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Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Do Not Disturb and Do Not Disturb Override supplementary services

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseau privé à intégration de services — Protocole de signalisation d'interéchange — Services supplémentaires ne pas déranger et dérogation à ne pas déranger

Reference number
ISO/IEC 14844:2003(E)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 14844 was prepared by ECMA (as ECMA-194) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

This second edition cancels and replaces the first edition (ISO/IEC 14844:1996), which has been technically revised.

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Introduction

This International Standard is one of a series of Standards defining services and signalling protocols applicable to Private Integrated Services Networks (PISNs). The series uses ISDN concepts as developed by ITU-T and conforms to the framework of International Standards for Open Systems Interconnection as defined by ISO/IEC.

This International Standard specifies the signalling protocol for use at the Q reference point in support of the Do Not Disturb (DND) and Do Not Disturb Override (DNDO) supplementary services. The protocol defined in this International Standard forms part of the PSS1 protocol (informally known as QSIG).

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

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Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Do Not Disturb and Do Not Disturb Override supplementary services

1 Scope

This International Standard specifies the signalling protocol for the support of the Do Not Disturb and Do Not Disturb Override supplementary services (SS-DND and SS-DNDO) at the Q reference point between Private Integrated services Network eXchanges (PINXs) connected together within a Private Integrated Services Network (PISN).

SS-DND is a supplementary service which enables a served user to cause the PISN to reject any calls, or just those associated with a specified basic service, addressed to the served user's PISN number. The calling user is given an indication. Incoming calls are rejected as long as the service is active. The served user's outgoing service is unaffected.

SS-DNDO is a supplementary service which enables a served user to override SS-DND at a called number; that is, to allow the call to proceed as if the called user had not activated SS-DND.

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 ETS 300 387. 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 14842.

The signalling protocols for SS-DND(O) operate on top of the signalling protocol for basic circuit switched call control, as specified in ISO/IEC 11572, and use 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-DND and other supplementary services and ANFs and between SS-DNDO and other supplementary services and ANFs.

NOTE - Additional interactions that have no impact on the signalling protocol at the Q reference point can be found in the relevant stage 1 specifications.

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

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 B.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 11572:2000, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Circuit mode bearer services - Inter-exchange signalling procedures and protocol*

ISO/IEC 11574:2000, *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)*

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ISO/IEC 11582:2002, *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 13870:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call Completion supplementary services*

ISO/IEC 13873:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call Diversion supplementary services*

ISO/IEC 14842:1996, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Do not disturb and do not disturb override supplementary services*

ISO/IEC 14843:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call Offer supplementary service*

ISO/IEC 14846:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call Intrusion supplementary service*

ETS 300 387:1994, *Private Telecommunication Network (PTN); Method for the specification of basic and supplementary services*

ITU-T Rec. I.112:1993, *Vocabulary of terms for ISDNs*

ITU-T Rec. I.210:1993, *Principles of telecommunication services supported by an ISDN and the means to describe them*

ITU-T Rec. Q.950:2000, *Supplementary services protocols, structure and general principles*

ITU-T Rec. Z.100:1999, *Specification and description language (SDL)*

4 Terms and definitions

For the purposes of this document, the following terms and 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 (ITU-T Rec. I.210)
- Call, Basic Call (ISO/IEC 11582)
- Coordination Function (ISO/IEC 11582)
- End PINX (ISO/IEC 11582)
- Gateway PINX (ISO/IEC 11572)
- Interpretation APDU (ISO/IEC 11582)
- Network Facility Extension (NFE) (ISO/IEC 11582)
- Originating PINX (ISO/IEC 11582)
- Private Integrated Services Network (PISN) (ISO/IEC 11579-1)
- Private Integrated services Network eXchange (PINX) (ISO/IEC 11579-1)
- Rerouteing PINX (ISO/IEC 13873)
- Served user (ISO/IEC 14842)
- Signalling (ITU-T Rec. I.112)
- Supplementary Service (ITU-T Rec. I.210)
- Supplementary Services Control Entity (ISO/IEC 11582)
- Terminating PINX (ISO/IEC 11582)

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– Transit PINX (ISO/IEC 11582)

– User (ISO/IEC 11574)

4.2 Other definitions

4.2.1 Activating PINX

The PINX serving the activating user.

4.2.2 Deactivating PINX

The PINX serving the deactivating user.

4.2.3 Inter-PINX link

The totality of a signalling channel and a number of information channels at the Q reference point**.**

4.2.4 Interrogating PINX

The PINX serving the interrogating user.

4.2.5 Path retention

The retaining of the network connection between the Originating PINX and the Terminating PINX so that a supplementary service (such as SS-DNDO) can be invoked without establishing a new connection.

4.2.6 Served User PINX

The PINX serving the served user.

5 Acronyms

ANF	Additional Network Feature
APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation no. 1
DNDOCL	DNDO Capability Level
DNDPL	DND Protection Level
ISDN	Integrated Services Digital Network
NFE	Network Facility Extension
PICS	Protocol Implementation Conformance Statement
PINX	Private Integrated services Network eXchange
PISN	Private Integrated Services Network
SDL	Specification and Description Language
SS-DND	Supplementary Service Do Not Disturb
SS-DNDO	Supplementary Service Do Not Disturb Override
TE	Terminal Equipment

6 Signalling protocol for the support of SS-DND and SS-DNDO

6.1 SS-DND and SS-DNDO description

SS-DND is a supplementary service which enables a served user to cause the PISN to reject any calls, or just those associated with a specified basic service, addressed to the served user's PISN number. The calling user is given an appropriate indication. Incoming calls are rejected as long as the service is active. The served user's outgoing service is unaffected.

SS-DNDO is a supplementary service which enables a calling user to override SS-DND at a called user, allowing the call to proceed as if the called user had not activated SS-DND.

Both SS-DND and SS-DNDO are applicable to all circuit mode basic services defined in ISO/IEC 11574.

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6.2 SS-DND and SS-DNDO operational requirements

6.2.1 Provision/withdrawal

6.2.1.1 Provision/withdrawal of SS-DND

SS-DND is provided or withdrawn after pre-arrangement with the service provider.

SS-DND is provided on a per PISN number basis and per basic service basis. For each PISN number, the supplementary service can be subscribed to for every basic service subscribed to by that PISN number, or for only some of the basic services subscribed to by that PISN number.

SS-DND subscription parameters may apply separately to each basic service to which SS-DND is subscribed, or for all the basic services to which SS-DND is subscribed.

If SS-DNDO is implemented then the subscription parameter "DND protection level" (DNDPL) shall be provided. The DNDPL has a value in the range 0 to 3 where 0 means no protection against DNDO and 3 means total protection against DNDO. The values 0 and 3 shall be offered. The values 1 and 2 may, as an implementation option, be offered. The effect of the subscription parameter DNDPL shall be as described in subclause 6.3.15 of ISO/IEC 14842.

The subscription parameter "Served user notification of SS-DND" may be provided. If it is not provided, as an implementation option, the network may or may not notify the served user of DND invocation.

6.2.1.2 Provision/withdrawal of SS-DNDO

SS-DNDO is provided or withdrawn after pre-arrangement with the service provider.

SS-DNDO is provided on a per PISN number basis and per basic service basis. For each PISN number, the supplementary service can be subscribed to for every basic service subscribed to by that PISN number, or for only some of the basic services subscribed to by that PISN number.

SS-DNDO subscription parameters may apply separately to each basic service to which SS-DNDO is subscribed, or for all the basic services to which SS-DNDO is subscribed.

The subscription parameter "DNDO capability level" (DNDOCL) shall be provided. The DNDOCL has a value in the range 1 (lowest capability) to 3 (highest capability). At least one of the DNDOCL levels shall be offered. The effect of the subscription parameter DNDOCL shall be as described in subclause 6.3.15 of ISO/IEC 14842.

6.2.2 Requirements on a 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. In addition, the generic procedures for notification, as specified in ISO/IEC 11582 for an End PINX, shall apply.

6.2.3 Requirements on an 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. In addition, the generic procedures for notification, as specified in ISO/IEC 11582 for an End PINX, shall apply.

6.2.4 Requirements on an Activating PINX

Generic procedures for the call-independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating PINX, shall apply.

6.2.5 Requirements on a Deactivating PINX

Generic procedures for the call-independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating PINX, shall apply.

6.2.6 Requirements on an Interrogating PINX

Generic procedures for the call-independent control (connection oriented) of supplementary services, as specified in ISO/IEC 11582 for an Originating PINX, shall apply.

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6.2.7 Requirements on a SS-DND Served User PINX

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

6.2.8 Requirements on a Transit PINX

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

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. In addition, the generic procedures for notification, as specified in ISO/IEC 11582 for a Transit PINX, shall apply.

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6.3 SS-DND and SS-DNDO coding requirements

6.3.1 Operations

The operations defined in Abstract Syntax Notation number 1 (ASN.1) in table 1 shall apply. The notation is in accordance with ITU-T Rec. X.680 and X.690. The ITU-T Rec. X.208 and X.209 superseded version is in annex F.

Table 1 - Operations in support of SS-DND(O)

```
Do-Not-Disturb-Operations-asn1-97
                        {iso(1) standard(0) pss1-do-not-disturb(14844) do-not-disturb-operations-asn1-97 (2) }

DEFINITIONS EXPLICIT TAGS ::=

BEGIN

IMPORTS                 OPERATION, ERROR FROM Remote-Operations-Information-Objects
                            {joint-iso-itu-t(2) remote-operations(4) informationObjects(5) version1(0)}
                        EXTENSION, Extension{} FROM Manufacturer-specific-service-extension-class-asn1-97
                            {iso(1) standard(0)
                            pss1-generic-procedures(11582) msi-class-asn1-97(11)}
                        basicServiceNotProvided, invalidServedUserNr, notAvailable,
                        userNotSubscribed, supplementaryServiceInteractionNotAllowed
                            FROM General-Error-List
                            {ccitt recommendation q 950 general-error-list (1)}
                        PartyNumber FROM Addressing-Data-Elements-asn1-97
                            {iso(1) standard(0) pss1-generic-procedures(11582)
                            addressing-data-elements-asn1-97 (20)}
                        BasicService FROM Call-Diversion-Operations-asn1-97
                            {iso(1) standard(0) pss1-call-diversion(13873) call-diversion-operations-asn1-97 (1) }
                        ;

Do-Not-Disturb-Operations OPERATION ::= {doNotDisturbActivateQ | doNotDisturbDeactivateQ |
doNotDisturbInterrogateQ | doNotDisturbOverrideQ | doNotDisturbOvrExecuteQ | pathRetain | serviceAvailable}

doNotDisturbActivateQ   OPERATION ::= {
                        ARGUMENT                DNDActivateArg
                        RESULT  DNDActivateRes
                        ERRORS {                userNotSubscribed |
                                                    notAvailable |
                                                    invalidServedUserNr |
                                                    basicServiceNotProvided |
                                                    temporarilyUnavailable |
                                                    supplementaryServiceInteractionNotAllowed |
                                                    unspecified}
                        CODE                    local: 35}
```


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Table 1 - Operations in support of SS-DND(O) (continued)

```
doNotDisturbDeactivateQ   OPERATION ::= {
                          ARGUMENT              DNDDeactivateArg
                          RESULT                DummyRes
                          ERRORS                {   userNotSubscribed |
                                                    notAvailable |
                                                    invalidServedUserNr |
                                                    notActivated |
                                                    temporarilyUnavailable |
                                                    supplementaryServiceInteractionNotAllowed |
                                                    unspecified}
                          CODE                  local: 36}

doNotDisturbInterrogateQ  OPERATION ::= {
                          ARGUMENT              DNDInterrogateArg
                          RESULT                DNDInterrogateRes
                          ERRORS                {   userNotSubscribed |
                                                    notAvailable |
                                                    invalidServedUserNr |
                                                    temporarilyUnavailable |
                                                    supplementaryServiceInteractionNotAllowed |
                                                    unspecified}
                          CODE                  local: 37}

doNotDisturbOverrideQ     OPERATION ::= {
                          ARGUMENT              DNDOverrideArg
                          RETURN RESULT         FALSE
                          ALWAYS RESPONDS       FALSE
                          CODE                  local: 38}

pathRetain                OPERATION ::= {
                          ARGUMENT              PathRetainArg     -- this operation may be used by other
                                                                  -- Supplementary Services using other
                                                                  -- values of the argument
                          RETURN RESULT         FALSE
                          ALWAYS RESPONDS       FALSE
                          CODE                  local: 41}

serviceAvailable          OPERATION ::= {
                          ARGUMENT ServiceAvailableArg    -- this operation may be used by other
                                                          -- Supplementary Services using other
                                                          -- values of the argument
                          RETURN RESULT         FALSE
                          ALWAYS RESPONDS       FALSE
                          CODE                  local: 42}
```

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Table 1 - Operations in support of SS-DND(O) (continued)

```
doNotDisturbOvrExecuteQ  OPERATION ::= {
                         ARGUMENT              DummyArg
                         RESULT                DummyRes
                         ERRORS                {  notAvailable |
                                                  temporarilyUnavailable |
                                                  supplementaryServiceInteractionNotAllowed |
                                                  unspecified}
                         CODE                  local: 39}

DummyArg                 ::= CHOICE {
                             null                  NULL,
                             extension             [1] IMPLICIT Extension{{DNDExtSet}},
                             sequenceOfExtn        [2] IMPLICIT SEQUENCE OF Extension{{DNDExtSet}}
                         }

DummyRes                 ::= CHOICE {
                             null                  NULL,
                             extension             [1] IMPLICIT Extension{{DNDExtSet}},
                             sequenceOfExtn        [2] IMPLICIT SEQUENCE OF Extension{{DNDExtSet}}
                         }

DNDActivateArg           ::= SEQUENCE {
                             basicService          BasicService,
                             servedUserNr          PartyNumber,
                             argumentExtension     CHOICE{
                                 extension             [1] IMPLICIT Extension{{DNDExtSet}},
                                 sequenceOfExtn        [2] IMPLICIT SEQUENCE OF Extension{{DNDExtSet}}
                                                       } OPTIONAL
                         }

DNDActivateRes           ::= SEQUENCE {
                             status                SET OF SEQUENCE{
                                 basicService          BasicService,
                                 dndProtectionLevel    DNDProtectionLevel OPTIONAL
                             } OPTIONAL,
                             resultExtension       CHOICE{
                                 extension             [1] IMPLICIT Extension{{DNDExtSet}},
                                 sequenceOfExtn        [2] IMPLICIT SEQUENCE OF Extension{{DNDExtSet}}
                                                       } OPTIONAL
                         }

DNDDeactivateArg         ::= SEQUENCE {
                             basicService          BasicService,
                             servedUserNr          PartyNumber,
                             argumentExtension     CHOICE{
                                 extension             [1] IMPLICIT Extension{{DNDExtSet}},
                                 sequenceOfExtn        [2] IMPLICIT SEQUENCE OF Extension{{DNDExtSet}}
                                                       } OPTIONAL
                         }
```


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Table 1 - Operations in support of SS-DND(O) (continued)

```
DNDInterrogateArg       ::= SEQUENCE {
                            servedUserNr          PartyNumber,
                            argumentExtension     CHOICE{
                                extension             [1]  IMPLICIT Extension{{DNDExtSet}},
                                sequenceOfExtn        [2]  IMPLICIT SEQUENCE OF Extension{{DNDExtSet}}
                                                      } OPTIONAL
                            }

DNDInterrogateRes       ::= SEQUENCE {
                            status                SET OF SEQUENCE {
                                basicService          BasicService,
                                dndProtectionLevel    DNDProtectionLevel OPTIONAL
                            } OPTIONAL,
                            resultExtension       CHOICE{
                                extension             [1]  IMPLICIT Extension{{DNDExtSet}},
                                sequenceOfExtn        [2]  IMPLICIT SEQUENCE OF Extension{{DNDExtSet}}
                                                      } OPTIONAL
                            }

DNDOverrideArg          ::= SEQUENCE {
                            dndoCapabilityLevel   DNDOCapabilityLevel,
                            argumentExtension     CHOICE{
                                extension             [1]  IMPLICIT Extension{{DNDExtSet}},
                                sequenceOfExtn        [2]  IMPLICIT SEQUENCE OF Extension{{DNDExtSet}}
                                                      } OPTIONAL
                            }

PathRetainArg           ::= CHOICE {
                            serviceList           ServiceList,
                            extendedServiceList   SEQUENCE {
                                serviceList           ServiceList,
                                extension             Extension{{DNDExtSet}}
                                                  }
                            }

ServiceAvailableArg     ::= CHOICE {
                            serviceList           ServiceList,
                            extendedServiceList   SEQUENCE {
                                serviceList           ServiceList,
                                extension             Extension{{DNDExtSet}}
                                                  }
                            }
```

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Table 1 - Operations in support of SS-DND(O) (concluded)

```
DNDProtectionLevel          ::= ENUMERATED {
                                    lowProtection(0),
                                    mediumProtection(1),
                                    highProtection(2),
                                    fullProtection(3)
                                }

DNDOCapabilityLevel         ::= ENUMERATED {
                                    overrideLowProt(1),
                                    overrideMediumProt(2),
                                    overrideHighProt(3)
                                }

ServiceList                 ::= BIT STRING
                                { dndo-low(1), dndo-medium(2), dndo-high(3) } (SIZE (1..32))
                                -- bits other than dndo-low, dndo-medium, or dndo-high, are reserved
                                -- for other Supplementary Services

temporarilyUnavailable      ERROR ::= { CODE      local: 1000}
notActivated                ERROR ::= { CODE      local: 43}

unspecified                 ERROR ::= {
                            PARAMETER Extension{{DNDExtSet}}
                            CODE                  local: 1008}

DNDExtSet EXTENSION ::= {…}

END                         -- of Do-Not-Disturb-Operations-asn1-97
```


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6.3.2 Notifications

The notification defined in Abstract Syntax Notation number 1 (ASN.1) in table 2 shall apply.

Table 2 - Notification in support of SS-DND

```
Do-Not-Disturb-Notifications-asn1-97
                        {iso(1) standard(0) pss1-do-not-disturb(14844) do-not-disturb-notifications-asn1-97 (3) }

DEFINITIONS EXPLICIT TAGS ::=
BEGIN

IMPORTS                 NOTIFICATION FROM Notification-class-asn1-97
                              { iso(1) standard(0)
                                pss1-generic-procedures (11582) notification-class-asn1-97(21) } ;

doNotDisturb            NOTIFICATION ::= {
                                  ARGUMENT        NULL
                                  CODE            local: 2002 }

Do-Not-Disturb-Notifications NOTIFICATION ::= { doNotDisturb }

END                     -- of Do-Not-Disturb-Notifications-asn1-97
```

6.3.3 Information elements

6.3.3.1 Facility information element

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

When conveying APDUs of operations defined in subclause 6.3.1, the destinationEntity data element of the NFE shall contain value endPINX.

When conveying the invoke APDU of operation doNotDisturbOverrideQ, the Interpretation APDU shall contain value discardAnyUnrecognisedInvokePdu.

When conveying the invoke APDUs of operations doNotDisturbOvrExecuteQ, doNotDisturbActivateQ, doNotDisturbDeactivateQ or doNotDisturbInterrogateQ, the Interpretation APDU shall be omitted.

NOTE - Additional requirements for the conveyance of APDUs of operations pathRetain and serviceAvailable are given in A.3.2 of annex A.

6.3.3.2 Notification indicator information element

The notification defined in subclause 6.3.2 shall be coded in the Notification indicator information element in accordance with ISO/IEC 11582.

6.3.3.3 Other information elements

Any other information elements (e.g. Progress indicator) shall be coded in accordance with the rules of ISO/IEC 11572 and ISO/IEC 11582.

6.3.4 Messages

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

Messages used for call establishment and release shall be as specified in ISO/IEC 11572.

6.4 SS-DND and SS-DNDO state definitions

6.4.1 State at the Terminating PINX

The procedures for the Terminating PINX are written in terms of the following conceptual state existing within the SS-DND Supplementary Service Control entity in that PINX in association with a particular incoming call for the served user.

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6.4.1.1 DND-tIdle

SS-DND or SS-DNDO operation is not in progress.

6.4.2 States at the Originating PINX

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

6.4.2.1 DNDO-oIdle

SS-DNDO is not operating.

6.4.2.2 DNDO-oAwaitExecResult

A doNotDisturbOvrExecuteQ invoke APDU has been sent.

6.4.3 States at the Activating PINX

The procedures for the Activating PINX for remote activation of SS-DND are written in terms of the following conceptual states existing within the SS-DND Supplementary Service Control entity in that PINX in association with a particular activation request from the activating user.

6.4.3.1 DND-aIdle

Activation not in progress.

6.4.3.2 DND-aWait

A doNotDisturbActivateQ invoke APDU has been sent. The Activating PINX is waiting for the response.

6.4.4 States at the Deactivating PINX

The procedures for the Deactivating PINX for remote deactivation of SS-DND are written in terms of the following conceptual states existing within the SS-DND Supplementary Service Control entity in that PINX in association with a particular deactivation request from the deactivating user.

6.4.4.1 DND-dIdle

Deactivation not in progress.

6.4.4.2 DND-dWait

A doNotDisturbDeactivateQ invoke APDU has been sent. The Deactivating PINX is waiting for the response.

6.4.5 States at the Interrogating PINX

The procedures for the Interrogating PINX for remote interrogation of SS-DND are written in terms of the following conceptual states existing within the SS-DND Supplementary Service Control entity in that PINX in association with a particular interrogation request from the interrogating user.

6.4.5.1 DND-iIdle

Interrogation not in progress.

6.4.5.2 DND-iWait

A doNotDisturbInterrogateQ invoke APDU has been sent. The Interrogating PINX is waiting for the response.

6.4.6 State at the SS-DND Served User PINX

The procedures at the Served User PINX for remote activation, deactivation and interrogation of SS-DND are written in terms of the following conceptual state existing within the SS-DND Supplementary Service Control entity in that PINX in association with a particular call-independent signalling connection for the served user.

6.4.6.1 DND-sIdle

Ready for receipt of a doNotDisturbActivateQ, doNotDisturbDeactivateQ or doNotDisturbInterrogateQ APDU.

6.5 SS-DND signalling procedures

References in this clause to protocol control states refer to basic call protocol control states defined in ISO/IEC 11572.

Annex C contains some examples of message sequences.

6.5.1 Actions at the Terminating PINX

The SDL representation of procedures at the Terminating PINX is shown in D.1 of annex D.

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6.5.1.1 Normal procedures

Having agreed the B-channel, and sent back a CALL PROCEEDING message in response to an incoming SETUP message in accordance with the procedures of ISO/IEC 11572, and having determined by a local procedure that SS-DND is to be invoked, the Terminating PINX shall proceed as follows.

NOTE 1 - If the SETUP message also contains a doNotDisturbOverrideQ invoke APDU or a pathRetain invoke APDU containing a retention request for SS-DNDO, there is interaction with SS-DNDO, and the procedures defined in subclause 6.6.1 apply instead of the procedures defined in this clause.

NOTE 2 - The Terminating PINX should inform the served user of invocation of SS-DND.

If an optional in-band tone or announcement is to be applied, the Terminating PINX shall connect an in-band tone or announcement to the incoming B-channel and transmit a PROGRESS message containing a Progress indicator information element with progress description 8 "in-band information or appropriate pattern now available", a Cause information element containing cause number 21 "Call rejected", and a Notification indicator information element containing a NotificationDataStructure with value doNotDisturb. The SS-DND entity shall remain in state DND-tIdle.

If no in-band tone or announcement is to be given, a DISCONNECT message shall be sent to clear the connection. The DISCONNECT message shall contain cause number 21 "Call rejected" in the Cause information element and a Notification indicator information element containing a NotificationDataStructure with value doNotDisturb. The SS-DND entity shall remain in state DND-tIdle.

NOTE - It is recommended that an in-band tone or announcement be provided by the Terminating PINX only if it conveys call rejection information which is not conveyable by the signalling protocol.

6.5.1.2 Exceptional procedures

Not applicable.

6.5.2 Actions at the Originating PINX

6.5.2.1 Normal procedures

None.

NOTE - In cases where an outgoing call encounters a do not disturb condition at the Terminating PINX, notification of do not disturb may be received from the Terminating PINX. Such a notification will be handled in accordance with subclause 7.4 of ISO/IEC 11582.

6.5.2.2 Exceptional procedures

Not applicable.

6.5.3 Actions at the Activating PINX

The SDL representation of procedures at the Activating PINX is shown in D.3 of annex D.

6.5.3.1 Normal procedures

On determining that activation of SS-DND for a served user at the Served User PINX is required, the Activating PINX shall send a doNotDisturbActivateQ invoke APDU to the Served User PINX using the call reference of a call-independent signalling connection. The call-independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in subclause 7.3 of ISO/IEC 11582. The Activating PINX shall enter the DND-aWait state and start timer T1. On receipt of the doNotDisturbActivateQ return result APDU, the Activating PINX shall stop timer T1 and revert to the DND-aIdle state.

NOTE - The Activating PINX should indicate acceptance to the activating user.

The Activating PINX is responsible for clearing the call-independent signalling connection towards the Served User PINX. This may occur on receipt of a return result APDU. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.3.2 Exceptional procedures

On receipt of the doNotDisturbActivateQ return error or reject APDU from the Served User PINX, the Activating PINX shall stop timer T1 and revert to the DND-aIdle state.

If timer T1 expires (i.e. the doNotDisturbActivateQ invoke APDU is not answered by the Served User PINX), the Activating PINX shall enter the DND-aIdle state.

NOTE - The Activating PINX should indicate rejection to the activating user.

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The Activating PINX is responsible for clearing the call-independent signalling connection towards the Served User PINX. This may occur on receipt of a return error or reject APDU or on expiry of timer T1. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.4 Actions at the Deactivating PINX

The SDL representation of procedures at the Deactivating PINX is shown in D.4 of annex D.

6.5.4.1 Normal procedures

On determining that deactivation of SS-DND for a served user at the Served User PINX is required, the Deactivating PINX shall send a doNotDisturbDeactivateQ invoke APDU to the Served User PINX using the call reference of a call-independent signalling connection. The call-independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in subclause 7.3 of ISO/IEC 11582. The Deactivating PINX shall enter the DND-dWait state and start timer T2. On receipt of the doNotDisturbDeactivateQ return result APDU, the Deactivating PINX shall stop timer T2 and revert to the DND-dIdle state.

NOTE - The Deactivating PINX should indicate acceptance to the deactivating user.

The Deactivating PINX is responsible for clearing the call-independent signalling connection towards the Served User PINX. This may occur on receipt of a return result APDU. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.4.2 Exceptional procedures

On receipt of the doNotDisturbDeactivateQ return error or reject APDU from the Served User PINX, the Deactivating PINX shall stop timer T2 and revert to the DND-dIdle state.

If timer T2 expires (i.e. the doNotDisturbDeactivateQ invoke APDU is not answered by the Served User PINX), the Deactivating PINX shall enter the DND-dIdle state.

NOTE - The Deactivating PINX should indicate rejection to the deactivating user.

The Deactivating PINX is responsible for clearing the call-independent signalling connection towards the Served User PINX. This may occur on receipt of a return error or reject APDU or on expiry of timer T2. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.5 Actions at the Interrogating PINX

The SDL representation of procedures at the Interrogating PINX is shown in D.5 of annex D.

6.5.5.1 Normal procedures

On determining that interrogation of SS-DND for a served user at the Served User PINX is required, the Interrogating PINX shall send a doNotDisturbInterrogateQ invoke APDU to the Served User PINX using the call reference of a call-independent signalling connection. The call-independent signalling connection shall be established (or used, if an appropriate connection is already available) in accordance with the procedures specified in subclause 7.3 of ISO/IEC 11582. The Interrogating PINX shall enter the DND-iWait state and start timer T3. On receipt of the doNotDisturbInterrogateQ return result APDU, the Interrogating PINX shall stop timer T3 and revert to the DND-iIdle state.

NOTE - The Interrogating PINX should indicate acceptance to the interrogating user.

The Interrogating PINX is responsible for clearing the call-independent signalling connection towards the Served User PINX. This may occur on receipt of a return result APDU. Alternatively, the signalling connection may be retained for other applications, if appropriate.

6.5.5.2 Exceptional procedures

On receipt of the doNotDisturbInterrogateQ return error or reject APDU from the Served User PINX, the Interrogating PINX shall stop timer T3 and revert to the DND-iIdle state.

If timer T3 expires (i.e. the doNotDisturbInterrogateQ invoke APDU is not answered by the Served User PINX), the Interrogating PINX shall enter DND-iIdle state.

NOTE - The Interrogating PINX should indicate rejection to the interrogating user.

The Interrogating PINX is responsible for clearing the call-independent signalling connection towards the Served User PINX. This may occur on receipt of a return error or reject APDU or on expiry of timer T3. Alternatively, the signalling connection may be retained for other applications, if appropriate.

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6.5.6 Actions at the Served User PINX

The SDL representation of procedures at the Served User PINX is shown in D.6 of annex D.

6.5.6.1 Normal procedures

6.5.6.1.1 Remote activation

On receipt of a doNotDisturbActivateQ invoke APDU using the call reference of a call-independent signalling connection (as specified in subclause 7.3 of ISO/IEC 11582), the Served User PINX shall check the received basic service (element basicService) for the served user (element servedUserNr) and verify that remote activation is possible.

If the activation request is acceptable, the Served User PINX shall activate SS-DND with the protection level subscribed to, and answer the doNotDisturbActivateQ invoke APDU with a return result APDU.

6.5.6.1.2 Remote deactivation

On receipt of a doNotDisturbDeactivate invoke APDU using the call reference of a call-independent signalling connection (as specified in subclause 7.3 of ISO/IEC 11582), the Served User PINX shall check the consistency of the received basic service (element basicService) for the served user (element servedUserNr), and verify that SS-DND is activated and that remote deactivation is possible.

If the deactivation request is valid, the Served User PINX shall deactivate SS-DND and answer the doNotDisturbDeactivate invoke APDU with a return result APDU.

6.5.6.1.3 Remote interrogation

On receipt of a doNotDisturbInterrogateQ invoke APDU using the call reference of a call-independent signalling connection (as specified in subclause 7.3 of ISO/IEC 11582), the Served User PINX shall check the interrogation request and answer the doNotDisturbInterrogateQ invoke APDU with a return result APDU if the interrogation request is valid.

6.5.6.2 Exceptional procedures

6.5.6.2.1 Remote activation of SS-DND

If the activation request cannot be accepted, the Served User PINX shall send back a return error APDU with an appropriate error value.

6.5.6.2.2 Remote deactivation of SS-DND

If the deactivation request is not valid, the Served User PINX shall answer the doNotDisturbDeactivateQ invoke APDU with a return error APDU containing an appropriate error value, e.g. "notActivated", if SS-DND is not activated for the relevant PISN number and basic service.

6.5.6.2.3 Remote interrogation of SS-DND

If the interrogation request is not valid, the Served User PINX shall answer the doNotDisturbInterrogateQ invoke APDU with a return error APDU containing an appropriate error value.

6.5.7 Actions at a Transit PINX

No special actions are required in support of SS-DND.

6.6 SS-DNDO signalling procedures

SS-DNDO may be invoked in two ways depending on whether the network connection is retained or not when a call encounters SS-DND activated for a called user. Retention of the network connection makes use of a generic path retention mechanism, which is specified in annex A.

References in this clause to protocol control states refer to basic call protocol control states defined in ISO/IEC 11572.

Annex C contains some examples of message sequences.

6.6.1 Actions at the Terminating PINX

The Terminating PINX shall support the two methods of invocation. For invocation with path retention, the procedures specified below apply in conjunction with the procedures specified in A.5.2 of annex A.

The SDL representation of procedures at the Terminating PINX is shown in D.1 of annex D.

6.6.1.1 Normal procedures

Having agreed the B-channel, and sent back a CALL PROCEEDING message in response to an incoming SETUP message, in accordance with the procedures of ISO/IEC 11572, the Terminating PINX shall proceed as follows. If the SETUP message

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contains a doNotDisturbOverrideQ invoke APDU and if, apart from the possibility of DNDO, all the conditions for the call failing due to SS-DND active are met, the Terminating PINX shall compare the received DNDOCL with the served user's DNDPL. If the DNDPL is smaller than the DNDOCL, SS-DNDO shall be invoked and the call proceeds normally as a basic call without invocation of SS-DND. However, if the DNDPL is greater than or equal to the received DNDOCL, then DNDO is not allowed and SS-DND shall be invoked. In this case the call shall be processed further as if the doNotDisturbOverrideQ invoke APDU had not been included in the SETUP message, and the procedures defined in subclause 6.5.1 for invocation of SS-DND at a Terminating PINX shall apply.

If the SETUP message contains a pathRetain invoke APDU with one of the bits dndo-high, dndo-medium or dndo-low in element serviceList set to ONE and if, apart from the possibility of DNDO, all the conditions for the call failing due to SS-DND active are met, the Terminating PINX shall compare the received DNDOCL with the served user's DNDPL. If the DNDPL is smaller than the DNDOCL, then SS-DNDO is invokable, and the procedures for path retention in A.5.2 shall apply.

The bit set to ONE in element serviceList in the serviceAvailable invoke APDU shall be the bit that corresponds to the bit set to ONE in the pathRetain invoke APDU. If the DNDPL is greater than or equal to the DNDOCL, then the procedures defined in subclause 6.5.1 for invocation of SS-DND at a Terminating PINX shall apply.

If subsequently, after having retained a network connection in accordance with A.5.2 of annex A, and having indicated SS-DNDO in the serviceAvailable APDU, in protocol control state Incoming Call Proceeding, a FACILITY message containing a doNotDisturbOvrExecuteQ invoke APDU is received, the Terminating PINX shall override SS-DND at the destination, permit the incoming call to proceed as for a normal basic call, send a doNotDisturbOvrExecuteQ return result APDU to the Originating PINX and remain in state DND-tIdle. The APDU shall be sent in a FACILITY message on the call reference of the retained network connection.

6.6.1.2 Exceptional procedures

If, on receipt of a doNotDisturbOvrExecuteQ invoke APDU, the Terminating PINX is not able to override SS-DND at the destination, it shall send a doNotDisturbOvrExecuteQ return error APDU to the Originating PINX in a FACILITY or a DISCONNECT message and remain in state DNDO-tIdle.

6.6.2 Actions at the Originating PINX

For a given call, the Originating PINX shall choose one of the following two methods for invocation of SS-DNDO:

– invocation without path retention;

– invocation with path retention.

For invocation with path retention, the procedures below apply in conjunction with the procedures specified in A.5.1 of annex A.

The SDL representation of procedures at the Originating PINX is shown in D.2 of annex D.

6.6.2.1 Normal procedures

6.6.2.1.1 Without path retention

On determining for a new call that SS-DNDO is to be invoked when at the destination SS-DND active is encountered, the Originating PINX shall include a doNotDisturbOverrideQ invoke APDU in the SETUP message sent on the call reference of that call and remain in state DNDO-oIdle.

6.6.2.1.2 With path retention

For invocation of SS-DNDO with path retention, the Originating PINX shall send a doNotDisturbOvrExecuteQ invoke APDU in a FACILITY message using the call reference of a call for which the network connection has been retained in accordance with A.5.1 of annex A and for which the received serviceAvailable invoke APDU indicated that SS-DNDO is invokable, start timer T4, and enter state DND-oAwaitExecResult.

On receipt in state DNDO-oAwaitExecResult of a FACILITY message containing a doNotDisturbOvrExecuteQ return result APDU on the call reference of the retained call, the Originating PINX shall stop timer T4 and enter state DNDO-oIdle.

6.6.2.2 Exceptional procedures

On expiry of timer T4, the Originating PINX shall abort the procedure for SS-DNDO, and enter state DNDO-oIdle.

On receipt in state DNDO-oAwaitExecResult of a FACILITY or DISCONNECT message containing a doNotDisturbOvrExecuteQ return error APDU on the call reference of the retained call, the Originating PINX shall stop timer T4, and enter state DNDO-oIdle.

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On receipt in state DNDO-oAwaitExecResult of an ALERTING, CONNECT or DISCONNECT message without a doNotDisturbOvrExecuteQ return result, return error or reject APDU, the Originating PINX shall stop timer T4 and enter state DNDO-oIdle. The call shall continue in accordance with ISO/IEC 11572.

6.6.3 Actions at a Transit PINX

No special actions are required in support of SS-DNDO.

6.7 Impact of interworking with public ISDNs

6.7.1 SS-DND

NOTE - At the time of publication of this International Standard, an equivalent service was not specified for public ISDNs.

6.7.1.1 Incoming calls

On a call to a PISN from a public ISDN, which encounters SS-DND in the PISN, the Incoming Gateway PINX may convey the received notification of SS-DND to the public ISDN if the signalling protocol permits, and may apply a tone or announcement.

6.7.1.2 Outgoing calls

No impact.

6.7.2 SS-DNDO

NOTE - At the time of publication of this International Standard, an equivalent service was not specified for public ISDNs.

6.7.2.1 Incoming calls

On a call to a PISN from a public ISDN that does not support an equivalent service, SS-DNDO may be invoked automatically by the Gateway PINX, depending on the requirements of the public ISDN.

6.7.2.2 Outgoing calls

On a call from a PISN to a public ISDN that does not support an equivalent service, the Outgoing Gateway PINX shall behave as specified in subclause 6.6.1 for a Terminating PINX at which conditions for invocation of SS-DNDO are not met.

6.8 Impact of interworking with non-ISDNs

6.8.1 SS-DND

When interworking with a non-ISDN which does not support an equivalent service, the procedures defined in subclause 6.7.1 shall apply.

When interworking with a non-ISDN which supports an equivalent service, the two networks may cooperate in the operation of SS-DND. In this case, either the Originating PINX functionality or the Terminating PINX functionality will be provided in the non-ISDN. The Incoming or Outgoing Gateway PINX shall provide conversion between the signalling protocol specified in this International Standard and the signalling protocol of the other network.

6.8.2 SS-DNDO

When interworking with a non-ISDN which does not support an equivalent service, the procedures defined in subclause 6.7.2 shall apply.

When interworking with a non-ISDN which supports an equivalent service, the two networks may cooperate in the operation of SS-DNDO. In this case, either the Originating PINX functionality or the Terminating PINX functionality will be provided in the non-ISDN. The Incoming or Outgoing Gateway PINX shall provide conversion between the signalling protocol specified in this International Standard and the signalling protocol of the other network.

6.9 Protocol interactions between SS-DND and other supplementary services and ANFs

This clause specifies protocol interactions between SS-DND and other supplementary services and ANFs for which stage 3 standards had been published at the time of publication of this International Standard. For interactions with supplementary services and ANFs for which stage 3 standards are published subsequent to the publication of this International Standard, see those other stage 3 standards.

NOTE 1 - Additional interactions that have no impact on the signalling protocol at the Q reference point can be found in the relevant stage 1 specifications.

NOTE 2 - Simultaneous conveyance of APDUs for SS-DND and another supplementary service or ANF in the same message, each in accordance with the requirements of its respective stage 3 standard, does not, on its own, constitute a protocol interaction.

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6.9.1 Interaction between SS-DND and Calling Name Identification Presentation (SS-CNIP)

No protocol interaction.

6.9.2 Interaction between SS-DND and Connected Name Identification Presentation (SS-CONP)

No protocol interaction.

6.9.3 Interaction between SS-DND and Call Completion to Busy Subscriber (SS-CCBS)

The following protocol interaction shall apply if SS-CCBS is supported in accordance with ISO/IEC 13870.

6.9.3.1 Actions at the Terminating PINX

If SS-CCBS is invoked on a destination with SS-DND active, then the SS-CCBS invocation shall fail using a ccbsRequest return error APDU with error value shortTermRejection.

If at the time the PISN attempts to complete the call to the destination following CCBS recall, SS-DND is active at the destination, then SS-CCBS shall fail with the appropriate indication to the calling user. The Terminating PINX shall return a DISCONNECT message and a doNotDisturb notification shall be included.

6.9.3.2 Actions at the Originating PINX

No interactions.

6.9.4 Interaction between SS-DND and Call Completion on No Reply (SS-CCNR)

The following protocol interaction shall apply if SS-CCNR is supported in accordance with ISO/IEC 13870.

6.9.4.1 Actions at the Terminating PINX

If SS-CCNR is invoked on a destination with SS-DND active, then the SS-CCNR invocation shall fail using a ccnrRequest return error APDU with error value shortTermRejection.

If at the time the PISN attempts to complete the call to the destination following CCNR recall, SS-DND is active at the destination, then SS-CCNR shall fail with the appropriate indication to the calling user. The Terminating PINX shall return a DISCONNECT message and a doNotDisturb notification shall be included.

6.9.4.2 Actions at the Originating PINX

No interactions.

6.9.5 Interaction between SS-DND and Call Transfer (SS-CT)

No protocol interaction.

6.9.6 Interaction between SS-DND and Call Forwarding Unconditional (SS-CFU)

No protocol interaction.

6.9.7 Interaction between SS-DND and Call Forwarding Busy (SS-CFB)

No protocol interaction.

6.9.8 Interaction between SS-DND and Call Forwarding No Reply (SS-CFNR)

No protocol interaction.

6.9.9 Interaction between SS-DND and Path Replacement (ANF-PR)

No protocol interaction.

6.9.10 Interaction between SS-DND and Call Offer (SS-CO)

No protocol interaction.

6.9.11 Interaction between SS-DND and Do Not Disturb Override (SS-DNDO)

Protocol interactions are specified in subclause 6.6.

6.9.12 Interaction between SS-DND and Call Intrusion (SS-CI)

No protocol interaction.

6.10 Protocol interactions between SS-DNDO and other supplementary services and ANFs

This clause specifies protocol interactions between SS-DNDO and other supplementary services and ANFs for which stage 3 standards had been published at the time of publication of this International Standard. For interactions with supplementary

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services and ANFs for which stage 3 standards are published subsequent to the publication of this International Standard, see those other stage 3 standards.

NOTE 1 - Additional interactions that have no impact on the signalling protocol at the Q reference point can be found in the relevant stage 1 specifications.

NOTE 2 - Simultaneous conveyance of APDUs for SS-DNDO and another supplementary service or ANF in the same message, each in accordance with the requirements of its respective stage 3 standard, does not, on its own, constitute a protocol interaction.

6.10.1 Interaction between SS-DNDO and Calling Name Identification Presentation (SS-CNIP)

No protocol interaction.

6.10.2 Interaction between SS-DNDO and Connected Name Identification Presentation (SS-CONP)

No protocol interaction.

6.10.3 Interaction between SS-DNDO and Call Completion to Busy Subscriber (SS-CCBS)

No protocol interaction.

6.10.4 Interaction between SS-DNDO and Call Completion on No Reply (SS-CCNR)

No protocol interaction.

6.10.5 Interaction between SS-DNDO and Call Transfer (SS-CT)

No protocol interaction.

6.10.6 Interaction between SS-DNDO and Call Forwarding Unconditional (SS-CFU)

The following protocol interaction shall apply if SS-CFU is supported in accordance with ISO/IEC 13873.

6.10.6.1 Actions at the Rerouteing PINX

When executing call forwarding, the Rerouteing PINX shall act as follows:

– Include a doNotDisturbOverrideQ invoke APDU in the SETUP message to the Diverted-to PINX if either this was included in the SETUP message to the Diverting PINX, or SS-DNDO has been invoked successfully at the diverting user following path retention.

– Include a pathRetain invoke APDU with bit dndo-low, dndo-medium or dndo-high set to ONE in the SETUP message to the Diverted-to PINX if and only if this was included in the SETUP message to the Diverting PINX and SS-DNDO has not been successfully invoked at the diverting user.

NOTE - This interaction takes into account the possible use of SS-CFU signalling in support of Call Deflection Immediate, which can be invoked following SS-DNDO.

6.10.6.2 Actions at the Originating PINX

In order to invoke SS-DNDO without path retention after a call has encountered a diverted-to user with DND active, the Originating PINX shall include a doNotDisturbOverrideQ invoke APDU in addition to the divertingLegInformation2 invoke APDU in the SETUP message of the new call to the diverted-to user.

6.10.7 Interaction between SS-DNDO and Call Forwarding Busy (SS-CFB)

The following protocol interaction shall apply if SS-CFB is supported in accordance with ISO/IEC 13873.

6.10.7.1 Actions at the Rerouteing PINX

When executing call forwarding, the Rerouteing PINX shall act as follows:

– Include a doNotDisturbOverrideQ invoke APDU in the SETUP message to the Diverted-to PINX if either this was included in the SETUP message to the Diverting PINX, or SS-DNDO has been invoked successfully at the diverting user following path retention.

– Include a pathRetain invoke APDU with bit dndo-low, dndo-medium or dndo-high set to ONE in the SETUP message to the Diverted-to PINX if and only if this was included in the SETUP message to the Diverting PINX and SS-DNDO was not successfully invoked at the diverting user.

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6.10.7.2 Actions at the Originating PINX

In order to invoke SS-DNDO without path retention after a call has encountered a diverted-to user with DND active, the Originating PINX shall include a doNotDisturbOverrideQ invoke APDU in the SETUP message of the new call to the diverted-to user.

6.10.8 Interaction between SS-DNDO and Call Forwarding No Reply (SS-CFNR)

No protocol interaction.

6.10.9 Interaction between SS-DNDO and Path Replacement (ANF-PR)

No protocol interaction.

6.10.10 Interaction between SS-DNDO and Call Offer (SS-CO)

The following protocol interaction shall apply if SS-CO is supported in accordance with ISO/IEC 14843.

6.10.10.1 Actions at the Terminating PINX

On receiving a SETUP message containing a callOfferRequest invoke APDU together with a doNotDisturbOverrideQ invoke APDU, the procedures of SS-DNDO shall apply and, if SS-DND is not active or is successfully overridden, the procedures of SS-CO shall apply.

6.10.11 Interaction between SS-DNDO and Do Not Disturb (SS-DND)

Protocol interaction are specified in subclause 6.6.

6.10.12 Interaction between SS-DNDO and Call Intrusion (SS-CI)

The following protocol interaction shall apply if SS-CI is supported in accordance with ISO/IEC 14846.

6.10.12.1 Actions at the Terminating PINX

On receiving a SETUP message containing a callIntrusionRequest invoke APDU together with a doNotDisturbOverrideQ invoke APDU, the procedures of SS-DNDO shall apply and, if DND is not active or is successfully overridden, the procedures of SS-CI shall apply.

6.11 SS-DND and SS-DNDO parameter values (timers)

The following timers apply:

6.11.1 Timer T1

Timer T1 operates at the Activating PINX during state DND-aWait. Its purpose is to protect against the absence of a response to the doNotDisturbActivateQ invoke APDU.

Timer T1 shall have a value not less than 15 s.

6.11.2 Timer T2

Timer T2 operates at the Deactivating PINX during state DND-dWait. Its purpose is to protect against the absence of a response to the doNotDisturbDeactivateQ invoke APDU.

Timer T2 shall have a value not less than 15 s.

6.11.3 Timer T3

Timer T3 operates at the Interrogating PINX during state DND-iWait. Its purpose is to protect against the absence of a response to the doNotDisturbInterrogateQ invoke APDU.

Timer T3 shall have a value not less than 15 s.

6.11.4 Timer T4

Timer T4 operates at the Originating PINX during state DNDO-oAwaitExecResult. Its purpose is to protect against the absence of a response to the doNotDisturbOvrExecute invoke APDU.

Timer T4 shall have a value not less than 15 s.

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Annex A
(normative)

Signalling protocol for the support of Path Retention

This annex is applicable to Originating PINXs that support SS-DNDO with path retention and to Terminating PINXs that support SS-DNDO. A similar annex will appear in other standards that make use of the generic mechanism for path retention.

A.1 Path Retention description

Path retention is a generic mechanism which can be used by supplementary services during call establishment.

Path retention is invoked by the Originating PINX either for one supplementary service or for several supplementary services at the same time. Invocation for a particular supplementary service means that the network connection is to be retained if the Terminating PINX encounters conditions in which it is appropriate to invoke that supplementary service. The Originating PINX is informed of the reason for retaining the connection so that it can decide (e.g. by consulting the calling user) whether to invoke the supplementary service. Under some circumstances in which the network connection is retained, more than one of the supplementary services for which path retention has been invoked may be applicable.

Successive retentions of the network connection by the Terminating PINX following a single invocation of path retention by the Originating PINX are possible as a result of different conditions being encountered at the Terminating PINX. When an attempt is made to invoke a supplementary service for which the network connection has been retained, a further condition can be encountered that can cause the network connection to be retained again for the same supplementary service or a different supplementary service.

Path retention is specified in terms of a Path Retention entity existing within the Coordination Function at the Originating PINX and at the Terminating PINX.

A.2 Path Retention operational requirements

A.2.1 Requirements on the Originating PINX

Call establishment procedures for the outgoing side of an inter-PINX link, 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.

A.2.2 Requirements on the Terminating PINX

Call establishment procedures for the incoming side of an inter-PINX link, 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.

A.2.3 Requirements on a Transit PINX

Call establishment 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 a Transit PINX, shall apply.

A.3 Path Retention coding requirements

A.3.1 Operations

The operations pathRetain and serviceAvailable as defined in subclause 6.3.1 shall apply. Within the ARGUMENT of operation pathRetain, the element of type ServiceList may contain bits other than those named in subclause 6.3.1, in order to request path retention for other supplementary services. Within the ARGUMENT of operation serviceAvailable, the element of type ServiceList may contain bits other than those named in subclause 6.3.1, in order to indicate retention of the network connection for other supplementary services.

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A.3.2 Information elements

APDUs of the operations pathRetain and serviceAvailable shall be coded in the Facility information element in accordance with ISO/IEC 11582.

When conveying an APDU of operation pathRetain or serviceAvailable, the NFE shall be included. In the case of an invoke APDU the destinationEntity data element of the NFE shall contain value endPINX.

When conveying an invoke APDU of operation pathRetain or serviceAvailable, the Interpretation APDU shall contain value discardAnyUnrecognisedInvokePdu.

A.3.3 Messages

The Facility information element shall be conveyed in the messages as specified in clause 10 of ISO/IEC 11582. The basic call messages shall be used for call establishment as specified in ISO/IEC 11572.

A.4 Path Retention state definitions

A.4.1 States at the Originating PINX

The procedures at the Originating PINX are written in terms of the following conceptual states existing within the Path Retention entity in that PINX in association with a particular call.

A.4.1.1 PRTO-Idle

Path retention is not operating.

A.4.1.2 PRTO-Requested

A pathRetain invoke APDU has been sent and the Originating PINX is waiting for a serviceAvailable invoke APDU from the Terminating PINX.

A.4.1.3 PRTO-Retained

A serviceAvailable invoke APDU has been received and the network connection is retained.

A.4.1.4 PRTO-Invoking

Invocation of a supplementary service is being attempted using a retained network connection.

A.4.2 States at the Terminating PINX

The procedures at the Terminating PINX are written in terms of the following conceptual states existing within the Path Retention entity in that PINX in association with a particular incoming call.

A.4.2.1 PRTT-Idle

Path retention is not operating.

A.4.2.2 PRTT-Requested

A pathRetain invoke APDU has been received and the Terminating PINX is waiting until conditions for retaining the network connection are encountered.

A.4.2.3 PRTT-Retained

A serviceAvailable invoke APDU has been sent and the network connection is retained.

A.4.2.4 PRTT-Invoking

Invocation of a supplementary service is being attempted using a retained network connection.

A.5 Path Retention signalling procedures for invocation and operation

A.5.1 Actions at the Originating PINX

The SDL representation of procedures at the Originating PINX is shown in A.9.1.

On sending a SETUP message for call establishment, if path retention is required for allowing the possibility of invoking one or more supplementary services on encountering certain conditions at the Terminating PINX, the Originating PINX shall include a pathRetain invoke APDU in the SETUP message and shall enter state PRTO-Requested. In the element of type ServiceList in the ARGUMENT, any bit corresponding to a supplementary service for which path retention is required shall be set to ONE and all other bits shall be set to ZERO.

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On receipt of a serviceAvailable invoke APDU in a PROGRESS or a FACILITY message in state PRTO-Requested, the Originating PINX shall enter state PRTO-Retained.

In state PRTO-Requested, if the Originating PINX determines that retention of the network connection can no longer occur (e.g. on receipt of a CONNECT message), it shall enter state PRTO-Idle.

During state PRTO-Retained, invocation of any of the supplementary services indicated in the serviceAvailable invoke APDU may be requested. If invocation is requested (by sending the appropriate APDU in a FACILITY message), the Terminating PINX shall enter state PRTO-Invoking.

In state PRTO-Invoking, if the supplementary service concerned is successfully invoked, the Originating PINX shall either:

i) if there is a possibility of the network connection being retained again prior to completion of call establishment (e.g. to allow for the possibility of invoking another supplementary service or for the possibility of invoking the same supplementary service again), enter state PRTO-Requested again; or

ii) enter state PRTO-Idle.

In state PRTO-Invoking, if the supplementary service concerned fails to be invoked successfully, the Originating PINX shall either:

i) if the network connection is still retained to allow the possibility of invoking another supplementary service, enter state PRTO-Retained again; or

ii) enter state PRTO-Idle.

If, in any state other than PRTO-Idle, the call is released, state PRTO-Idle shall be entered.

A.5.2 Actions at the Terminating PINX

The SDL representation of procedures at the Terminating PINX is shown in A.9.2.

On receipt of a pathRetain invoke APDU in a SETUP message, the Terminating PINX shall enter state PRTT-Requested and record the list of supplementary services for which path retention has been requested, as indicated by the element of type ServiceList.

If, during state PRTT-Requested, a condition is encountered in which it is appropriate to invoke one or more of the supplementary services for which path retention has been requested, the Terminating PINX shall retain the network connection, send a serviceAvailable invoke APDU to the Originating PINX, start timer PRT1 and enter state PRTT-Retained. In the element of type ServiceList in the ARGUMENT, any bit corresponding to a supplementary service that can be invoked at this stage and for which path retention has been requested shall be set to ONE and all other bits shall be set to ZERO. This procedure replaces the normal procedure appropriate to the condition that has been encountered.

The serviceAvailable invoke APDU shall be sent either in a FACILITY message or, if a PROGRESS message is to be sent at the same time, in the PROGRESS message. A PROGRESS message containing a Progress indicator information element with Progress description no. 8 (in-band information or appropriate pattern now available) shall be sent if this Progress description has not already been sent for this call.

NOTE - It is necessary that this Progress description be sent, as a means of ensuring that basic call timer T310 is stopped at other PINXs. However, if this Progress description has already been sent in conjunction with an earlier serviceAvailable invoke APDU for this call, it need not be repeated.

In state PRTT-Requested, if the Terminating PINX determines that retention of the network connection can no longer occur (e.g. on sending a CONNECT message), it shall enter state PRTT-Idle.

In state PRTT-Retained, on receipt of an invocation request from the Originating PINX for any of the supplementary services for which the network connection has been retained, the Terminating PINX shall stop timer PRT1 and enter state PRTT-Invoking.

In state PRTT-Invoking, if the supplementary service concerned is successfully invoked, the Terminating PINX shall either:

i) if there is a possibility of the network connection being retained again prior to completion of call establishment (e.g. to allow for the possibility of invoking another supplementary service or for the possibility of invoking the same supplementary service again), enter state PRTT-Requested again; or

ii) enter state PRTT-Idle.

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In state PRTT-Invoking, if the supplementary service concerned fails to be invoked successfully, the Terminating PINX shall either:

i) continue to retain the network connection, return to state PRTT-Retained and start timer PRT1 if there are other supplementary services for which the network connection has been retained and that are still able to be invoked; or

ii) enter state PRTT-Idle and allow the call to proceed as specified for failure of the supplementary service concerned (e.g. initiate release of the call).

In case i), any APDU sent to the Originating PINX to indicate failure of the requested supplementary service shall be sent in a FACILITY message.

On expiry of timer PRT1, the Terminating PINX shall enter state PRTT-Idle and initiate call clearing in accordance with ISO/IEC 11572.

If, in any state other than PRTT-Idle, the call is released, state PRTT-Idle shall be entered and timer PRT1, if running, shall be stopped.

A.5.3 Actions at a Transit PINX

No special actions are required in support of path retention.

A.6 Path Retention impact of interworking with public ISDNs

On a call from a public ISDN that does not support an equivalent mechanism, path retention shall not be requested by the Incoming Gateway PINX.

On a call from a PISN to a public ISDN that does not support an equivalent mechanism, the Outgoing Gateway PINX shall, on encountering a condition in the public ISDN in which it is appropriate to invoke one or more of the supplementary services for which path retention has been requested, either:

i) proceed as if path retention had not been requested; or

ii) retain the network connection and allow invocation of the supplementary services concerned in accordance with A.5.2.

NOTE 1 - If invocation of a supplementary service is requested while the network connection is retained, the Outgoing Gateway PINX is responsible for establishing a new network connection through the public ISDN in order to request invocation of the supplementary service. Failure to establish a new network connection (e.g. because of network congestion) can cause the Outgoing Gateway PINX to reject the supplementary service and release the call.

NOTE 2 - At the time of publication of this International Standard, no equivalent mechanism was specified for public ISDNs.

A.7 Path Retention impact of interworking with non-ISDNs

When interworking with a non-ISDN that does not support an equivalent mechanism, the procedures defined in A.6 for interworking with a public ISDN that does not support an equivalent mechanism shall apply.

When interworking with a non-ISDN that does support an equivalent mechanism, the two networks may cooperate in the operation of path retention. In this case, either the Originating PINX functionality or the Terminating PINX functionality will be provided in the non-ISDN. The Incoming or Outgoing Gateway PINX shall provide conversion between the signalling protocol specified in this International Standard and the signalling protocol of the other network.

A.8 Path Retention parameter values (timers)

Timer PRT1 operates at the Terminating PINX during state PRTT-Retained. Its purpose is to protect against absence of a supplementary service invocation request as a response to the serviceAvailable invoke APDU.

Timer PRT1 shall have a value not less than 60 s.

A.9 Specification and Description Language (SDL) - Representation of procedures (informative)

The diagrams in this annex use the Specification and Description Language defined in ITU-T Rec. Z.100 (1999).

Each diagram represents the behaviour of a Path Retention entity at a particular type of PINX. In accordance with the protocol model described in ISO/IEC 11582, the Path Retention entity as a part of the coordination function uses the services of Generic Functional Procedures Control and Basic Call Control and provides services to the various Supplementary Service Control entities.

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Where an output symbol represents a primitive to other parts of the coordination function, and that primitive results in a PSS1 message being sent, the output symbol bears the name of the message and any remote operations APDU(s) contained in that message. In the case of a message specified in ISO/IEC 11572, basic call actions associated with the sending of that message are deemed to occur.

Where an input symbol represents a primitive from other parts of the coordination function, and that primitive is the result of a PSS1 message being received, the input symbol bears the name of the message and any remote operations APDU(s) contained in that message. In the case of a message specified in ISO/IEC 11572, basic call actions associated with the receipt of that message are deemed to have occurred.

The following abbreviation is used:

inv. invoke APDU.

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A.9.1 SDL representation of Path Retention at the Originating PINX

Figure A.1 shows the behaviour of a Path Retention entity within the Originating PINX.

In figure A.1 output signals to the right represent messages sent via protocol control, input signals from the right represent messages received via protocol control, and input signals from the left represent internal primitives.

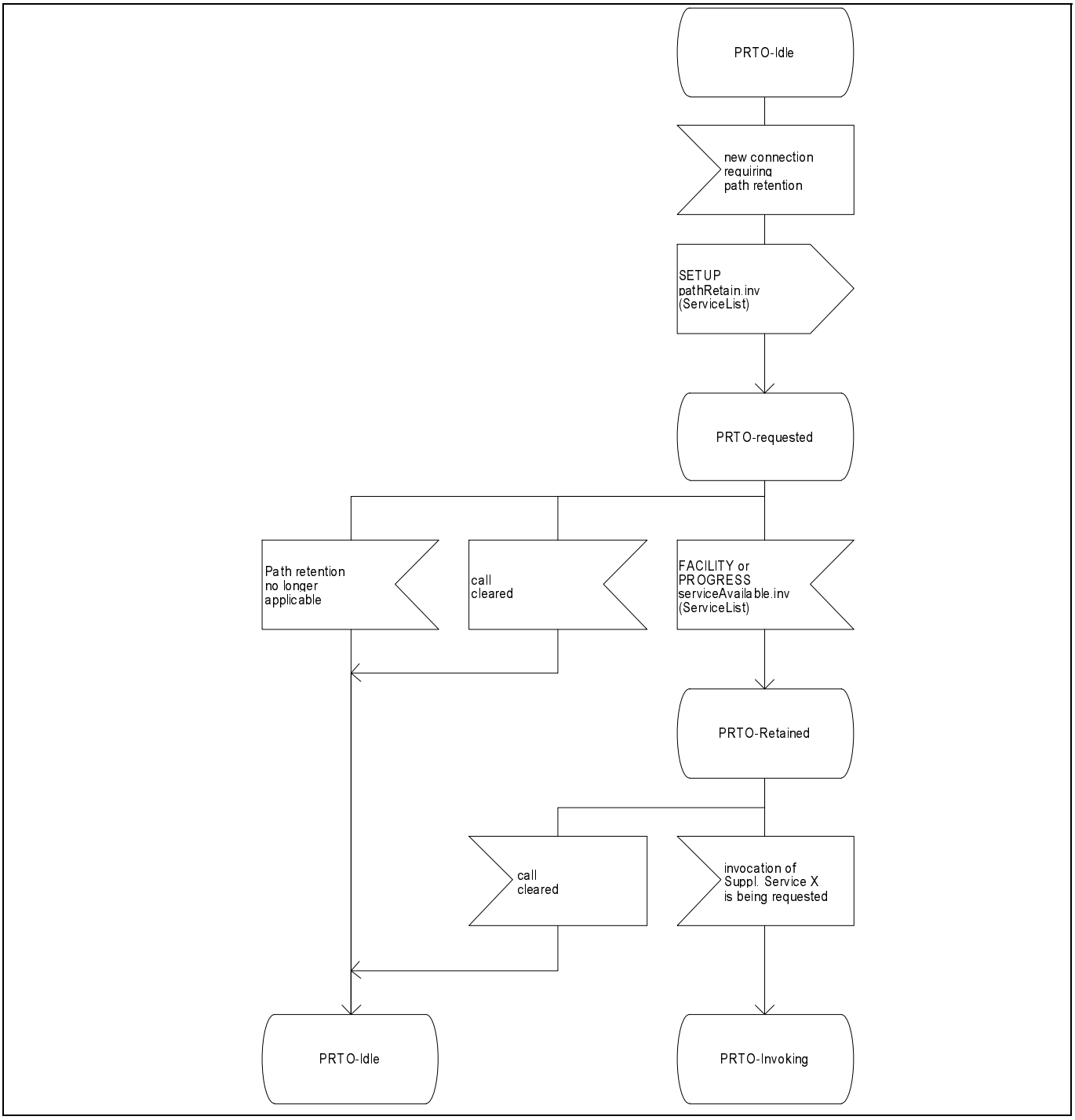

Figure A.1 (sheet 1 of 2) - SDL representation of Path Retention at the Originating PINX

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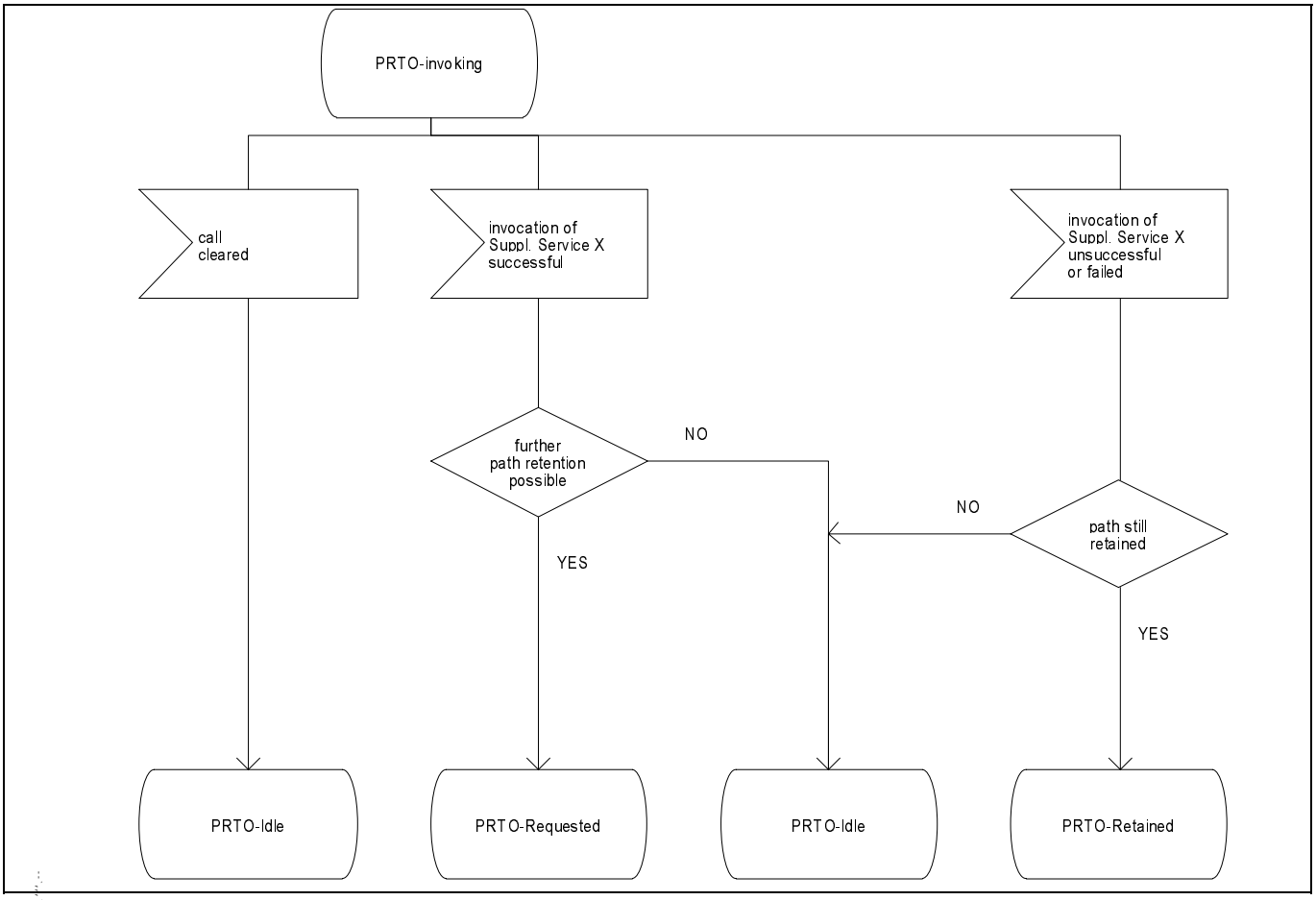

Figure A.1 (sheet 2 of 2) - SDL representation of Path Retention at the Originating PINX

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A.9.2 SDL representation of Path Retention at the Terminating PINX

Figure A.2 shows the behaviour of a Path Retention entity within the Terminating PINX.

In figure A.2 output signals to the left represent messages sent via protocol control, input signals from the left represent messages received via protocol control, and input signals from the right represent internal primitives.

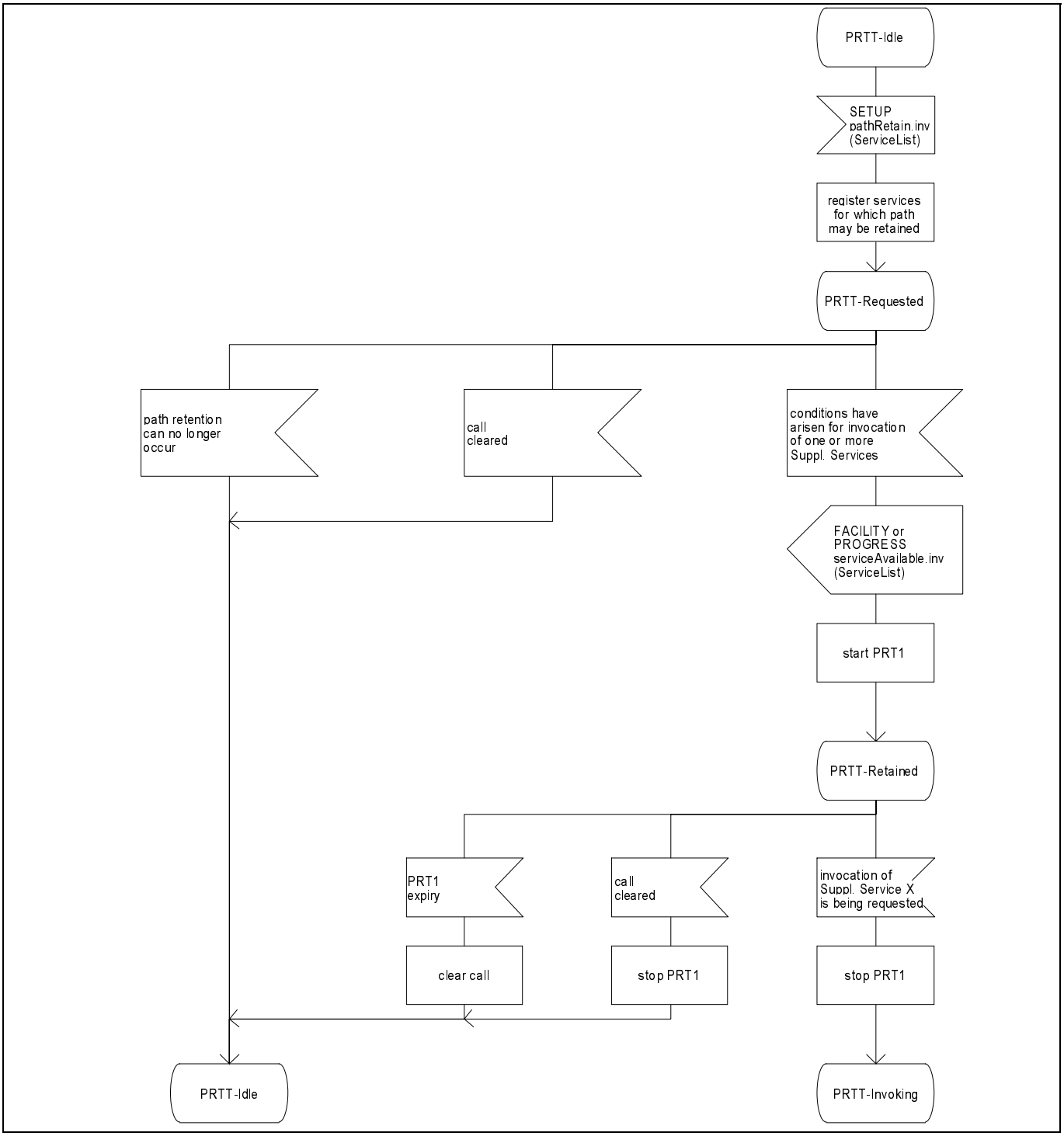

Figure A.2 (sheet 1 of 2) - SDL representation of Path Retention at the Terminating PINX

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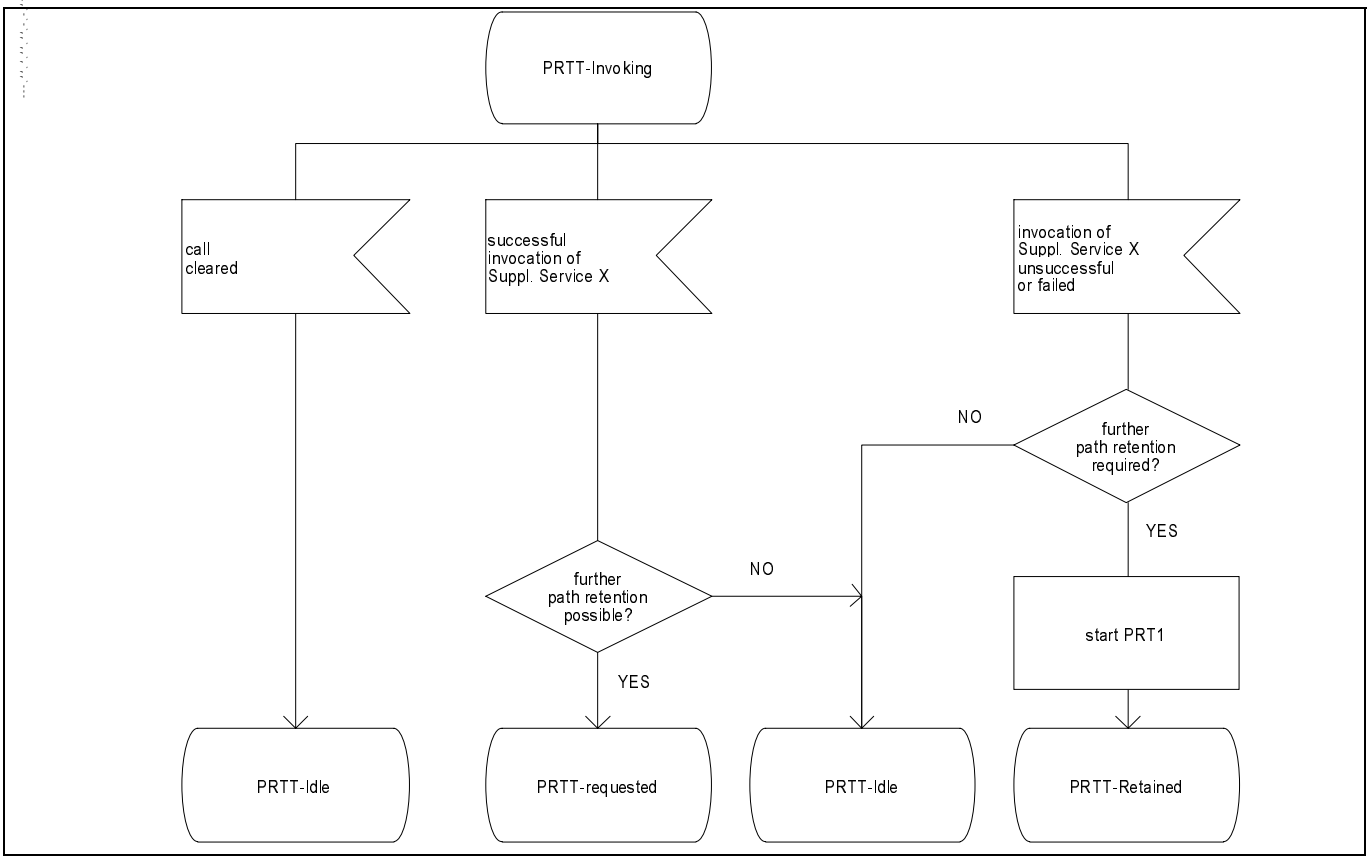

Figure A.2 (sheet 2 of 2) - SDL representation of Path Retention at the Terminating PINX

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Annex B
(normative)

Protocol Implementation Conformance Statement (PICS) proforma

B.1 Introduction

The supplier of a protocol implementation which is claimed to conform to this International Standard shall complete the following Protocol Implementation Conformance Statement (PICS) proforma.

A completed PICS proforma is the PICS for the implementation in question. The PICS is a statement of which capabilities and options of the protocol have been implemented. The PICS can have a number of uses, including use:

- by the protocol implementor, as a check list to reduce the risk of failure to conform to the Standard through oversight;
- by the supplier and acquirer, or potential acquirer, of the implementation, as a detailed indication of the capabilities of the implementation, stated relative to the common basis for understanding provided by the Standard's PICS proforma;
- by the user or potential user of the implementation, as a basis for initially checking the possibility of interworking with another implementation - while interworking can never be guaranteed, failure to interwork can often be predicted from incompatible PICS's;
- by a protocol tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

B.2 Instructions for completing the PICS proforma

B.2.1 General structure of the PICS proforma

The PICS proforma is a fixed format questionnaire divided into sub-clauses each containing a group of individual items. Each item is identified by an item number, the name of the item (question to be answered), and the reference(s) to the clause(s) that specifies (specify) the item in the main body of this International Standard.

The "Status" column indicates whether an item is applicable and if so whether support is mandatory or optional. The following terms are used:

m	mandatory (the capability is required for conformance to the protocol);
o	optional (the capability is not required for conformance to the protocol, but if the capability is implemented it is required to conform to the protocol specifications);
o.<n>	optional, but support of at least one of the group of options labelled by the same numeral <n> is required;
x	prohibited;
c.<cond>	conditional requirement, depending on support for the item or items listed in condition <cond>;
<item>:m	simple conditional requirement, the capability being mandatory if item number <item> is supported, otherwise not applicable;
<item>:o	simple conditional requirement, the capability being optional if item number <item> is supported, otherwise not applicable.

Answers to the questionnaire items are to be provided either in the "Support" column, by simply marking an answer to indicate a restricted choice (Yes or No), or in the "Not Applicable" column (N/A).

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B.2.2 Additional information

Items of Additional Information allow a supplier to provide further information intended to assist the interpretation of the PICS. It is not intended or expected that a large quantity will be supplied, and a PICS can be considered complete without any such information. Examples might be an outline of the ways in which a (single) implementation can be set up to operate in a variety of environments and configurations.

References to items of Additional Information may be entered next to any answer in the questionnaire, and may be included in items of Exception information.

B.2.3 Exception information

It may occasionally happen that a supplier will wish to answer an item with mandatory or prohibited status (after any conditions have been applied) in a way that conflicts with the indicated requirement. No pre-printed answer will be found in the Support column for this. Instead, the supplier is required to write into the support column an x.<i> reference to an item of Exception Information, and to provide the appropriate rationale in the Exception item itself.

An implementation for which an Exception item is required in this way does not conform to this International Standard. A possible reason for the situation described above is that a defect in the Standard has been reported, a correction for which is expected to change the requirement not met by the implementation.

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B.3 PICS proforma for ISO/IEC 14844 : SS-DND

B.3.1 Implementation identification

Supplier	
Contact point for queries about the PICS	
Implementation Name(s) and Version(s)	
Other information necessary for full identification, e.g. Name(s) and Version(s) for machines and/or operating systems; system name(s)	

Only the first three items are required for all implementations; other information may be completed as appropriate in meeting requirements for full identification.

The terms Name and Version should be interpreted appropriately to correspond with a suppliers terminology (e.g. Type, Series, Model).

B.3.2 Protocol summary

Protocol version	1.0
Addenda implemented (if applicable)	
Amendments implemented	
Have any exception items been required (see B.2.3)?	No [ ] Yes [ ] (The answer Yes means that the implementation does not conform to this International Standard)

Date of statement	

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B.3.3 General

Item	Question/feature	References	Status	N/A	Support
A1	Behaviour as Terminating PINX for SS-DND		o.1		Yes [ ] No [ ]
A2	Behaviour as Activating PINX for remote activation of SS-DND		o.1		Yes [ ] No [ ]
A3	Behaviour as Deactivating PINX for remote deactivation of SS-DND		o.1		Yes [ ] No [ ]
A4	Behaviour as Interrogating PINX for remote interrogation of SS-DND		o.1		Yes [ ] No [ ]
A5	Behaviour as Served User PINX for remote activation, deactivation, and interrogation of SS-DND		A1:o	[ ]	Yes [ ] No [ ]
A6	Behaviour as Incoming Gateway PINX for SS-DND	6.7.1 6.8.1	o		Yes [ ] No [ ]

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B.3.4 Procedures

Item	Question/feature	References	Status	N/A	Support
B1	Support of relevant ISO/IEC 11572 and ISO/IEC 11582 procedures at a Terminating PINX	6.2.2	A1:m	[ ]	m: Yes [ ]
B2	Support of relevant ISO/IEC 11572 and ISO/IEC 11582 procedures at an Activating PINX	6.2.4	A2:m	[ ]	m: Yes [ ]
B3	Support of relevant ISO/IEC 11572 and ISO/IEC 11582 procedures at a Deactivating PINX	6.2.5	A3:m	[ ]	m: Yes [ ]
B4	Support of relevant ISO/IEC 11572 and ISO/IEC 11582 procedures at an Interrogating PINX	6.2.6	A4:m	[ ]	m: Yes [ ]
B5	Support of relevant ISO/IEC 11572 and ISO/IEC 11582 procedures at a Served User PINX	6.2.7	A5:m	[ ]	m: Yes [ ]
B6	Signalling procedures at a Terminating PINX, invocation	6.5.1	A1:m	[ ]	m: Yes [ ]
B7	Signalling procedures at an Activating PINX	6.5.3	A2:m	[ ]	m: Yes [ ]
B8	Signalling procedures at a Deactivating PINX	6.5.4	A3:m	[ ]	m: Yes [ ]
B9	Signalling procedures at an Interrogating PINX	6.5.5	A4:m	[ ]	m: Yes [ ]
B10	Signalling procedures at a Served User PINX, activation	6.5.6.1.1 6.5.6.2.1	A5:o	[ ]	Yes [ ] No [ ]
B11	Signalling procedures at a Served User PINX, deactivation	6.5.6.1.2 6.5.6.2.2	A5:o	[ ]	Yes [ ] No [ ]
B12	Signalling procedures at a Served User PINX, interrogation	6.5.6.1.3 6.5.6.2.3	A5:o	[ ]	Yes [ ] No [ ]

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B.3.5 Coding

Item	Question/feature	References	Status	N/A	Support
D1	Sending of Notification Description doNotDisturb in a Notification information element	6.3.2, 6.3.3.2 6.3.4	A1:m	[ ]	m: Yes [ ]
D2	Sending of doNotDisturbActivateQ invoke APDU and receipt of return result and return error APDUs	6.3.1, 6.3.3.1 6.3.4	A2:m	[ ]	m: Yes [ ]
D3	Sending of doNotDisturbDeactivateQ invoke APDU and receipt of return result and return error APDUs	6.3.1, 6.3.3.1 6.3.4	A3:m	[ ]	m: Yes [ ]
D4	Sending of doNotDisturbInterrogateQ invoke APDU and receipt of return result and return error APDUs	6.3.1, 6.3.3.1 6.3.4	A4:m	[ ]	m: Yes [ ]
D5	Receipt of doNotDisturbActivateQ invoke APDU and sending of return result and return error APDUs	6.3.1, 6.3.3.1 6.3.4	A5:m	[ ]	m: Yes [ ]
D6	Receipt of doNotDisturbDeactivateQ invoke APDU and sending of return result and return error APDUs	6.3.1, 6.3.3.1 6.3.4	A5:m	[ ]	m: Yes [ ]
D7	Receipt of doNotDisturbInterrogateQ invoke APDU and sending of return result and return error APDUs	6.3.1, 6.3.3.1 6.3.4	A5:m	[ ]	m: Yes [ ]

B.3.6 Timers

Item	Question/feature	References	Status	N/A	Support
E1	Support of timer T1	6.11.1	A2:m	[ ]	m: Yes [ ] Value [ ]
E2	Support of timer T2	6.11.2	A3:m	[ ]	m: Yes [ ] Value [ ]
E3	Support of timer T3	6.11.3	A4:m	[ ]	m: Yes [ ] Value [ ]

B.3.7 Interactions between SS-DND and Call Completion to Busy Subscriber (SS-CCBS)

Item	Question/feature	Reference	Status	N/A	Support
J1	Support of SS-CCBS (Terminating PINX)		o		Yes [ ] No [ ]
J2	Interaction at the Terminating PINX	6.9.3.1	c.1	[ ]	m: Yes [ ]

c.1: if (A1 and J1) then mandatory, else N/A

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B.3.8 Interactions between SS-DND and Call Completion on No Reply (SS-CCNR)

Item	Question/feature	Reference	Status	N/A	Support
K1	Support of SS-CCNR (Terminating PINX)		o		Yes [ ] No [ ]
K2	Interaction at the Terminating PINX	6.9.4.1	c.1	[ ]	m: Yes [ ]

c.1: if (A1 and K1) then mandatory, else N/A

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B.4 PICS proforma for ISO/IEC 14844 : SS-DNDO

B.4.1 Implementation identification

Supplier	
Contact point for queries about the PICS	
Implementation Name(s) and Version(s)	
Other information necessary for full identification, e.g. Name(s) and Version(s) for machines and/or operating systems; system name(s)	

Only the first three items are required for all implementations; other information may be completed as appropriate in meeting requirements for full identification.

The terms Name and Version should be interpreted appropriately to correspond with a suppliers terminology (e.g. Type, Series, Model).

B.4.2 Protocol summary

Protocol version	1.0
Addenda implemented (if applicable)	
Amendments implemented	
Have any exception items been required (see B.2.3)?	No [ ] Yes [ ] (The answer Yes means that the implementation does not conform to this International Standard)

Date of statement	

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B.4.3 General

Item	Question/feature	References	Status	N/A	Support
F1	Behaviour as Terminating PINX for SS-DNDO		o.1		Yes [ ] No [ ]
F2	Behaviour as Originating PINX for SS-DNDO		o.1		Yes [ ] No [ ]
F3	Behaviour as Incoming Gateway PINX for SS-DNDO	6.7.2 6.8.2	o		Yes [ ] No [ ]
F4	Behaviour as Outgoing Gateway PINX for SS-DNDO	6.7.2 6.8.2	o		Yes [ ] No [ ]

B.4.4 Procedures

Item	Question/feature	References	Status	N/A	Support
G1	Support of relevant ISO/IEC 11572 and ISO/IEC 11582 procedures at a Terminating PINX	6.2.2	F1:m	[ ]	m: Yes [ ]
G2	Support of relevant ISO/IEC 11572 and ISO/IEC 11582 procedures at an Originating PINX	6.2.3	F2:m	[ ]	m: Yes [ ]
G3	Signalling procedures without path retention at a Terminating PINX	6.6.1	F1:m	[ ]	m: Yes [ ]
G4	Signalling procedures with path retention at a Terminating PINX	6.6.1 A.5.2	F1:m	[ ]	m: Yes [ ]
G5	Signalling procedures at an Originating PINX in support of DNDO without path retention	6.6.2.1.1	F2:o.2	[ ]	Yes [ ] No [ ]
G6	Signalling procedures at an Originating PINX in support of DNDO with path retention	6.6.2.1.2 A.5.1 6.6.2.2	F2:o.2	[ ]	Yes [ ] No [ ]

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B.4.5 Coding

Item	Question/feature	References	Status	N/A	Support
H1	Sending of doNotDisturbOverrideQ invoke APDU	6.3.1 6.3.3.1	G5:m	[ ]	m: Yes [ ]
H2	Receipt of doNotDisturbOverrideQ invoke APDU	6.3.1 6.3.3.1	F1:m	[ ]	m: Yes [ ]
H3	Sending of pathRetain invoke APDU	6.3.1 6.3.3.1	G6:m	[ ]	m: Yes [ ]
H4	Receipt of pathRetain invoke APDU	6.3.1 6.3.3.1	F1:m	[ ]	m: Yes [ ]
H5	Sending of serviceAvailable invoke APDU	6.3.1 6.3.3.1	F1:m	[ ]	m: Yes [ ]
H6	Receipt of serviceAvailable invoke APDU	6.3.1 6.3.3.1	G6:m	[ ]	m: Yes [ ]
H7	Sending of doNotDisturbOvrExecuteQ invoke APDU and receipt of return result and return error APDUs	6.3.1 6.3.3.1	G6:m	[ ]	m: Yes [ ]
H8	Receipt of doNotDisturbOvrExecuteQ invoke APDU and sending of return result and return error APDUs	6.3.1 6.3.3.1	F1:m	[ ]	m: Yes [ ]

B.4.6 Timers

Item	Question/feature	References	Status	N/A	Support
I1	Support of timer T4	6.11.4	G6:m	[ ]	m: Yes [ ] Value [ ]
I2	Support of timer PRT1	A.8	F1:m	[ ]	m: Yes [ ] Value [ ]

B.4.7 Interactions between SS-DNDO and Call Forwarding Unconditional (SS-CFU)

Item	Question/feature	Reference	Status	N/A	Support
L1	Support of SS-CFU (Rerouteing PINX)		o		Yes [ ] No [ ]
L2	Support of SS-CFU (Originating PINX)		o		Yes [ ] No [ ]
L3	Interactions at Rerouteing PINX	6.10.6.1	L1:m	[ ]	m: Yes [ ]
L4	Interactions at Originating PINX	6.10.6.2	c.1	[ ]	m: Yes [ ]

c.1: if (F2 and L2) then mandatory, else N/A

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B.4.8 Interactions between SS-DNDO and Call Forwarding Busy (SS-CFB)

Item	Question/feature	Reference	Status	N/A	Support
M1	Support of SS-CFB (Originating PINX)		o		Yes [ ] No [ ]
M2	Support of SS-CFB (Rerouteing PINX)		o		Yes [ ] No [ ]
M3	Interactions at Rerouteing PINX	6.10.7.1	c.1	[ ]	m: Yes [ ]
M4	Interactions at Originating PINX	6.10.7.2	c.2	[ ]	m: Yes [ ]

c.1: if ((F1 or F2) and M2) then mandatory, else N/A

c.2: if (F2 and M1) then mandatory, else N/A

B.4.9 Interactions between SS-DNDO and Call Offer (SS-CO)

Item	Question/feature	Reference	Status	N/A	Support
N1	Support of SS-CO (Terminating PINX)		o		Yes [ ] No [ ]
N2	Interactions at the Terminating PINX	6.10.10.1	c.1	[ ]	m: Yes [ ]

c.1: if (F1 and N1) then mandatory, else N/A

B.4.10 Interactions between SS-DNDO and Call Intrusion (SS-CI)

Item	Question/feature	Reference	Status	N/A	Support
O1	Support of SS-CI (Terminating PINX)		o		Yes [ ] No [ ]
O2	Interactions at the Terminating PINX	6.10.12.1	c.1	[ ]	m: Yes [ ]

c.1: if (F1 and O1) then mandatory, else N/A

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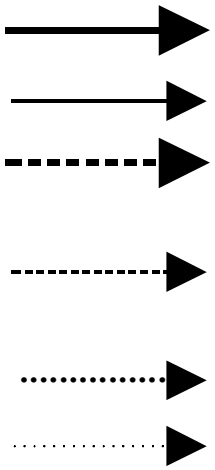
Annex C
(informative)

Examples of message sequences

This annex describes some typical message flows for SS-DND and SS-DNDO. The following conventions are used in the figures of this annex:

1 The following notation is used:



Basic call message containing SS-DND or SS-DNDO information.

Basic call message without SS-DND or SS-DNDO information.

Call independent signalling connection message containing SS-DND or SS-DNDO information.

Call independent signalling connection message without SS-DND or SS-DNDO information.

Symbolic primitive containing SS-DND or SS-DNDO information.

Symbolic primitive without SS-DND or SS-DNDO information.

xxx.inv	**Invoke APDU for operation xxx**
xxx.res	**Return result APDU for operation xxx**
xxx.err	**Return error APDU for operation xxx**
xxx.rej	**Reject APDU for operation xxx**

2 The figures show messages exchanged via Protocol Control between PINXs involved in SS-DND and SS-DNDO. Only messages relevant to SS-DND or SS-DNDO are shown.

3 Only the relevant information content (i.e., remote operation APDUs) is listed below each message name. The Facility information elements containing remote operation APDUs are not explicitly shown. Information with no impact on SS-DND or SS-DNDO is not shown in all cases.

4 Some interactions with users are included in the form of symbolic primitives. The actual protocol at the terminal interface is outside the scope of this International Standard.

5 The following abbreviations are used:

dndActivate	doNotDisturbActivateQ;
dndDeactvte	doNotDisturbDeactivateQ;
dndIntrgate	doNotDisturbInterrogateQ;
dndOverride	doNotDisturbOverrideQ;
dndOvrExec	doNotDisturbOvrExecuteQ;
pathRetain	pathRetain;
svcAvail	serviceAvailable.

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Example message sequences for normal operation

Figure C.1 shows an example of a normal operation of SS-DND when a tone or announcement is provided by the Terminating PINX. The calling user is notified of the encountered do not disturb condition. The served user is notified of the unsuccessful call attempt.

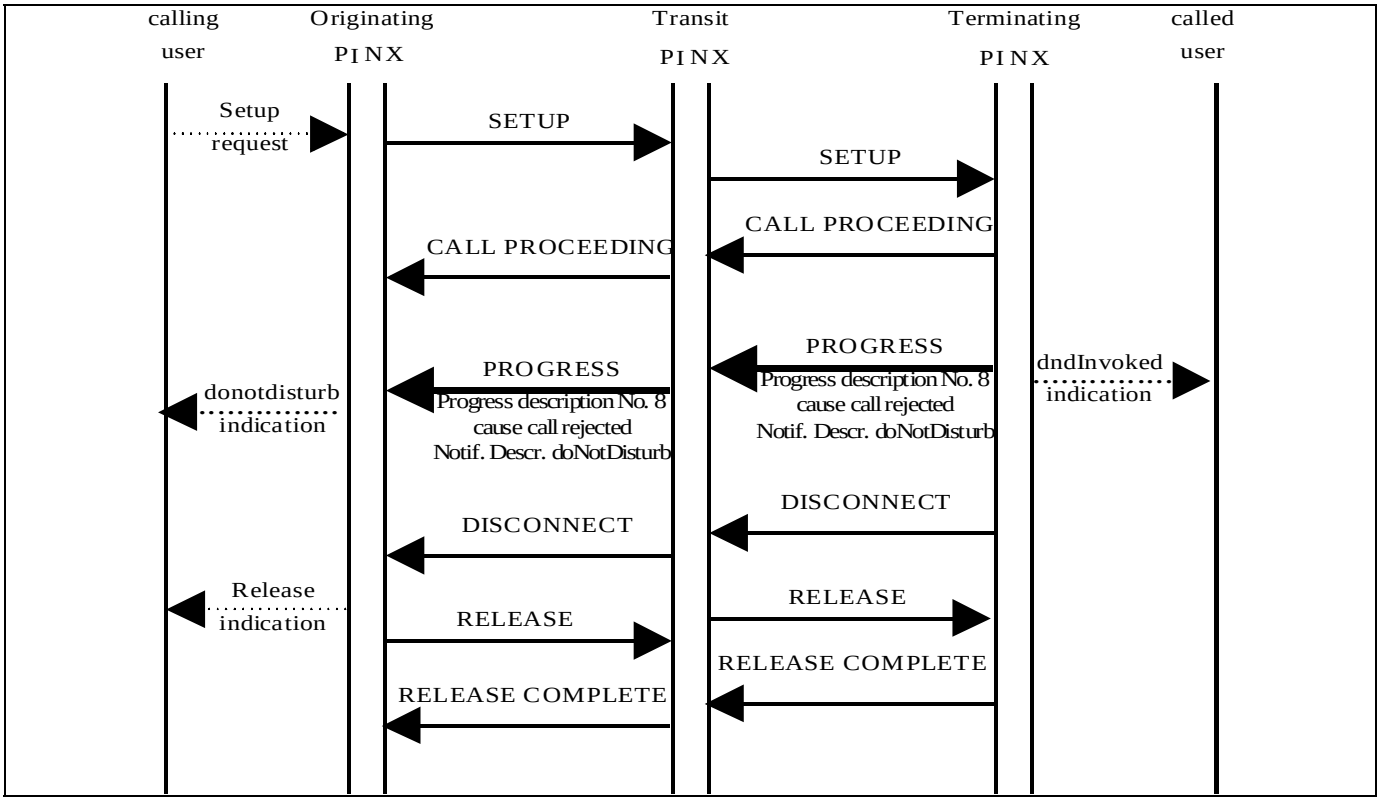

Figure C.1 - Message sequence for normal operation of SS-DND with tone or announcement to Originating PINX

Figure C.2 shows an example of a normal operation of SS-DND when no tone or announcement is provided by the Terminating PINX.

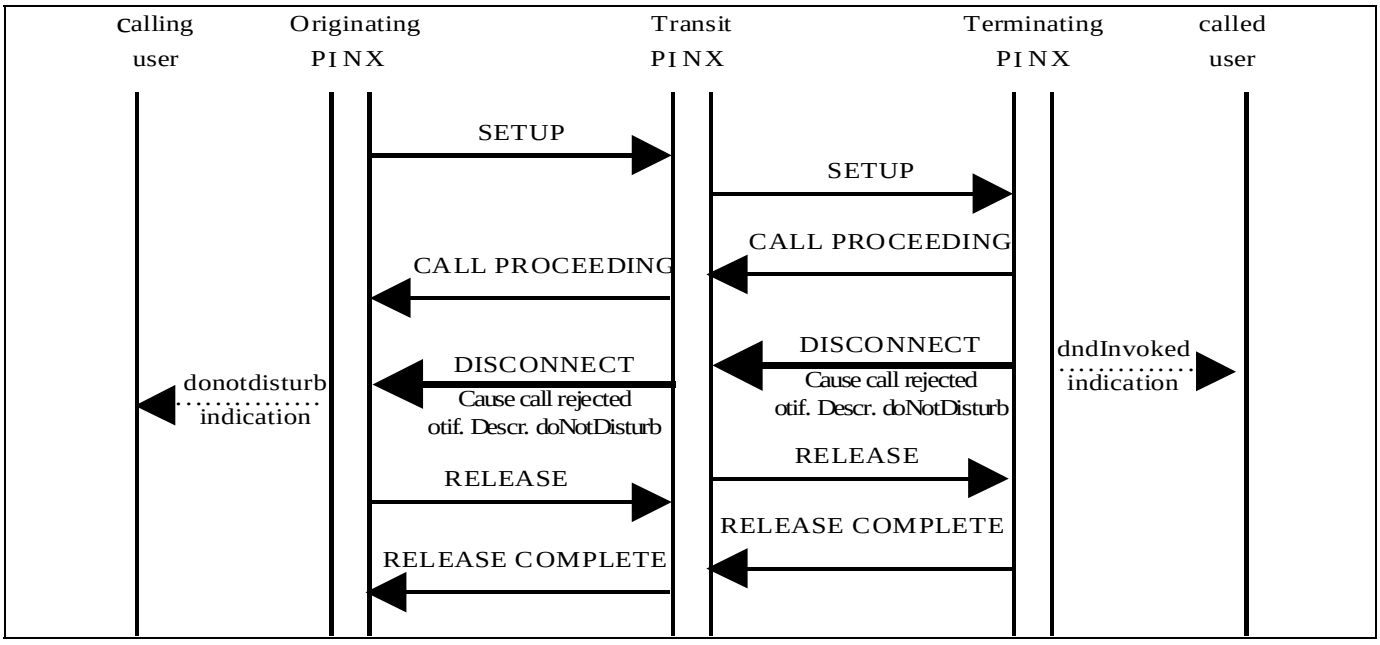

Figure C.2 - Message sequence for normal operation of SS-DND with no tone or announcement to Originating PINX

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Figure C.3 shows an example of a normal operation of SS-DNDO without using path retention. In this example override is allowed, the called user is not busy, and alerting commences.

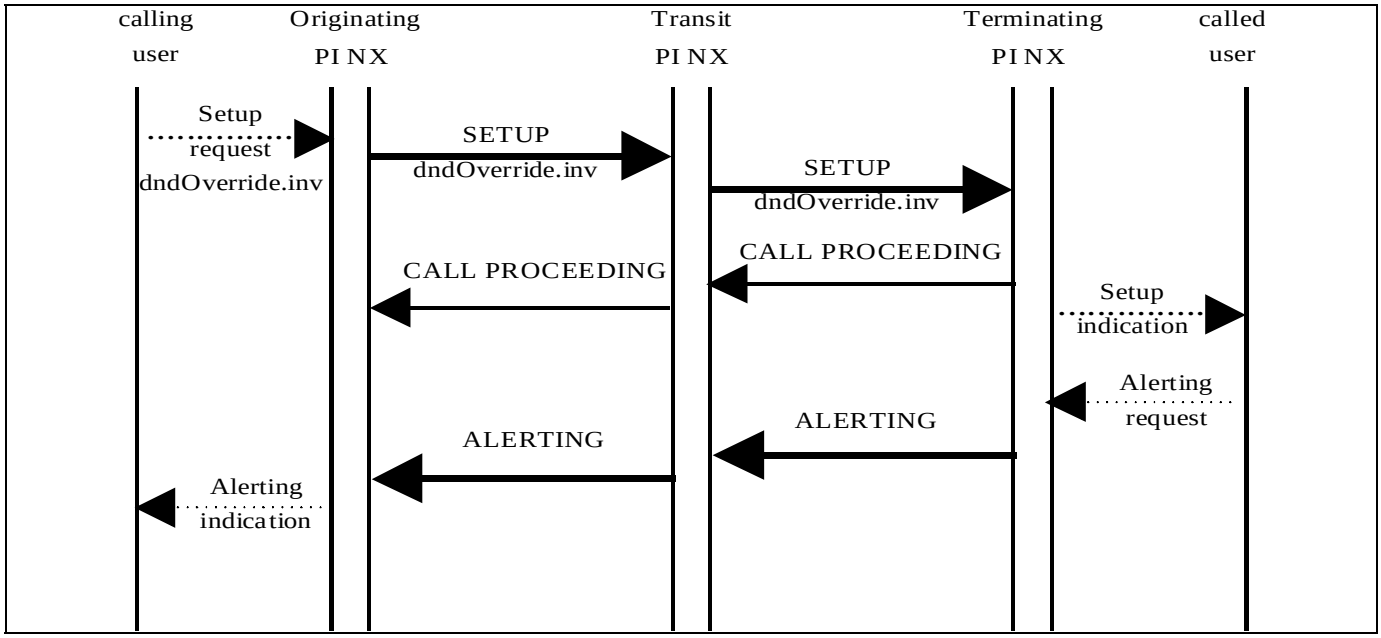

Figure C.3 - Message sequence for normal operation of SS-DNDO without using Path Retention, override successful

Figure C.4 shows an example of a normal operation of SS-DNDO using path retention, and override is successful. In this example the calling user is consulted whether to apply SS-DNDO, and he chooses to request this.

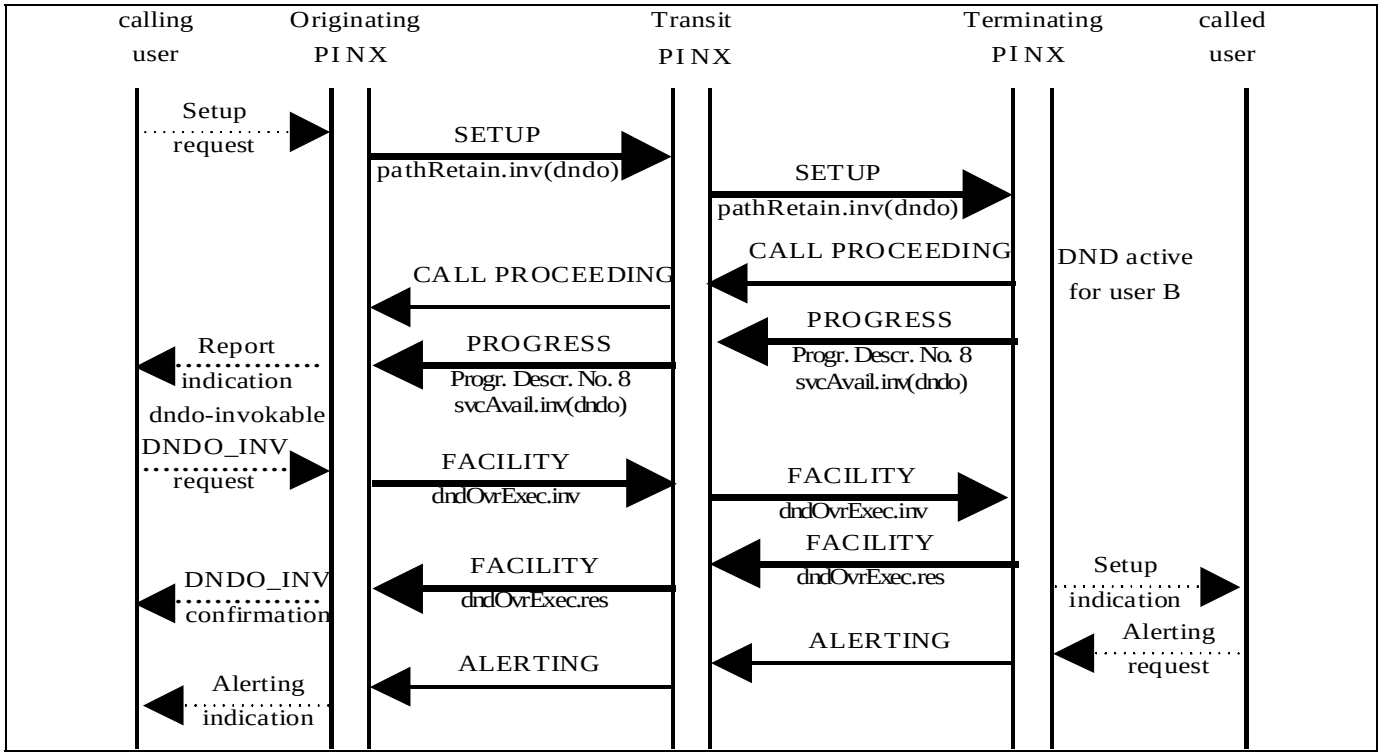

Figure C.4 - Message sequence for normal operation of SS-DNDO using Path Retention, consultation, override is allowed

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Figure C.5 shows an example of a normal operation of SS-DNDO when override is not allowed. In this example the DNDOCL of the calling user is not sufficient to override the DNDPL of the called user. The call is further processed according to the procedures of SS-DND.

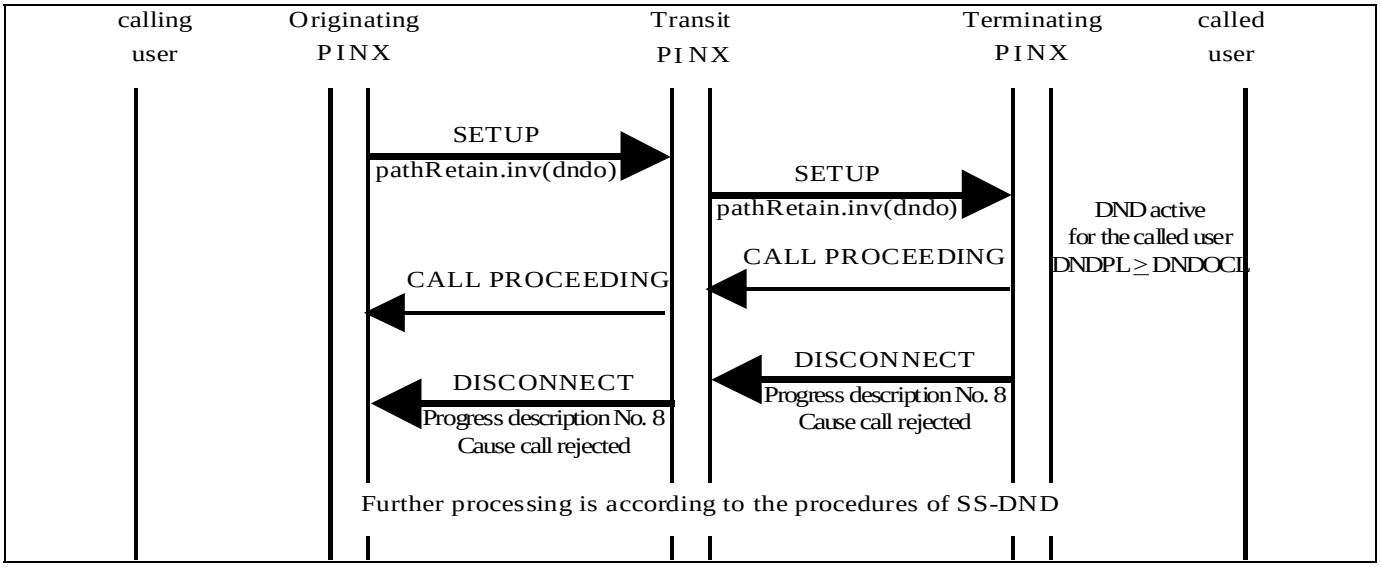

Figure C.5 - Message sequence for normal operation of SS-DNDO with Path Retention, override is not allowed

Figure C.6 shows an example of remote activation of SS-DND.

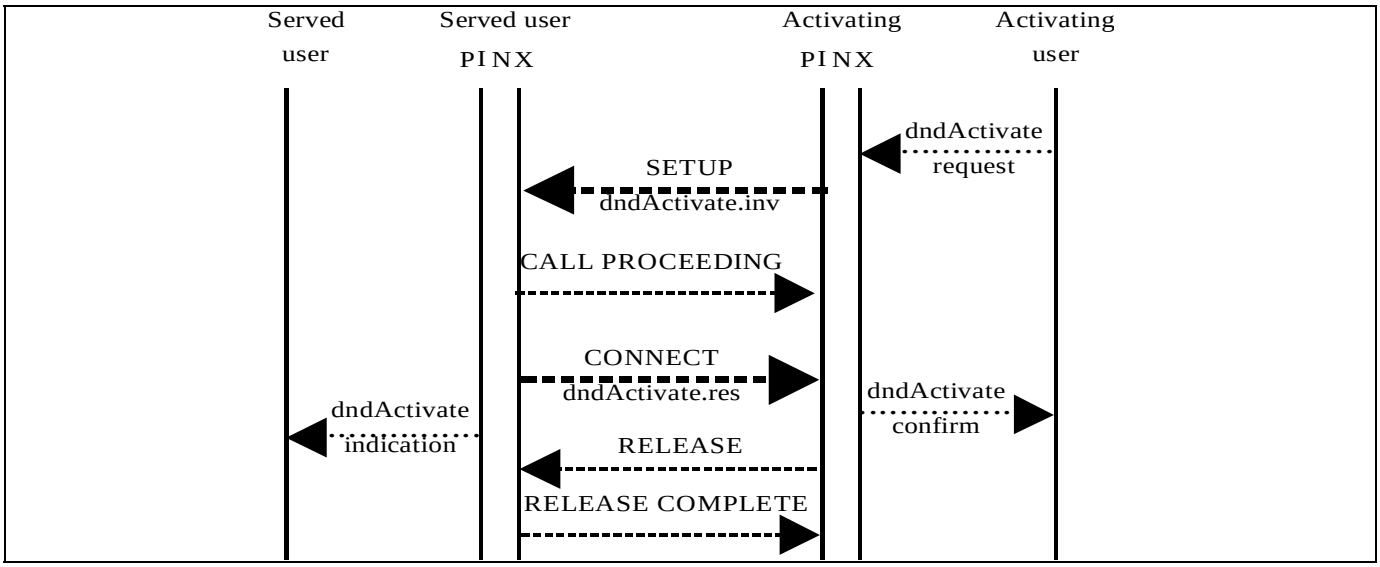

Figure C.6 - Remote activation of SS-DND

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Figure C.7 shows an example of remote deactivation of SS-DND.

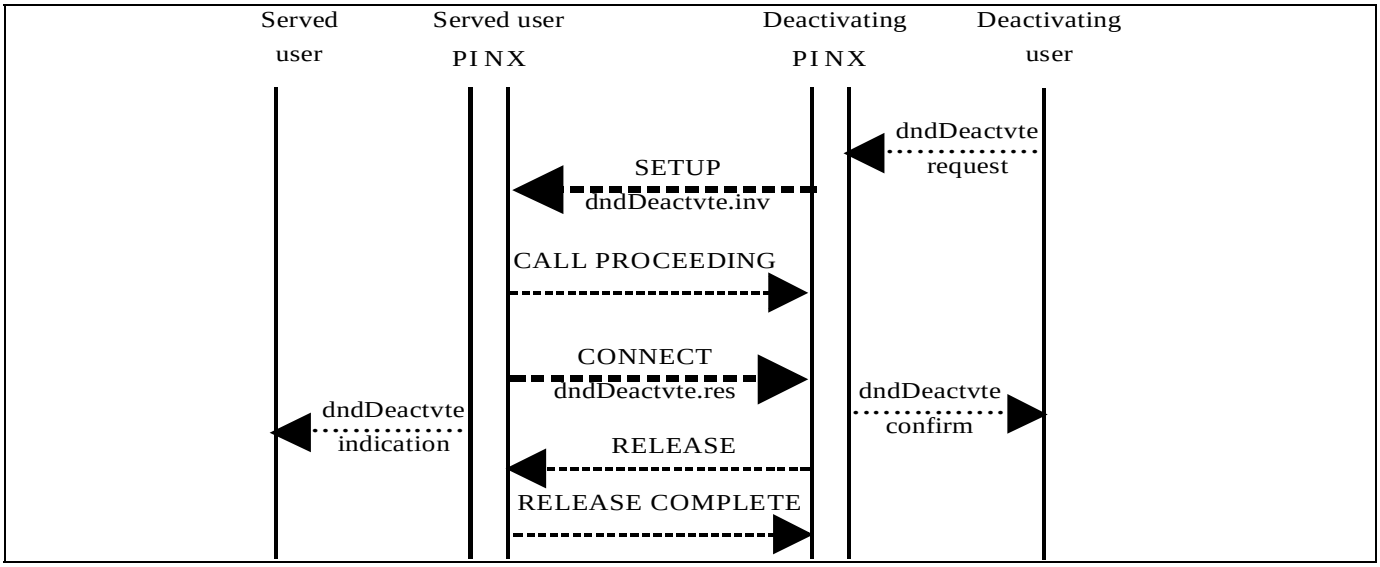

Figure C.7 - Remote deactivation of SS-DND

Figure C.8 shows an example of remote interrogation of SS-DND.

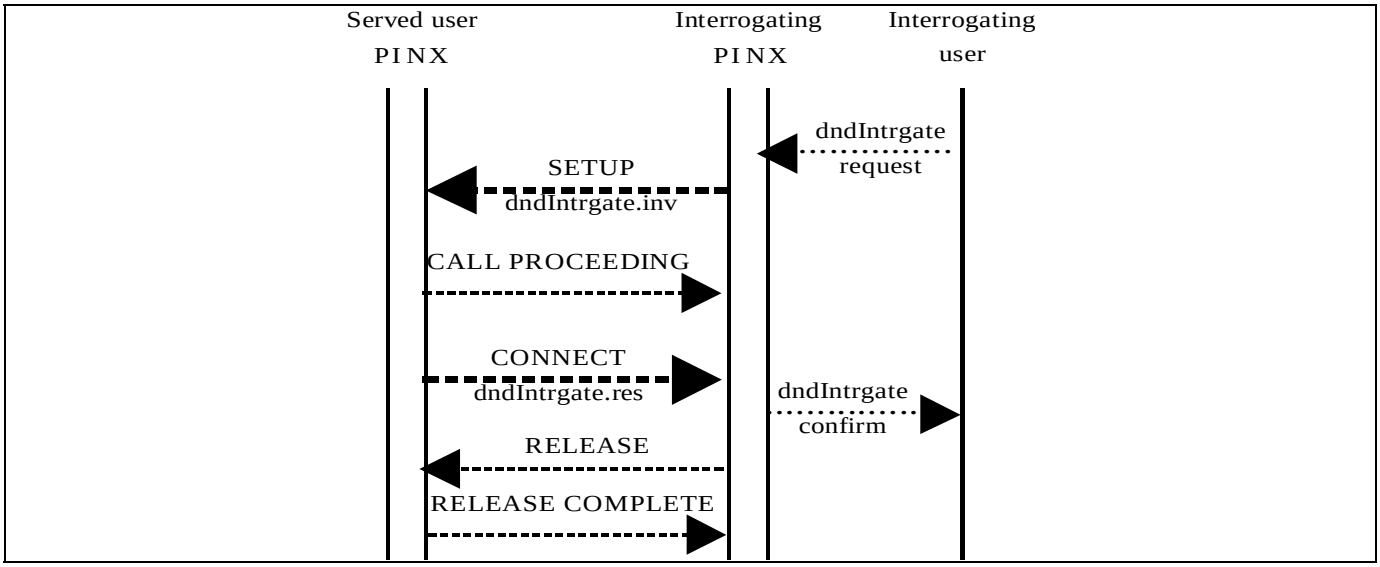

Figure C.8 - Remote interrogation of SS-DND

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Annex D
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Specification and Description Language (SDL) representation of procedures

The diagrams in this annex use the Specification and Description Language defined in ITU-T Recommendation Z.100 (1999).

Each diagram represents the behaviour of an SS-DND Supplementary Service Control entity at a particular type of PINX. In accordance with the protocol model described in ISO/IEC 11582, the Supplementary Service Control entity uses, via the Coordination Function, the services of Generic Functional Transport Control and Basic Call Control.

Where an output symbol represents a primitive to the Coordination Function, and that primitive results in a message being sent, the output symbol bears the name of the message and any remote operations APDU(s) or notification(s) contained in that message. In the case of a message specified in ISO/IEC 11572, basic call actions associated with the sending of that message are deemed to occur.

Where an input symbol represents a primitive from the Coordination Function, and that primitive is the result of a message being received, the input symbol bears the name of the message and any remote operations APDU(s) or notification(s) contained in that message. In the case of a message specified in ISO/IEC 11572, basic call actions associated with the receipt of that message are deemed to have occurred.

The following abbreviations are used:

inv.	invoke APDU
res.	return result APDU
err.	return error APDU
rej.	reject APDU
dndActivate	doNotDisturbActivateQ
dndDeactvte	doNotDisturbDeactivateQ
dndIntrgate	doNotDisturbInterrogateQ
dndOverride	doNotDisturbOverrideQ
dndOvrExec	doNotDisturbOvrExecuteQ
DNDO-oWaitExec	DNDO-oAwaitExecResult

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D.1 SDL representation of SS-DND and SS-DNDO at a Terminating PINX

Figure D.1 shows the behaviour of an SS-DND Supplementary Service Control entity within the Terminating PINX.

Input signals from the left and output signals to the left represent primitives from and to the coordination functions.

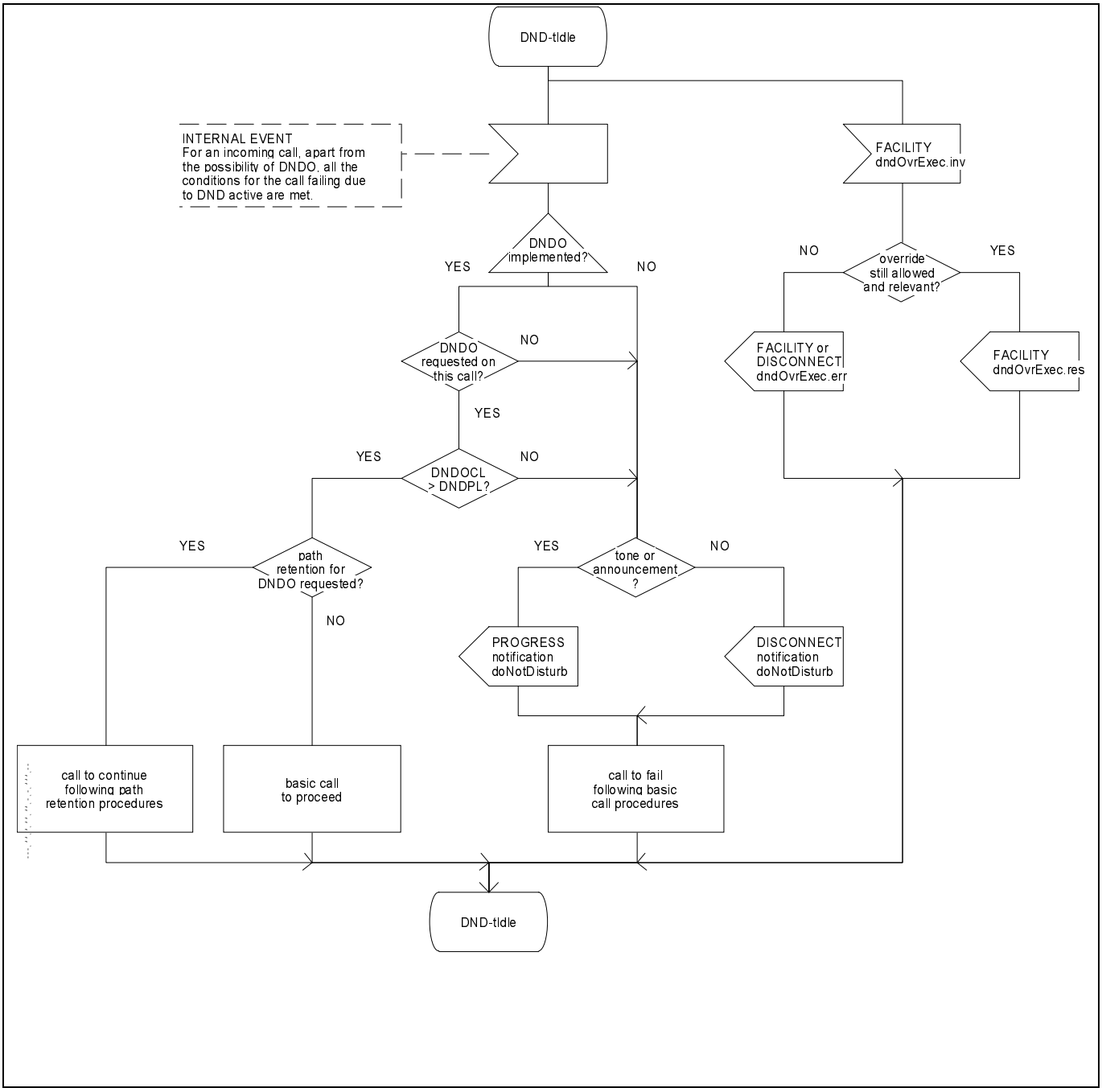

Figure D.1 - Terminating PINX behaviour

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D.2 SDL representation of SS-DNDO at an Originating PINX

Figure D.2 shows the behaviour of an SS-DNDO Supplementary Service Control entity within the Originating PINX.

Input signals from the left and output signals to the left represent primitives from and to the user or an entity acting on behalf of the user.

Input signals from the right and output signals to the right represent primitives from and to the coordination functions. Also protocol timer expiry is indicated by an input signal from the right.

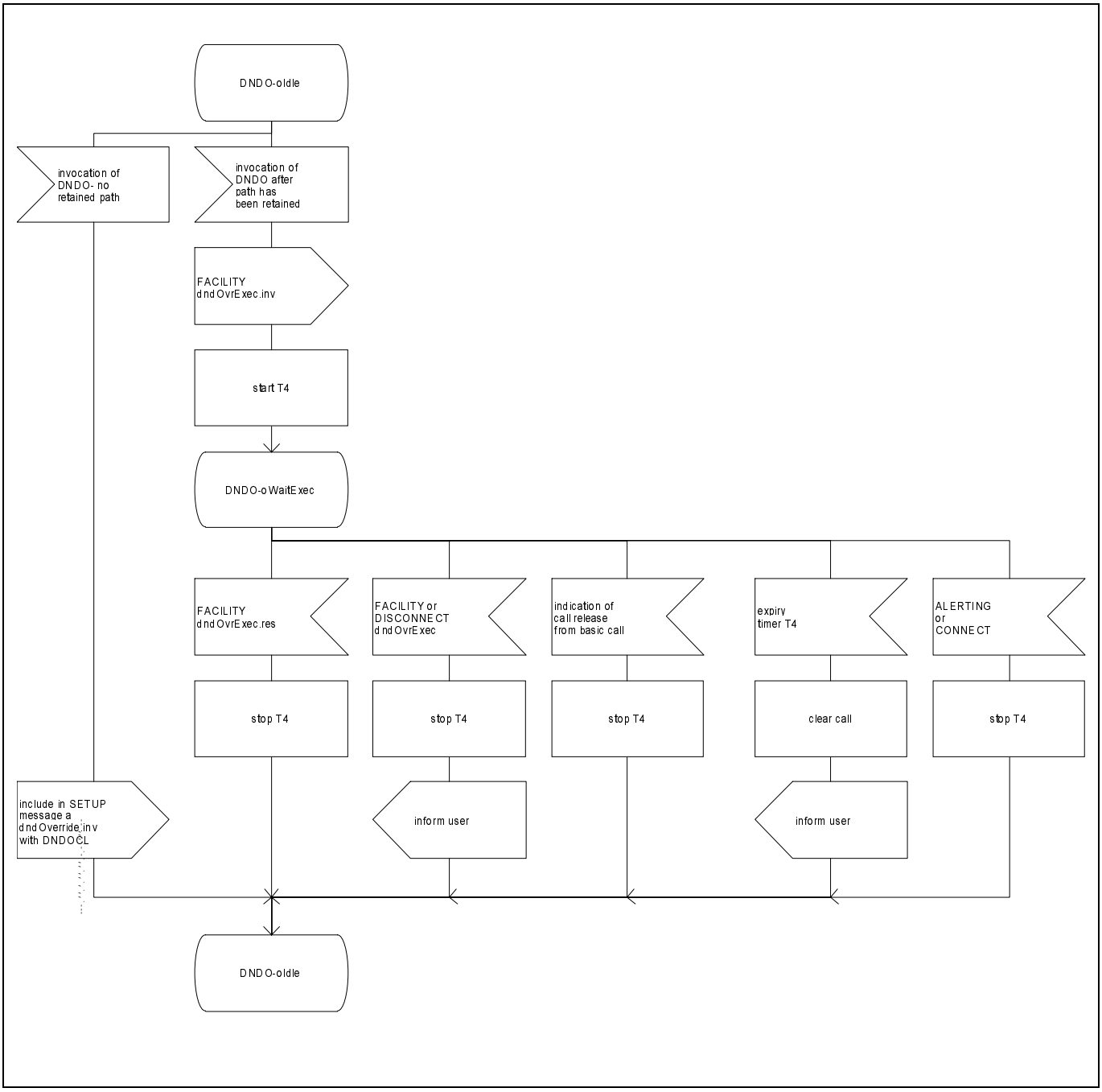

Figure D.2 - Originating PINX behaviour

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D.3 SDL representation of SS-DND at an Activating PINX

Figure D.3 shows the behaviour of an SS-DND Supplementary Service Control entity within the Activating PINX.

Input signals from the left and output signals to the left represent primitives from and to the user or an entity acting on behalf of the user.

Input signals from the right and output signals to the right represent primitives from and to the coordination functions. Also protocol timer expiry is indicated by an input signal from the right.

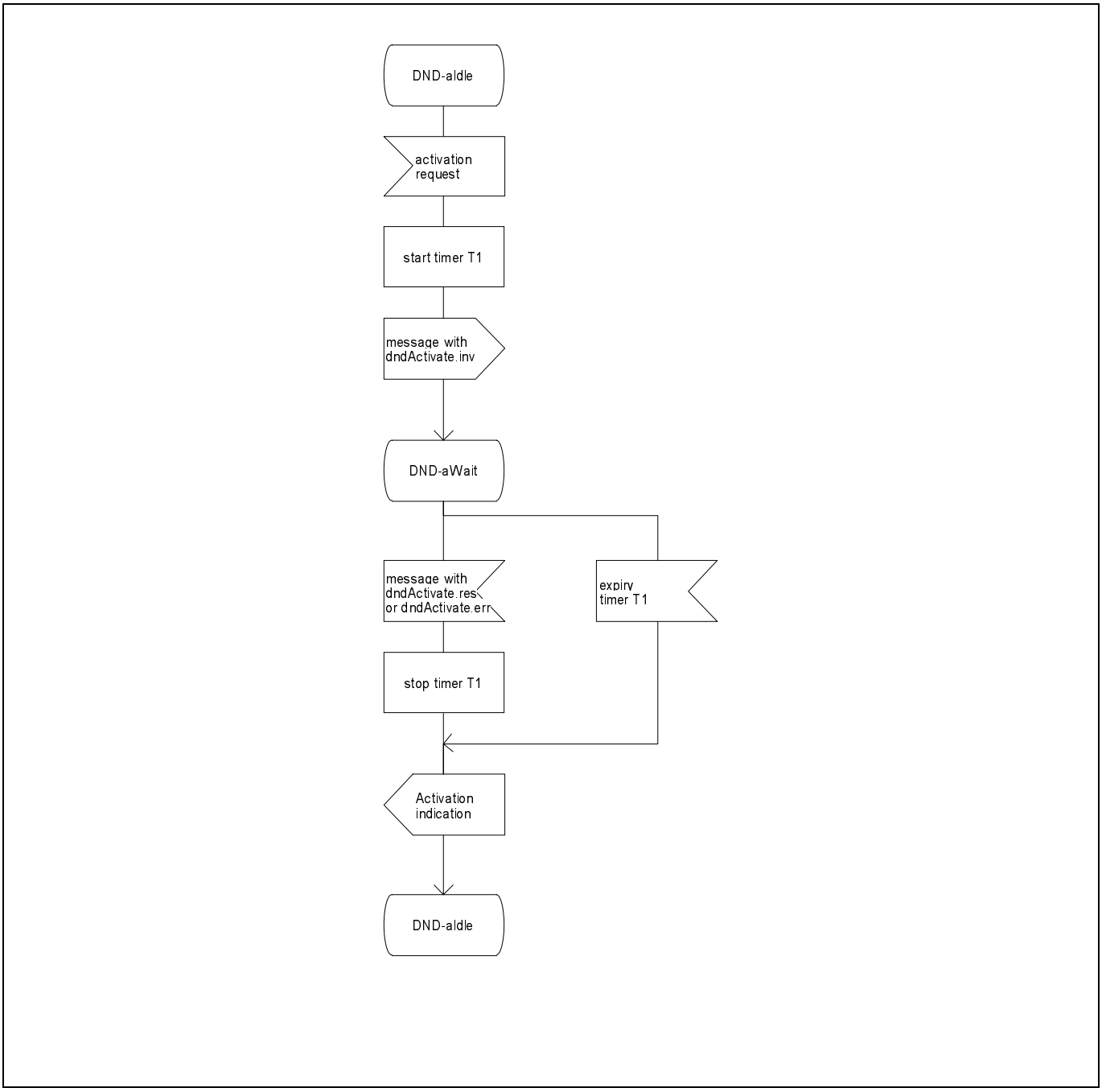

Figure D.3 - Activating PINX behaviour

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D.4 SDL representation of SS-DND at a Deactivating PINX

Figure D.4 shows the behaviour of an SS-DND Supplementary Service Control entity within the Deactivating PINX.

Input signals from the left and output signals to the left represent primitives from and to the user or an entity acting on behalf of the user.

Input signals from the right and output signals to the right represent primitives from and to the coordination functions. Also protocol timer expiry is indicated by an input signal from the right.

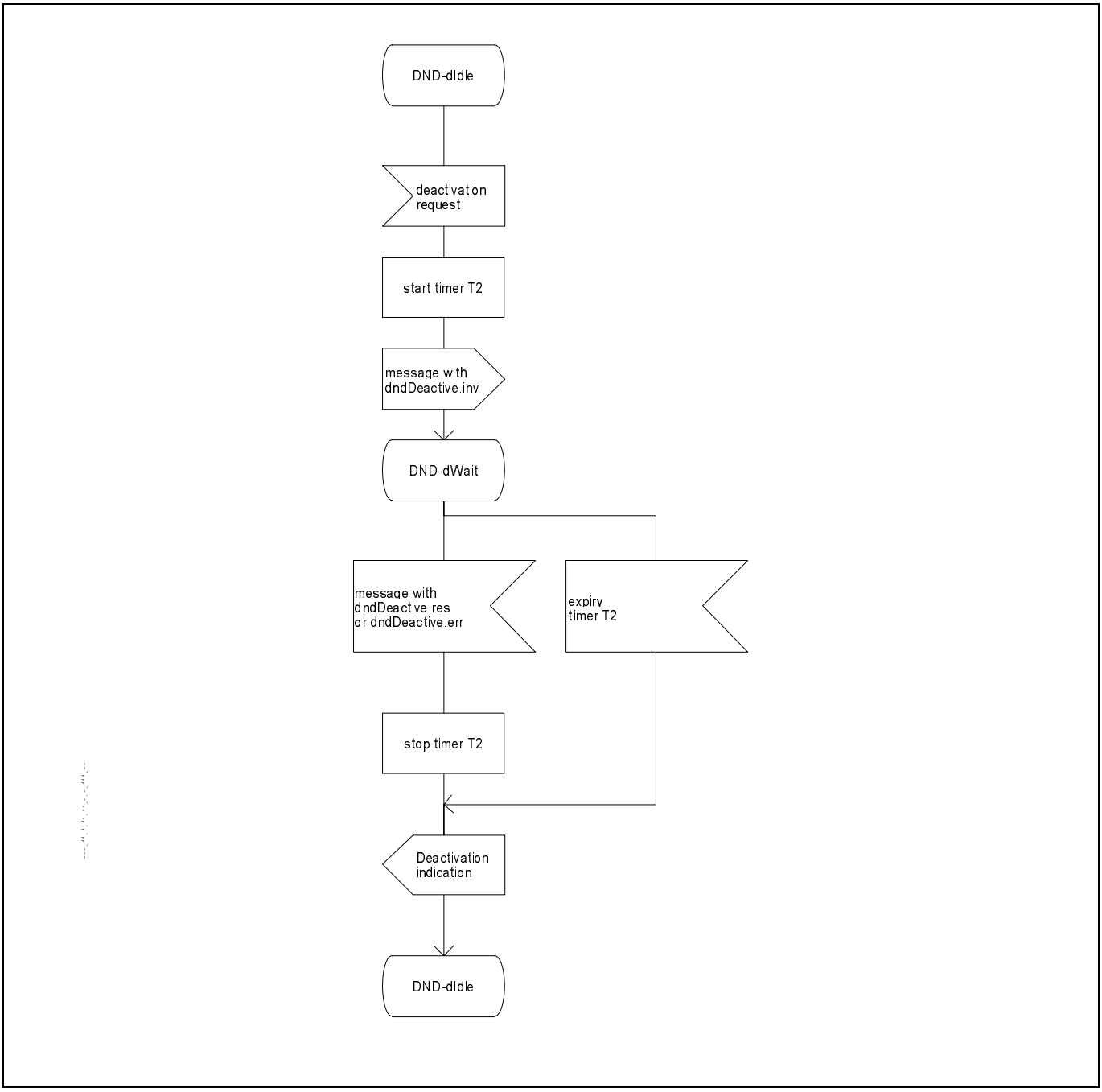

Figure D.4 - Deactivating PINX behaviour

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D.5 SDL representation of SS-DND at an Interrogating PINX

Figure D.5 shows the behaviour of an SS-DND Supplementary Service Control entity within the Interrogating PINX.

Input signals from the left and output signals to the left represent primitives from and to the user or an entity acting on behalf of the user.

Input signals from the right and output signals to the right represent primitives from and to the coordination functions. Also protocol timer expiry is indicated by an input signal from the right.

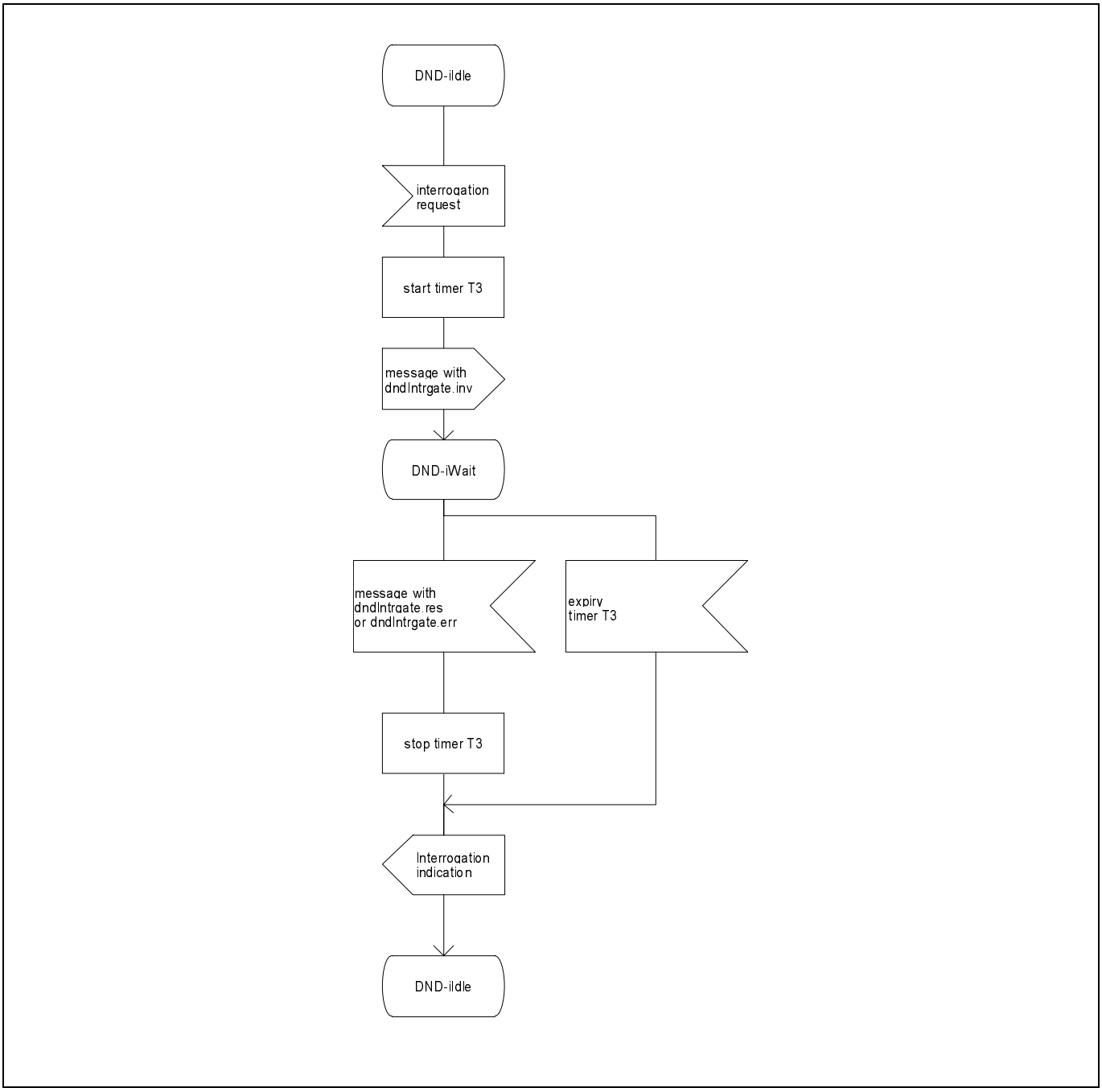

Figure D.5 - Interrogating PINX behaviour

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D.6 SDL representation of SS-DND at a Served User PINX

Figure D.6 shows the behaviour of an SS-DND Supplementary Service Control entity within the Served User PINX.

Input signals from the left and output signals to the left represent primitives from and to the coordination functions.

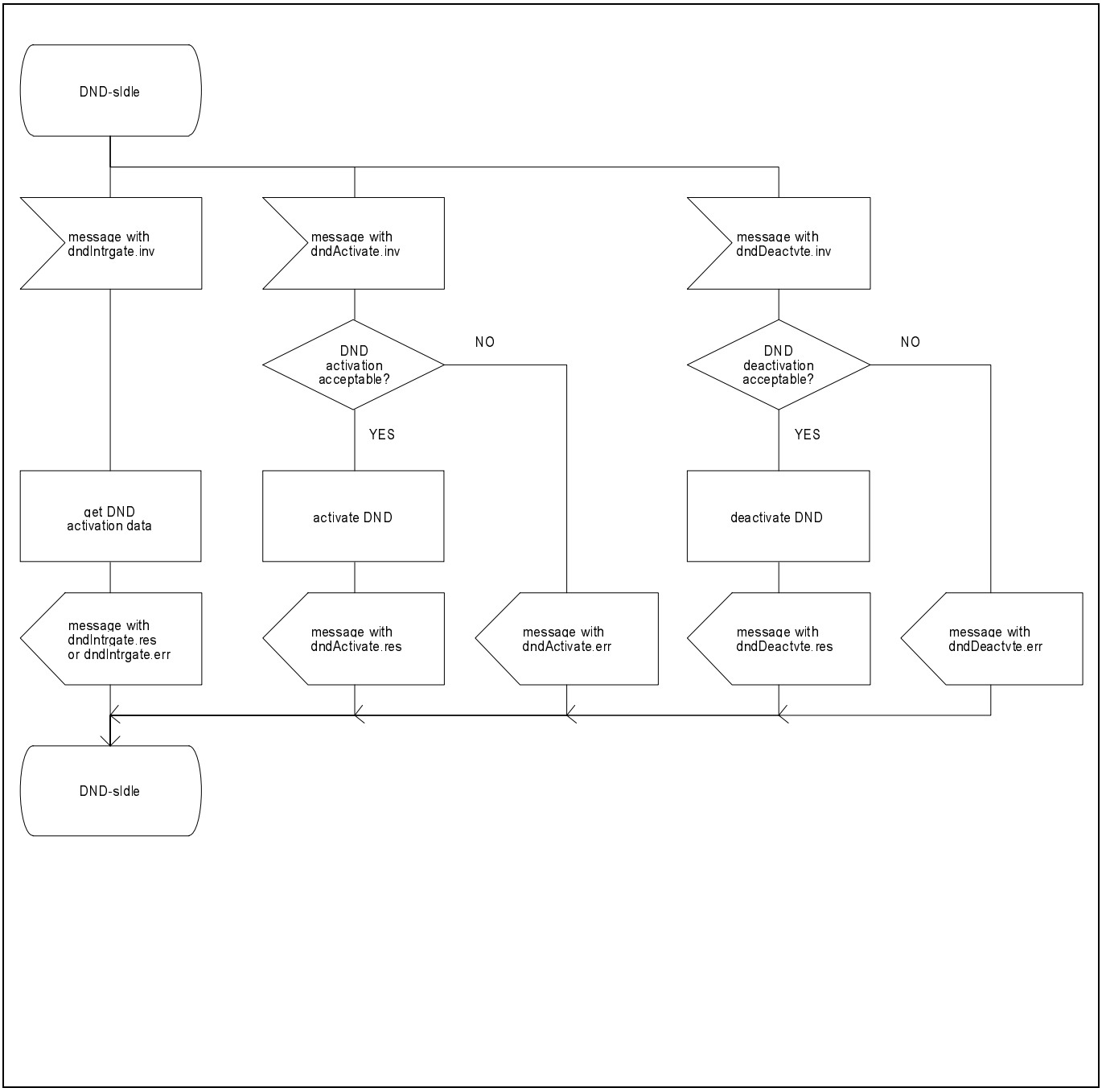

Figure D.6 - Served User PINX behaviour

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Annex E
(informative)

Imported ASN.1 definitions relating to numbers

The content of this annex has been deleted to remove duplicate ASN.1 definitions defined elsewhere.

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Annex F
(normative)

ASN.1 definitions according to ITU-T Recs. X.208 / X.209

This annex lists all ASN.1 modules as they were defined in the first edition of ISO/IEC 14844, i.e. based on ITU-T Recommendations X.208 / X.209. Starting with this edition the ASN.1 modules within ISO/IEC 14844 comply with ITU-T Recommendations X.680 / X.690. Please note that regardless of which version of these modules is used as a base of a QSIG implementation, the line encoding remains unchanged. Changes in future editions to modules based on X.680 / X.690 ASN.1 are not reflected in the modules in this annex.

Table F.1 - Do-Not-Disturb-Operations – based on ITU-T Recs. X.208 / X.209

```
Do-Not-Disturb-Operations
                        {iso(1) standard(0) pss1-do-not-disturb(14844) do-not-disturb-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)}
                        basicServiceNotProvided, invalidServedUserNumber, notAvailable,
                        userNotSubscribed,
                            supplementaryServiceInteractionNotAllowed
                            FROM General-Error-List
                            {ccitt recommendation q 950 general-error-list (1)}
                        PartyNumber FROM Addressing-Data-Elements
                            {iso(1) standard(0) pss1-generic-procedures(11582)
                            addressing-data-elements(9)}
                        BasicService FROM Call-Diversion-Operations
                            {iso(1) standard(0) pss1-call-diversion(13873) call-diversion-operations(0) }
                        ;

DoNotDisturbActivate    ::= OPERATION
                        ARGUMENT DNDActivateArg
                        RESULT DNDActivateRes
                        ERRORS              {   userNotSubscribed,
                                                notAvailable,
                                                invalidServedUserNumber,
                                                basicServiceNotProvided,
                                                temporarilyUnavailable,
                                                supplementaryServiceInteractionNotAllowed,
                                                unspecified}
```


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Table F.1 - Do-Not-Disturb-Operations – based on ITU-T Recs. X.208 / X.209 (continued)

```
DoNotDisturbDeactivate      ::= OPERATION
                            ARGUMENT DNDDeactivateArg
                            RESULT DummyRes
                            ERRORS              {   userNotSubscribed,
                                                    notAvailable,
                                                    invalidServedUserNumber,
                                                    notActivated,
                                                    temporarilyUnavailable,
                                                    supplementaryServiceInteractionNotAllowed,
                                                    unspecified}

DoNotDisturbInterrogate     ::= OPERATION
                            ARGUMENT DNDInterrogateArg
                            RESULT DNDInterrogateRes
                            ERRORS              {   userNotSubscribed,
                                                    notAvailable,
                                                    invalidServedUserNumber,
                                                    temporarilyUnavailable,
                                                    supplementaryServiceInteractionNotAllowed,
                                                    unspecified}

DoNotDisturbOverride        ::= OPERATION
                            ARGUMENT DNDOverrideArg

PathRetain                  ::= OPERATION
                            ARGUMENT PathRetainArg          -- this operation may be used by other
                                                            -- Supplementary Services using other
                                                            -- values of the argument
ServiceAvailable            ::= OPERATION
                            ARGUMENT ServiceAvailableArg    -- this operation may be used by other
                                                            -- Supplementary Services using other
                                                            -- values of the argument

DoNotDisturbOvrExecute      ::= OPERATION
                            ARGUMENT DummyArg
                            RESULT DummyRes
                            ERRORS              {   notAvailable,
                                                    temporarilyUnavailable,
                                                    supplementaryServiceInteractionNotAllowed,
                                                    unspecified}

DummyArg                    ::= CHOICE {
                                null                NULL,
                                extension           [1]  IMPLICIT Extension,
                                sequenceOfExtn      [2]  IMPLICIT SEQUENCE OF Extension
                            }
```

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Table F.1 - Do-Not-Disturb-Operations – based on ITU-T Recs. X.208 / X.209 (continued)

```
DummyRes                ::= CHOICE {
                            null                    NULL,
                            extension               [1]  IMPLICIT Extension,
                            sequenceOfExtn          [2]  IMPLICIT SEQUENCE OF Extension
                        }

DNDActivateArg          ::= SEQUENCE {
                            basicService            BasicService,
                            servedUserNr            PartyNumber,
                            argumentExtension       CHOICE{
                                extension               [1]  IMPLICIT Extension,
                                sequenceOfExtn          [2]  IMPLICIT SEQUENCE OF Extension
                                                    } OPTIONAL
                        }

DNDActivateRes          ::= SEQUENCE {
                            status                  SET OF SEQUENCE{
                                basicService            BasicService,
                                dndProtectionLevel      DNDProtectionLevel OPTIONAL
                            } OPTIONAL,
                            resultExtension         CHOICE{
                                extension               [1]  IMPLICIT Extension,
                                sequenceOfExtn          [2]  IMPLICIT SEQUENCE OF Extension
                                                    } OPTIONAL
                        }

DNDDeactivateArg        ::= SEQUENCE {
                            basicService            BasicService,
                            servedUserNr            PartyNumber,
                            argumentExtension       CHOICE{
                                extension               [1]  IMPLICIT Extension,
                                sequenceOfExtn          [2]  IMPLICIT SEQUENCE OF Extension
                                                    } OPTIONAL
                        }

DNDInterrogateArg       ::= SEQUENCE {
                            servedUserNr            PartyNumber,
                            argumentExtension       CHOICE{
                                extension               [1]  IMPLICIT Extension,
                                sequenceOfExtn          [2]  IMPLICIT SEQUENCE OF Extension
                                                    } OPTIONAL
                        }
```


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Table F.1 - Do-Not-Disturb-Operations – based on ITU-T Recs. X.208 / X.209 (continued)

```
DNDInterrogateRes       ::= SEQUENCE {
                            status                  SET OF SEQUENCE {
                                basicService            BasicService,
                                dndProtectionLevel      DNDProtectionLevel OPTIONAL
                            } OPTIONAL,
                            resultExtension         CHOICE{
                                extension               [1]  IMPLICIT Extension,
                                sequenceOfExtn          [2]  IMPLICIT SEQUENCE OF Extension
                                                    } OPTIONAL
                        }

DNDOverrideArg          ::= SEQUENCE {
                            dndoCapabilityLevel     DNDOCapabilityLevel,
                            argumentExtension       CHOICE{
                                extension               [1]  IMPLICIT Extension,
                                sequenceOfExtn          [2]  IMPLICIT SEQUENCE OF Extension
                                                    } OPTIONAL
                        }

PathRetainArg           ::= CHOICE {
                            serviceList             ServiceList,
                            extendedServiceList     SEQUENCE {
                                serviceList             ServiceList,
                                extension               Extension
                                                    }
                        }

ServiceAvailableArg     ::= CHOICE {
                            serviceList             ServiceList,
                            extendedServiceList     SEQUENCE {
                                serviceList             ServiceList,
                                extension               Extension
                                                    }
                        }

DNDProtectionLevel      ::= ENUMERATED {
                                lowProtection(0),
                                mediumProtection(1),
                                highProtection(2),
                                fullProtection(3)
                        }

DNDOCapabilityLevel     ::= ENUMERATED {
                                overrideLowProt(1),
                                overrideMediumProt(2),
                                overrideHighProt(3)
                        }
```

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Table F.1 - Do-Not-Disturb-Operations – based on ITU-T Recs. X.208 / X.209 (concluded)

```
ServiceList                 ::= BIT STRING
                                { dndo-low(1), dndo-medium(2), dndo-high(3) } (SIZE (1..32))
                                -- bits other than dndo-low, dndo-medium, or dndo-high, are reserved
                                -- for other Supplementary Services

temporarilyUnavailable      ERROR ::= localValue 1000
notActivated                ERROR ::= localValue 43

Unspecified                 ::= ERROR PARAMETER Extension

unspecified                 Unspecified ::= localValue 1008

doNotDisturbActivateQ       DoNotDisturbActivate      ::= localValue 35
doNotDisturbDeactivateQ     DoNotDisturbDeactivate    ::= localValue 36
doNotDisturbInterrogateQ    DoNotDisturbInterrogate   ::= localValue 37
doNotDisturbOverrideQ       DoNotDisturbOverride      ::= localValue 38
doNotDisturbOvrExecuteQ     DoNotDisturbOvrExecute    ::= localValue 39
pathRetain                  PathRetain                ::= localValue 41
serviceAvailable            ServiceAvailable          ::= localValue 42

END                         -- of Do-Not-Disturb-Operations
```

Table F.2 - Do-Not-Disturb-Notifications – based on ITU-T Recs. X.208 / X.209

```
Do-Not-Disturb-Notifications
                            {iso(1) standard(0) pss1-do-not-disturb(14844) do-not-disturb-notifications(1) }

DEFINITIONS EXPLICIT TAGS ::=
BEGIN

IMPORTS                     NOTIFICATION FROM Notification-macro
                                {iso(1) standard(0)
                                pss1-generic-procedures(11582) notification-macro(10)};

DoNotDisturb                ::= NOTIFICATION
                                ARGUMENT NULL

doNotDisturb                DoNotDisturb ::= localValue 2002

END                         -- of Do-Not-Disturb-Notifications
```


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