 [14].

On receipt of this return error component, user A shall remove knowledge of all CCBS requests.

If network A cannot accept the request because user A has provided an invalid cCBSReference parameter, then network A shall send a CCBSInterrogate return error component indicating "invalidCCBSReference" to user A using the procedure described in subclause 10.2.4.2 of EN 300 196-1 [14].

On receipt of this return error component, user A shall remove knowledge of the CCBS request identified by the cCBSReference parameter.

Subsequent procedures for network A and user A are as specified in subclause 10.2.4.2 of EN 300 196-1 [14] for terminating the transaction.

If user A receives a reject component and the invoke identifier is included, then user A shall retain knowledge of the CCBS request identified by the cCBSReference parameter.

On expiration of timer T-INTERROGATE and user A has not received any response to the CCBSInterrogate invoke component, then user A shall consider that this attempt to interrogate the CCBS supplementary service has failed.

9.4 Invocation and operation

9.4.1 Recall indication

9.4.1.1 Normal operation

If network A is informed that user B is not busy, network A shall determine whether user A is neither busy nor CCBS busy by using the procedures in subclause 9.4.6.

If user A is neither busy nor CCBS busy, then network A shall start timer T-CCBS3 and indicate that it is prepared for establishment of the requested call, by sending a CCBSRemoteUserFree invoke component to user A. If network A knows that a point-to-point configuration exists at user A's access, network A shall send this invoke component according to the procedure in subclause 8.3.2.2 of EN 300 196-1 [14]. Otherwise network A shall send this invoke component according to the procedure in subclause 8.3.2.4 of EN 300 196-1 [14]. The invoke component shall contain as arguments the recallMode parameter, the cCBSReference parameter, and, according to the procedures in subclause 9.7, the addressOfB parameter and q931InfoElement parameter. The recallMode parameter shall be set according to the value of the subscription option "recall mode".

If user A is busy or CCBS busy, then network A shall proceed according to subclause 9.4.5.

On receipt of the CCBSRemoteUserFree invoke component, user A shall ignore the invoke component, unless the service provided by user A is compatible with the service indicated in the CCBSRemoteUserFree invoke component as determined by the procedure in subclause 9.7.

Users accepting this invoke component shall retain the cCBSReference parameter value and may proceed to establish a call using the procedures in subclause 9.4.2.

9.4.1.2 Exceptional procedures

If on receipt of the CCBSRemoteUserFree invoke component user A does not want to accept the CCBS call, then user A shall either:

- ignore the CCBSRemoteUserFree invoke component; or,
- shall initiate the deactivation procedure as described in subclause 9.2.

If timer T-CCBS2 or T-CCBS3 expire, the CCBS supplementary service shall be deactivated according to the procedures in subclause 9.4.4. The cCBSEraseReason parameter shall indicate "t-CCBS2-timeout" respectively "t-CCBS3-timeout".

If a reject component is received and the invoke identifier is included, then network A shall take no action.

9.4.2 CCBS call request

9.4.2.1 Normal operation

To establish the CCBS call, user A shall send a SETUP message to network A in accordance with EN 300 403-1 [11], subclause 5.1. The SETUP message shall contain the Bearer capability information element(s) from the original call, and a Facility information element with a CCBSCall invoke component with the cCBSReference parameter value received in the CCBSRemoteUserFree invoke component.

NOTE 1: In relation with other supplementary services further (not retained) information elements may be present in the SETUP message (e.g. the User-user information element). Further information is given in EN 300 195-1 [13].

If "specificRecall" was indicated in the CCBSRemoteUserFree invoke component, then user A shall retain the cCBSReference parameter value after having sent this SETUP message.

NOTE 2: If "globalRecall" was indicated in the CCBSRemoteUserFree invoke component, then user A may retain the cCBSReference parameter value after having sent this SETUP message.

On receiving the SETUP message, network A shall stop timer T-CCBS3, discard any received call information which is subject to call information retention as defined in subclause 9.1.1 and proceed with normal en-bloc basic call procedures in accordance with EN 300 403-1 [11], subclauses 5.1.2 and 5.1.5.1 using the retained call information. Furthermore, if a multipoint configuration exists and the subscription option "recall mode" is set to "globalRecall", then network A shall send a CCBSStopAlerting invoke component containing the cCBSReference parameter to user A, according to the procedures in subclause 8.3.2.4 of EN 300 196-1 [14].

If user A has acted upon a CCBSRemoteUserFree invoke component and has not yet requested call establishment with the CCBSCall invoke component, then, on receipt of the CCBSStopAlerting invoke component containing the same cCBSReference parameter value, user A shall take no protocol actions.

9.4.2.2 Exceptional procedures

If network A cannot accept the request because user A provided an invalid cCBSReference parameter value, network A shall send a CCBSCall return error component, indicating "invalidCCBSReference" to user A in an appropriate clearing message according to the procedures in subclause 8.3.1.1.2 of EN 300 196-1 [14].

If network A cannot accept the request because timer T-CCBS3 is not running for the given cCBSReference parameter value (e.g. network A is still monitoring user B), then network A shall send a CCBSCall return error component indicating "notReadyForCall" to user A in an appropriate clearing message according to the procedures in subclause 8.3.1.1.2 of EN 300 196-1 [14].

If network A cannot accept the request because no B-channels can be selected, then network A shall proceed according to the procedures in EN 300 403-1 [11], subclause 5.1.2. Furthermore, network A shall suspend the CCBS request at network B and resume monitoring of user A according to the procedures in subclause 9.4.5. If a multipoint configuration exists and the subscription option "recall mode" is set to "globalRecall" then network A shall send a CCBSStopAlerting invoke component containing the cCBSReference parameter to user A, according to the procedures in subclause 8.3.2.4 of EN 300 196-1 [14].

If the CCBSRemoteUserFree invoke component sent to user A indicated "globalRecall", network A may receive more than one SETUP message with a CCBSCall invoke component and indicating all the same cCBSReference parameter value. In this case network A shall respond to all subsequent SETUP messages by sending an appropriate clearing message containing a CCBSCall return error component indicating "alreadyAccepted" according to the procedures defined in subclause 8.3.1.1.2 of EN 300 196-1 [14].

On receipt of a CCBSCall return error component indicating "invalidCCBSReference" user A shall remove knowledge of the cCBSReference parameter value.

NOTE: If a CCBSCall return error component is received indicating "alreadyAccepted" or "notReadyForCall", then the cCBSReference parameter value may be retained, e.g. for the purpose of interrogation and deactivation.

If a reject component is received and the invoke identifier is included, user A shall retain knowledge of the cCBSReference parameter value.

9.4.3 CCBS call establishment

9.4.3.1 Normal operation

On accepting a CCBSCall invoke component, network A shall proceed to establish a call to user B.

On receiving an indication that user alerting has been initiated at the called address, network A shall proceed with basic call procedures as specified in subclause 5.1.7 of EN 300 403-1 [11]. Furthermore, the CCBS supplementary service shall be deactivated according to the procedures in subclause 9.4.4. The cCBSEraseReason parameter shall indicate "normal-unspecified".

On receiving an indication that the call has been accepted, without having first received an indication of user alerting, network A shall proceed with basic call procedures as specified in subclause 5.1.8 of EN 300 403-1 [11]. Furthermore, the CCBS supplementary service shall be deactivated according to the procedures in subclause 9.4.4. The cCBSEraseReason parameter shall indicate "normal-unspecified".

9.4.3.2 Exceptional procedures

If network B cannot establish the call because user B is busy again, and the CCBS request has not been deactivated, and the network option "CCBS request retention" is set to "yes", then as a result of network B proceeding with normal call clearing, network A shall clear the call according to the procedures in subclause 5.3.4 of EN 300 403-1 [11] and network B shall resume monitoring user B for being not busy.

If network B cannot establish the call because user B is busy again, and the CCBS request has not been deactivated, and the network option "CCBS request retention" is set to "no", then as a result of network B proceeding with normal call clearing, network A shall clear the call according to the procedures in subclause 5.3.4 of EN 300 403-1 [11], and allow user A to activate the CCBS supplementary service again using the procedures in subclause 9.1.1. Furthermore, the CCBS supplementary service shall be deactivated according to the procedures in subclause 9.4.4. The cCBSEraseReason parameter shall indicate "basic-call-failed".

If network B cannot establish the call for any reason other than user B being busy again, then as a result of network B proceeding with normal call clearing, network A shall clear the call according to the procedures in subclause 5.3.4 of EN 300 403-1 [11]. Furthermore, if the CCBS request has not been deactivated the CCBS supplementary service shall be deactivated according to the procedures in subclause 9.4.4. The cCBSEraseReason parameter shall indicate "basic-call-failed".

If timer T-CCBS2 expires before sending the ALERTING or CONNECT message to user A, the CCBS supplementary service shall be deactivated according to the procedures in subclause 9.4.4. The cCBSEraseReason parameter shall indicate "t-CCBS2-timeout". Furthermore, the CCBS call shall be allowed to proceed according to the procedures in EN 300 403-1 [11].

If clearing of the CCBS call is initiated by user A before the ALERTING or CONNECT message is sent to user A, network A shall proceed with clearing according to the procedures in subclause 5.3.3 of EN 300 403-1 [11]. Furthermore the CCBS supplementary service shall be deactivated according to the procedures in subclause 9.4.4. The cCBSEraseReason parameter shall indicate "basic-call-failed".

If user A requests deactivation of a CCBS request while the CCBS call associated with that request is in the process of being established, then the procedures in subclause 9.2 shall be followed and the establishment of the CCBS call shall continue according to the procedures in EN 300 403-1 [11].

9.4.4 Network initiated deactivation procedures

9.4.4.1 Normal operation

Whenever network A deactivates the CCBS supplementary service, network A shall:

- stop timer T-CCBS2, if running; and,
- stop timer T-CCBS3, if running; and,
- send a CCBSErase invoke component to user A. If network A knows that a point-to-point configuration exists, network A shall send this invoke component according to the procedures defined in subclause 8.3.2.2 of EN 300 196-1 [14], otherwise network A shall send this invoke component according to the procedures in subclause 8.3.2.4 of EN 300 196-1 [14]. The invoke component shall contain as arguments the recallMode parameter, the cCBSEraseReason parameter, and, according to the procedures in subclause 9.7, the addressOfB parameter and q931InfoElement parameter. The recallMode parameter shall be set according to the value of the subscription option "recall mode". The cCBSEraseReason parameter shall be set to "normal-unspecified", "t-CCBS2-timeout", "t-CCBS3-timeout", or "basic-call-failed" as appropriate;
- release the cCBSReference parameter value and make it available for subsequent use; and
- remove the request from queue A; and
- release all retained call information.

On receipt of the CCBSErase invoke component, user A shall remove knowledge of the indicated CCBS request.

9.4.4.2 Exceptional procedures

Not applicable.

9.4.5 B free but A busy procedure

9.4.5.1 Normal operation

If network A is informed that user B is not busy, and user A is either busy or CCBS busy (as determined using the procedures in subclause 9.4.6), then network A shall inform user A by sending a CCBSBFree invoke component to user A, suspend CCBS processing and wait for user A becoming not CCBS busy.

Network A shall send the CCBSBFree invoke component to user A containing as arguments the recallMode parameter, the cCBSReference parameter, and, according to the procedure in subclause 9.7, the addressOfB parameter and q931InfoElement parameter. If network A knows that a point-to-point configuration exists at user A's access, network A shall send this invoke component according to the procedure in subclause 8.3.2.2 of EN 300 196-1 [14]. Otherwise network A shall send this invoke component according to the procedure in subclause 8.3.2.4 of EN 300 196-1 [14].

On receipt of the CCBSBFree invoke component, user A shall ignore the invoke component unless it is compatible with the request as determined by the procedure in subclause 9.7. Users accepting this invoke component shall treat it as an indication that user B is now free.

In case of CCBS request(s) being suspended, network A shall apply the user A monitoring procedure in subclause 9.4.6 for all suspended requests in the following situations:

- on user A becoming not CCBS busy; or,
- if a busy or reserved B-channel becomes free while user A is not CCBS busy.

Each request for which user A indicates to be free shall be resumed. For each resumed CCBS request, network A shall continue according to the procedures in subclause 9.4.1.1. CCBS requests for which user A indicates to be busy shall remain suspended.

9.4.5.2 Exceptional procedures

If a reject component is received and the invoke identifier is included, then network A shall take no action.

9.4.6 User A monitoring procedure

9.4.6.1 Normal operation

Whenever network A needs to know the status of user A, network A shall decide if user A is CCBS busy.

In the case that user A is not CCBS busy, in order to determine if user A is not busy, network A shall start timer T-CCBS1 and send a CCBSStatusRequest invoke component to user A. For this purpose, the status request procedure as defined in subclause 10.3 of EN 300 196-1 [14] is used, with the exception that the CCBSStatusRequest components are used instead of the components of the StatusRequest operation. The invoke component shall contain as arguments the cCBSReference parameter, the recallMode parameter, and, according to the procedure in subclause 9.7, the q931InfoElement parameter. The recallMode parameter shall be set according to the value of the subscription option "recall mode". If network A knows that a point-to-point configuration exists at user A's access, network A shall send this invoke component according to the procedure in subclause 8.3.2.2 of EN 300 196-1 [14]. Otherwise network A shall send this invoke component according to the procedure in subclause 8.3.2.4 of EN 300 196-1 [14].

On receiving this invoke component, user A shall ignore the invoke component unless the service it provides is compatible with the request as determined by the procedure in subclause 9.7.

Users accepting this invoke component shall send a CCBSStatusRequest return result component to network A according to the procedures in subclause 8.3.2.2 of EN 300 196-1 [14]. The return result component shall indicate the user A status for a call compatible with the request as determined by the q931InfoElement parameter according to the procedure in subclause 9.7.

On the receipt of the first CCBSStatusRequest return result component indicating "free" and provided user A is not CCBS busy, network A shall stop timer T-CCBS1 and determine user A to be not busy.

On receipt of a CCBSStatusRequest return result component indicating "busy" and network A has knowledge that a point-to-point configuration exists, then network A shall stop timer T-CCBS1 and determine user A to be busy.

If timer T-CCBS1 expires and only CCBSStatusRequest return result component(s) indicating "busy" are received, network A shall determine that user A is busy.

9.4.6.2 Exceptional procedures

If timer T-CCBS1 expires and no CCBSStatusRequest return result component has been received by network A, network A shall deactivate the CCBS supplementary service according to subclause 9.4.4. The cCBSEraseReason parameter shall indicate "normal-unspecified".

If a reject component is received and the invoke identifier is included, user A or network A shall ignore this component.

9.5 Procedures at network B

9.5.1 Determination that CCBS is available

9.5.1.1 Normal operation

CCBS is available at network B , when the following set of conditions apply:

- a clearing message has been received from user B with cause value #17 (user busy) or #34 (no circuit/channel available) or the call fails due to network determined user busy; and,
- the maximum length of queue B is greater than zero.

9.5.1.2 Exceptional procedures

Not applicable.

9.5.2 Acceptance of a CCBS request

9.5.2.1 Normal operation

A request to activate CCBS to a given destination shall be accepted by network B and queued if:

- user B has subscribed to the given basic service; and,
- the limit on the number of CCBS requests to the given destination has not been exceeded (this limit is a network provider option with a maximum value of 5); and,
- user B has not invoked a supplementary service which prohibits the activation of the CCBS supplementary service against that destination; and,
- user B compatibility requirements are met.

User B compatibility requirements are the following:

- the service is an existing service and the status request subscription parameter (see Annex B) indicates "status request procedures are not supported for existing services"; or
- the service is an existing service, the status request subscription parameter (see Annex B) indicates "status request procedures are supported for existing services", and a response of "compatible and busy" or "compatible and free" has been received from user B of the status request procedures as defined in subclause 10.3 of EN 300 196-1 [14] or
- the service is not an existing service and a response of "compatible and busy" or "compatible and free" has been received from user B of the status request procedures as defined in subclause 10.3 of EN 300 196-1 [14].

9.5.2.2 Exceptional procedures

The following situation shall be treated as "longTermDenial":

- the length of queue B is zero,
- user B has not subscribed to the basic service.

If network B cannot accept the request to activate CCBS for any other reason, then network B shall inform network A that the CCBS request shall be rejected indicating "shortTermDenial".

9.5.3 Queue B processing

9.5.3.1 Normal operation

The CCBS requests in queue B shall be processed in chronological order, although the actual mechanism for processing queue B is outside the scope of the present document. During the processing of queue B, the CCBS requests which are currently suspended shall be ignored.

Queue B processing shall start if a busy or reserved B-channel becomes free.

If a new request is queued and queue processing is not active, then for this new request the determination of user B free shall take place according to the procedures in subclause 9.5.4, with the additional requirement that if the subscription parameter indicates "status request procedures not supported for existing services", all B-channels shall be free.

If on resumption of a CCBS request queue processing is not active, then for this request the determination of user B free shall take place according to the procedures in subclause 9.5.4.

On selection of a CCBS request the determination of user B free shall take place according to the procedure in subclause 9.5.4.

If, for any reason, no CCBS call results from the processing of a CCBS request, then the next CCBS request against user B shall be selected for processing.

If the whole queue B has been processed and no CCBS call results, processing is complete and shall only be restarted, if the conditions for starting (as specified above) are fulfilled again or became fulfilled again while the previous processing of queue B was ongoing.

9.5.3.2 Exceptional procedures

Not applicable.

9.5.4 Determination of user B free

9.5.4.1 Normal operation

In order to determine whether user B is free, the following procedure is followed.

If:

- there is a free B-channel; and
- the status request subscription parameter indicates "status request procedures not supported for existing services"; and
- the service is an existing service,

then network B shall start timer T-CCBS4 and reserve a B-channel.

If:

- there is a free B-channel; and
- the status request subscription parameter indicates "status request procedures supported for existing services"; or
- the service is not an existing service,

then network B shall reserve a B-channel, determine if there is a compatible and free user present using the procedures in subclause 10.3 of EN 300 196-1 [14], and, if there is, start timer T-CCBS4. If network B receives only an indication "compatible and busy", network B shall select the next CCBS request in queue B and continue processing as specified in subclause 9.5.3, and cancel any B-channel reservation.

Reservation of a B-channel in this case means that the last free B-channel shall not be allocated to an incoming call. The reserved B-channel may be used for outgoing calls. Incoming calls shall be offered to user B only if they have service requirements and address information not identical to the CCBS request currently being processed. Identical calls shall be rejected with cause #34 (no circuit/channel available). To determine if the incoming call and the CCBS request currently being processed are identical, the following basic call information shall be compared, if available:

- Bearer capability information;
- High layer compatibility information;
- Low layer compatibility information;
- Called party address information.

NOTE: Further interactions with the call waiting supplementary service are specified in EN 300 195-1 [13].

On expiry of timer T-CCBS4 and:

- there being a free B-channel; and
- if the status request subscription parameter indicates "status request procedures not supported for existing services"; and
- if the service is an existing service,

then the network B shall continue to reserve a B-channel and inform network A that user B is free.

On expiry of timer T-CCBS4 and:

- there being a free B-channel; and
- if the status request subscription parameter indicates "status request procedures supported for existing services"; or
- if the service is not an existing service,

then network B shall continue to reserve a B-channel, determine if there is a compatible and free user present using the procedures in subclause 10.3 of EN 300 196-1 [14], and, if there is, network B shall inform network A that user B is free. If network B receives only an indication "compatible and busy" network B shall select the next CCBS request in queue B and continue processing as specified in subclause 9.5.3, and cancel any B-channel reservation.

Reservation of a B-channel after the expiry of timer T-CCBS4 means that the last free B-channel shall not be allocated to an incoming call, except the CCBS call. Other incoming calls shall be offered to user B only if they have service requirements and address information not identical to the CCBS request currently being processed. Identical calls shall be rejected with cause #34 (no circuit/channel available). To determine if the incoming call and the CCBS request currently being processed are identical, the following basic call information shall be compared, if available:

- Bearer capability information;
- High layer compatibility information;
- Low layer compatibility information;
- Called party address information.

The reserved B-channel may be used for outgoing calls.

9.5.4.2 Exceptional procedures

If there is no compatible user present using the procedures in subclause 10.3 of EN 300 196-1 [14], network B shall release the reservation and deactivate the CCBS supplementary service. On expiry of timer T-CCBS4 and if there is no B-channel available, network B shall cancel any B-channel reservation and wait for a B-channel to become free.

9.5.5 CCBS call

9.5.5.1 Normal operation

If user A establishes the CCBS call, then network B shall cancel the B-channel reservation and offer the call to user B according to the procedures in subclause 5.2 of EN 300 403-1 [11].

If user B accepts the call with either an ALERTING or a CONNECT message, network B shall deactivate the CCBS request and proceed according to the procedures in EN 300 403-1 [11].

9.5.5.2 Exceptional procedures

If user A establishes the CCBS call, and user B is determined to be busy again, then network B shall inform network A, and, depending on the "CCBS request retention" option being used, shall either maintain the CCBS request, or deactivate the CCBS request.

If user A does not establish the CCBS call and network A deactivates the CCBS request, then network B shall deactivate the CCBS request and cancel the B-channel reservation.

If user A establishes the CCBS call and user B does not accept the call, or the call is rejected for any reason except busy, then network B shall deactivate the CCBS request and inform network A.

If network A indicates suspension of the CCBS request, then network B shall suspend the CCBS request and cancel the B-channel reservation.

9.6 Call information retention

The call information retention procedure is used for a specific call if a supplementary service which needs the call information may be in operation for that call.

NOTE: The call information retention procedure shall be considered as generic. This implies that the retained information may be available for a number of supplementary services applicable to the specific call.

9.6.1 Normal operation

To provide the call information retention procedure, the network shall:

- select a new value for the callLinkageID parameter; and,
- retain the call information and the callLinkageID parameter; and,
- start timer T-RETENTION; and,
- send a CallInfoRetain invoke component containing the callLinkageID parameter to user A in an appropriate call clearing message according to the procedures in subclause 8.3.1.1 of EN 300 196-1 [14].

A network may restrict the number of calls that can simultaneously be subject to the generic call information retention procedure.

The callLinkageID parameter is an identifier used to make reference to the retained call information. The callLinkageID parameter has significance on the whole access.

On receipt of the CallInfoRetain invoke component, the user may retain the callLinkageID parameter and use it to control a supplementary service(s).

On operation of a supplementary service that requires the call information, the network shall make the call information available for the supplementary service. The network may then release the retained call information if it has knowledge that no other supplementary service will need the information. Alternatively, the network shall retain the call information for other supplementary services until timer T-RETENTION expires.

If the network releases the call information on operation of a supplementary service, the network shall stop timer T-RETENTION, release the callLinkageID parameter and make the value available for subsequent use, release unwanted retained call information, and send an EraseCallLinkageID invoke component containing the callLinkageID parameter to user A. If the network knows that a point-to-point configuration exists at user A's access, the network shall send this information according to the procedure in subclause 8.3.2.2 of EN 300 196-1 [14]. Otherwise the network shall send this information according to the procedure in subclause 8.3.2.4 of EN 300 196-1 [14].

If timer T-RETENTION expires, the network shall release the callLinkageID parameter value and make the value available for subsequent use, release all retained call information, and send an EraseCallLinkageID invoke component containing the callLinkageID parameter to user A. If network A knows that a point-to-point configuration exists at user A's access, network A shall send this information according to the procedure in subclause 8.3.2.2 of EN 300 196-1 [14]. Otherwise, network A shall send this information according to the procedure in subclause 8.3.2.4 of EN 300 196-1 [14].

On receipt of an EraseCallLinkageID invoke component, the user shall remove knowledge, if any, of the callLinkageID parameter value.

9.6.2 Exceptional procedures

If the network receives a reject component and the invoke identifier is included, then the network may wait for the expiry of timer T-RETENTION, else may stop timer T-RETENTION, release the callLinkageID parameter value and make the value available for subsequent use, and release all retained call information.

9.7 Basic call information and compatibility checking at user A

9.7.1 Normal operation

Network A is required to send retained call information to user A in order to allow user A to determine whether it is compatible with a particular CCBS request, and to allow user A to identify the basic call information retained by network A for a given CCBS request. The following basic call information shall be provided to user A in the appropriate components:

- the q931InfoElement parameter shall contain the bearer capability information in one or more Bearer capability information elements, and if available, the high layer compatibility information in one or more High layer compatibility information elements, and the low layer compatibility information in a Low layer compatibility information element;
- the addressOfB parameter shall contain the called party address information;
- if defined in the used operation, the subAddressOfA parameter shall contain the calling party subaddress information, if available.

On receipt of a component containing this information and:

- if the recallMode parameter indicates "specificRecall", then user A is only compatible with CCBS requests that relate to a cCBSReference parameter retained by user A; or
- if the recallMode parameter indicates "globalRecall", then user A is only compatible with CCBS requests for which user A is compatible with all the indicated basic services as defined by the Bearer capability, High layer compatibility and Low layer compatibility information elements as follows:
  - if there is only a single Bearer capability information element and if available a single High layer compatibility information element, then compatibility checking is performed using the Bearer capability information element, and if available, the High layer compatibility information element and Low layer compatibility information element according to subclauses B.3.2 and B.3.3 of EN 300 403-1 [11];
  - if there are multiple Bearer capability or High layer compatibility information elements, then compatibility checking is performed for each valid combination of Bearer capability and High layer compatibility information element as defined in subclause 5.5.5 of EN 300 267-1 [15];
  - in addition, the user may check the subAddressOfA parameter in determining whether the user is compatible with the CCBS request, if received.

9.7.2 Exceptional procedures

Not applicable.

10 Procedures for interworking with private ISDNs

The following subclauses cover the procedures associated with the original call attempt, a signalling connection to determine when the CCBS call can be established, and the establishment of the CCBS call. The protocols associated with these three procedures need not exist at the same interface.

10.1 Procedures for the originating T reference point

10.1.1 CCBS available indication

10.1.1.1 Normal operation

If on the attempt to establish a call according to the procedures in subclause 5.1 of EN 300 403-1 [11] the public network encounters or is notified of a busy destination, and CCBS is available to the destination and the private network has subscribed to the CCBS supplementary service, then the public network shall send a CCBS-T-Available invoke component to the private network in an appropriate clearing message according to the procedures in subclause 8.3.1.1 of EN 300 196-1 [14].

On receipt of the CCBS-T-Available invoke component, the private network may invoke CCBS according to the procedures in subclause 10.1.2.

10.1.1.2 Exceptional procedures

Not applicable.

10.1.2 CCBS supplementary service request

10.1.2.1 Normal operation

To setup the signalling connection with the public network and to request the activation of CCBS, the private network shall send a CCBS-T-Request invoke component to the public network according to the procedures defined in subclause 8.3.2.1.1 of EN 300 196-1 [14]. The CCBS-T-Request invoke component shall contain as parameters the Bearer capability information element, destinationAddress parameter, retentionSupported parameter, and if available the High layer compatibility information element and Low layer compatibility information element. The retentionSupported parameter shall be set to "TRUE" if the private network supports the "CCBS request retention" option. The retentionSupported parameter shall be set to "FALSE" if the private network does not support the "CCBS request retention" option. In addition the public network shall start the timer T-CCBS6.

NOTE 1: The functionality of timer T-CCBS6 need not be provided in the DSS1 protocol if equivalent functionality is provided at the same network by Signalling System No.7.

NOTE 2: The originationAddress and presentationAllowedIndicator parameters may be included and are used to support the interaction between CCBS and Calling Line Identification Presentation and Calling Line Identification Restriction supplementary services. These interactions are specified in EN 300 195-1 [13].

The call reference established as part of the procedures in subclause 8.3.2.1.1 in EN 300 196-1 [14] shall be used in all subsequent messages using the signalling connection to identify this instance of the CCBS supplementary service.

On receipt of the CCBS-T-Request invoke component the public network shall start monitoring the destination for being not busy and send a CCBS-T-Request return result component to the private network according to the procedures defined in subclause 8.3.2.1.2 of EN 300 196-1 [14]. The CCBS-T-Request return result component shall contain the retentionSupported parameter. The retentionSupported parameter in the return result component shall be set to "TRUE" if the retentionSupported parameter value in the invoke component was set to "TRUE" and the network supports the "CCBS request retention" option. The retentionSupported parameter shall be set to "FALSE" if the retentionSupported parameter value in the invoke component was set to "TRUE" and the network does not support the "CCBS request retention" option. If the retentionSupported parameter value in the invoke component was set to "FALSE", then the retentionSupported parameter in the return result component is not significant.

On receipt of the CCBS-T-Request return result component the private network shall await an indication that the destination is not busy according to the procedures in subclause 10.1.3.

If both the private network and the public network support the "CCBS request retention" option then the "CCBS request retention" option shall be used in the subsequent procedures. If either or both the private network and the public network do not support the "CCBS request retention" option then the "CCBS request retention" option shall not be used in the subsequent procedures.

10.1.2.2 Exceptional procedures

If the public network receives a request for establishment of the signalling connection indicating a CCBS-related invoke component different from CCBS-T-Request, the public network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14] with cause #29 "facility rejected".

If the public network cannot accept the CCBS request because the CCBS supplementary service is not subscribed to, then the public network shall clear the signalling connection to the private network according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14] and shall include in the RELEASE message a CCBS-T-Request return error component indicating "notSubscribed".

If the public network cannot accept the CCBS request because CCBS is not available to the destination (e.g. interworking with a non-CCBS network), then the public network shall clear the signalling connection to the private network according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14] and shall include in the RELEASE message a CCBS-T-Request return error component indicating "longTermDenial".

If the public network cannot accept the CCBS request because CCBS cannot be provided to the destination at this time (e.g. due to queue B congestion, or supplementary service interaction), then the public network shall clear the signalling connection to the public network according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14] and shall include in the RELEASE message a CCBS-T-Request return error component indicating "shortTermDenial".

If the private network receives a reject component on the signalling connection from the public network then the private network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14].

When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS6.

10.1.3 User B free indication

10.1.3.1 Normal operation

When the destination becomes not busy, and the public network is ready to accept the CCBS call, the public network shall send a CCBS-T-RemoteUserFree invoke component to the private network using the signalling connection according to the procedures defined in subclause 8.3.2.1.2 of EN 300 196-1 [14].

After receiving a CCBS-T-RemoteUserFree invoke component, if the private network does not need to suspend CCBS and becomes ready to establish the CCBS call, the private network shall request the CCBS call establishment according to the procedures in subclause 10.1.6.

After receiving a CCBS-T-RemoteUserFree invoke component, if the private network needs to suspend CCBS, the private network shall proceed according to the procedures in subclause 10.1.4.

10.1.3.2 Exceptional procedures

If the public network receives a reject component from the private network on the signalling connection then the public network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS6.

10.1.4 Suspend request

10.1.4.1 Normal operation

To request suspension of the CCBS request the private network shall send a CCBS-T-Suspend invoke component to the public network using the signalling connection according to the procedures in subclause 8.3.2.1.2 of EN 300 196-1 [14].

On receipt of the CCBS-T-Suspend invoke component, the public network shall await resumption of the CCBS request according to the procedures in subclause 10.1.5.

10.1.4.2 Exceptional procedures

If the private network receives a reject component on the signalling connection from the public network then the private network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS6.

10.1.5 Resume request

10.1.5.1 Normal operation

To request resumption of the CCBS request the private network shall send a CCBS-T-Resume invoke component to the public network using the signalling connection according to the procedures in subclause 8.3.2.1.2 of EN 300 196-1 [14].

On receipt of the CCBS-T-Resume request the public network shall resume monitoring of the destination for being not busy.

10.1.5.2 Exceptional procedures

If the private network receives a reject component on the signalling connection from the public network then the private network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS6.

10.1.6 CCBS call establishment

10.1.6.1 Normal operation

To initiate establishment of the CCBS call the private network shall send a SETUP message to the public network according to the procedures in subclause 5.1 of EN 300 403-1 [11] using the call establishment information used in the original call attempt. In addition the private network shall include a CCBS-T-Call invoke component in a Facility information element, to indicate that this message is used to establish a CCBS call.

On receipt of the CCBS-T-Call invoke component the public network shall proceed to establish the call to the destination.

On clearing of the signalling connection from destination B, the public network shall clear the signalling connection according to the procedures in subclause 8.3.2.1.3 of EN 300 196-1 [14] and stop timer T-CCBS6.

10.1.6.2 Exceptional procedures

If establishment of the CCBS call fails because user B is busy again and if the "CCBS request retention" option is being used, then the network B shall resume monitoring the destination for being not busy, and the public network shall send an appropriate clearing message to the private network according to the procedures defined in subclause 5.3.4 of EN 300 403-1 [11]. This clearing message shall also include a CCBS-T-Available invoke component according to the procedures in subclause 10.1.1.

On receipt of this clearing message and the "CCBS request retention" option being used, the private network shall await an indication that the destination is not busy according to the procedures in subclause 10.1.3.

If establishment of the CCBS call fails because user B is busy again, and if the "CCBS request retention" option is not being used, then the public network shall send an appropriate clearing message to the private network according to the procedures defined in subclause 5.3.4 of EN 300 403-1 [11]. This clearing message shall also include a CCBS-T-Available invoke component according to the procedures in subclause 10.1.1. On clearing of the signalling connection from destination B, the public network shall clear the signalling connection according to the procedures in subclause 8.3.2.1.3 of EN 300 196-1 [14] and stop timer T-CCBS6.

If establishment of the CCBS call fails due to any other reason at the destination, then the public network shall send an appropriate clearing message to the private network according to the procedures defined in subclause 5.3.4 of EN 300 403-1 [11]. On clearing of the signalling connection from destination B, the public network shall clear the signalling connection according to the procedures in subclause 8.3.2.1.3 of EN 300 196-1 [14] and stop timer T-CCBS6.

If establishment of the CCBS call fails before reaching the destination, then basic call procedures according to subclause 5.3.4 of EN 300 403-1 [11] apply and the private network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS6.

If a reject component is received and the invoke identifier is included, the private network shall clear the CCBS call according to the procedures in subclause 5.3 EN 300 403-1 [11]. Furthermore, the private network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS6.

On expiry of timer T-CCBS6 the public network shall clear the signalling connection according to the procedures in subclause 8.3.2.1.3 of EN 300 196-1 [14].

10.1.7 Deactivation

10.1.7.1 Normal operation

If the private network or the public network want to deactivate the CCBS request, then the private or public network shall clear the signalling connection according to the procedures in subclause 8.3.2.1.3 of EN 300 196-1 [14] and stop timer T-CCBS6.

10.1.7.2 Exceptional procedures

Not applicable.

10.2 Procedures for the destination T reference point

10.2.1 CCBS available indication

10.2.1.1 Normal operation

If on the attempt to establish a call according to the procedures in subclause 5.2 of EN 300 403-1 [11] the private network encounters a busy destination, and CCBS is available to the destination, then the private network shall send a CCBS-T-Available invoke component to the public network in an appropriate clearing message according to the procedures in subclause 8.3.1.1 of EN 300 196-1 [14].

If the CCBS-T-Available invoke component is received, the CCBS possible condition exists.

10.2.1.2 Exceptional procedures

Not applicable.

10.2.2 CCBS supplementary service request

10.2.2.1 Normal operation

To setup the signalling connection with the private network and to request the activation of CCBS, the public network shall send a CCBS-T-Request invoke component to the private network according to the procedures defined in subclause 8.3.2.1.1 of EN 300 196-1 [14]. The CCBS-T-Request invoke component shall contain as parameters the Bearer capability information element, destinationAddress parameter, retentionSupported parameter, and, if available, the High layer compatibility information element and Low layer compatibility information element. The retentionSupported parameter shall be set to "TRUE" if the public network supports the "CCBS request retention" option. The retentionSupported parameter shall be set to "FALSE" if the public network does not support the "CCBS request retention" option. In addition the public network shall start timer T-CCBS5.

NOTE: The functionality of timer T-CCBS5 need not be provided in the DSS1 protocol if equivalent functionality is provided at the same network by Signalling System No.7.

The call reference established as part of the procedures in subclause 8.3.2.1.1 of EN 300 196-1 [14] shall be used in all subsequent messages using the signalling connection to identify this instance of the CCBS supplementary service.

On receipt of the CCBS-T-Request invoke component the private network shall start monitoring the destination for being not busy and send a CCBS-T-Request return result component to the public network according to the procedures defined in subclause 8.3.2.1.2 of EN 300 196-1 [14]. The CCBS-T-Request return result component shall contain the retentionSupported parameter. The retentionSupported parameter in the return result component shall be set to "TRUE" if the retentionSupported parameter value in the invoke component was set to "TRUE" and the network supports the "CCBS request retention" option. The retentionSupported parameter shall be set to "FALSE" if the retentionSupported parameter value in the invoke component was set to "TRUE" and the network does not support the "CCBS request retention" option. If the retentionSupported parameter value in the invoke component was set to "FALSE" then the retentionSupported parameter in the return result component is not significant.

On receipt of the CCBS-T-Request return result component, the public network shall await an indication that the destination is not busy according to the procedures in subclause 10.2.3.

If both the public network and the private network support the "CCBS request retention" option, then the "CCBS request retention" option shall be used in the subsequent procedures. If either or both the public network and the private network do not support the "CCBS request retention" option, then the "CCBS request retention" option shall not be used in the subsequent procedures.

10.2.2.2 Exceptional procedures

If the private network has not registered for the CCBS supplementary service, the public network shall reject the CCBS request towards network A indicating "longTermDenial".

If the private network receives a request for establishment of the signalling connection indicating a CCBS-related invoke component different from CCBS-T-Request, the private network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14] with cause #29 "facility rejected".

If the private network cannot accept the CCBS request because CCBS is not available to the destination (e.g. interworking with a non-CCBS network), then the private network shall clear the signalling connection to the public network according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14] and shall include in the RELEASE message a CCBS-T-Request return error component indicating "longTermDenial".

If the private network cannot accept the CCBS request because CCBS cannot be provided to the destination at this time (e.g. due to queue B congestion, or supplementary service interaction), then the private network shall clear the signalling connection to the public network according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14] and shall include in the RELEASE message a CCBS-T-Request return error component indicating "shortTermDenial".

If the public network receives a CCBS-T-Request return error component indicating "notSubscribed" it shall be treated as "longTermDenial".

If the public network receives a reject component on the signalling connection from the private network then the public network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS5.

10.2.3 User B free indication

10.2.3.1 Normal operation

When the destination becomes not busy, and the private network is ready to accept the CCBS call, the private network shall send a CCBS-T-RemoteUserFree invoke component to the public network using the signalling connection according to the procedures defined in subclause 8.3.2.1.2 of EN 300 196-1 [14].

After receiving a CCBS-T-RemoteUserFree invoke component, if the public network does not need to suspend CCBS and becomes ready to establish the CCBS call, the public network shall request the CCBS call establishment according to the procedures in subclause 10.2.6.

After receiving a CCBS-T-RemoteUserFree invoke component, if the public network needs to suspend CCBS, the public network shall proceed according to the procedures in subclause 10.2.4.

10.2.3.2 Exceptional procedures

If the private network receives a reject component on the signalling connection from the public network then the private network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS5.

10.2.4 Suspend request

10.2.4.1 Normal operation

To request suspension of the CCBS request, the public network shall send a CCBS-T-Suspend invoke component to the private network using the signalling connection according to the procedures in subclause 8.3.2.1.2 of EN 300 196-1 [14].

On receipt of the CCBS-T-Suspend invoke component, the private network shall await resumption of the CCBS request according to the procedures in subclause 10.2.5.

10.2.4.2 Exceptional procedures

If the public network receives a reject component on the signalling connection from the private network then the public network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS5.

10.2.5 Resume request

10.2.5.1 Normal operation

To request resumption of the CCBS request, the public network shall send a CCBS-T-Resume invoke component to the private network using the signalling connection according to the procedures in subclause 8.3.2.1.2 of EN 300 196-1 [14].

On receipt of the CCBS-T-Resume request, the private network shall resume monitoring of the destination for being not busy.

10.2.5.2 Exceptional procedures

If the public network receives a reject component on the signalling connection from the private network then the public network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS5.

10.2.6 CCBS call establishment

10.2.6.1 Normal operation

To initiate establishment of the CCBS call, the public network shall send a SETUP message to the private network according to the procedures in subclause 5.2 of EN 300 403-1 [11] using the call establishment information used in the original call attempt. In addition, the public network shall include a CCBS-T-Call invoke component in a Facility information element to indicate that this message is used to establish a CCBS call.

On receipt of the CCBS-T-Call invoke component, the private network shall proceed to establish the call to the destination.

On clearing of the signalling connection from destination B, the private network shall clear the signalling connection according to the procedures in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS5.

10.2.6.2 Exceptional procedures

If establishment of the CCBS call fails because user B is busy again and if the "CCBS request retention" option is being used, then the network B shall resume monitoring the destination for being not busy, and the private network shall send an appropriate clearing message to the public network according to the procedures defined in subclause 5.3.4 of EN 300 403-1 [11]. This clearing message shall also include a CCBS-T-Available invoke component according to the procedures in subclause 10.2.1.

If the public network receives an indication that the CCBS call failed due to a busy condition and the "CCBS request retention" option is being used, the public network shall await an indication that the destination is not busy according to the procedures in subclause 10.2.3.

If establishment of the CCBS call fails because user B is busy again, and if the "CCBS request retention" option is not being used, then the private network shall send an appropriate clearing message to the public network according to the procedures in subclause 5.3.4 of EN 300 403-1 [11]. This clearing message shall also include a CCBS-T-Available invoke component according to the procedures in subclause 10.2.1. Furthermore, the private network shall clear the signalling association according to the procedures in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS5.

If establishment of the CCBS call fails due to any other reason at the destination, then the private network shall clear the CCBS call according to the procedures in subclause 5.3.4 of EN 300 403-1 [11]. Furthermore, the private network shall clear the signalling association according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. When clearing of the signalling connection is complete, the public network shall stop timer T-CCBS5.

If establishment of the CCBS call fails before reaching the destination, then basic call procedures according to subclause 5.3 of EN 300 403-1 [11] apply and the public network shall clear the signalling connection according to the procedures defined in subclause 8.3.2.1.3 of EN 300 196-1 [14]. and stop timer T-CCBS5.

If the public network receives a reject component no protocol action shall be taken.

On expiry of timer T-CCBS5 and if the signalling connection is still established, the public network shall clear the signalling connection according to the procedures in subclause 8.3.2.1.3 of EN 300 196-1 [14].

10.2.7 Deactivation

10.2.7.1 Normal operation

If the private network or the public network want to deactivate the CCBS request, then the public or private network shall clear the signalling connection according to the procedures in subclause 8.3.2.1.3 of EN 300 196-1 [14] and stop timer T-CCBS5.

10.2.7.2 Exceptional procedures

Not applicable.

11 Interactions with other networks

Interaction with other networks (e.g. a PSTN) is only possible if the network is capable to perform the FE3 functions as specified in ETS 300 358 [16] and the gateway signalling is compatible with regard to the CCBS supplementary service.

12 Interactions with other supplementary services

The interaction with other supplementary services shall be as specified in EN 300 195-1 [13].

13 Parameter values (timers)

Retention timer T-RETENTION:

this timer is started by the network after sending a CallInfoRetain invoke component to user A. User A shall send the CCBSRequest invoke component to the network before expiry of this timer. Network A stores relevant information only for the duration of this timer.

The duration of this timer shall have a minimum of 15 seconds.

Status check timer T-CCBS1:

the maximum time the network will wait for user A response for checking for compatible terminals. The value of this timer is 4 seconds.

Status check timer T-STATUS:

the maximum time the network will wait for user B response for checking for compatible terminals. The value of this timer is 4 seconds.

NOTE: Timer T-STATUS is defined in EN 300 196-1 [14], subclause 10.3.

CCBS service duration timer T-CCBS2:

the maximum time the service will be active within the network. The value is a network option, between 15 and 45 minutes.

Recall timer T-CCBS3:

the maximum time the network will wait for user A response to a CCBS recall. The value is between 10 and 20 seconds.

Destination B idle guard timer T-CCBS4:

the time the network will wait after destination B has become not busy before indicating a "CCBS recall" or " indication of B idle" to user A. The value of this timer is between 0 - 15 seconds.

Service lifetime supervision timer T-CCBS5:

this timer supervises the lifetime of the signalling connection at the destination public network. The value is 60 minutes.

Service lifetime supervision timer T-CCBS6:

this timer supervises the lifetime of the signalling connection at the originating public network. The value is 60 minutes.

Activation timer T-ACTIVATE:

this timer is started by user A, after sending a CCBSRequest invoke component to network A. The value of this timer is 10 seconds.

Deactivation timer T-DEACTIVATE:

this timer is started by user A, after sending a CCBSDeactivate invoke component to network A. The value of this timer is 4 seconds.

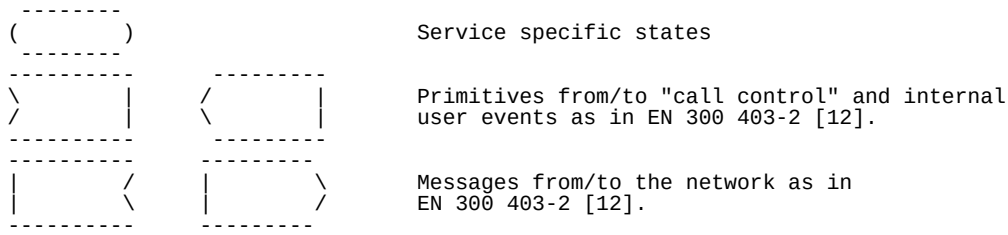
Interrogation timer T-INTERROGATE:

this timer is started by user A, after sending a CCBSInterrogate invoke component to network A. The value of this timer is 4 seconds.

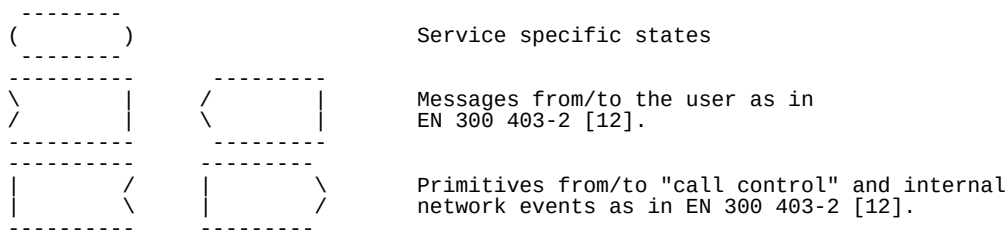
14 Dynamic description (SDL diagrams)

The dynamic description specified in figures 1 to 8 are according to CCITT Recommendation Z.100 [10].

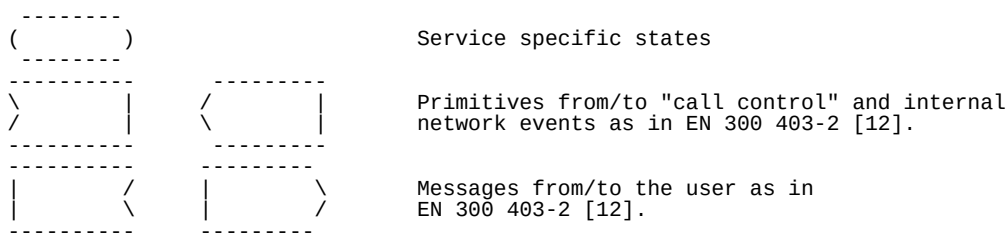
CCBS user side process SDL diagrams



CCBS network A side process SDL diagrams



CCBS destination network side process SDL diagrams



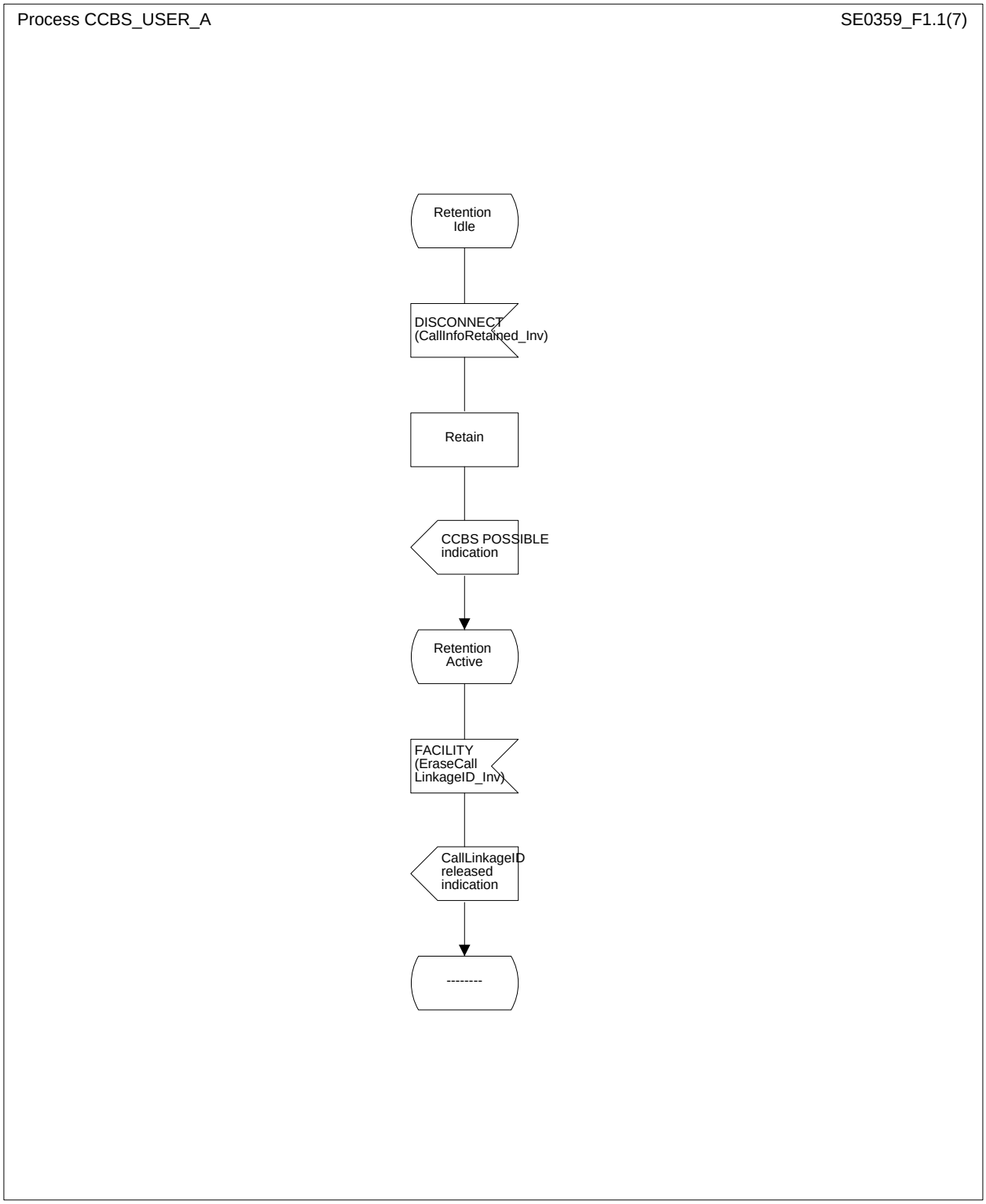


Figure 1 (sheet 1 of 7): CCBS user A process

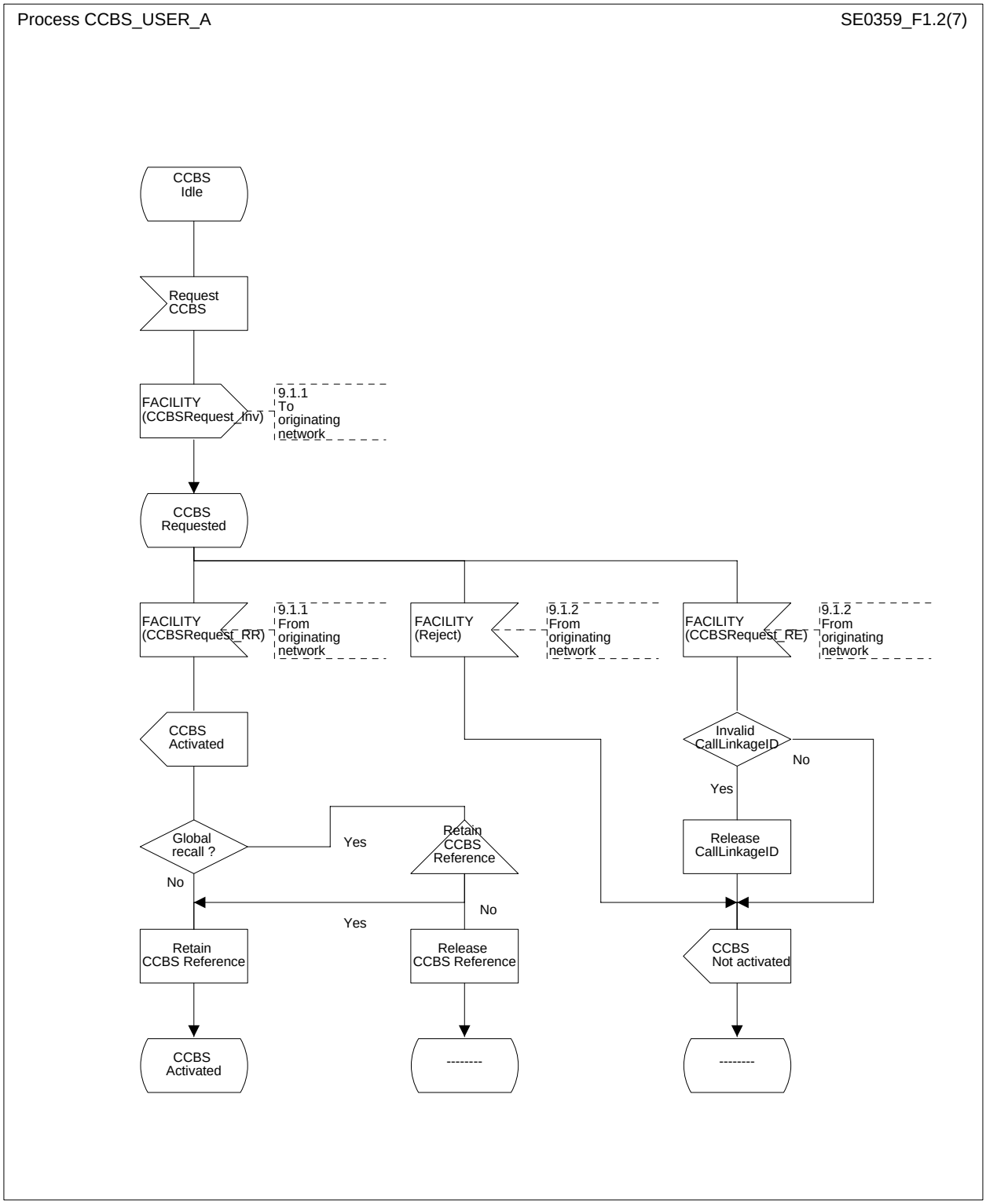


Figure 1 (sheet 2 of 7): CCBS user A process

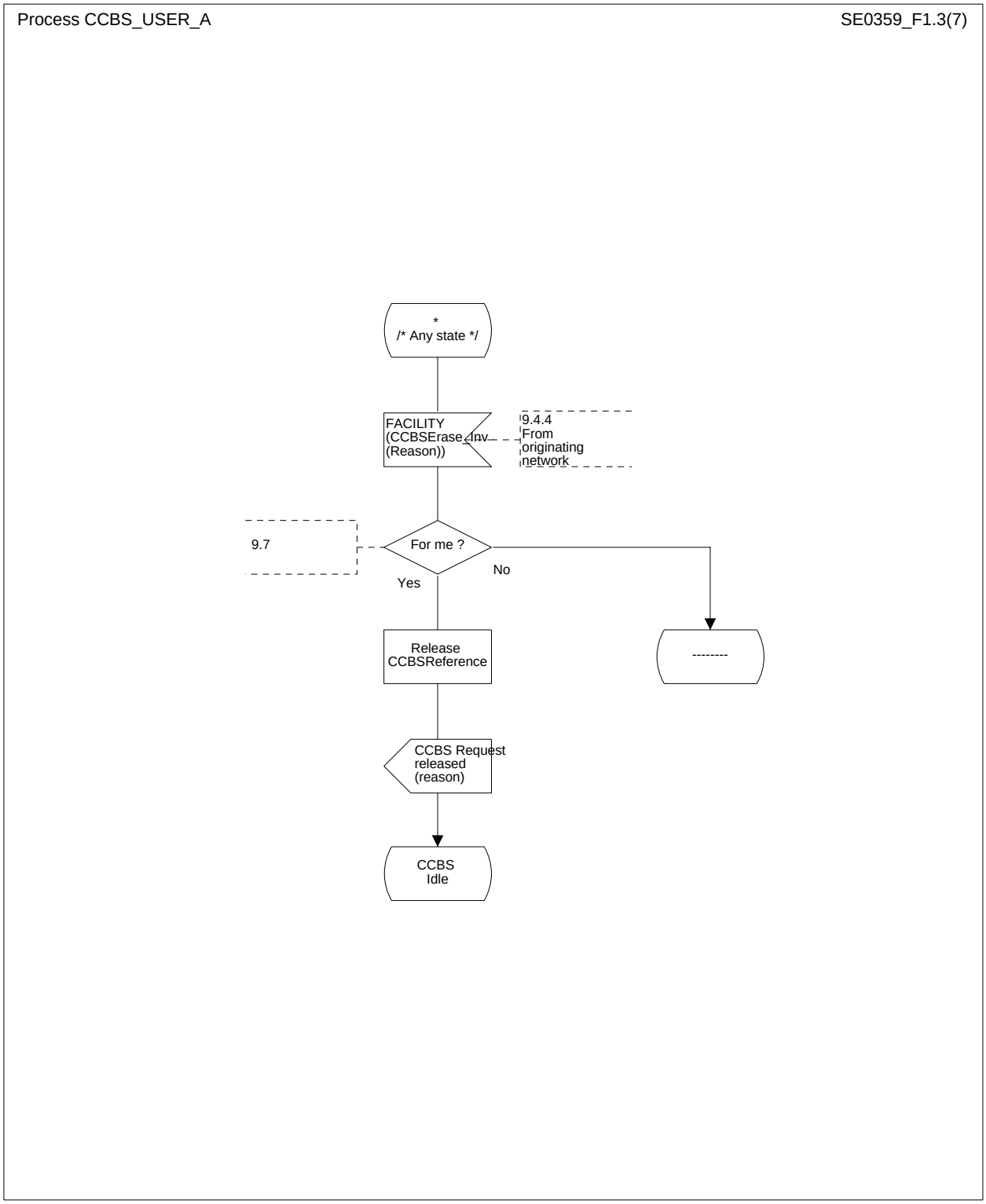


Figure 1 (sheet 3 of 7): CCBS user A process

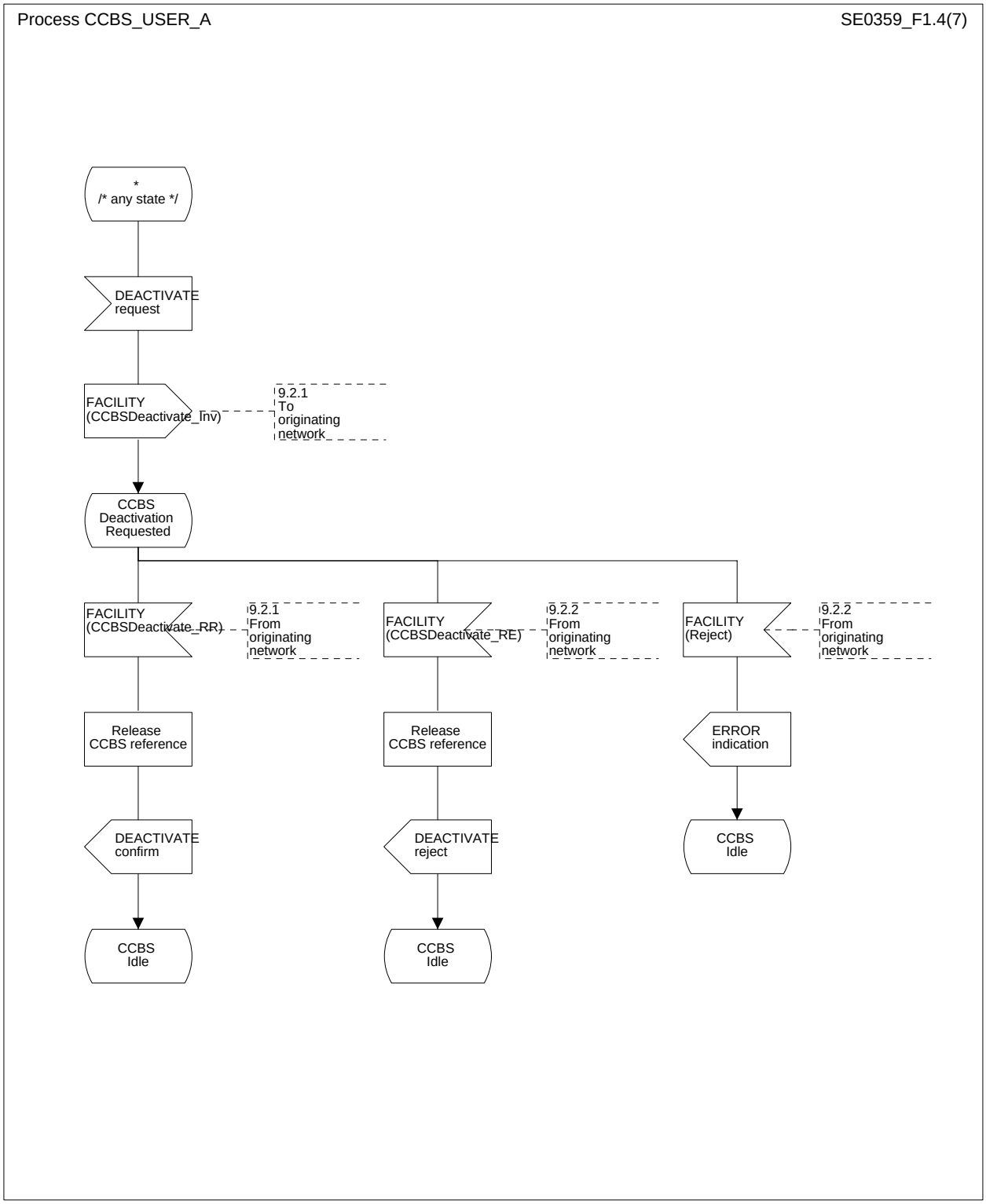


Figure 1 (sheet 4 of 7): CCBS user A process

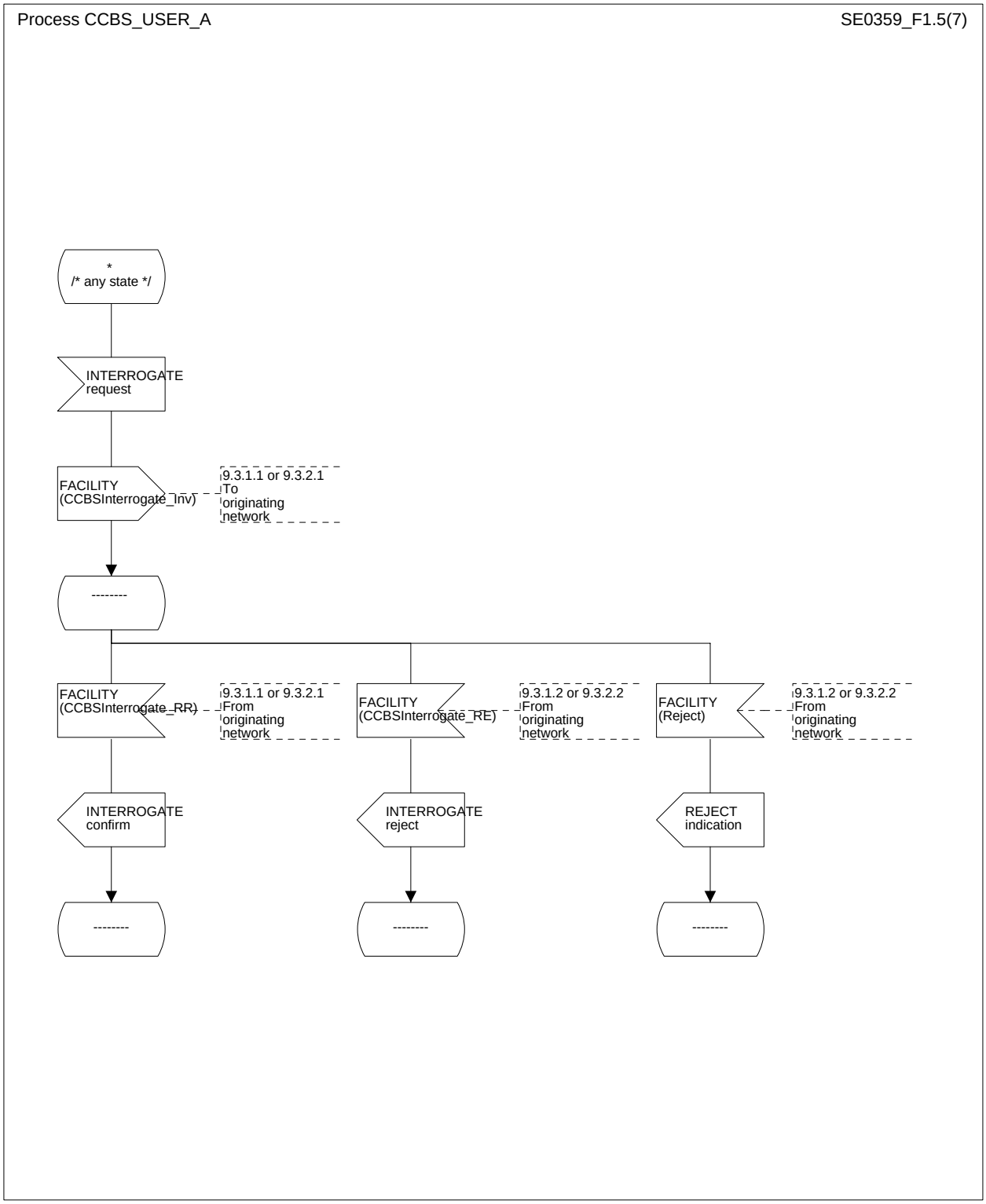


Figure 1 (sheet 5 of 7): CCBS user A process

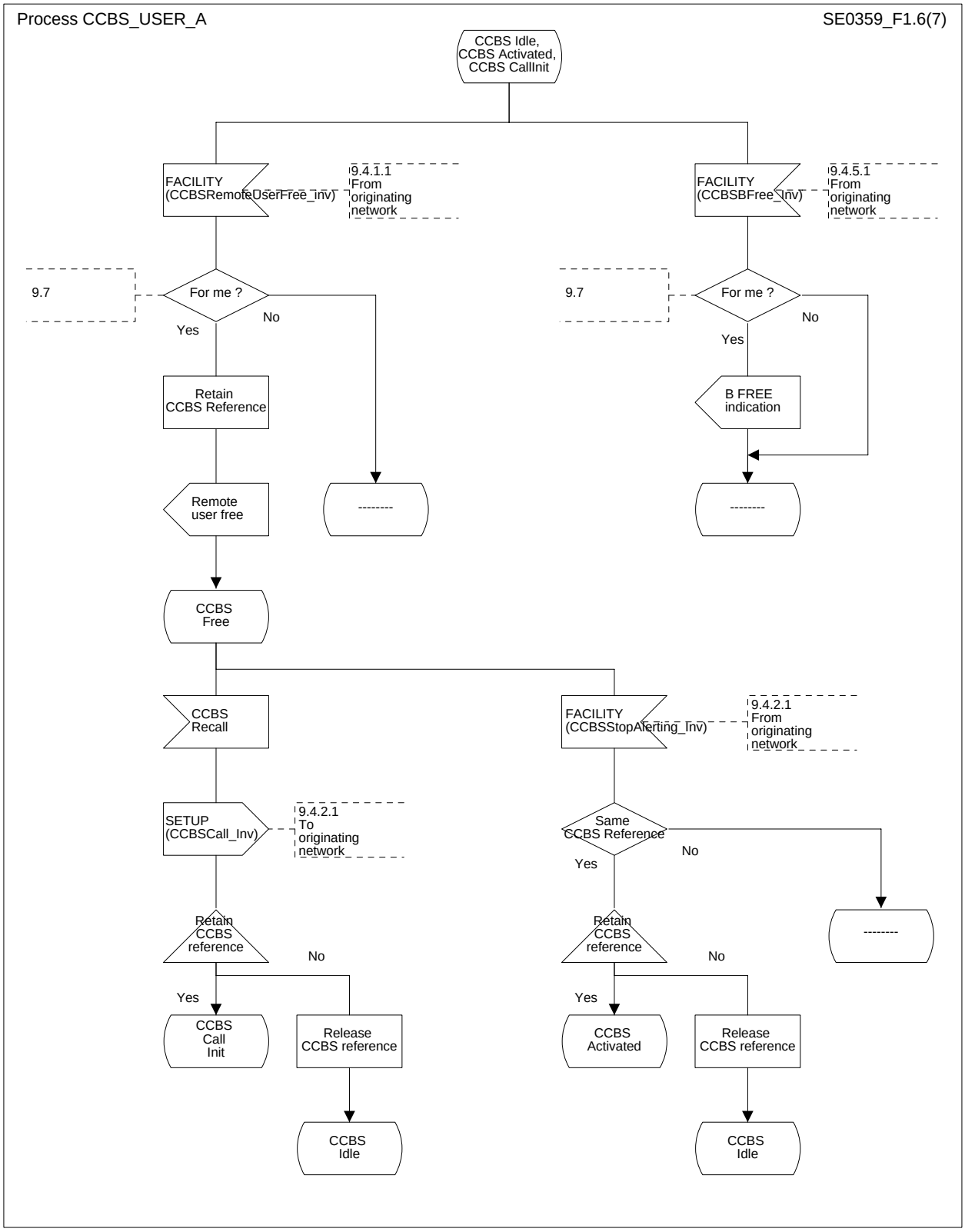


Figure 1 (sheet 6 of 7): CCBS user A process

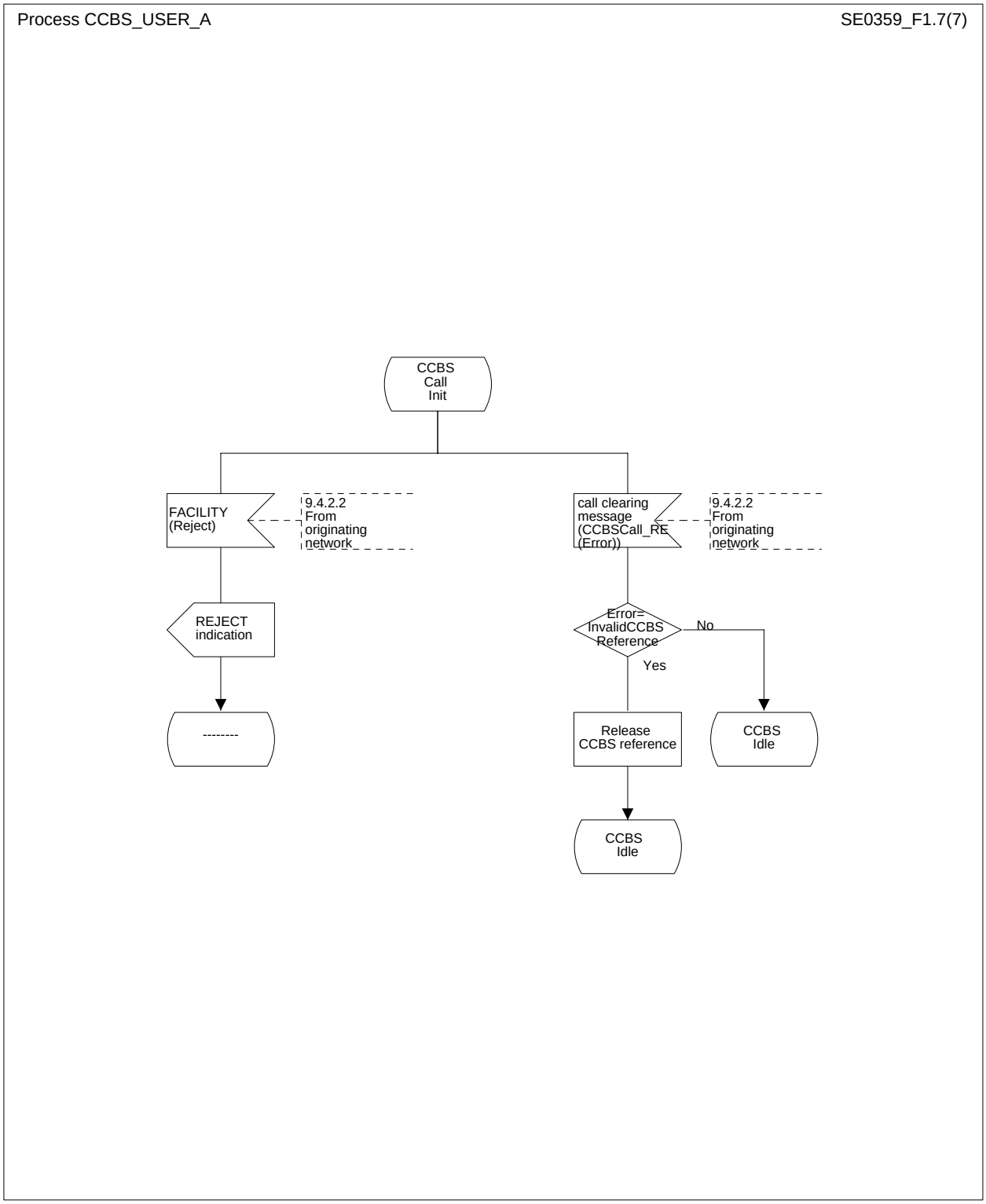


Figure 1 (sheet 7 of 7): CCBS user A process

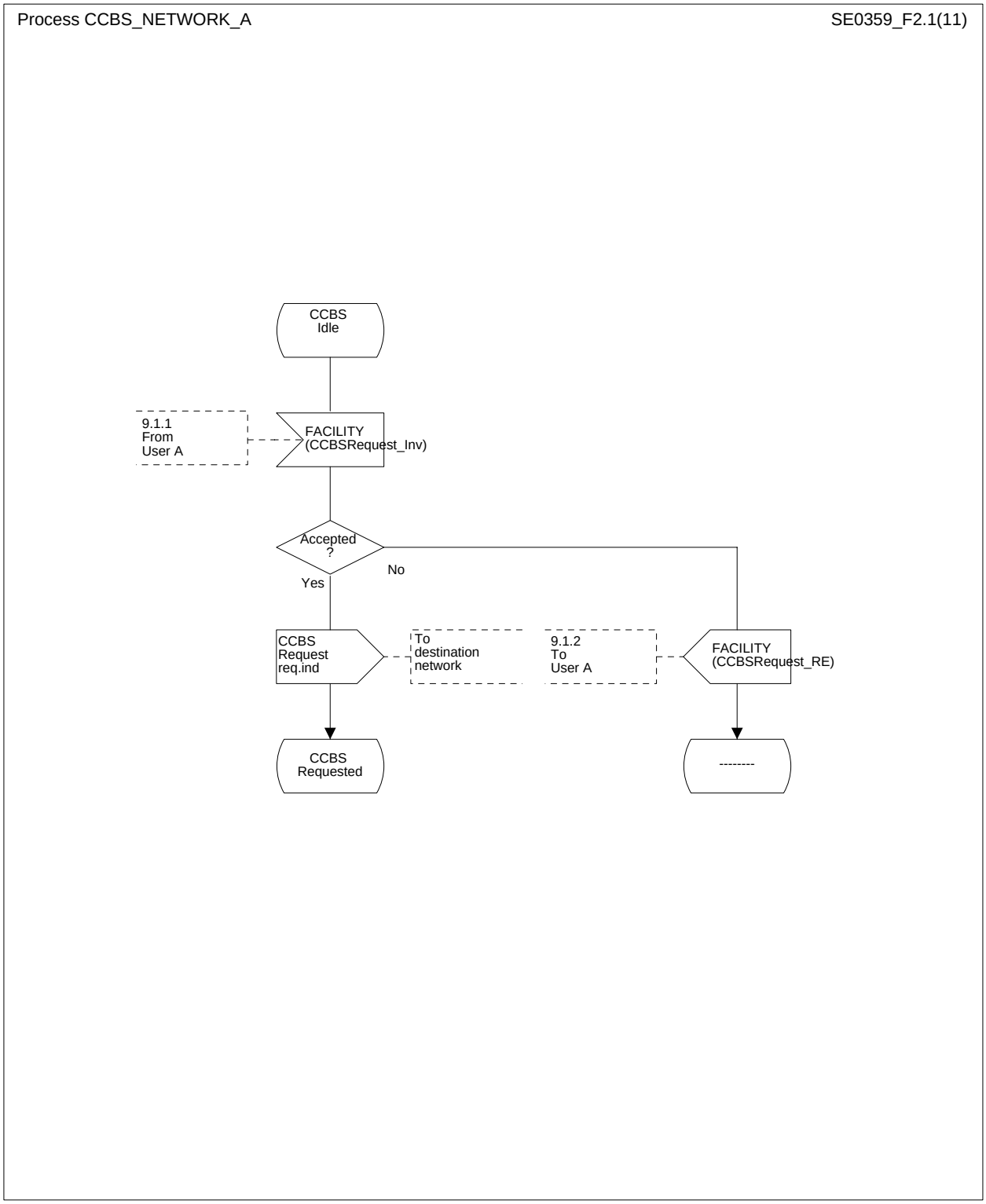


Figure 2 (sheet 1 of 11): CCBS network A process

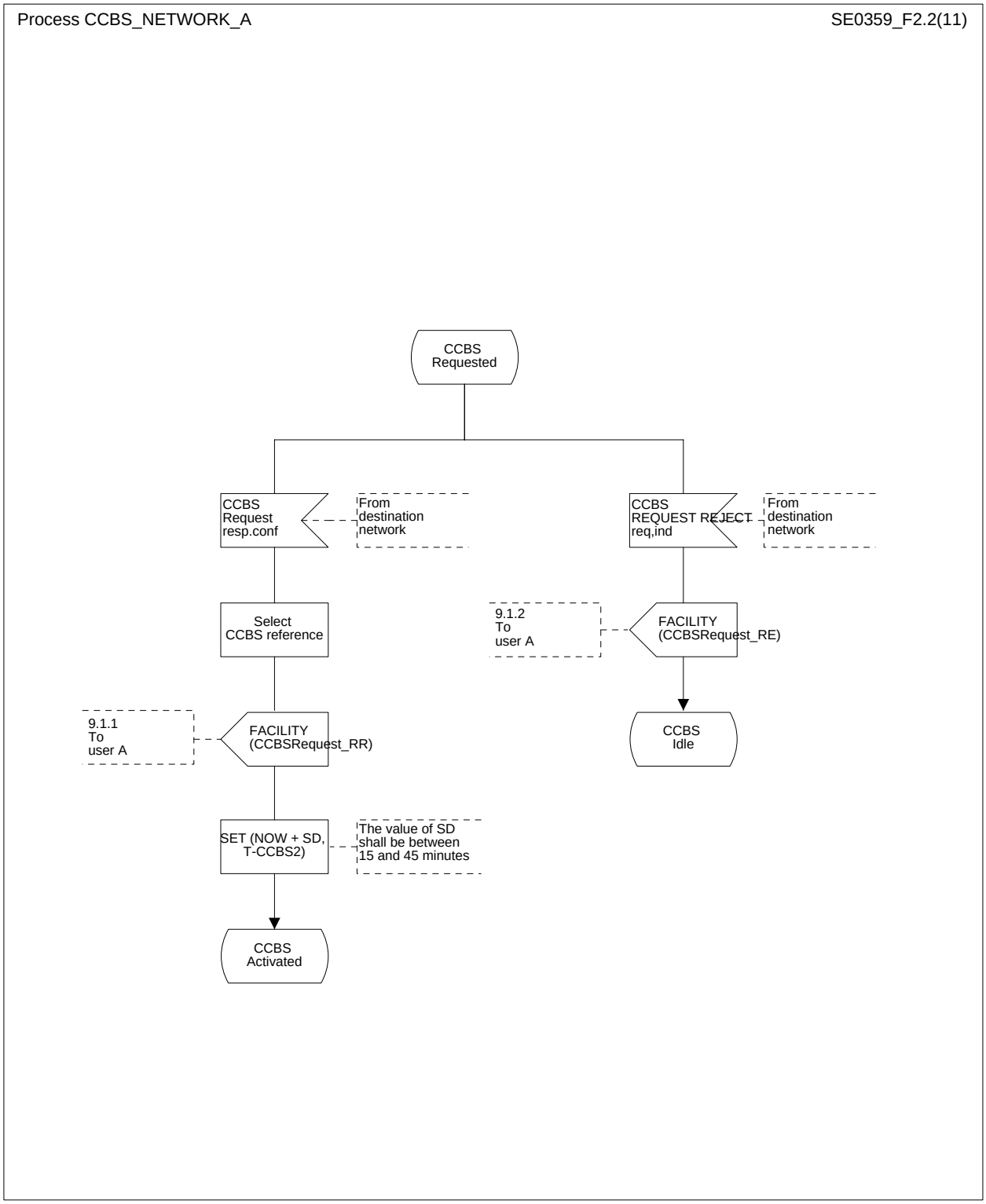


Figure 2 (sheet 2 of 11): CCBS network A process

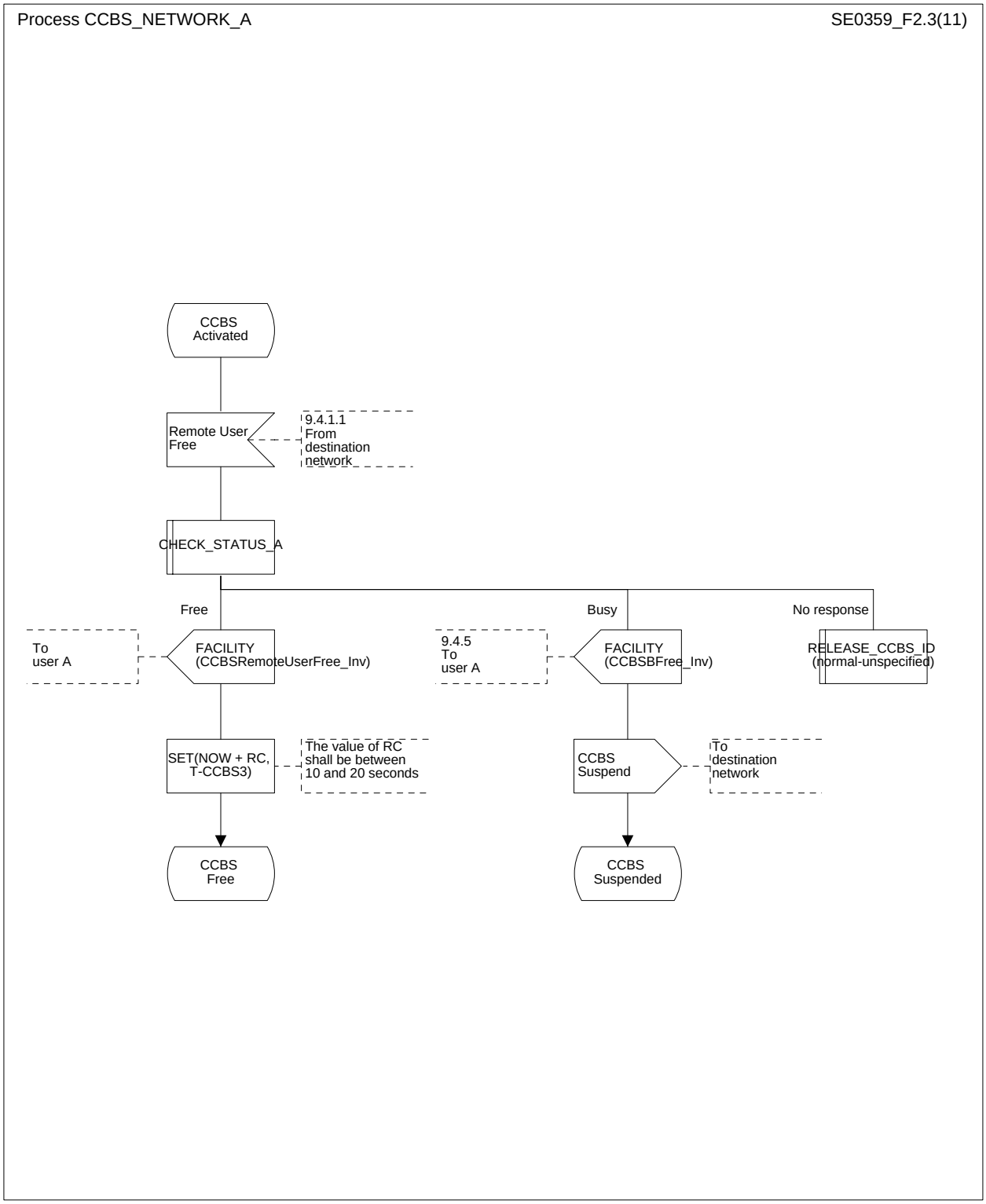


Figure 2 (sheet 3 of 11): CCBS network A process

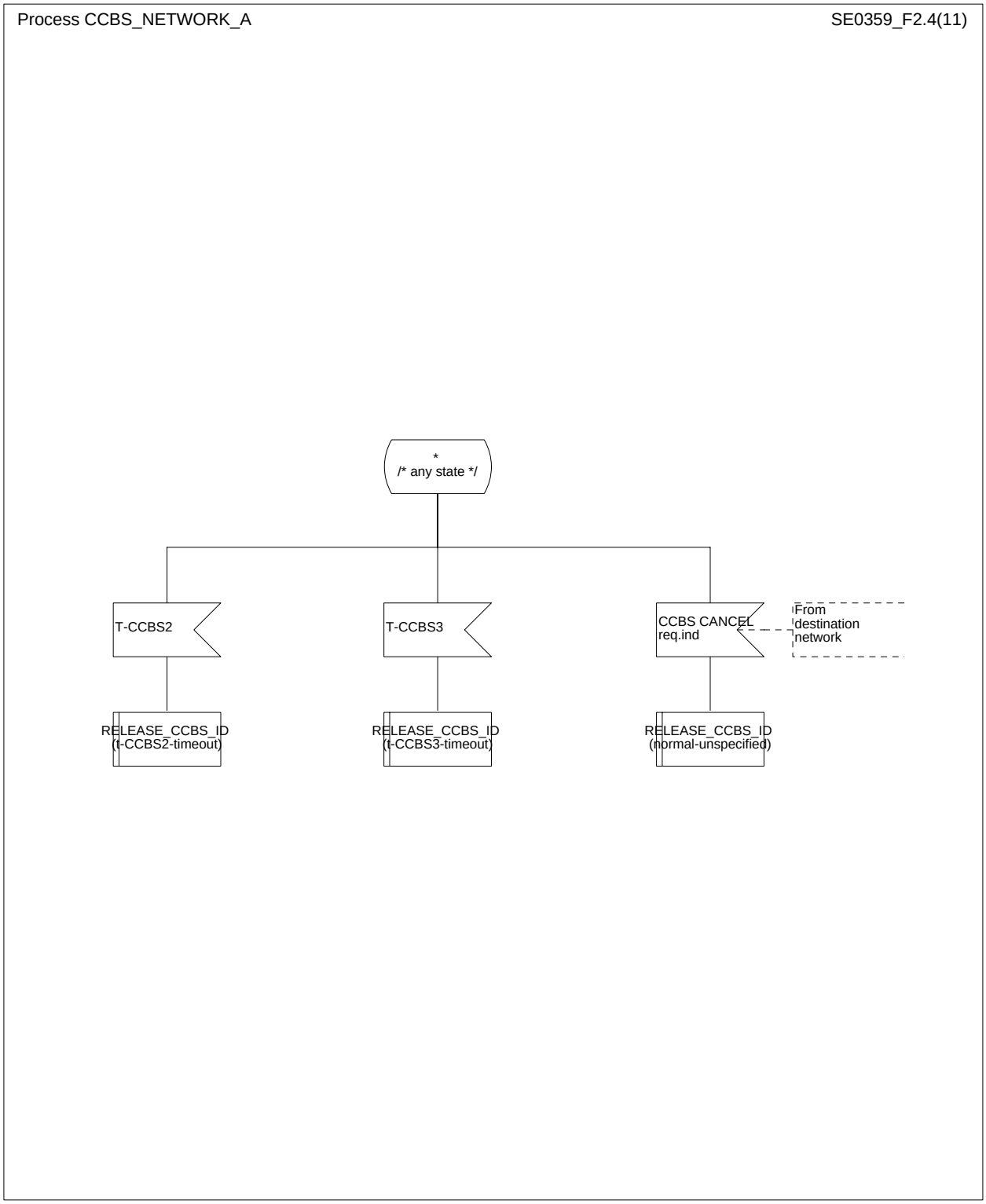


Figure 2 (sheet 4 of 11): CCBS network A process

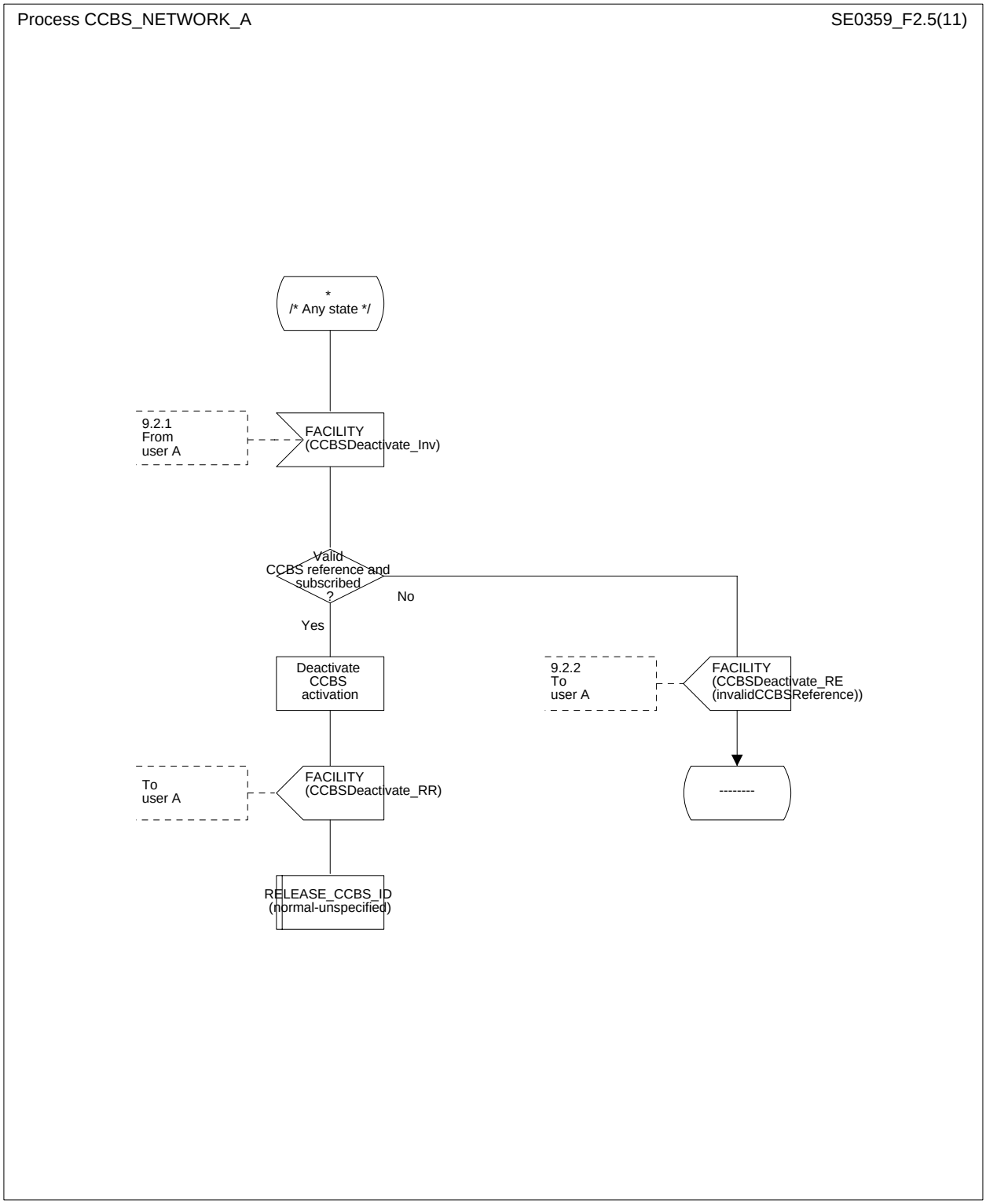


Figure 2 (sheet 5 of 11): CCBS network A process

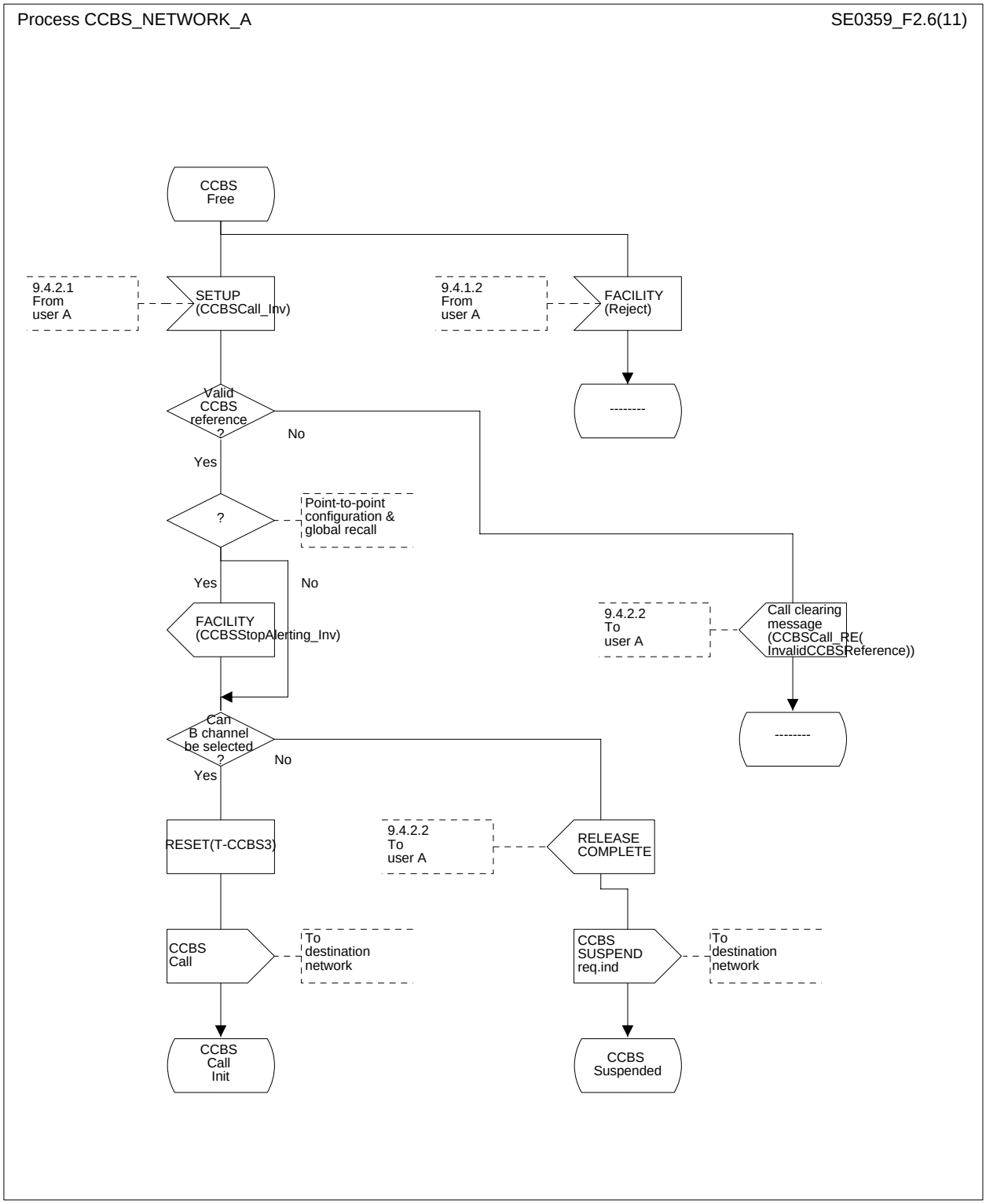


Figure 2 (sheet 6 of 11): CCBS network A process

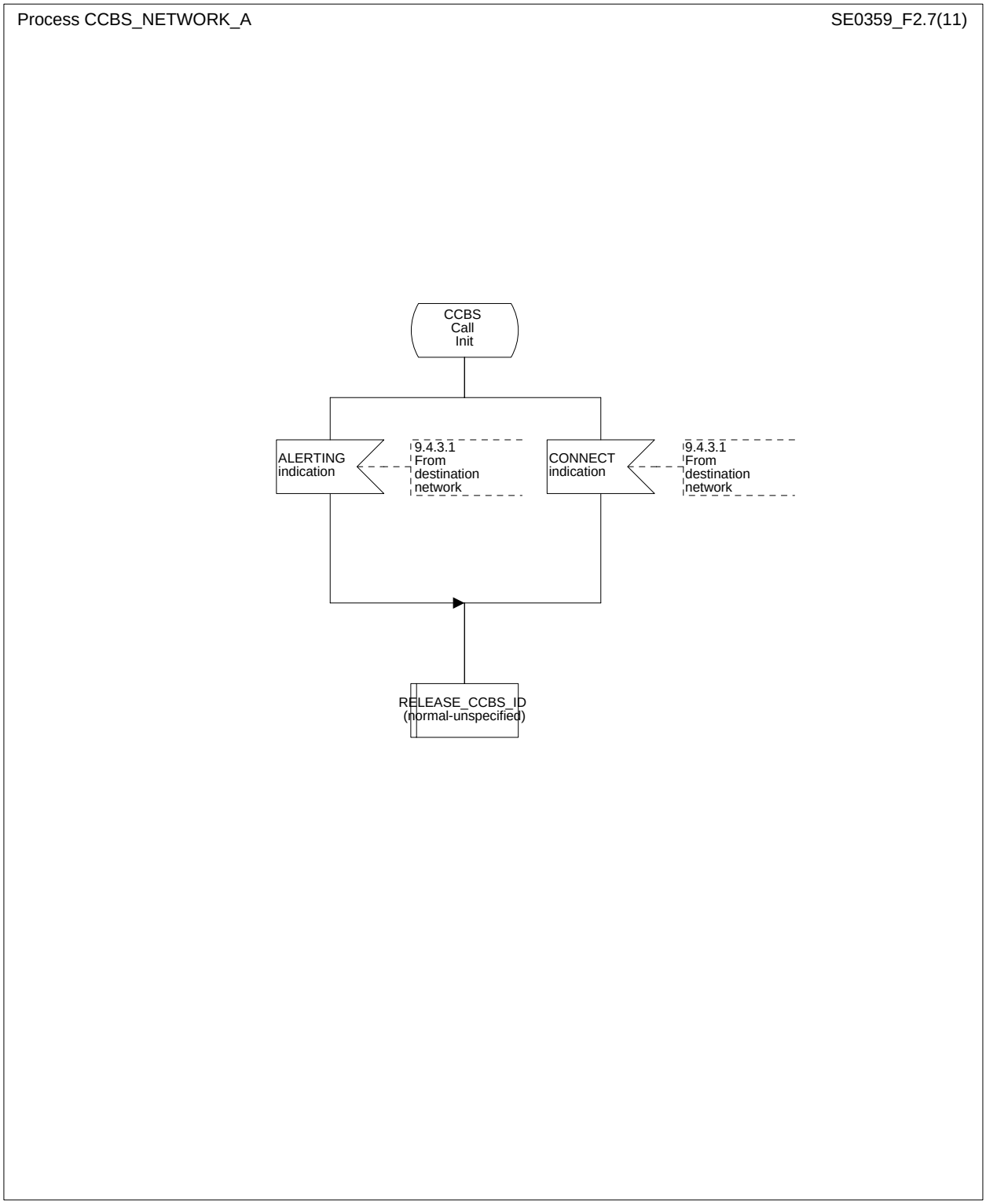


Figure 2 (sheet 7 of 11): CCBS network A process

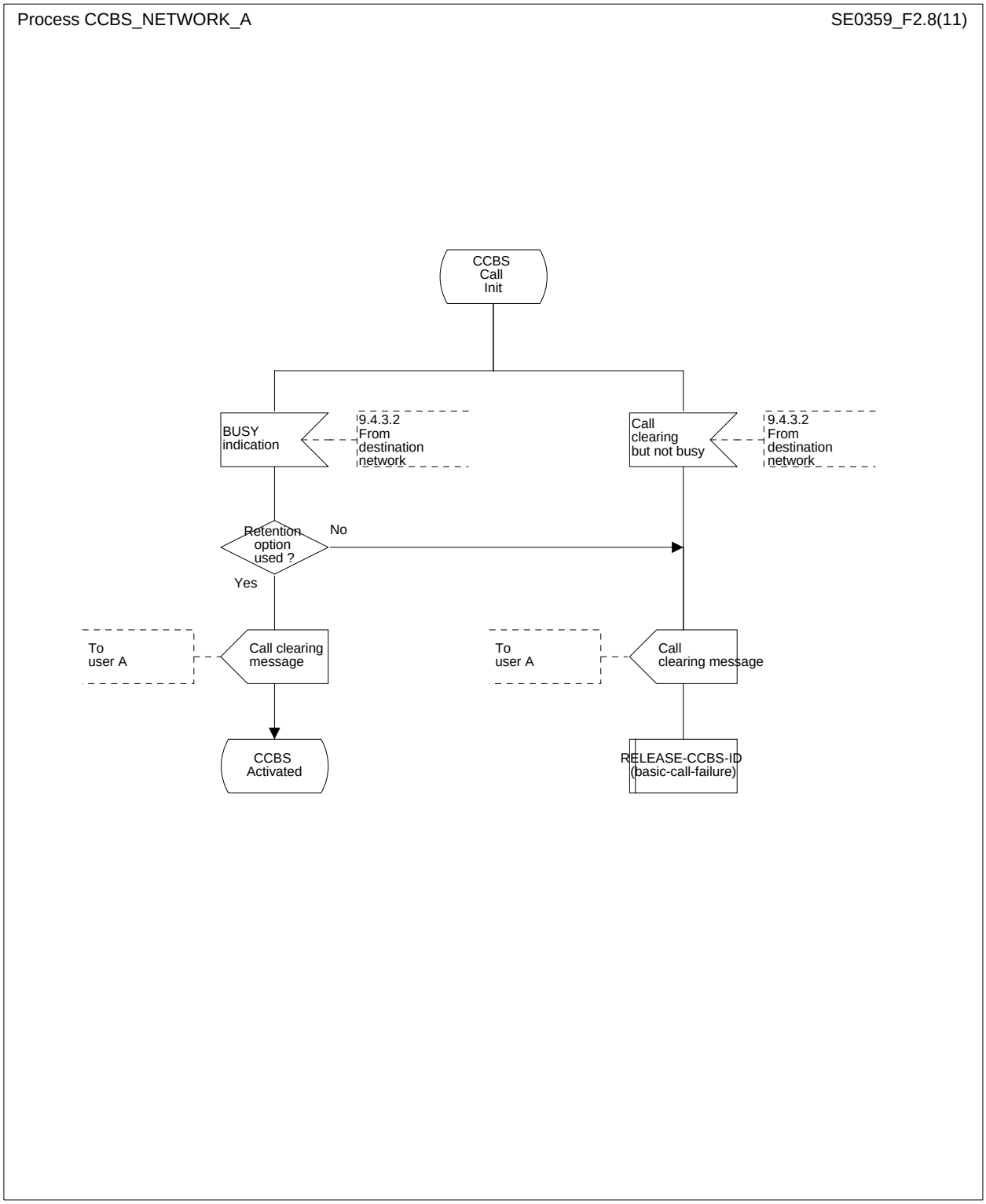


Figure 2 (sheet 8 of 11): CCBS network A process

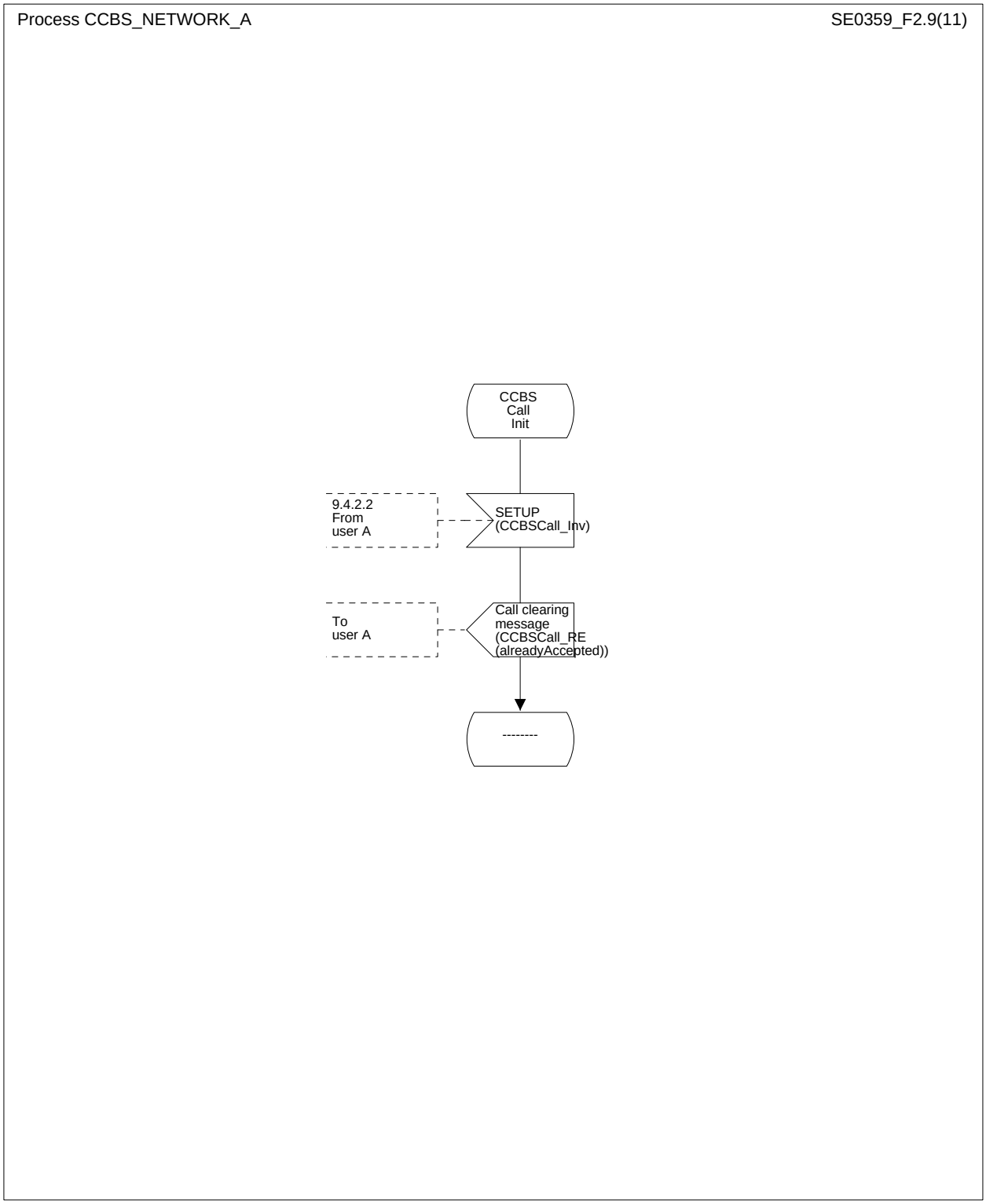


Figure 2 (sheet 9 of 11): CCBS network A process

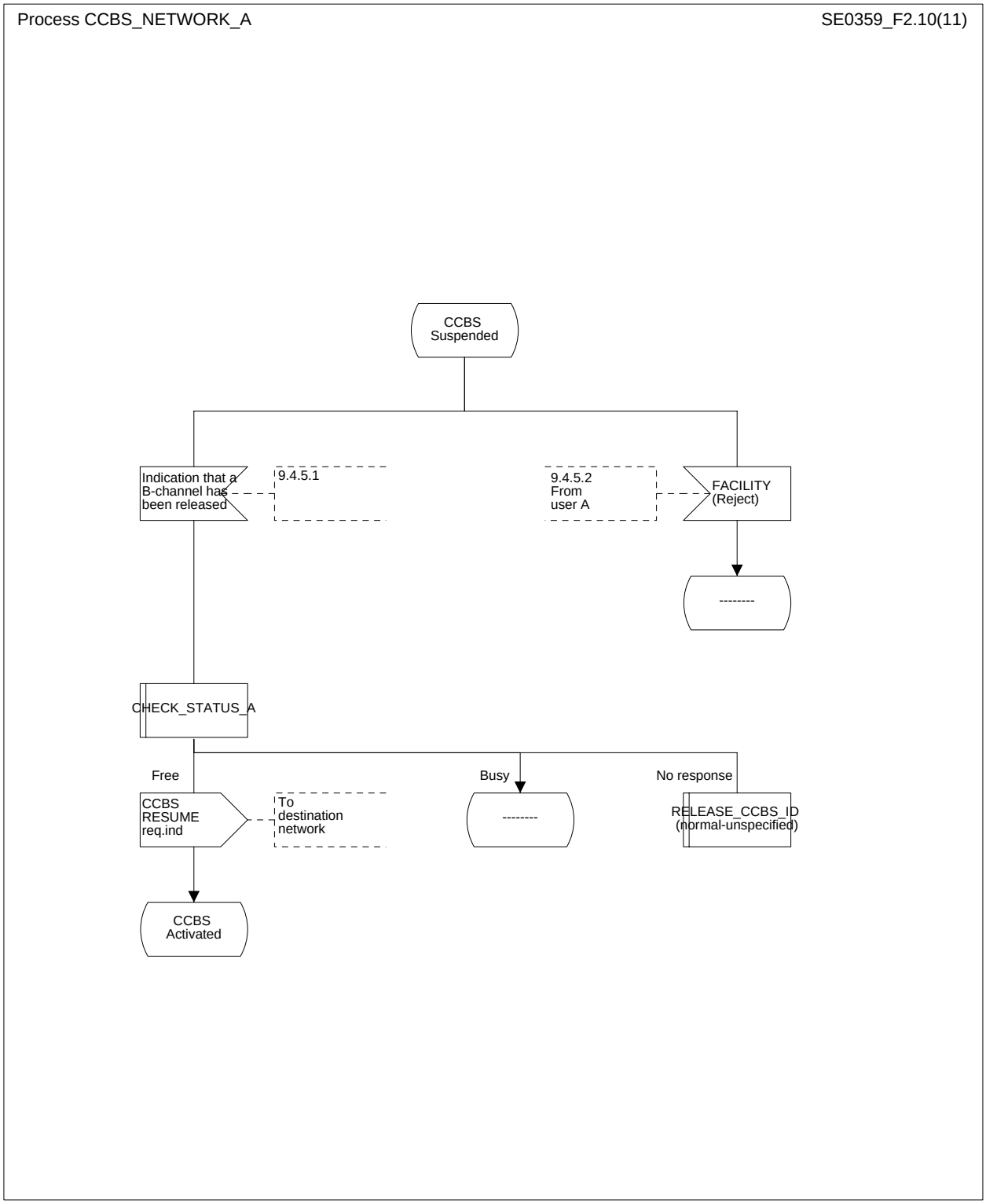


Figure 2 (sheet 10 of 11): CCBS network A process

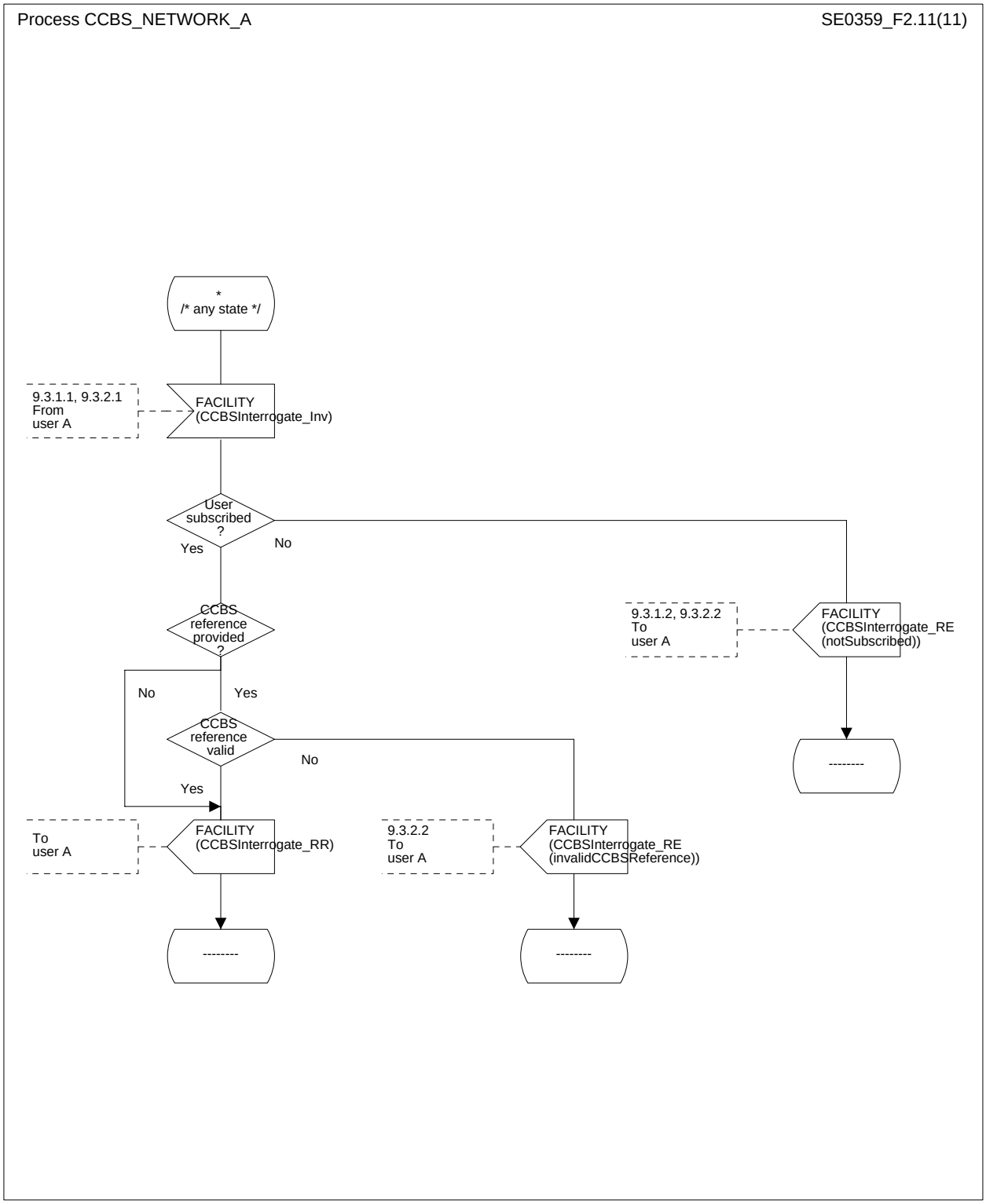


Figure 2 (sheet 11 of 11): CCBS network A process

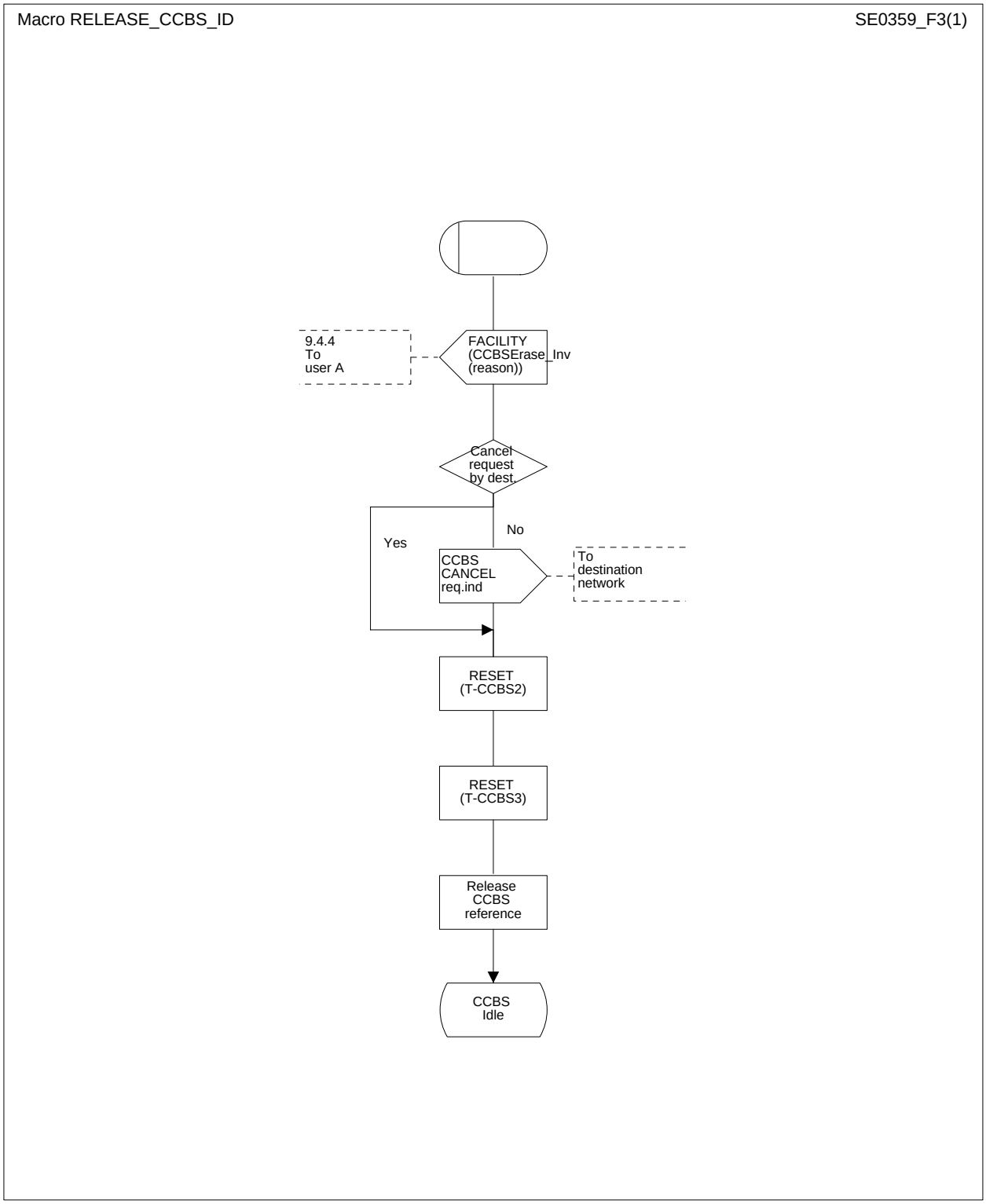


Figure 3: Macro RELEASE_CCBS_ID

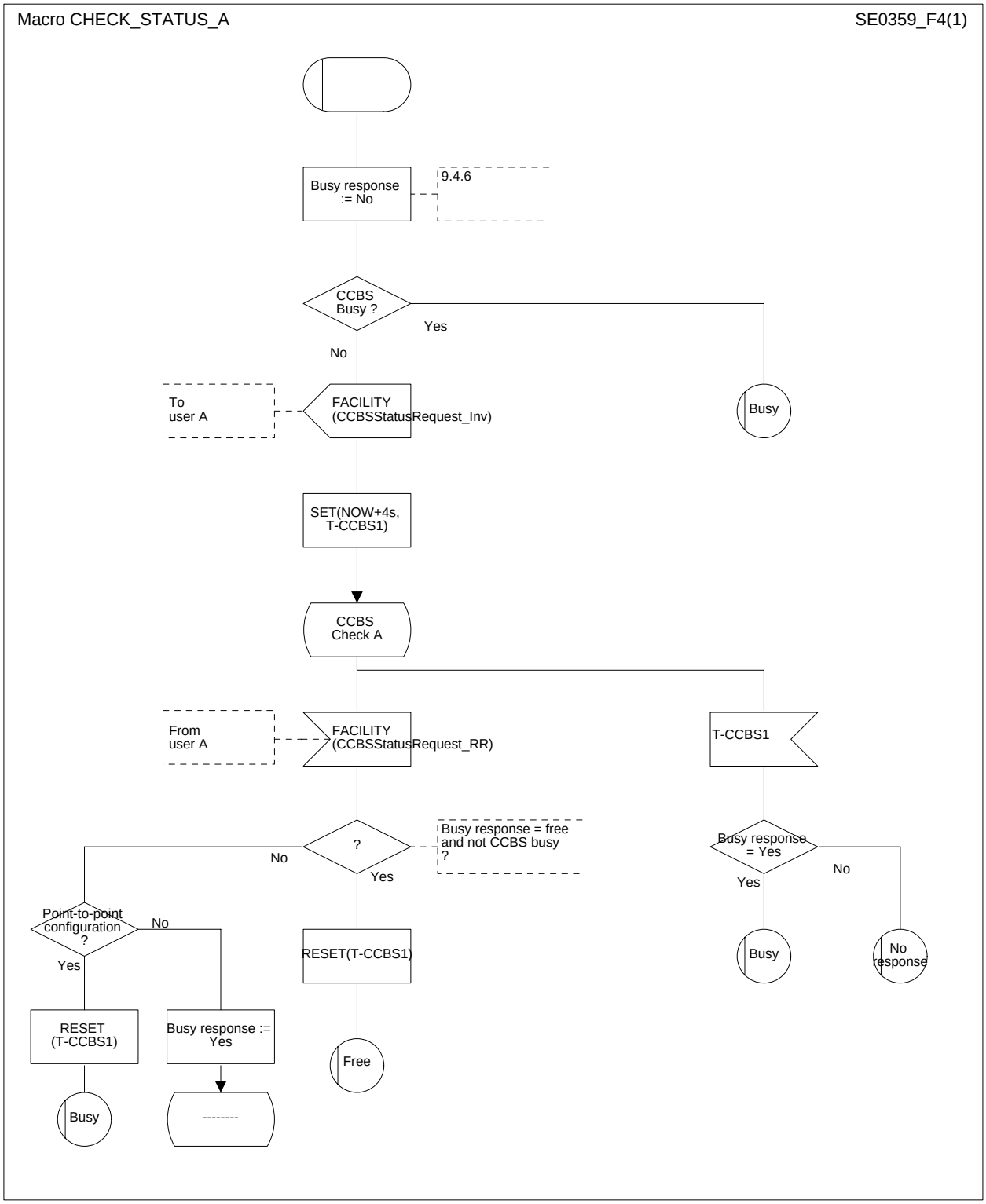


Figure 4: Macro CHECK_STATUS_A

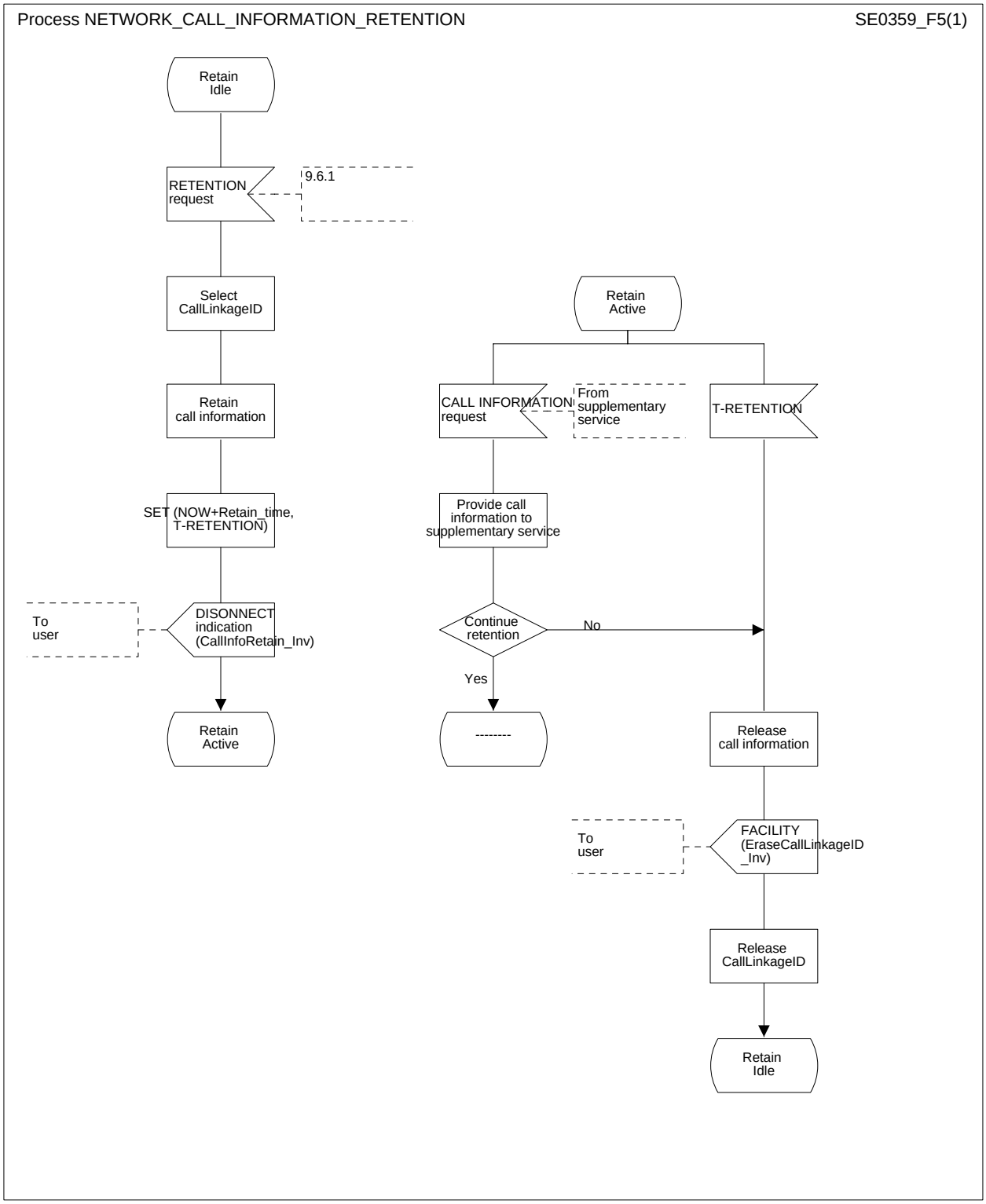


Figure 5: Call information retention network A process

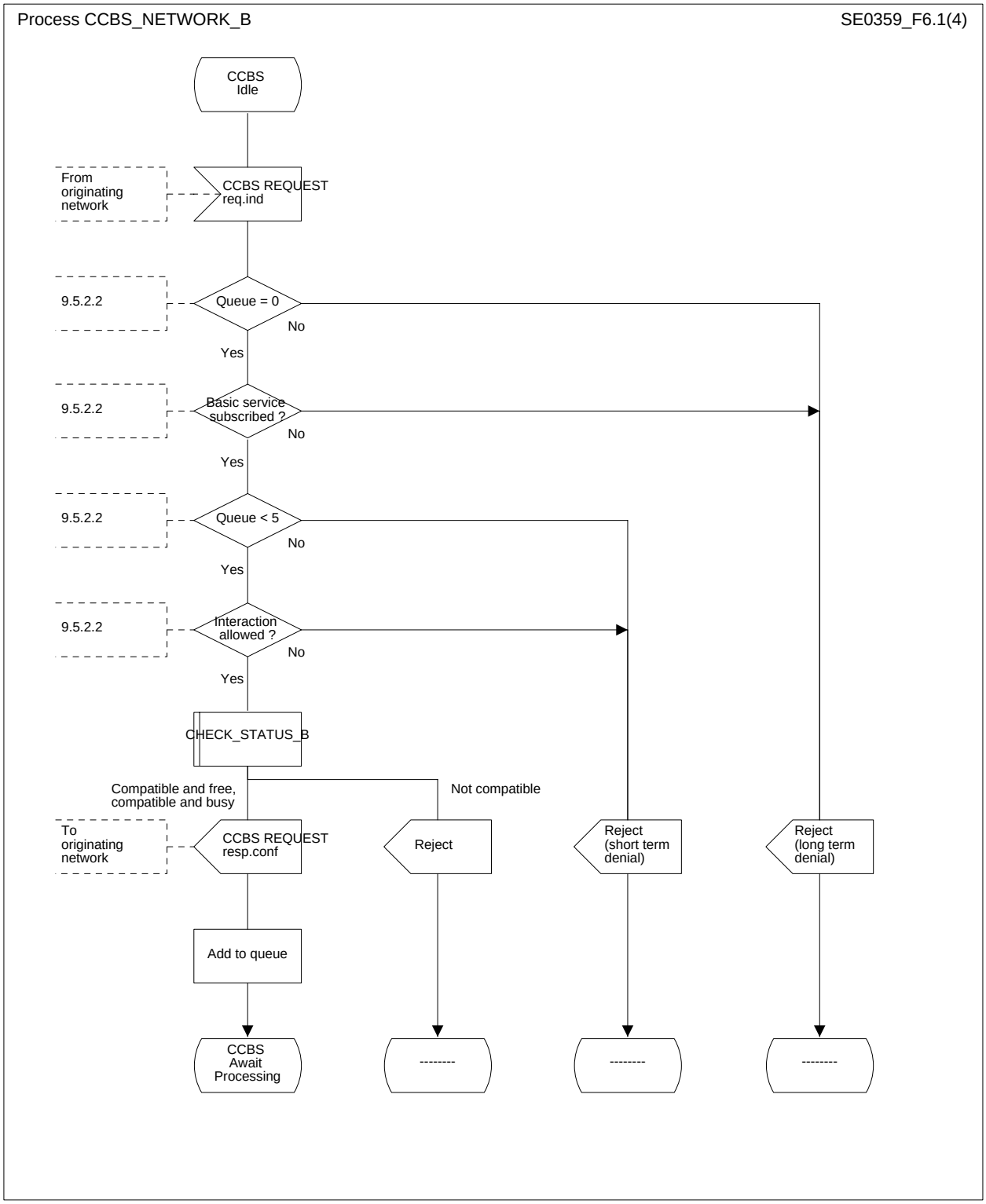


Figure 6 (sheet 1 of 4): CCBS network B process

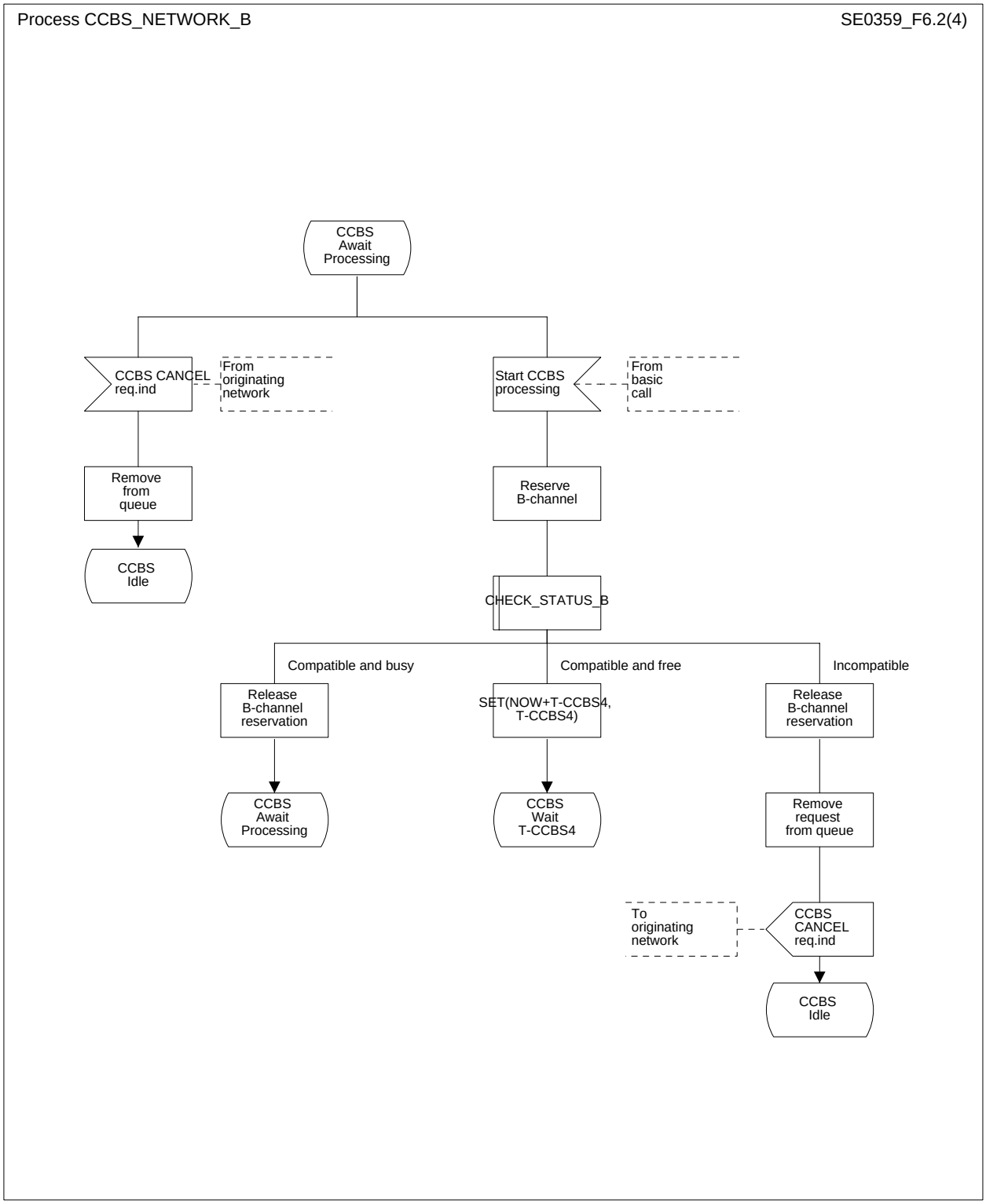


Figure 6 (sheet 2 of 4): CCBS network B process

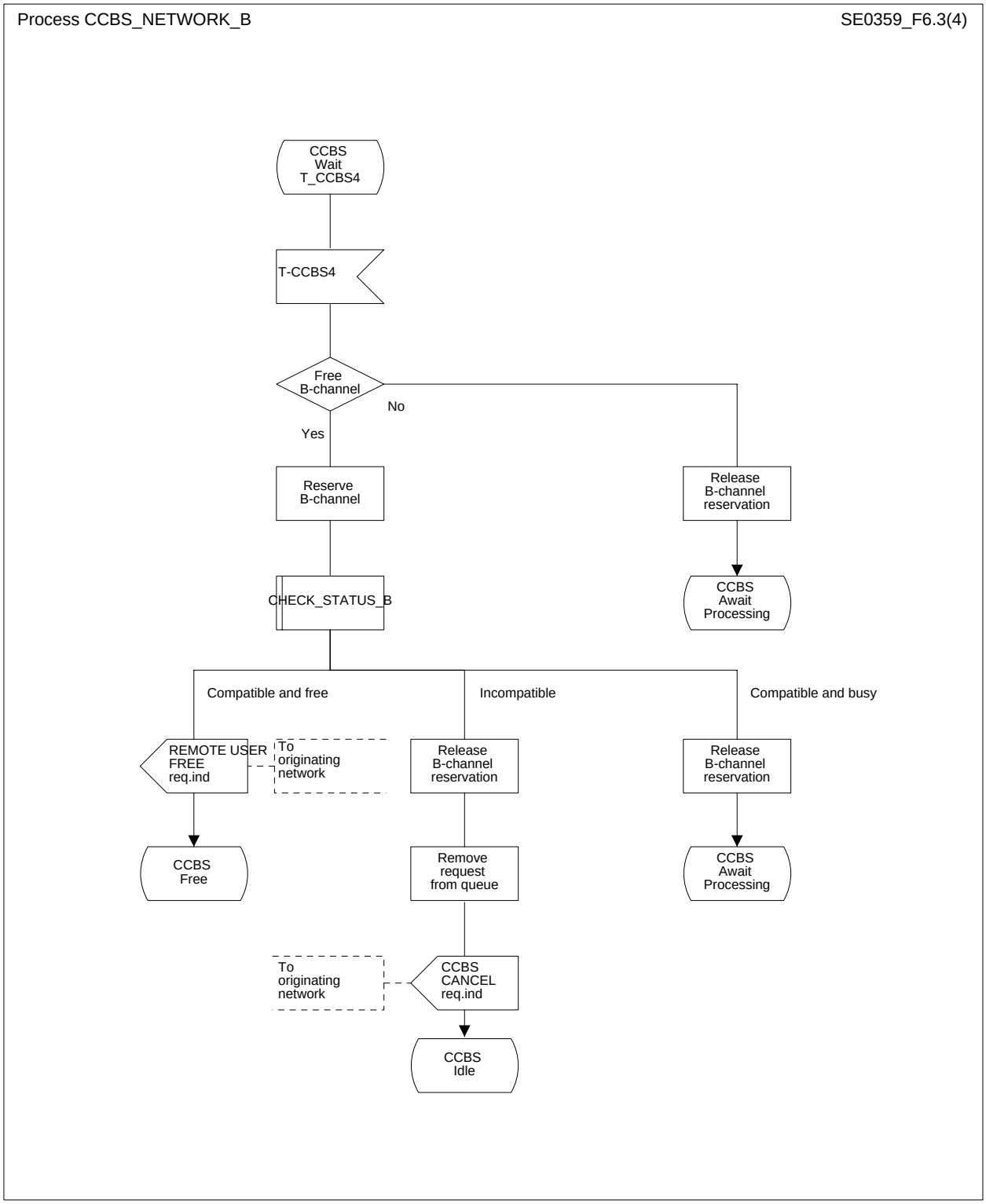


Figure 6 (sheet 3 of 4): CCBS network B process

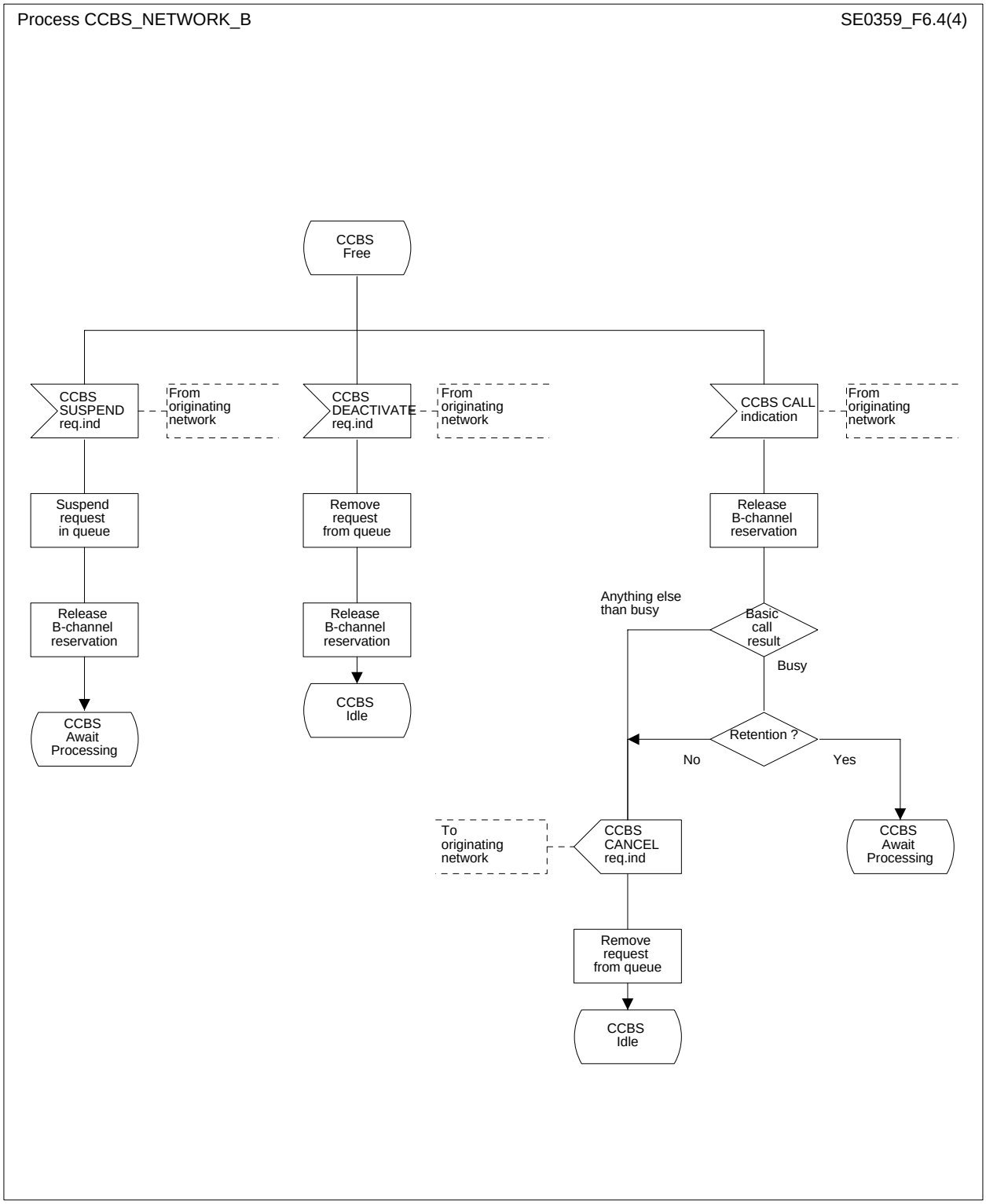


Figure 6 (sheet 4 of 4): CCBS network B process

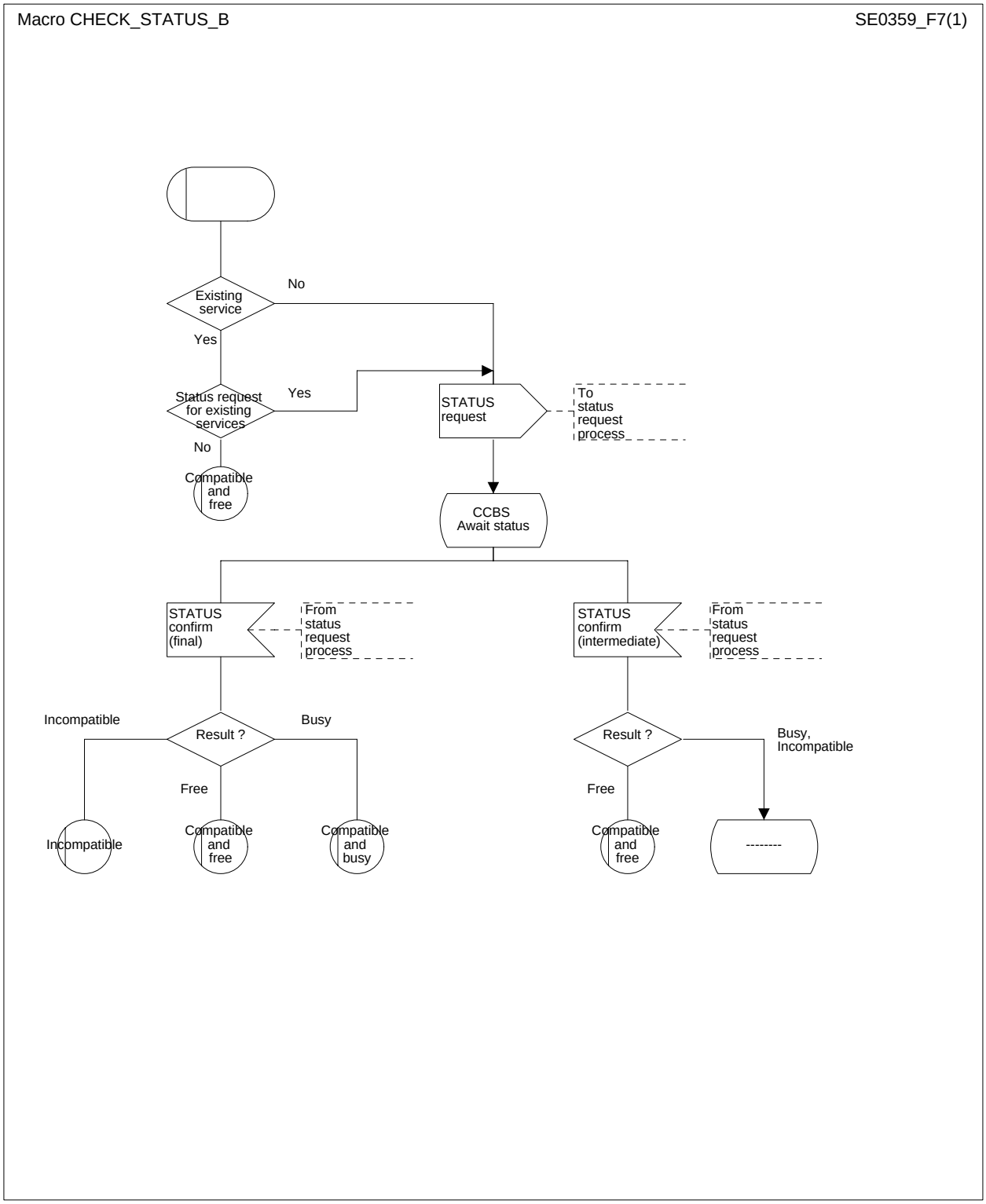


Figure 7: Macro CHECK_STATUS_B

Figure 8 sheet 1 replaced

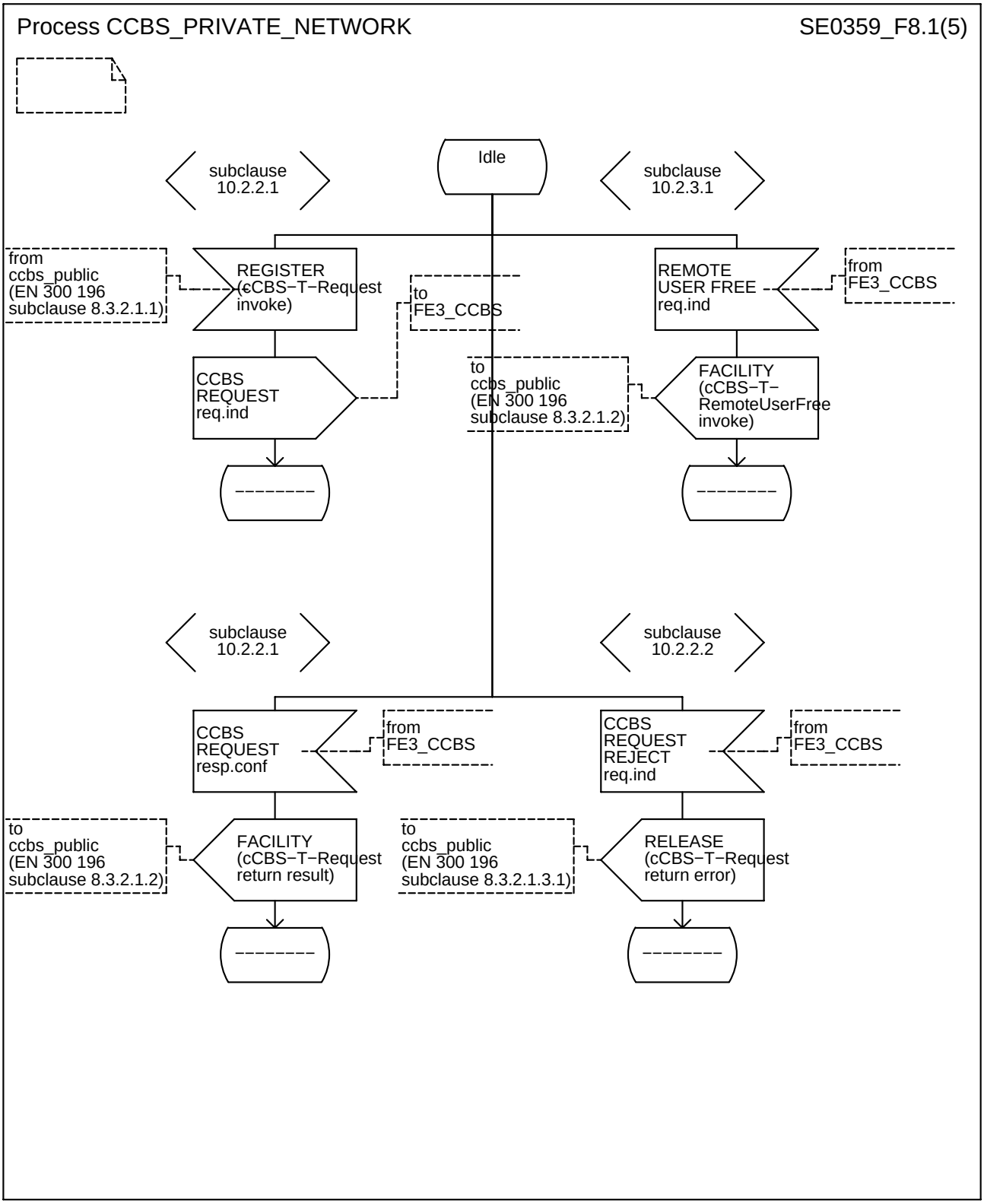


Figure 8 (sheet 1 of 5): CCBS private network process

Figure 8 sheet 2 replaced

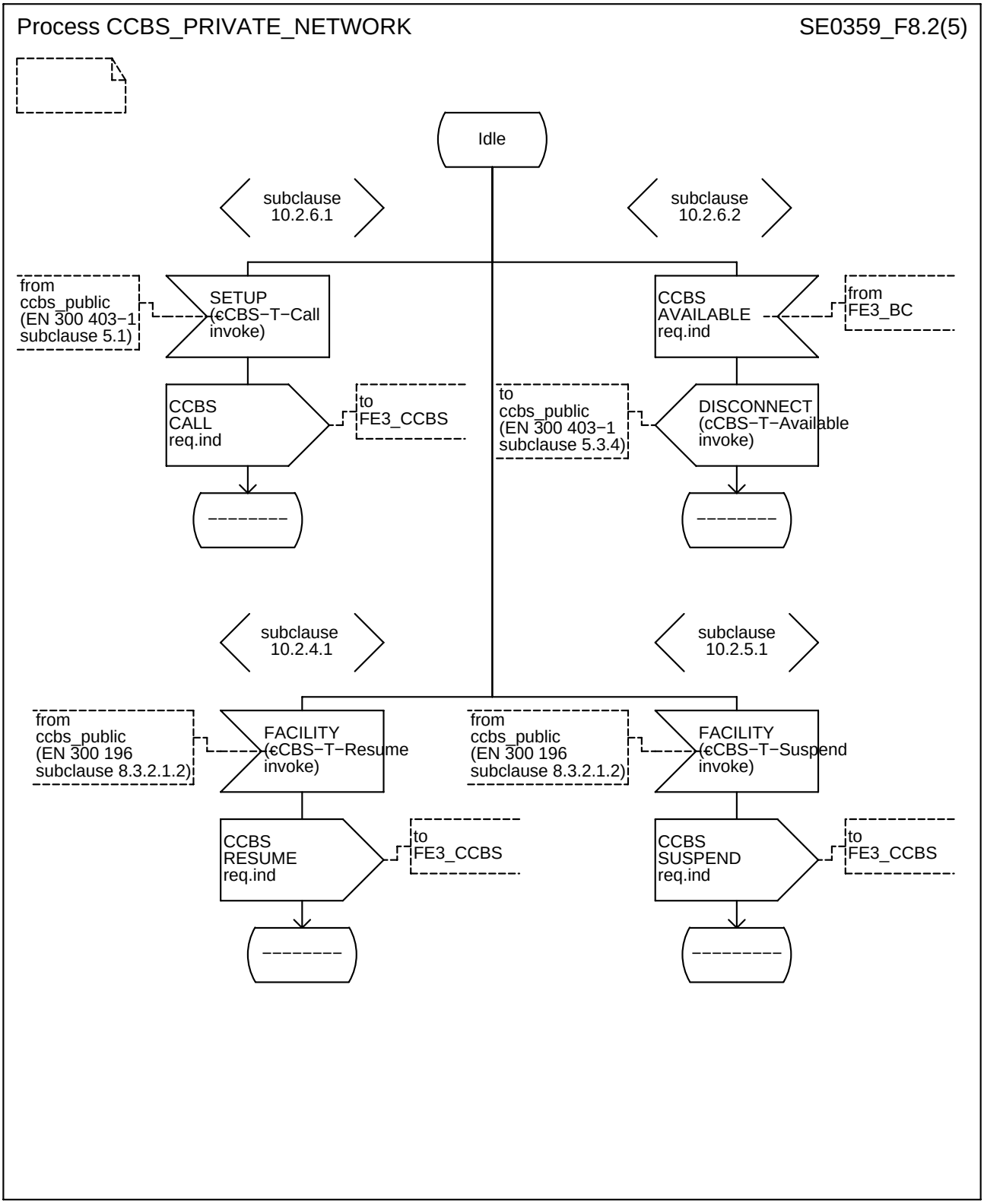


Figure 8 (sheet 2 of 5): CCBS private network process

Figure 8 sheet 3 replaced

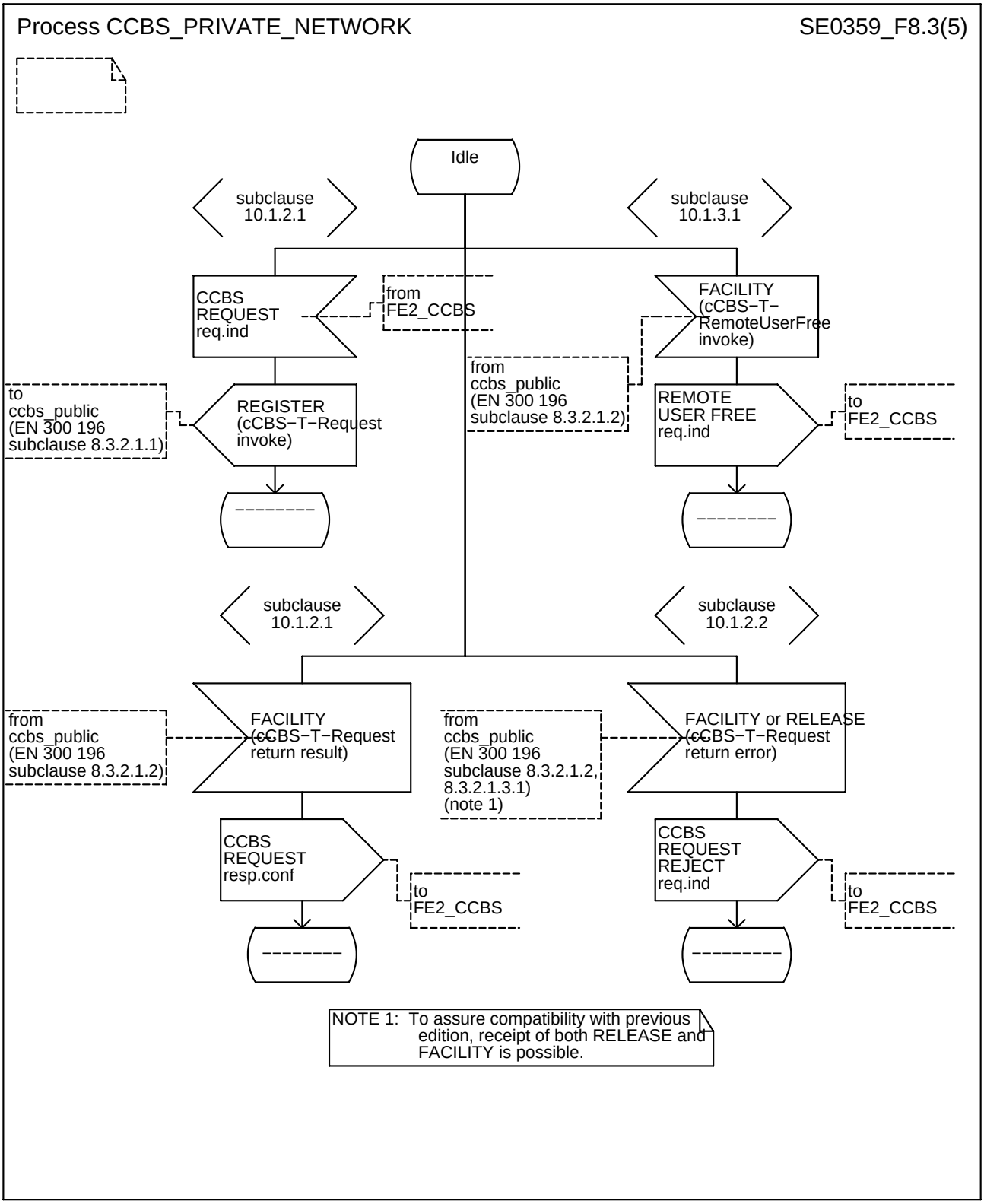


Figure 8 (sheet 3 of 5): CCBS private network process

Figure 8 sheet 4 replaced

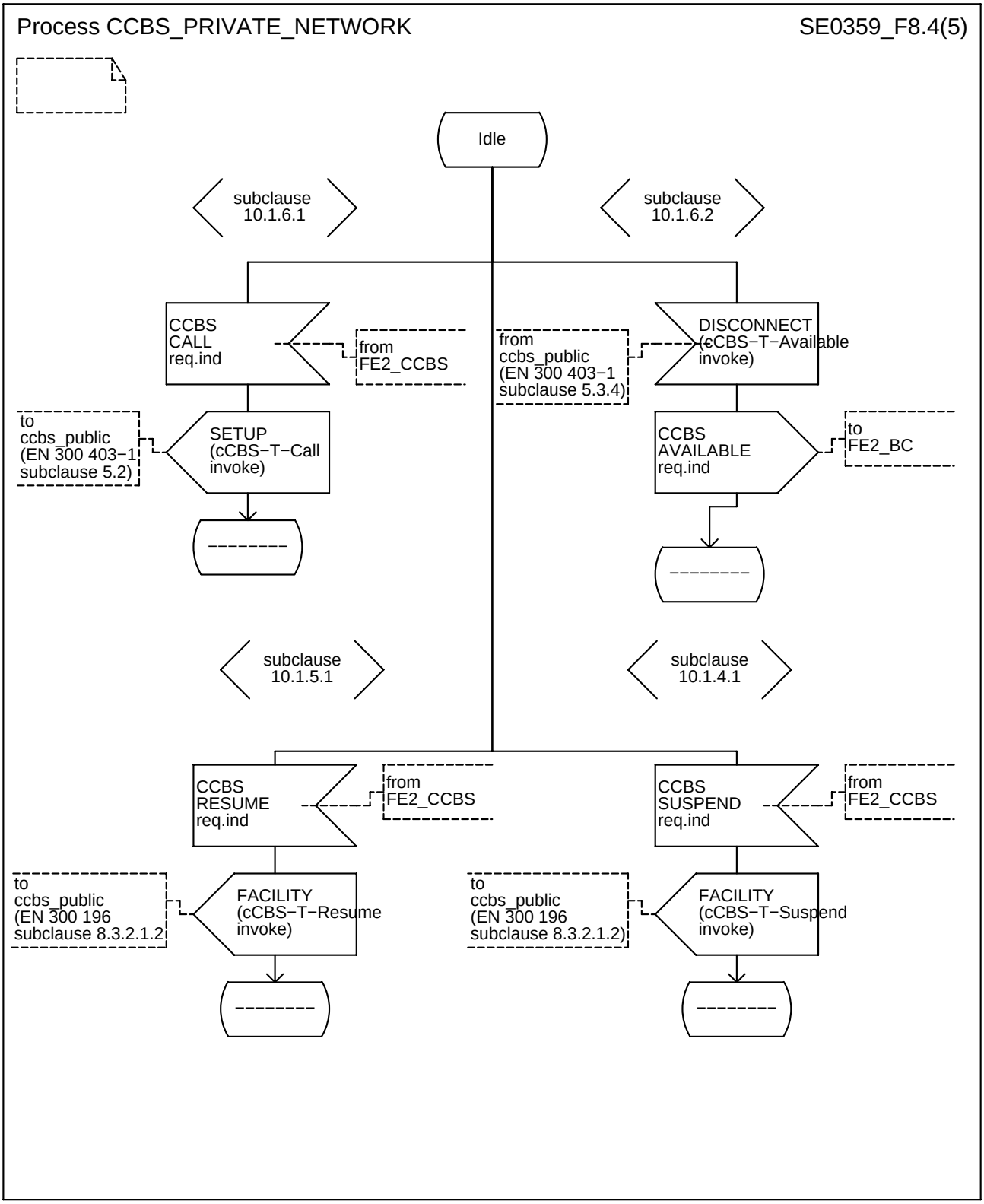


Figure 8 (sheet 4 of 5): CCBS private network process

Figure 8 sheet 5 replaced

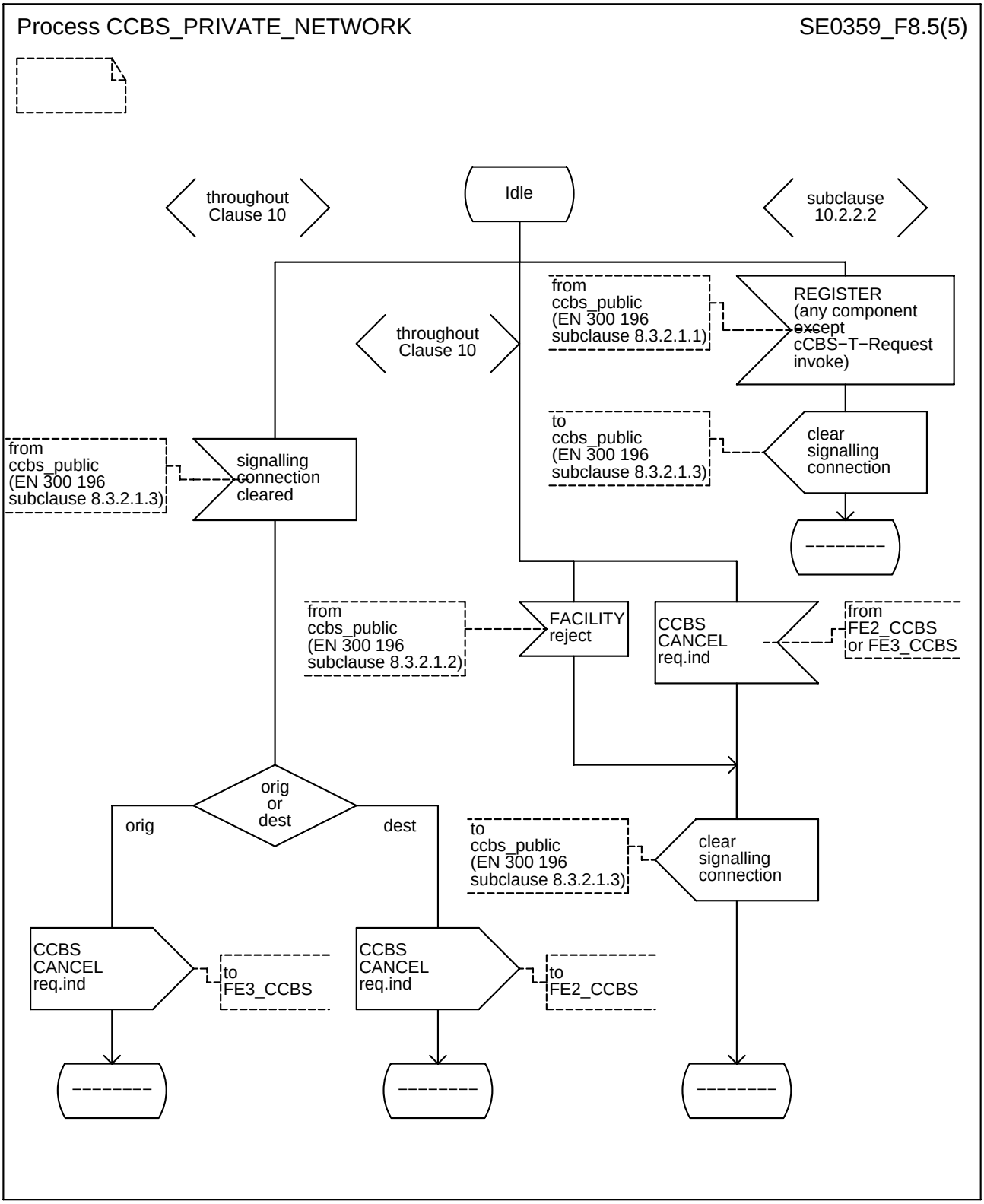


Figure 8 (sheet 5 of 5): CCBS private network process

Figure 9 sheet 1 replaced

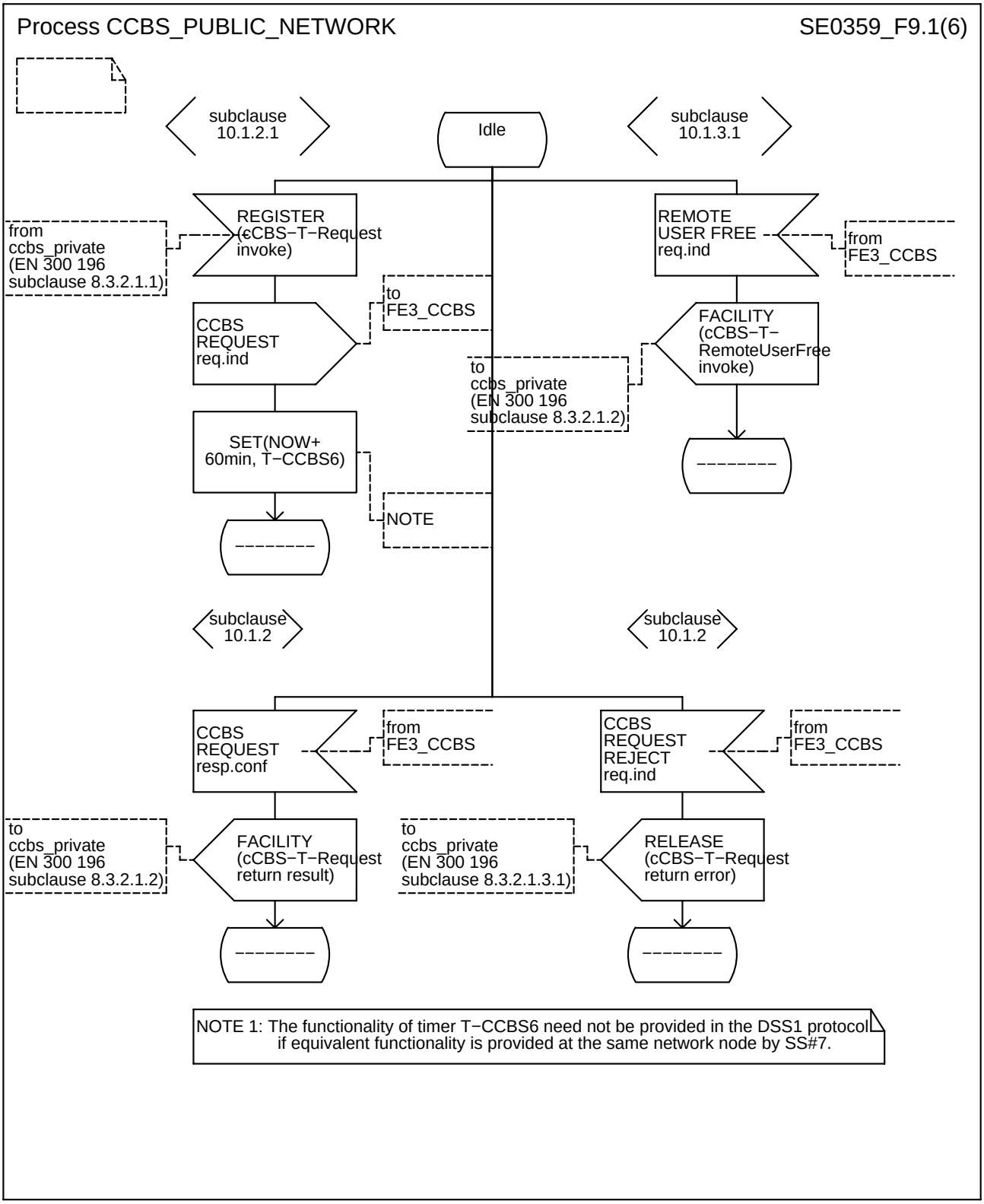


Figure 9 (sheet 1 of 6): CCBS public network process

Figure 9 sheet 2 replaced

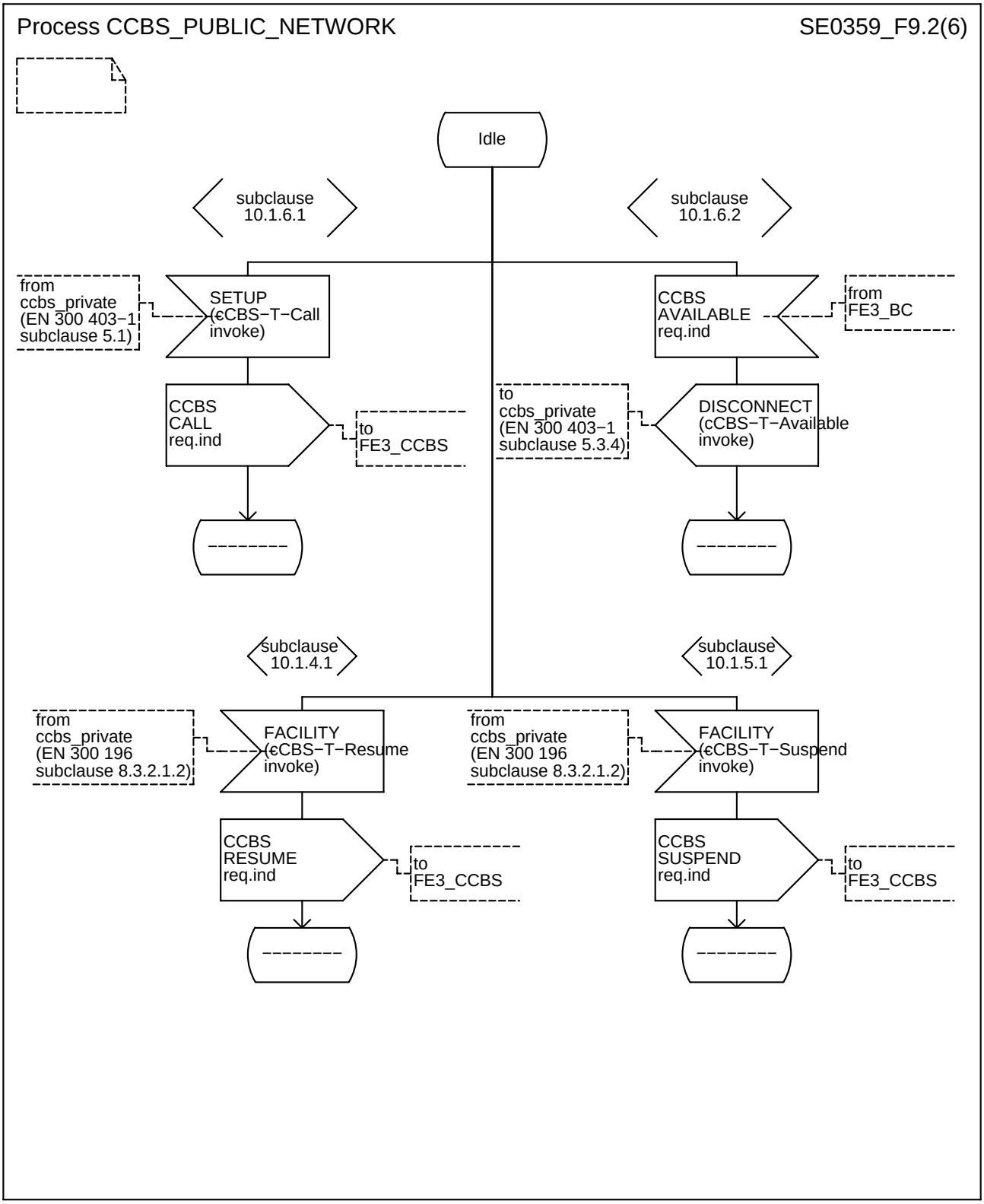


Figure 9 (sheet 2 of 6): CCBS public network process

Figure 9 sheet 3 replaced

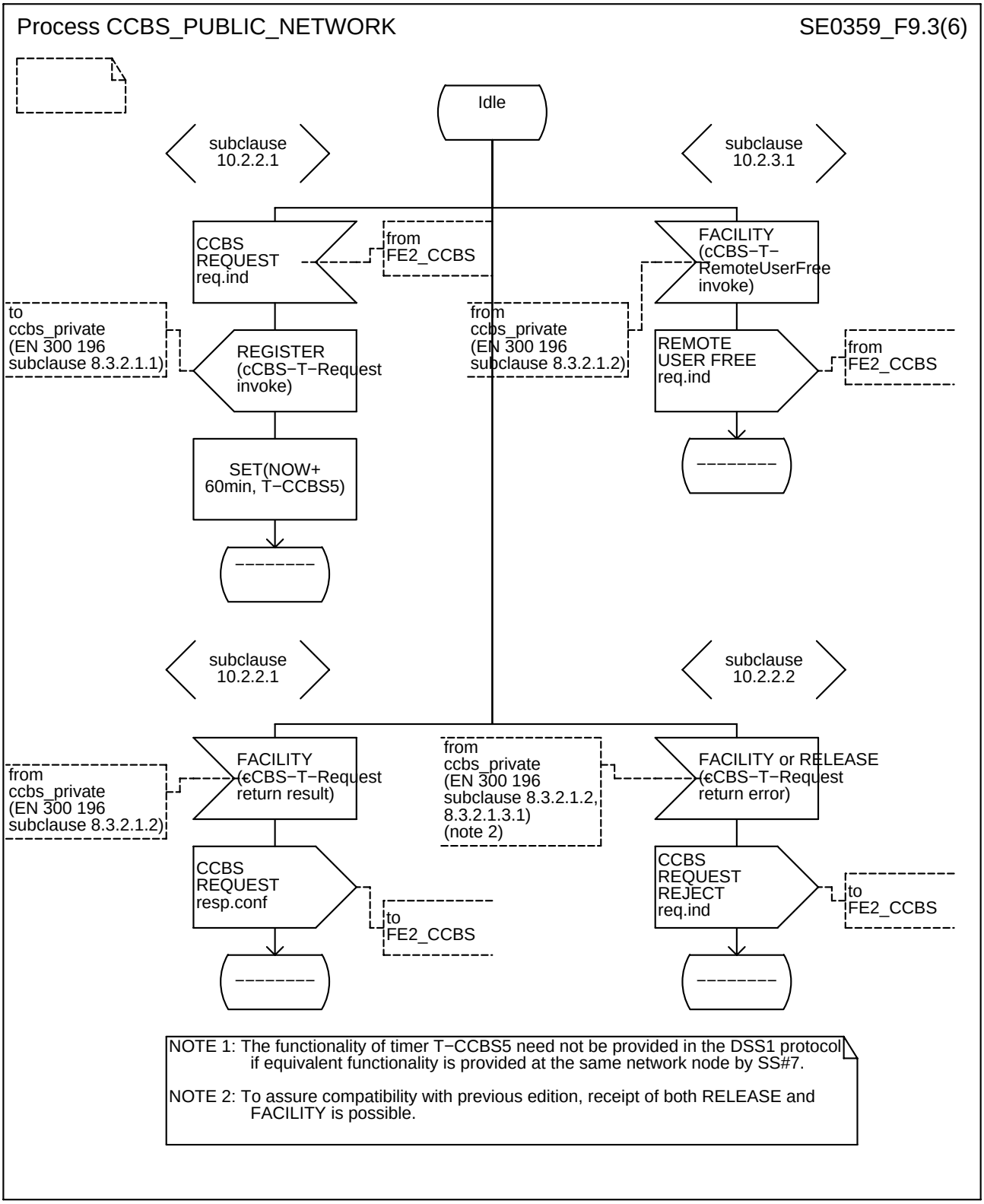


Figure 9 (sheet 3 of 6): CCBS public network process

Figure 9 sheet 4 replaced

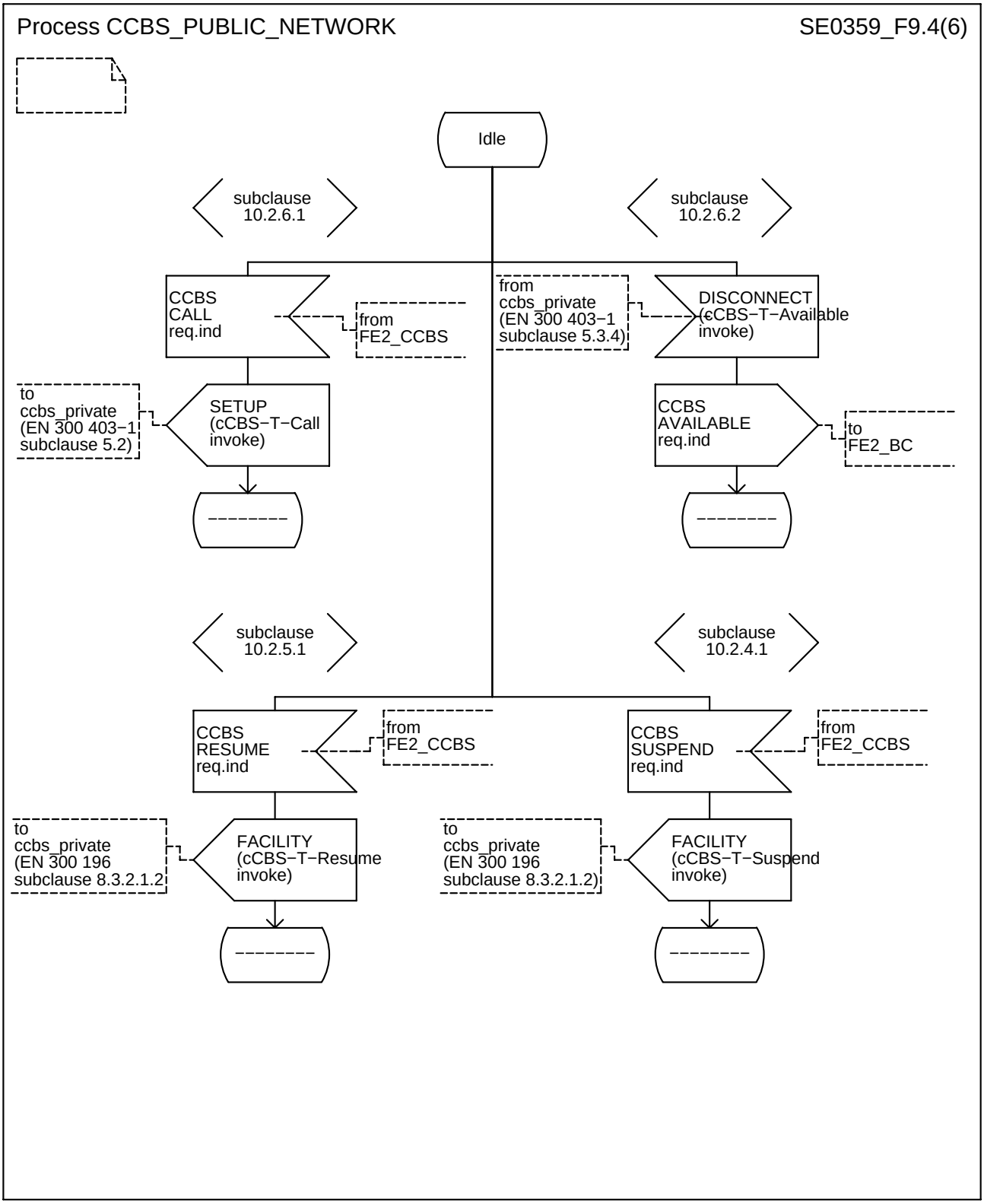


Figure 9 (sheet 4 of 6): CCBS public network process

Figure 9 sheet 5 replaced

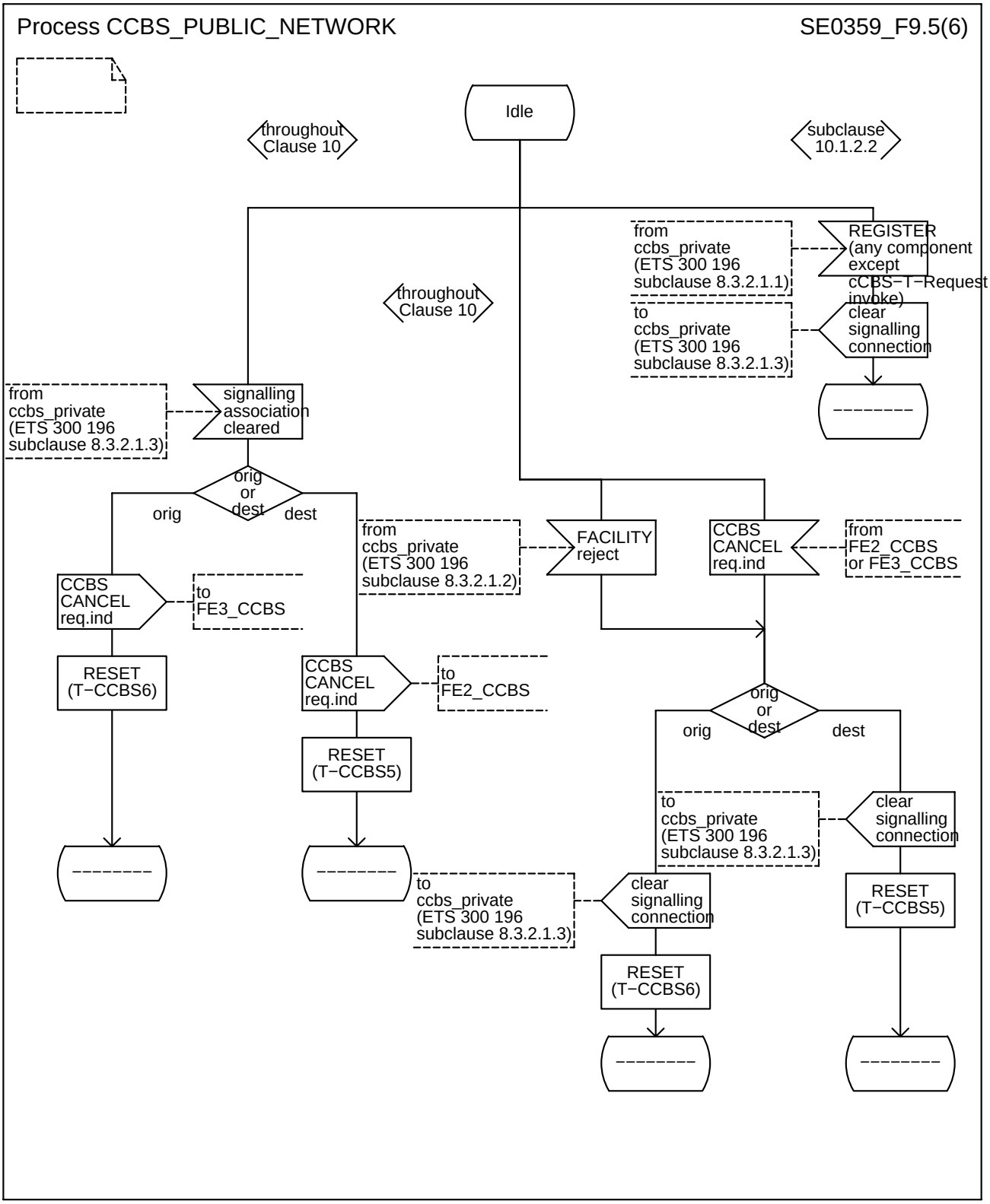


Figure 9 (sheet 5 of 6): CCBS public network process

Figure 9 sheet 6 replaced

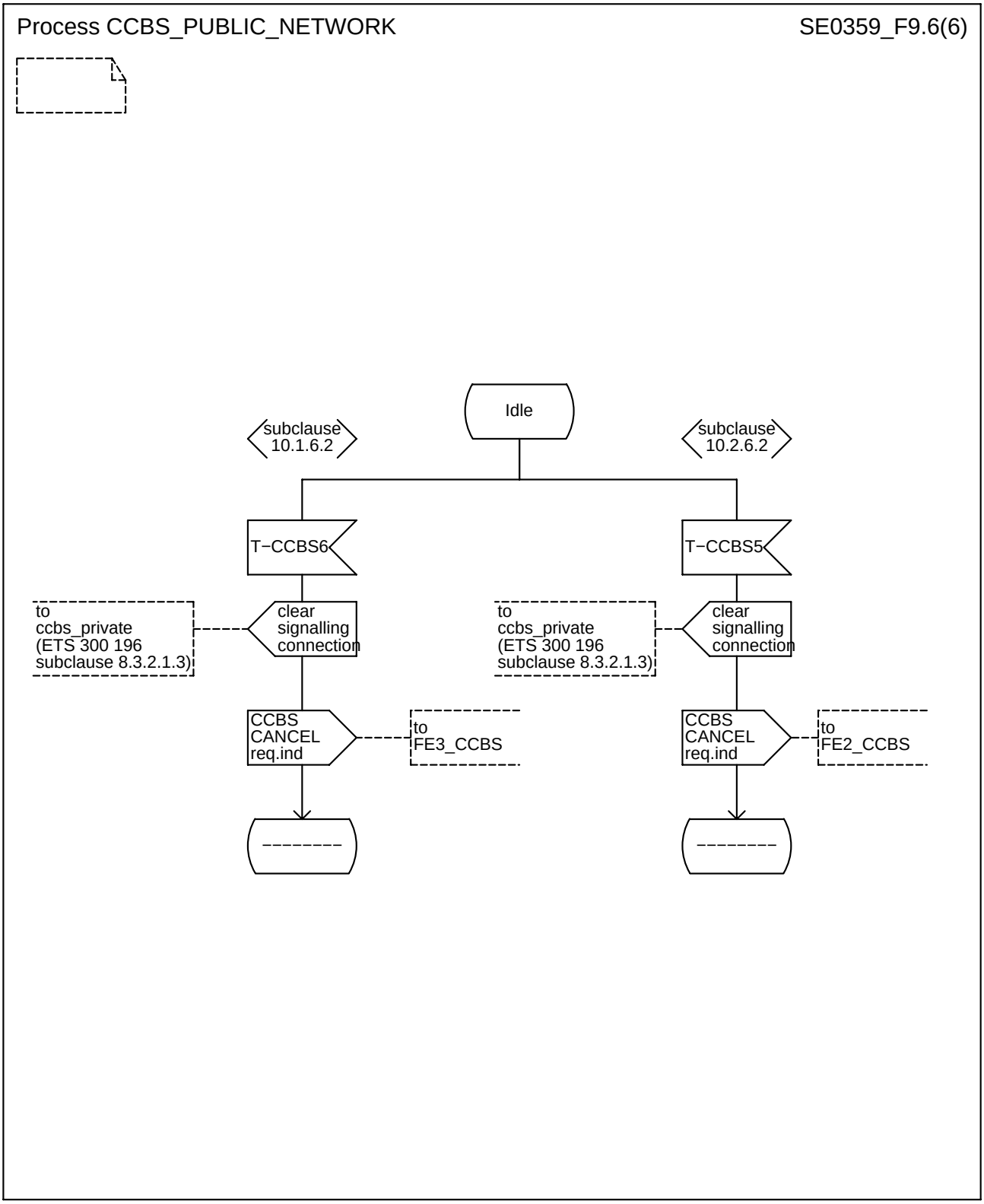


Figure 9 (sheet 6 of 6): CCBS public network process

Annex A (informative): CCBS signalling flows

This annex contains the signalling flows for the different cases of the CCBS supplementary service:

Figure A.1: Normal operation, specific recall, user A free;
Figure A.2: Specific recall, user A busy;
Figure A.3: Normal operation, global recall, at least one user A free;
Figure A.4: Global recall, user A busy;
Figure A.5: CCBS deactivation by user A;
Figure A.6: CCBS deactivation by the network;
Figure A.7: Normal operation, originating private ISDN;
Figure A.8: User A busy, originating private ISDN.

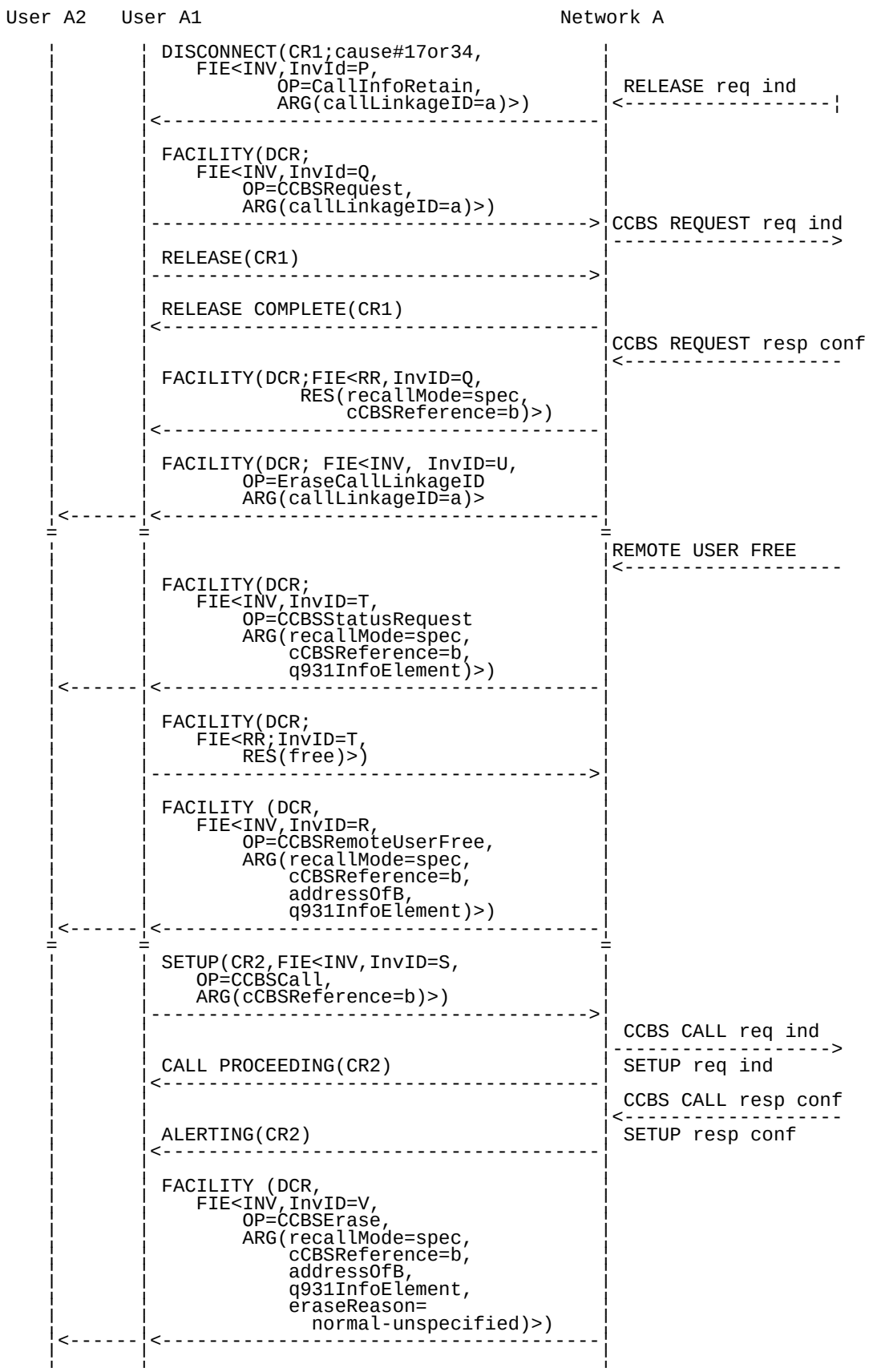


Figure A.1: Normal operation, specific recall, user A free

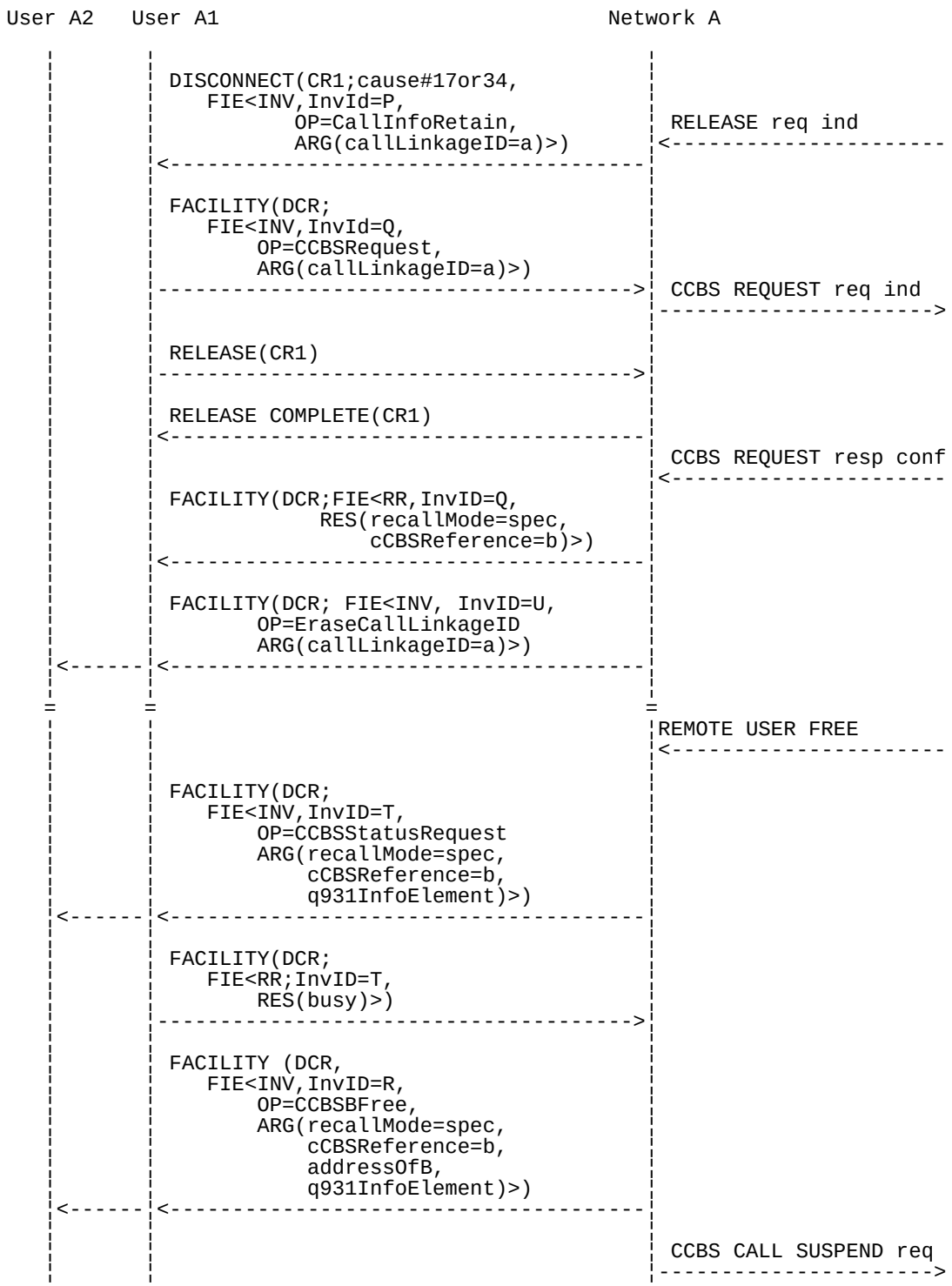


Figure A.2: Specific recall, user A busy

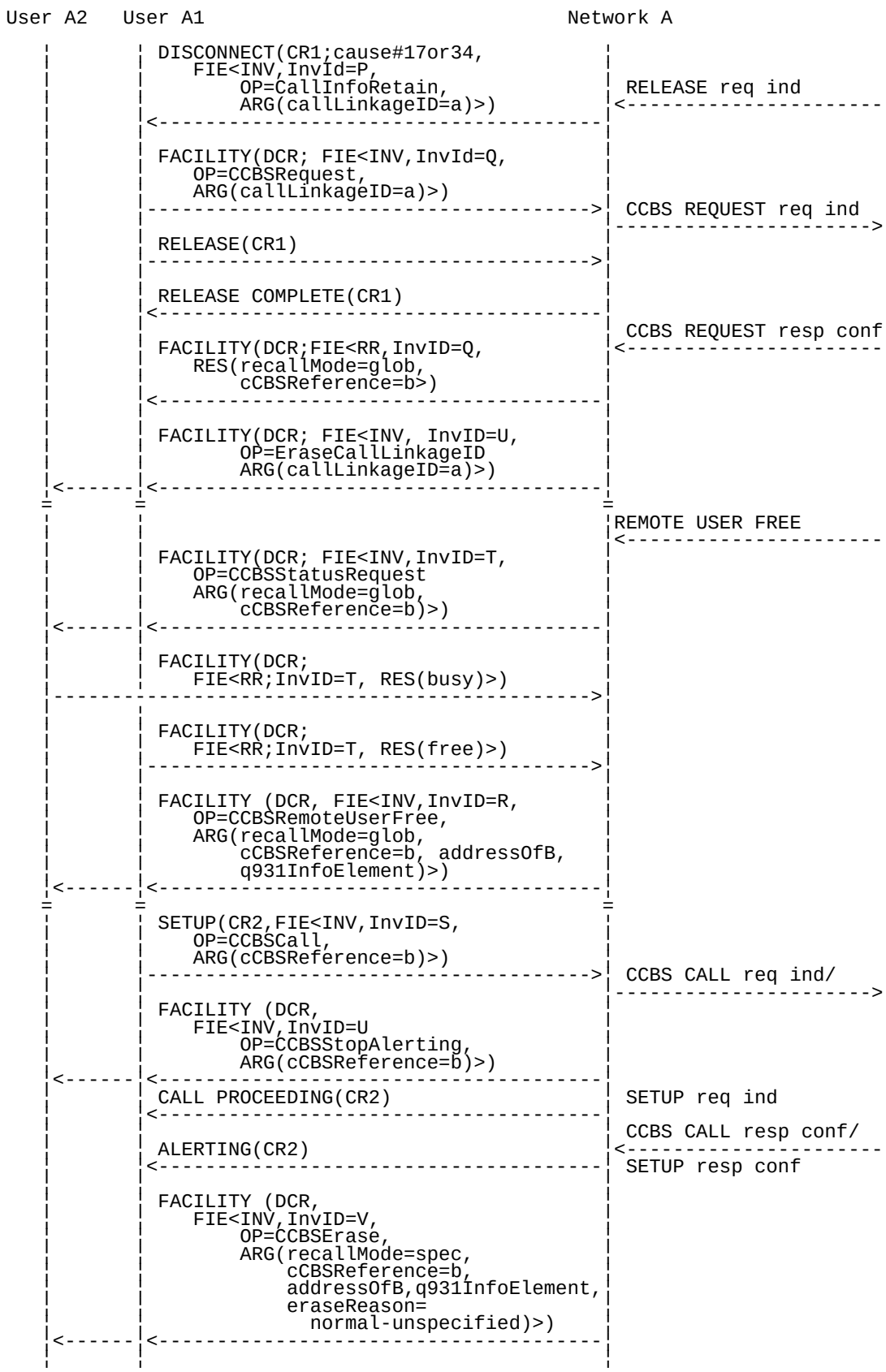


Figure A.3: Normal operation, global recall, at least one user A free

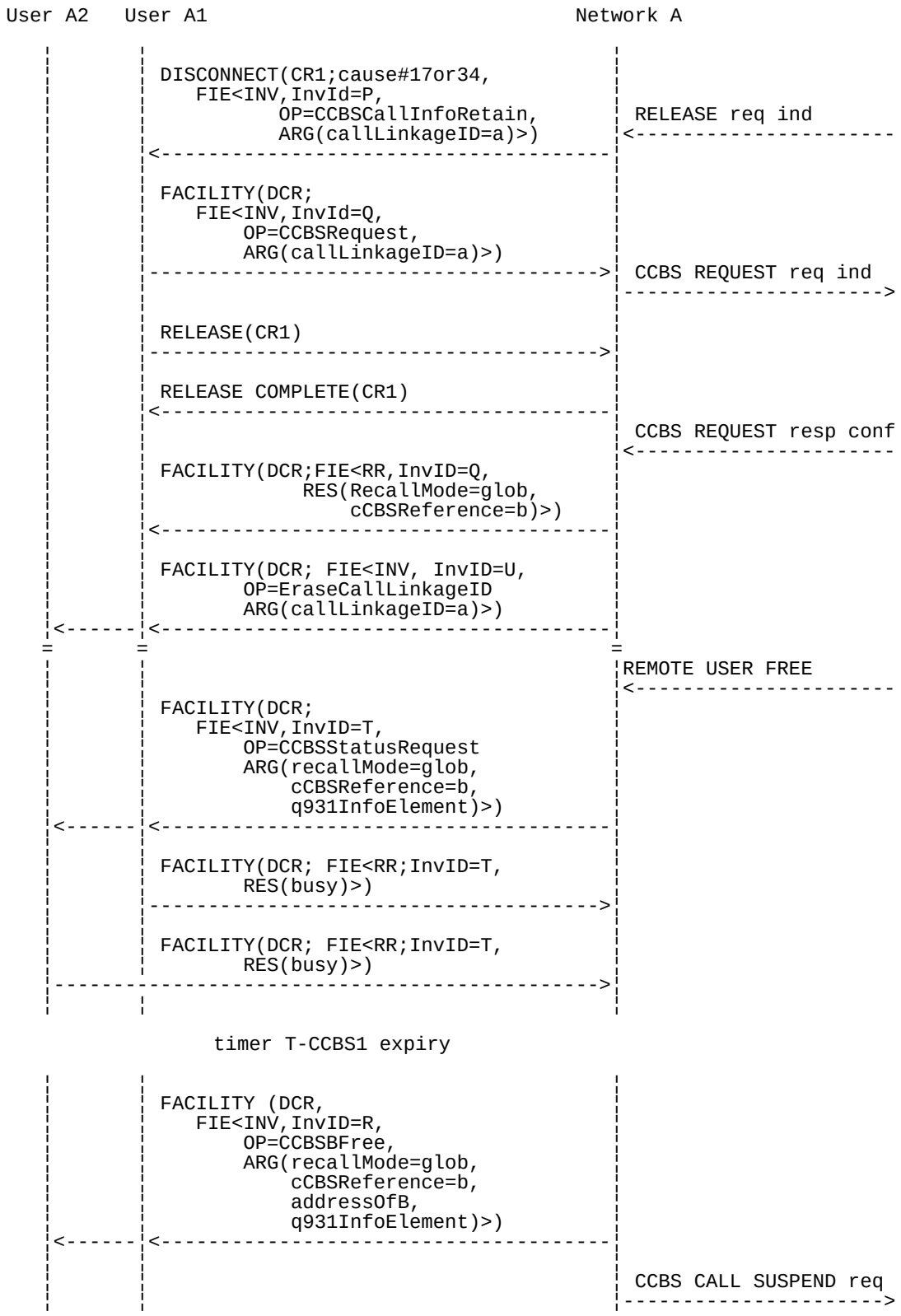


Figure A.4: Global recall, user A busy

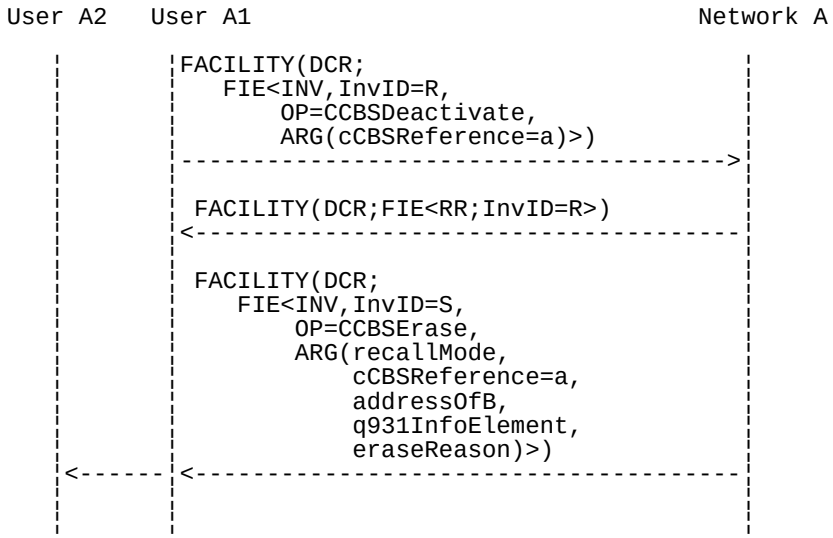


Figure A.5: CCBS deactivation by user A

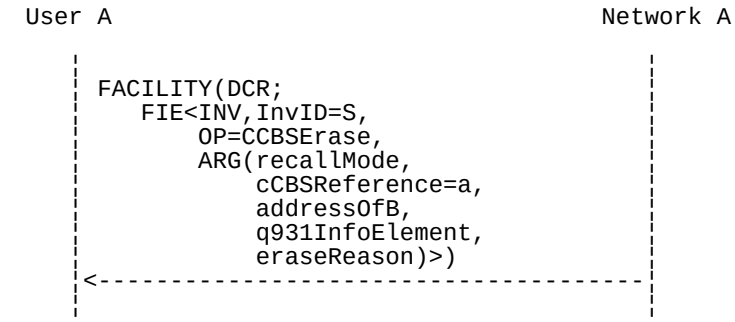


Figure A.6: CCBS deactivation by the network

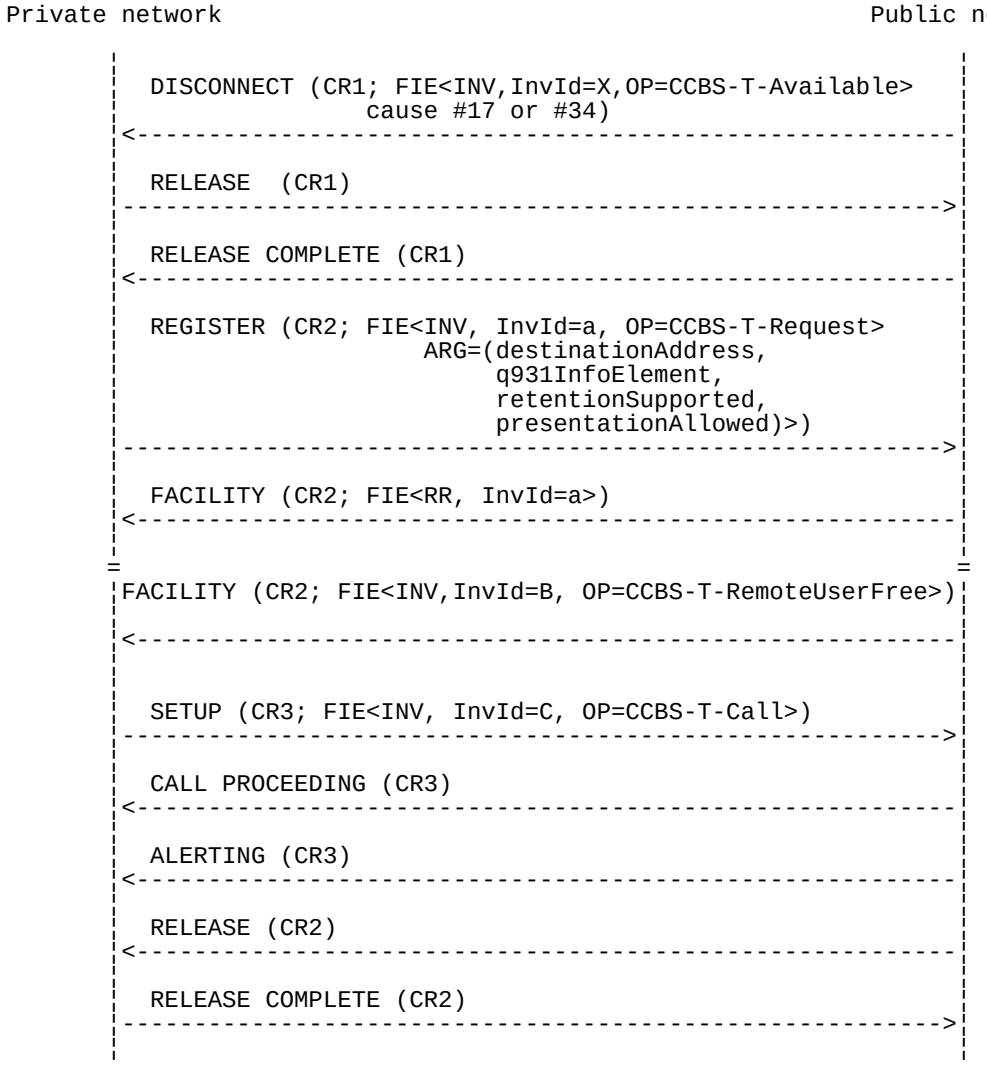


Figure A.7: Originating private ISDN (normal operation)

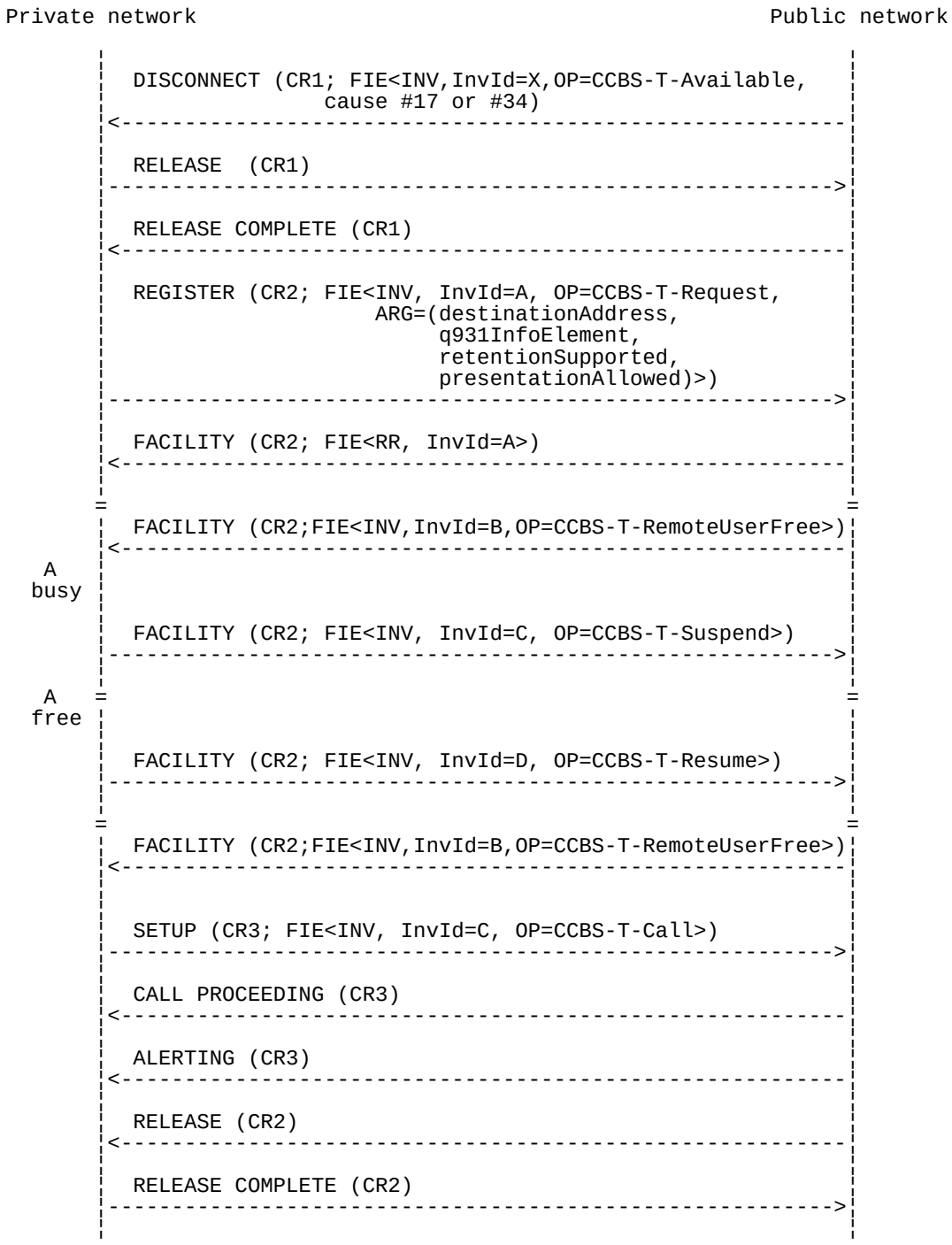


Figure A.8: Originating private ISDN (user A busy)

Annex B (normative): Provision of status request procedures

The network shall maintain a subscription parameter to control use of the status request procedures. The status request procedures are described in EN 300 196-1 [14], subclause 10.3.

When the value of this parameter is "status request procedures are not supported for existing services", the status request procedures shall only be used for calls that are not associated solely with any of the following list of bearer capabilities:

- speech;
- 3,1 kHz audio;
- 64 kbit/s unrestricted.

The basic telecommunication services associated with these bearer capabilities shall be known as "existing services".

Where fallback is provided according to the procedures in subclauses 5.5.2 and 5.5.4 of EN 300 267-1 [15], and the lowest priority bearer capability included in the SETUP message (i.e. that appearing first) is not included in this list, this shall count as a call where status request procedures are used.

When the value of this parameter is "status request procedures are supported for existing services", the status request procedures shall be allowed, when applicable, on calls associated with all bearer capabilities.

Support of the status request procedures in EN 300 196-1 [14], subclause 10.3 is mandatory for any implementation conforming to the present document that provides a circuit-mode basic telecommunication service that is not an existing service.

Annex C (informative): Assignment of object identifier values

The following object identifier values are assigned in the present document:

```
{ccitt identified-organization etsi(0) 359 operations-and-errors(1)}

{ccitt identified-organization etsi(0) 359 operations-and-errors(1)  1} to
{ccitt identified-organization etsi(0) 359 operations-and-errors(1) 11}

{ccitt identified-organization etsi(0) 359 operations-and-errors(1) 20} to
{ccitt identified-organization etsi(0) 359 operations-and-errors(1) 28}

{ccitt identified-organization etsi(0) 359 private-networks-operations-and-errors(2)}

{ccitt identified-organization etsi(0) 359 private-networks-operations-and-errors(2)  1} to
{ccitt identified-organization etsi(0) 359 private-networks-operations-and-errors(2)  6}

{ccitt identified-organization etsi(0) 359 private-networks-operations-and-errors(2) 20} to
{ccitt identified-organization etsi(0) 359 private-networks-operations-and-errors(2) 21}
```

Annex D (informative): Changes with respect to the previous ETS 300 359-1

The following changes have been done:

- conversion to EN layout;
- replacement of references to ETS 300 102 with EN 300 403;
- substitution of non-specific references to basic standards where the intention is to refer to the latest version.

History

Document history		
Edition 1	November 1995	Publication as ETS 300 359-1
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V1.2.4	June 1998	Publication

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