

AS/NZS 4340:1997
ISO/IEC 13870:1995

Australian/New Zealand Standard[®]

**Information technology—
Telecommunications and
information exchange between
systems—Private integrated
services network—Inter-exchange
signalling protocol—Call
completion supplementary services**



AS/NZS 4340:1997

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee IT/16, Private Telecommunications Networking, to supersede AS/NZS 4340(Int):1995.

This Standard is identical with, and has been reproduced from, ISO/IEC 13870:1995, *Information technology—Telecommunications and information exchange between systems—Private Integrated Services Network—Inter-exchange signalling protocol—Call completion supplementary services*.

The objective of this Standard is to provide private integrated services network (PISN) designers and users with the specification for the signalling protocol for use at the Q reference point between PISN exchanges, in order to allow call completion to busy subscribers or subscribers who do not respond worldwide.

The Standard is one of a series of emerging ISO/IEC Standards applicable to private integrated services networking. The series uses the ISDN concepts as developed by ITU-T and is also within the framework of Standards for Open Systems Interconnection (OSI) as defined by ISO/IEC JTC 1.

Statements expressed in mandatory terms in notes to clauses are deemed to be requirements of this Standard.

Users of this Standard are advised by Standards Australia and Standards New Zealand, under arrangements made with ISO and IEC, as well as certain other Standards organizations, that the number of this Standard is not reproduced on each page; its identity is shown only on the cover, inside front cover and title pages.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the annex to which they apply. A 'normative' annex is an integral part of a Standard, whereas an 'informative' annex is only for information and guidance.

For the purpose of this Joint Standard, the ISO/IEC text should be modified as follows:

- (a) *Terminology* The words 'this Australian/New Zealand Standard' should replace the words 'this International Standard' wherever they appear.
- (b) *References* The references to international Standards should be replaced by references, where appropriate, to the following Australian/New Zealand Standards:

*Reference to International Standard
or other Publication*

Australian/New Zealand Standard

ISO/IEC

AS/NZS

11572 Information technology—
Telecommunications and
information exchange between
systems—Private Integrated
Services Network—Circuit-mode
bearer services—Inter-exchange
signalling procedures and protocol

4137 Information technology—
Telecommunications and
information exchange between
systems—Private integrated
services network—Circuit-mode
bearer services—Inter-exchange
signalling procedures and protocol

11574 Information technology—
Telecommunications and
information exchange between
systems—Private Integrated
Services Network—Circuit-mode
64 bit/s bearer services—Service
description, functional capabilities
and information flows

4135 Information technology—
Telecommunications and
information exchange between
systems—Private integrated
services network—Circuit-mode
64 kbit/s bearer services—Service
description, functional capabilities
and information flows

ISO/IEC		AS/NZS	
11579	Information technology— Telecommunications and information exchange between systems—Private Integrated Services Network	4136	Information technology— Telecommunications and information exchange between systems—Private integrated services network
11579-1	Part 1: Reference configuration for PISN exchanges (PINX)	4136.1	Part 1: Reference configuration for PISN exchanges (PINX)
11582	Information technology— Telecommunications and information exchange between systems—Private Integrated Services Network—Generic functional protocol for the support of supplementary services— Inter-exchange signalling procedures and protocol	4239	Information technology— Telecommunications and information exchange between systems—Private integrated services network—Generic functional protocol for the support of supplementary services— Inter-exchange signalling procedures and protocol
13866	Information technology— Telecommunications and information exchange between systems—Private Integrated Services Network—Specification, functional model and information flows—Call completion supplementary services	4338(Int)	Information technology— Telecommunications and information exchange between systems—Private integrated services network—Specification, functional model and information flows—Call completion supplementary services
13873	Information technology— Telecommunications and information exchange between systems—Private Integrated Services Network—Inter-exchange signalling protocol—Diversion supplementary services	—	
CCITT			
Rec.I.112	Vocabulary of terms for ISDNs (Blue Book)	—	
Rec.I.130	Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN (Blue Book)	—	
Rec.I.210	Principles of telecommunication services supported by an ISDN and the means to describe them (Blue Book)	—	
Rec.Q.950	Digital Subscriber Signalling System No. 1 (DSS1)— Supplementary services protocols, structure and general principles	—	
Rec.Z.100	Specification and Description Language (Blue Book)	—	

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AUSTRALIAN/NEW ZEALAND STANDARD

Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call completion supplementary services

1 Scope

This International Standard specifies the signalling protocol for the support of the Call Completion supplementary services at the Q reference point between Private Integrated Network Exchanges (PINXs) connected together within a Private Integrated Services Network (PISN). The Call Completion supplementary services are Completion of Calls to Busy Subscribers (SS-CCBS) and Completion of Calls on No Reply (SS-CCNR).

SS-CCBS enables a calling User A, encountering a busy destination User B, to have the call completed when User B becomes not busy, without having to make a new call attempt.

SS-CCNR enables a calling User A, encountering a destination User B that, though alerted, does not answer, to have the call completed when User B becomes not busy again after a period of activity, without having to make a new call attempt.

The Q reference point is defined in ISO/IEC 11579-1.

Service specifications are produced in three stages and according to the method specified in CCITT Recommendation I.130. This International Standard contains the stage 3 specification for the Q reference point and satisfies the requirements identified by the stage 1 and stage 2 specifications in ISO/IEC 13866.

The signalling protocols for SS-CCBS and SS-CCNR operate on top of the signalling protocol for basic circuit switched call control, as specified in ISO/IEC 11572, and uses certain aspects of the generic procedures for the control of supplementary services specified in ISO/IEC 11582.

This International Standard also specifies additional signalling protocol requirements for the support of interactions at the Q reference point between SS-CC and other supplementary services and ANFs.

This International Standard is applicable to PINXs which can interconnect to form a PISN.

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2 Conformance

In order to conform to this International Standard, a PINX shall satisfy the requirements identified in the Protocol Implementation Conformance Statement (PICS) proforma in annex A.

3 Normative references

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

ISO/IEC 11572:1994, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit-mode bearer services Inter-exchange signalling procedures and protocol.*

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

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

ISO/IEC 11582:1995, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Generic functional protocol for the support of supplementary services - Inter-exchange signalling procedures and protocol.*

ISO/IEC 13866:1995, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Call completion supplementary services.*

ISO/IEC 13873:1995, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Diversion supplementary services.*

CCITT Rec. I.112(1988), *Vocabulary of terms for ISDNs (Blue Book).*

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

CCITT Rec. I.210(1988), *Principles of telecommunications services supported by an ISDN and the means to describe them (Blue Book).*

ITU-T Rec. Q.950(1993), *Digital Subscriber Signalling System No. 1 (DSS1) - Supplementary services protocols, structure and general principles.*

CCITT Rec. Z.100(1988), *Specification and Description Language (Blue Book).*

4 Definitions

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

4.1 External definitions

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

- Application Protocol Data Unit (APDU) (ISO/IEC 11582)
- Basic Service (CCITT Rec. I.210)
- Complete Number (ISO/IEC 11571)

- Interpretation APDU	(ISO/IEC 11582)
- Network Facility Extension (NFE)	(ISO/IEC 11582)
- Originating PINX	(ISO/IEC 11582)
- Outgoing Gateway PINX	(ISO/IEC 11572)
- Private Integrated Services Network (PISN)	(ISO/IEC 11579-1)
- Private Integrated Services Network Exchange (PINX)	(ISO/IEC 11579-1)
- Signalling	(CCITT Rec. I.112)
- Supplementary Service	(CCITT Rec. I.210)
- Supplementary Service Control Entity	(ISO/IEC 11582)
- Terminating PINX	(ISO/IEC 11582)
- Transit PINX	(ISO/IEC 11582)
- User	(ISO/IEC 11574)

4.2 Other definitions

4.2.1 CC Call: The re-initiation, in the course of executing a CC Request, of the previously unsuccessful call from User A to User B on behalf of User A, with or without Path Reservation.

4.2.2 CC Request: An instance of SS-CCBS or SS-CCNR.

4.2.3 connection release: The release of the call independent signalling connection as soon as a SS-CC has been initiated and the establishment of further call independent signalling connections for subsequent phases of the service.

4.2.4 connection retention: The use of a single call independent signalling connection throughout the lifetime of a particular instance of SS-CC.

4.2.5 path reservation: The reservation of resources prior to the SS-CC Recall, by means of a basic call set up from the Originating to the Terminating PINX, in order to have a bearer connection through the PISN available when User A accepts the SS-CC Recall.

4.2.6 service retention: The optional capability to continue with a CC Request after the CC Call failed due to User B being busy again.

5 List of acronyms

APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation no. 1
CC	Call Completion
ISDN	Integrated Services Digital Network
MSI	Manufacturer Specific Information
NFE	Network Facility Extension
PICS	Protocol Implementation Conformance Statement
PISN	Private Integrated Services Network
PINX	Private Integrated Services Network Exchange
SDL	Specification and Description Language
SS-CC	Supplementary Service Completion of Calls (i.e. SS-CCBS or SS-CCNR)
SS-CCBS	Supplementary Service Completion of Calls to Busy Subscribers

SS-CCNR Supplementary Service Completion of Calls on No Reply
TE Terminal Equipment

6 Signalling protocol for the support of SS-CCBS and SS-CCNR

6.1 SS-CCBS/CCNR description

Completion of Calls to Busy Subscribers (SS-CCBS) is a supplementary service which allows a calling User A, on encountering a busy called User B, to request that the PISN monitors User B and indicates to User A when User B becomes not busy. On response by User A to that indication the PISN will attempt to complete the call to User B.

Completion of Calls on No Reply (SS-CCNR) is a supplementary service which allows a calling User A, when the called User B does not respond to the call request, to request that the PISN monitors User B and indicates to User A when User B becomes not busy after a subsequent period of activity at User B's TE. On response by User A to that indication the PISN will attempt to complete the call to User B.

NOTE - Which activities at User B's TE would result in a 'B not busy' indication to User A is outside the scope of this International Standard.

These supplementary services are applicable to all basic services defined in ISO/IEC 11574.

6.2 SS-CC operational requirements

6.2.1 Requirements on the Originating PINX

Call establishment procedures for the outgoing side of an inter-PINX link and call release procedures, as specified in ISO/IEC 11572, shall apply.

Generic procedures for the call related control of supplementary services, as specified in ISO/IEC 11582 for an End PINX, shall apply. Additionally generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating and a Terminating PINX, shall apply.

6.2.2 Requirements on the Terminating PINX

Call establishment procedures for the incoming side of an inter-PINX link and call release procedures, as specified in ISO/IEC 11572, shall apply.

Generic procedures for the call related control of supplementary services, as specified in ISO/IEC 11582 for an End PINX, shall apply. Additionally generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating and a Terminating PINX, shall apply.

6.2.3 Requirements on a Transit PINX

Basic call procedures for call establishment and call clearing at a Transit PINX, as specified in ISO/IEC 11572, shall apply.

NOTE - The use of basic call timer T310 at a Transit PINX can cause premature clearing of a reserved path if the timer value is too short. For this reason this International Standard specifies the sending of CCITT progress description no. 8 "in-band information or appropriate pattern now available" by the Terminating PINX, in order to stop timer T310, even though in-band tones and announcements are not applicable in this situation.

Generic procedures for the call related control and call independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for a Transit PINX, shall apply.

6.3 SS-CC coding requirements**6.3.1 Operations**

The operations defined in Abstract Syntax Notation number 1 (ASN.1) below shall apply.

Operations in support of SS-CC

```

SS-CC-Operations { iso (1) standard (0) pss1-call-completion (13870) operations (0)}
DEFINITIONS EXPLICIT TAGS ::=
BEGIN
IMPORTS
    OPERATION,
    ERROR
FROM Remote-Operation-Notation { joint-iso-ccitt (2) remote-operations (4) notation (0)}

    Extension
FROM Manufacturer-specific-service-extension-definition
    {iso(1)standard (0) pss1-generic-procedures (11582) msi-definition (0)}

    PSS1InformationElement
FROM pss1-generic-parameters-definition
    { iso (1) standard (0) pss1-generic-procedures (11582) pss1-generic-parameters (6)}

    PartyNumber,
    PartySubaddress,
    PresentedNumberUnscreened
FROM Addressing-Data-Elements
    {iso(1) standard (0) pss1-generic-procedures (11582) addressing-data-elements
    (9)}

    supplementaryServiceInteractionNotAllowed
FROM General-Error-List
    { ccitt (0) recommendation (0) q 950 general-error-list (1) };

```

--TYPE DEFINITIONS FOR CC OPERATIONS AND ERRORS
--FOLLOW

```

CcbsRequest ::= OPERATION
    ARGUMENT
        CcRequestArg
    RESULT
        CcRequestRes
    ERRORS{
        shortTermRejection,
        longTermRejection,

```

```

        unspecified,
        supplementaryServiceInteractionNotAllowed
    }
CcnrRequest ::= OPERATION
    ARGUMENT
        CcRequestArg
    RESULT
        CcRequestRes
    ERRORS{
        shortTermRejection,
        longTermRejection,
        unspecified ,
        supplementaryServiceInteractionNotAllowed
    }

CcCancel ::= OPERATION
    ARGUMENT
        CcOptionalArg
CcExecPossible ::= OPERATION
    ARGUMENT
        CcOptionalArg
CcPathReserve ::= OPERATION
    ARGUMENT
        CcExtension
    RESULT
        CcExtension
    ERRORS {
        remoteUserBusyAgain,
        failureToMatch,
        failedDueToInterworking,
        unspecified
    }
CcRingout ::= OPERATION
    ARGUMENT
        CcExtension
    ERRORS{
        remoteUserBusyAgain,
        failureToMatch,
        unspecified
    }
CcSuspend ::= OPERATION
    ARGUMENT
        CcExtension
CcResume ::= OPERATION
    ARGUMENT
        CcExtension

```

Unspecified ::= ERROR
 PARAMETER
 Extension

-- TYPE DEFINITIONS FOR CC DATA TYPES FOLLOW

```

CcRequestArg ::= SEQUENCE {
    numberA          PresentedNumberUnscreened,
    numberB          PartyNumber,
    service          PSS1InformationElement,
                    -- permitted information elements are:
                    -- Bearer capability;
                    --Low layer compatibility;
                    --High layer compatibility--

    subaddrA         [10] PartySubaddress OPTIONAL,
    subaddrB         [11] PartySubaddress OPTIONAL,
    can-retain-service [12] IMPLICIT BOOLEAN DEFAULT FALSE,
    retain-sig-connection [13] IMPLICIT BOOLEAN OPTIONAL,
                    -- TRUE: signalling connection to be retained;
                    -- FALSE: signalling connection to be released;
                    -- omission: release or retain signalling connection--

    extension        CcExtension OPTIONAL
}

CcRequestRes ::= SEQUENCE{
    no-path-reservation [0] IMPLICIT BOOLEAN DEFAULT FALSE,
    retain-service       [1] IMPLICIT BOOLEAN DEFAULT FALSE,
    extension            CcExtension OPTIONAL
}

CcOptionalArg ::= CHOICE{
    fullArg          [0] IMPLICIT SEQUENCE {
        numberA      PartyNumber,
        numberB      PartyNumber,
        service       PSS1InformationElement,

                    -- permitted information elements are:
                    -- Bearer capability;
                    -- Low layer compatibility;
                    -- High layer compatibility.

        subaddrA     [10] PartySubaddress OPTIONAL,
        subaddrB     [11] PartySubaddress OPTIONAL,
        extension     CcExtension OPTIONAL
    },
    extArg           CcExtension
}

CcExtension ::= CHOICE {

```

none
single
multiple

NULL,
[14] IMPLICIT Extension,
[15] IMPLICIT SEQUENCE OF Extension

--VALUE DEFINITIONS FOR OPERATIONS AND ERRORS FOLLOW

ccbsRequest	CcbsRequest	::= 40
ccnrRequest	CcnrRequest	::= 27
ccCancel	CcCancel	::= 28
ccExecPossible	CcExecPossible	::= 29
ccPathReserve	CcPathReserve	::= 30
ccRingout	CcRingout	::= 31
ccSuspend	CcSuspend	::= 32
ccResume	CcResume	::= 33
shortTermRejection	ERROR	::= 1010
longTermRejection	ERROR	::= 1011
remoteUserBusyAgain	ERROR	::= 1012
failureToMatch	ERROR	::= 1013
failedDueToInterworking	ERROR	::= 1014
unspecified	Unspecified	::= 1008
END	-- of SS-CC-Operations--	

6.3.2 Information elements

6.3.2.1 Facility information element

The operations defined in 6.3.1 shall be coded in the Facility information element in accordance with 11.3.3 of ISO/IEC 11582.

The Facility information element shall always contain an NFE. When the Facility information element is sent and conveys an invoke APDU the destinationEntity element of the NFE shall contain value endPINX.

A Facility information element conveying a ccPathReserve invoke APDU shall also contain an Interpretation APDU with value clearCallIfAnyInvokePduNotRecognised. In all other cases the Interpretation APDU shall either be omitted or included with value rejectAnyUnrecognised-InvokePdu.

Within elements of type PSS1InformationElement information elements (e.g. Bearer capability) shall be coded in accordance with ISO/IEC 11572.

6.3.2.2 Other information elements

Any other information elements (e.g. Calling party number, Called party number) shall be coded in accordance with the rules of ISO/IEC 11572 and ISO/IEC 11582

6.3.3 Messages

The Facility information element shall be conveyed in the messages as specified in clause 10 of ISO/IEC 11582.

6.4 SS-CC State definitions

6.4.1 States at the Originating PINX

The procedures for the Originating PINX are written in terms of the following conceptual states existing within the SS-CC Supplementary Service Control entity in that PINX in association with a particular CC Request.

6.4.1.1 CC-Idle

This state exists if SS-CC is not active.

6.4.1.2 CC-Invoked-User-A-RET

This state exists for an active CC Request while waiting for the indication that User B is not busy, using the connection retention method.

6.4.1.3 CC-Invoked-User-A-RLS

This state exists for an active CC Request while waiting for the indication that User B is not busy, using the connection release method.

6.4.1.4 CC-Path-Setup

This state exists during Path Reservation.

6.4.1.5 CC-Ringout

This state exists when User A has accepted the SS-CC Recall but completion of the call to User B is still pending.

6.4.1.6 CC-Suspended-User-A

This state exists when a CC Call without Path Reservation has been postponed because User A is busy.

6.4.1.7 CC-Wait-ACK

This state exists during SS-CC invocation.

6.4.1.8 CC-Wait-User-A-Answer-N

This state exists while waiting for SS-CC Recall acceptance from User A if no path has been reserved.

6.4.1.9 CC-Wait-User-A-Answer-R

This state exists while waiting for SS-CC Recall acceptance from User A after a path has been reserved.

6.4.1.10 CC-Wait-User-A-Free

This state exists when Path Reservation is delayed because User A is busy.

6.4.2 States at the Terminating PINX

The procedures for the Terminating PINX are written in terms of the following conceptual states existing within the SS-CC Supplementary Service Control entity in that PINX in association with a particular CC Request.

6.4.2.1 CC-Idle

This state exists if SS-CC is not active.

6.4.2.2 CC-Await-Call-Completion

This state exists while waiting for the incoming CC Call after having indicated that User B is not busy.

6.4.2.3 CC-Invoked-User-B

This state exists while User B is monitored as a result of a CC Request received.

6.4.2.4 CC-Path-Complete

This state exists when a path has been successfully reserved and CC Call completion is pending.

6.4.2.5 CC-Suspended-User-B

This state exists when a CC Call has been postponed because User A is busy.

6.4.2.6 CC-Wait-User-B-Alert

This state exists after a CC Call has been extended to User B, while waiting for acceptance (alerting or connect).

6.5 SS-CC signalling procedures

The following procedures are a combination of call related and call independent signalling. The latter uses the connection-oriented APDU transport mechanism specified in ISO/IEC 11582, which provides call independent signalling connections for supplementary service control.

All SS-CC control information is exchanged between Originating PINX and Terminating PINX.

Examples of message sequences are shown in annex B.

6.5.1 Major options

The signalling protocol contains the following major options. These are negotiated between the Originating and Terminating PINXs at SS-CC invocation time, using specific elements in the argument and result of operations ccbsRequest and ccnrRequest.

6.5.1.1 Path reservation

There are two methods of establishing the CC Call:

path reservation method - a bearer connection between the Originating and Terminating PINXs is established before recalling User A, to avoid the possibility of encountering network congestion after User A responds to SS-CC Recall;

non-reservation method - a bearer connection between the Originating and Terminating PINXs is established after User A responds to SS-CC Recall and the service is canceled if network congestion is encountered.

As described in 6.5.2, it is an option of the Originating PINX which of these methods is used. The procedures specified in 6.5.3 mandate from a Terminating PINX the support of both methods. In interworking situations, an Outgoing Gateway PINX can force the use of the non-reservation method if the other network cannot support path reservation; see 6.6 and 6.7.

6.5.1.2 Retention of signalling connection

There are two ways in which SS-CC uses call independent signalling connections:

connection retention method - the signalling connection is maintained until completion or cancellation of SS-CC;

connection release method - the signalling connection is cleared after each phase of call independent signalling and a new signalling connection is established for each subsequent phase of call independent signalling.

If the path reservation method is used, both methods above are possible. The procedures specified in 6.5.2 and 6.5.3 leave the decision on the method to the Terminating PINX, but permit the Originating PINX to ask for the use of the connection release method if possible, in order to avoid occupying network resources for the duration of the service. Similarly, 6.7 permits an Incoming Gateway PINX to ask for the use of the connection release method for compatibility with other networks.

If the non-reservation method is used connection retention is required. Clauses 6.6 and 6.7 provide a means by which an Incoming Gateway PINX or Outgoing Gateway PINX can force the use of the connection retention method for compatibility with public ISDNs and other networks that operate with a retained connection.

6.5.1.3 Service retention

There are two possible behaviours when User B is found to be busy again after User A responds to SS-CC Recall.

service retention method - the CC Request remains in force at the Originating and Terminating PINXs and the Terminating PINX commences the monitoring of User B again;

service cancellation method - the CC Request is canceled at the Originating and Terminating PINXs.

Either PINX can force the use of the service cancellation method. The service retention method will be used if both PINXs agree.

6.5.2 Actions at the Originating PINX

The SDL representation of procedures at the Originating PINX is shown in C.1 of annex C.

6.5.2.1 Normal procedures

6.5.2.1.1 CCBS invocation

If User A requests SS-CCBS and the request is acceptable to the Originating PINX, the Originating PINX shall send a ccbsRequest invoke APDU to the Terminating PINX according to 6.5.2.1.3.

NOTE - SS-CCBS can be requested after a call attempt has encountered a busy condition at User B. The release of the original call is beyond the scope of this International Standard .

Upon receipt of a ccbsRequest return result APDU the Originating PINX shall start the service duration timer T2 with a value appropriate for SS-CCBS, enter state CC-Invoked-A-RET (connection retention case) or CC-Invoked-A-RLS (connection release case), and wait for an indication that User B has become not busy.

6.5.2.1.2 CCNR invocation

If User A requests SS-CCNR and the request is acceptable to the Originating PINX, the Originating PINX shall send a ccnrRequest invoke APDU to the Terminating PINX according to 6.5.2.1.3.

NOTE - SS-CCNR can be requested after a call to User B has remained unanswered. The release of the original call is beyond the scope of this International Standard .

Upon receipt of a ccnrRequest return result APDU the Originating PINX shall start the service duration timer T2 with a value appropriate for SS-CCNR, enter state CC-Invoked-A-RET (connection retention case) or CC-Invoked-A-RLS (connection release case), and wait for an indication that User B has become not busy after a subsequent period of activity.

6.5.2.1.3 SS-CC invocation - detailed procedure

The Facility information element containing the ccbsRequest or ccnrRequest invoke APDU shall be sent in a SETUP message which establishes a call independent signalling connection between the two end PINXs, according to 7.3 of ISO/IEC 11582. The SETUP message shall contain User B's number in information element Called party number, and optionally User A's number in information element Calling party number.

The following information shall be included in the argument of the ccbsRequest or ccnrRequest invoke APDU:

- basic call information from the original call:
 - the number of User A, or an indication that it is not available or restricted, in element numberA;
 - optionally and if available, the subaddress of User A, in element subaddrA;
 - the number of User B, in element numberB;
 - if available, the subaddress of User B, in element subaddrB;
 - the information elements Bearer capability, Low layer compatibility (if available) and High layer compatibility (if available), embedded in element service;
- optionally element retain-sig-connection, according to the following rules:
 - if the signalling connection has to be retained because the non-reservation method is going to be used the element shall be included with value TRUE;
 - if the Originating PINX is going to use the path reservation method and prefers the connection release option the element shall be included with value FALSE;
 - if the originating PINX is going to use the path reservation method and has no preference for the connection release option the element shall be omitted;
- optionally element can-retain-service with value TRUE if the Originating PINX is able to use the service retention method. Otherwise the element shall either be omitted or have the value FALSE.

After sending the ccbsRequest/ccnrRequest invoke APDU the Originating PINX shall start timer T1 and enter state CC-Wait-Ack.

Upon receipt of a ccbsRequest or ccnrRequest return result APDU the Originating PINX shall stop timer T1. If the result contains element retain-service with value TRUE and element can-retain-service was sent with value TRUE in the argument of the corresponding invoke APDU, the Originating PINX shall record the fact that the service retention method is to be used; otherwise it shall record the fact that the service cancellation method is to be used. If the result contains element no-path-reservation with value TRUE the Originating PINX shall record the fact that the non-reservation method is to be used. Otherwise it may select either the path reservation method or the non-reservation method.

If the ccbsRequest/ccnrRequest return result APDU was received in a CONNECT message the Originating PINX shall continue according to the procedures specified for the connection retention method. If the return result APDU was received in a RELEASE message and connection release is permitted, the Originating PINX shall complete the clearing of the signalling connection in accordance with 7.3 of ISO/IEC 11582. and continue according to the procedures specified for the connection release method.

6.5.2.1.4 Indication that User B is not busy

a) Connection retention case:

If a ccExecPossible invoke APDU is received in a FACILITY message (i.e. on the retained call independent signalling connection) while in state CC-Invoked-A-RET the Originating PINX shall proceed as described under c) below. Any basic call information, if present in the argument of the ccExecPossible invoke APDU, shall be ignored.

b) Connection release case:

On receipt of a ccExecPossible invoke APDU in a SETUP message for a call independent signalling connection the Originating PINX shall process the SETUP message according to 7.3 of ISO/IEC 11582, attempt to associate the APDU with a CC Request that is in state CC-Invoked-A-RLS, and if successful proceed as described under c) below.

The association shall be achieved by comparing all the basic call information received in the argument of the ccExecPossible invoke APDU with the information stored at the Originating PINX. If less information is received than what is stored, a match shall be deemed to occur if all the elements received match those stored and any missing element belongs to the following group: subaddress of User A; subaddress of User B; High layer compatibility information element; Low layer compatibility information element.

NOTES

- 1 Information can be missing as a result of the Terminating PINX discarding part of the optional information at SS-CC invocation time. This need not cause ambiguity provided the Terminating PINX rejects CC Requests which are duplicates with regard to the remaining information.
- 2 The Originating PINX with regard to SS-CC is the Terminating PINX with regard to the call independent signalling connection.

c) For both cases:

In both cases a) and b) above the Originating PINX shall proceed in accordance with:

- 6.5.2.1.5, if User A is not busy and the non-reservation method is to be used; or
- 6.5.2.1.6, if User A is not busy and the path reservation method is to be used; or
- 6.5.2.1.7, if User A is busy and the non-reservation method is to be used; or
- 6.5.2.1.8, if User A is busy and the path reservation method is to be used.

6.5.2.1.5 CC Call without Path Reservation

If User A is not busy and the Originating PINX chooses the non-reservation method for establishing the CC Call, the Originating PINX shall indicate the SS-CC Recall to User A, start the recall timer T3 and enter state CC-Wait-User-A-Answer-N.

If the SS-CC Recall is accepted before timer T3 expires the Originating PINX shall initiate the CC Call in accordance with ISO/IEC 11572 by sending a SETUP message towards the Terminating PINX, stop timer T3 and enter state CC-Ringout. The SETUP message shall contain, plus a Facility information element with a ccRingout invoke APDU.

If in state CC-Ringout an ALERTING or a CONNECT message is received the Originating PINX shall stop the service duration timer T2, delete the CC Request and return to state CC-Idle. If a call independent signalling connection for SS-CC still exists it may be released according to 7.3 of ISO/IEC 11582.. The CC Call shall continue in accordance with ISO/IEC 11572

6.5.2.1.6 CC Call with Path Reservation

If User A is not busy and the Originating PINX chooses the path-reservation method for establishing the CC Call, the Originating PINX shall:

- if the connection release method is used, return a RELEASE message with cause value #16 "normal call clearing" to release the signalling connection; optionally the RELEASE message may also be sent in the connection retention case, if the service retention option does not apply and no further call independent signalling is expected;
- initiate Path Reservation as a basic call request according to ISO/IEC 11572, sending a SETUP message towards the Terminating PINX; include in the SETUP message a ccPathReserve invoke APDU, as well as all the information stored from the original call;
- start timer T4; and
- enter state CC-Path-Setup.

Upon receipt of a ccPathReserve return result APDU in a call related PROGRESS message, while in state CC-Path-Setup the Originating PINX shall stop timer T4.

If User A is busy the Originating PINX shall, if the capability exists, indicate to User A that User B is not busy. Either immediately or if the busy condition persists the Originating PINX shall continue according to 6.5.2.1.9.

NOTE - The means of determining whether the busy condition persists is implementation dependent.

If User A is not busy the Originating PINX shall indicate the SS-CC Recall to User A, start the recall timer T3 and enter state CC-Wait-User-A-Answer-R.

If the SS-CC Recall is accepted before timer T3 expires the Originating PINX shall stop timer T3, send a call related FACILITY message with a ccRingout invoke APDU to the Terminating PINX and enter state CC-Ringout.

If in state CC-Ringout an ALERTING or CONNECT message is received, the Originating PINX shall stop the service duration timer T2, delete the CC Request and return to state CC-Idle. If a call independent signalling connection for SS-CC still exists it may be released according to 7.3 of ISO/IEC 11582. The CC Call shall continue in accordance with ISO/IEC 11572.

6.5.2.1.7 User A busy, non-reservation method

a) Suspend procedure:

If User A is busy and the Originating PINX chooses the non-reservation method, the Originating PINX shall send a ccSuspend invoke APDU to the Terminating PINX in a FACILITY message on the existing call independent signalling connection, start monitoring User A and enter state CC-Suspended-User-A.

b) Resume procedure:

If User A, for whom a CC Request in state CC-Suspended-A exists, becomes not busy the Originating PINX shall send a FACILITY message with a ccResume invoke APDU on the existing call independent signalling connection and enter state CC-Invoked-User-A-RET, waiting for another indication that User B is not busy.

6.5.2.1.8 User A busy before Path Reservation

If User A is busy and the Originating PINX chooses the path reservation method, the Originating PINX shall release the call independent signalling connection according to 7.3 of ISO/IEC 11582, unless the connection retention method applies, start monitoring User A, and enter state CC-Wait-User-A-Free. Cause #16 "normal call clearing" shall be used when releasing the signalling connection.

The Originating PINX may also send a ccSuspend invoke APDU to the Terminating PINX on the existing call independent signalling connection, either in the RELEASE message in case of connection release or in a FACILITY message in case of connection retention.

If User A, for whom a CC Request in state CC-Wait-User-A-Free exists, becomes not busy the Originating PINX shall initiate a CC Call with Path Reservation according to 6.5.2.1.6.

6.5.2.1.9 User A busy after Path Reservation

If User A is busy on completion of Path Reservation the Originating PINX shall release the reserved path by sending a DISCONNECT message to the Terminating PINX, start monitoring User A and enter state CC-Wait-User-A-Free. The DISCONNECT message shall contain a Facility information element with a ccSuspend invoke APDU.

If User A, for whom a CC Request in state CC-Wait-User-A-Free exists, becomes not busy the Originating PINX shall initiate a CC Call with Path Reservation according to 6.5.2.1.6.

6.5.2.1.10 CCBS/CCNR cancellation

a) Cancellation initiated by the Originating PINX: