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8 [[]HJbc`ca fYy`Y`n`]bH[f]fUb]a]glcf]Hj Ua]fG8 BŁ!`8 cdc`b]bUglcf]Hj .
Xc_cb Ub`Y`]WUb`UnUgYXYbY[UbUfc b]_Uf7 7 6 GŁ!`Dfctc_c`X][]HJbY`bUfc b]y_Y
g][bU]nUWY`Y`yH`%fB GG%Ł!`%`XY.`GdYWZ_UMY`Udfctc_c`U

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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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
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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.

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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".

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3 Definitions

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

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

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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.

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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)

```