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**Private Telecommunication Network (PTN);
Inter-exchange signalling protocol
Do not disturb and do not disturb override
supplementary services**

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Foreword

This European Telecommunication Standard (ETS) has been produced by the European Computer Manufacturers Association (ECMA) on behalf of its members and those of the European Telecommunications Standards Institute (ETSI).

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

This ETS 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 ETS is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO, ITU-T (formerly CCITT), ETSI and other international and national standardisation bodies. It represents a pragmatic and widely based consensus.

This ETS was produced by ECMA using the ECMA guidelines for the production of standards and using the ECMA stylesheet. In order to avoid undue delays in the approval process for this ETS it has been agreed that this ETS will not be converted to the ETSI stylesheet.

Transposition dates	
Date of latest announcement of this ETS (doa):	28 February 1995
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 August 1995
Date of withdrawal of any conflicting National Standard (dow):	31 August 1995

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1 Scope

This European Telecommunication Standard (ETS) 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 Telecommunication Network Exchanges (PTNXs) connected together within a Private Telecommunication Network (PTN).

SS-DND is a supplementary service which enables a served user to cause the PTN to reject any calls, or just those associated with a specified basic service, addressed to the served user's PTN 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 IS 11579.

Service specifications are produced in three stages and according to the method specified in ETS 300 387. This ETS contains the stage 3 specification for the Q reference point and satisfies the requirements identified by the stage 1 and stage 2 specifications in ETS 300 363.

The signalling protocols for SS-DND(O) operate on top of the signalling protocol for basic circuit switched call control, as specified in ETS 300 172, and use certain aspects of the generic procedures for the control of supplementary services specified in ETS 300 239.

The impact on the protocol of interactions between SS-DND and other supplementary services and SS-DNDO and other supplementary services is outside the scope of this ETS.

This ETS is applicable to PTNXs which can interconnect to form a PTN.

2 Conformance

In order to conform to this ETS, a PTNX shall satisfy the requirements identified in the Protocol Implementation Conformance Statement (PICS) proforma in annex B applies.

3 References

- | | |
|---------------|--|
| IS 11579 | Information Technology - Telecommunications and Information Exchange Between Systems - Private Integrated Services Network - Reference Configurations for PISN Exchanges (1993). |
| ETS 300 171 | Private Telecommunication Network (PTN); Specification, functional model and information flows, Control aspects of circuit mode basic services (1993). |
| ETS 300 172 | Private Telecommunication Network (PTN); Inter-exchange signalling protocol, Circuit mode basic services (1993). |
| ETS 300 196-1 | Integrated Services Digital Network (ISDN); Generic functional protocol for the support of supplementary services. Digital Subscriber Signalling System No. one (DSS1) protocol Part 1: Protocol specification (1993). |
| ETS 300 239 | Private Telecommunication Network (PTN); Inter-exchange signalling, Generic functional protocol for the support of supplementary services (1993). |
| ETS 300 363 | Private Telecommunication Network (PTN); Specification, functional model and information flows, Do not disturb and do not disturb override supplementary services (1994). |

- ETS 300 387 Private Telecommunication Network (PTN); Method for the specification of basic and supplementary services (1994).
- ENV 41007-1 Definition of terms in private telecommunication networks (1989).
- CCITT Rec. I.112 Vocabulary of terms for ISDNs (1988).
- CCITT Rec. I.210 Principles of telecommunication services supported by an ISDN and the means to describe them (1988).
- CCITT Rec. Z.100 Specification and description language (1988).

4 Definitions

For the purpose of this ETS the following definitions apply.

4.1 External definitions

This ETS uses the following terms defined in other documents:

- Application Protocol Data Unit (APDU) (ETS 300 239);
- Basic Service (CCITT Recommendation I.210);
- Coordination Function (ETS 300 239);
- End PTNX (ETS 300 239);
- Gateway PTNX (ETS 300 172);
- Interpretation APDU (ETS 300 239);
- Network Facility Extension (NFE) (ETS 300 239);
- Originating PTNX (ETS 300 239);
- Private (ENV 41007-1);
- Private Telecommunication Network Exchange (PTNX) (ENV 41007-1);
- Public ISDN (ENV 41007-1);
- Served user (ETS 300 363)
- Signalling (CCITT Recommendation I.112);
- Supplementary Service (CCITT Recommendation I.210);
- Supplementary Service Control Entity (ETS 300 239);
- Telecommunication Network (ENV 41007-1);
- Terminal (ENV 41007-1);
- Terminating PTNX (ETS 300 239);
- Transit PTNX (ETS 300 239);
- User (ETS 300 171).

4.2 Activating PTNX

The PTNX serving the activating user.

4.3 Deactivating PTNX

The PTNX serving the deactivating user.

4.4 Inter-PTNX link

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

4.5 Interrogating PTNX

The PTNX serving the interrogating user.

4.6 Path retention

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

4.7 Served user PTNX

The PTNX serving the served user.

5 List of acronyms

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
PTN	Private Telecommunication Network
PTNX	Private Telecommunication Network Exchange
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 PTN to reject any calls, or just those associated with a specified basic service, addressed to the served user's PTN 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 ETS 300 171.

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 PTN number basis and per basic service basis. For each PTN number, the supplementary service can be subscribed to for every basic service subscribed to by that PTN number, or for only some of the basic services subscribed to by that PTN 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 6.3.10 of ETS 300 363.

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 PTN number basis and per basic service basis. For each PTN number, the supplementary service can be subscribed to for every basic service subscribed to by that PTN number, or for only some of the basic services subscribed to by that PTN 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 "DNDO capability level" shall be as described in subclause 6.3.10 of ETS 300 363.

6.2.2 Requirements on the Terminating PTNX

Call establishment procedures for the incoming side of an inter-PTNX link and call release procedures, as specified in ETS 300 172, shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ETS 300 239 for an End PTNX, shall apply. In addition, the generic procedures for notification, as specified in ETS 300 239 for an End PTNX, shall apply.

6.2.3 Requirements on the Originating PTNX

Call establishment procedures for the outgoing side of an inter-PTNX link and call release procedures, as specified in ETS 300 172, shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ETS 300 239 for an End PTNX, shall apply. In addition, the generic procedures for notification, as specified in ETS 300 239 for an End PTNX, shall apply.

6.2.4 Requirements on the Activating PTNX

Generic procedures for the call-independent control (connection oriented) of supplementary services, as specified in ETS 300 239 for an Originating PTNX, shall apply.

6.2.5 Requirements on the Deactivating PTNX

Generic procedures for the call-independent control (connection oriented) of supplementary services, as specified in ETS 300 239 for an Originating PTNX, shall apply.

6.2.6 Requirements on the Interrogating PTNX

Generic procedures for the call-independent control (connection oriented) of supplementary services, as specified in ETS 300 239 for an Originating PTNX, shall apply.

6.2.7 Requirements on a SS-DND Served User PTNX

Generic procedures for the call-independent control (connection oriented) of supplementary services, as specified in ETS 300 239 for a Terminating PTNX, shall apply.

6.2.8 Requirements on a Transit PTNX

The basic call procedures for call establishment and call clearing at a Transit PTNX, as specified in ETS 300 172, shall apply.

Generic procedures for the call-related control and call-independent control (connection oriented) of supplementary services, as specified in ETS 300 239 for a Transit PTNX, shall apply. In addition, the generic procedures for notification, as specified in ETS 300 239 for a Transit PTNX, shall apply.

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.

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

Do-Not-Disturb-Operations	{iso(1) identified-organization(3) icd-ecma(0012) standard(0) qsig-do-not-disturb(194) 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 ecma-manufacturer-specific-service-extension-definition {iso(1) identified-organization(3) icd-ecma (0012) standard (0) qsig-generic-procedures (165) msi-definition(0) } basicServiceNotProvided, invalidServedUserNr, notAvailable, notSubscribed, supplementaryServiceInteractionNotAllowed FROM General-Errors {ccitt(0) identified-organization(3) etsi (0) 196 general-errors(2) } notActivated FROM Call-Diversion-Operations {ccitt(0) identified-organization(3) etsi (0) 207 diversion-operations (1)} PartyNumber FROM Addressing-Data-Elements { ccitt(0) identified-organization(3) etsi(0) 196 addressing-data-elements (6)} -- Note. The definition of PartyNumber is reproduced in annex C BasicService FROM Basic-Service-Elements { ccitt(0) identified-organization(3) etsi(0) 196 basic-service-elements (8) } -- Note. The definition of BasicService is reproduced in annex C
	;
ptn OBJECTIDENTIFIER	::= {iso(1) identified-organization(3) icd-ecma (0012) private-isdn-signalling-domain(9)}
DoNotDisturbActivate	::= OPERATION ARGUMENT DNDAActivateArg RESULT DNDAActivateRes ERRORS { notSubscribed, notAvailable, invalidServedUserNr, basicServiceNotProvided, temporarilyUnavailable, supplementaryServiceInteractionNotAllowed, unspecified}

```

DoNotDisturbDeactivate ::= OPERATION
                        ARGUMENT DNDDeactivateArg
                        RESULT DummyRes
                        ERRORS          { notSubscribed,
                                        notAvailable,
                                        invalidServedUserNr,
                                        notActivated,
                                        temporarilyUnavailable,
                                        supplementaryServiceInteractionNotAllowed,
                                        unspecified}

DoNotDisturbInterrogate ::= OPERATION
                        ARGUMENT DNDInterrogateArg
                        RESULT DNDInterrogateRes
                        ERRORS          { notSubscribed,
                                        notAvailable,
                                        invalidServedUserNr,
                                        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 DummyResult
                        ERRORS          { notAvailable,
                                        temporarilyUnavailable,
                                        supplementaryServiceInteractionNotAllowed,
                                        unspecified}

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

```

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

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

DNDAActivateRes ::= 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
}

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



```

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)
}

```

ServiceList	::= BITSTRING (SIZE (1..32)) { dndo-low(1), dndo-medium(2), dndo-high(3) } -- bits other than dndo-low, dndo-medium, or dndo-high, are reserved -- for other Supplementary Services
temporarilyUnavailable	ERROR ::= { ptn 1000 }
Unspecified	::= ERROR PARAMETER Extension
unspecified	Unspecified ::= {ptn 1008}
doNotDisturbActivateQ	DoNotDisturbActivate ::= {ptn dnd-activate-q (35) }
doNotDisturbDeactivateQ	DoNotDisturbDeactivate ::= {ptn dnd-deactivate-q (36) }
doNotDisturbInterrogateQ	DoNotDisturbInterrogate ::= {ptn dnd-interrogate-q (37) }
doNotDisturbOverrideQ	DoNotDisturbOverride ::= {ptn dndo-q (38) }
doNotDisturbOvrExecuteQ	DoNotDisturbOvrExecute ::= {ptn dndo-execute-q (39) }
pathRetain	PathRetain ::= {ptn pathretain (41) }
serviceAvailable	ServiceAvailable ::= {ptn service-available (42) }
END	-- of Do-Not-Disturb-Operations

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	{iso(1) identified-organization(3) icd-ecma(0012) standard(0) qsig-do-not-disturb(194) do-not-disturb-notifications (1) }
DEFINITIONS BEGIN	::=
IMPORTS	NOTIFICATION FROM Notification-Data-Structure { iso(1) identified-organization(3) icd-ecma (0012) standard (0) qsig-generic-procedures (165) notification-data-structure (7) } ;
DoNotDisturb	::= NOTIFICATION ARGUMENT NULL
doNotDisturb	DoNotDisturb ::= { iso(1) identified-organization(3) icd-ecma (0012) private-isdn-signalling-domain (9) 2002}
END	-- of Do-Not-Disturb-Notifications

6.3.3 Information elements

6.3.3.1 Facility information element

The operations defined in subclause 6.3.1 shall be coded in the Facility information element in accordance with ETS 300 239.

When conveying the invoke APDU of operations defined in subclause 6.3.1, the destinationEntity data element of the NFE shall contain value endPTNX.

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

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

NOTE 1

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 ETS 300 239.

6.3.3.3 Other information elements

Any other information elements (e.g. Progress indicator) shall be coded in accordance with the rules of ETS 300 172 and ETS 300 239.

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 ETS 300 239.

Messages used for call establishment and release shall be as specified in ETS 300 172.

6.4 SS-DND and SS-DNDO state definitions

6.4.1 State at the Terminating PTNX

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

6.4.1.1 DND-tIdle

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

6.4.2 States at the Originating PTNX

The procedures at the Originating PTNX are written in terms of the following conceptual states existing within the SS-DNDO Supplementary Service Control entity in that PTNX 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 PTNX**

The procedures at the Activating PTNX 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 PTNX 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 PTNX is waiting for the response.

6.4.4 **States at the Deactivating PTNX**

The procedures at the Deactivating PTNX 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 PTNX 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 PTNX is waiting for the response.

6.4.5 **States at the Interrogating PTNX**

The procedures at the Interrogating PTNX 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 PTNX 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 PTNX is waiting for the response.

6.4.6 **State at the SS-DND Served User PTNX**

The procedures at the Served User PTNX 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 PTNX 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 ETS 300 172.

Annex D contains some examples of message sequences.

6.5.1 Actions at the Terminating PTNX

The SDL representation of procedures at the Terminating PTNX is shown in E.1 of annex E.

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 ETS 300 172, and having determined by a local procedure that SS-DND is to be invoked, the Terminating PTNX 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 PTNX should inform the served user of invocation of SS-DND.

If an optional in-band tone or announcement is to be applied, the Terminating PTNX 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 3

It is recommended that an in-band tone or announcement be provided by the Terminating PTNX 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 PTNX

6.5.2.1 Normal procedures

None.

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In cases where an outgoing call encounters a do not disturb condition at the Terminating PTNX, notification of do not disturb may be received from the Terminating PTNX. Such a notification will be handled in accordance with subclause 7.4 of ETS 300 239.

6.5.2.2 Exceptional procedures

Not applicable.

6.5.3 Actions at the Activating PTNX

The SDL representation of procedures at the Activating PTNX is shown in E.3 of annex E.

6.5.3.1 Normal procedures

On determining that activation of SS-DND for a served user at the served user PTNX is required, the Activating PTNX shall send a doNotDisturbActivateQ invoke APDU to the Served User PTNX 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 ETS 300 239. The Activating PTNX shall enter the DND-aWait state and start timer T1. On receipt of the doNotDisturbActivateQ return result APDU, the Activating PTNX shall stop timer T1 and revert to the DND-aIdle state.

NOTE 5

The Activating PTNX should indicate acceptance to the activating user.

The Activating PTNX is responsible for clearing the call-independent signalling connection towards the Served User PTNX. 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 PTNX, the Activating PTNX 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 PTNX), the Activating PTNX shall enter the DND-aIdle state.

NOTE 6

The Activating PTNX should indicate rejection to the activating user.

The Activating PTNX is responsible for clearing the call-independent signalling connection towards the Served User PTNX. 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 PTNX

The SDL representation of procedures at the Deactivating PTNX is shown in E.4 of annex E.

6.5.4.1 Normal procedures

On determining that deactivation of SS-DND for a served user at the served user PTNX is required, the Deactivating PTNX shall send a doNotDisturbDeactivateQ invoke APDU to the Served User PTNX 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 ETS 300 239. The Deactivating PTNX shall enter the DND-dWait state and start timer T2. On receipt of the doNotDisturbDeactivateQ return result APDU, the Deactivating PTNX shall stop timer T2 and revert to the DND-dIdle state.

NOTE 7

The Deactivating PTNX should indicate acceptance to the deactivating user.

The Deactivating PTNX is responsible for clearing the call-independent signalling connection towards the Served User PTNX. 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 PTNX, the Deactivating PTNX 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 PTNX), the Deactivating PTNX shall enter the DND-dIdle state.

NOTE 8

The Deactivating PTNX should indicate rejection to the deactivating user.

The Deactivating PTNX is responsible for clearing the call-independent signalling connection towards the Served User PTNX. 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 PTNX

The SDL representation of procedures at the Interrogating PTNX is shown in E.5 of annex E.

6.5.5.1 Normal procedures

On determining that interrogation of SS-DND for a served user at the served user PTNX is required, the Interrogating PTNX shall send a doNotDisturbInterrogateQ invoke APDU to the Served User PTNX 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 ETS 300 239. The Interrogating PTNX shall enter the DND-iWait state and start timer T3. On receipt of the doNotDisturbInterrogateQ return result APDU, the Interrogating PTNX shall stop timer T3 and revert to the DND-iIdle state.

NOTE 9

The Interrogating PTNX should indicate acceptance to the interrogating user.

The Interrogating PTNX is responsible for clearing the call-independent signalling connection towards the Served User PTNX. 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 PTNX, the Interrogating PTNX 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 PTNX), the Interrogating PTNX shall enter DND-iIdle state.

NOTE 10

The Interrogating PTNX should indicate rejection to the interrogating user.

The Interrogating PTNX is responsible for clearing the call-independent signalling connection towards the Served User PTNX. 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.

6.5.6 Actions at the Served User PTNX

The SDL representation of procedures at the Served User PTNX is shown in E.6 of annex E.

6.5.6.1 Normal procedures

6.5.6.1.1 Remote activation

On receipt of an doNotDisturbActivateQ invoke APDU using the call reference of a call-independent signalling connection (as specified in subclause 7.3 of ETS 300 239), the Served User PTNX 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 PTNX 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 ETS 300 239), the Served User PTNX 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 PTNX 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 ETS 300 239), the Served User PTNX 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 PTNX 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 PTNX 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 PTN number and basic service.

6.5.6.2.3 Remote interrogation of SS-DND

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

6.5.7 Actions at a Transit PTNX

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 ETS 300 172.

Annex D contains some examples of message sequences.

6.6.1 Actions at the Terminating PTNX

The Terminating PTNX 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 PTNX is shown in E.1 of annex E.

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 ETS 300 172, the Terminating PTNX shall proceed as follows. If the SETUP message 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 PTNX 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 PTNX 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 PTNX 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 PTNX 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 PTNX 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 PTNX 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 PTNX is not able to override SS-DND at the destination, it shall send a doNotDisturbOvrExecuteQ return error APDU to the Originating PTNX in a FACILITY or a DISCONNECT message and remain in state DNDO-tIdle.

6.6.2 Actions at the Originating PTNX

For a given call, the Originating PTNX 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 PTNX is shown in E.2 of annex E.

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 PTNX 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 PTNX 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 invocable, 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 PTNX shall stop timer T4 and enter state DNDO-oIdle.

6.6.2.2 Exceptional procedures

On expiry of timer T4, the Originating PTNX 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 PTNX shall stop timer T4, and enter state DNDO-oIdle.

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 PTNX shall stop timer T4 and enter state DNDO-oIdle. The call shall continue in accordance with ETS 300 172.

6.6.3 Actions at a Transit PTNX

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

6.7 Impact of interworking with public ISDNs

6.7.1 SS-DND

NOTE 11

At the time of publication of this ETS, an equivalent service was not specified for public ISDNs.

6.7.1.1 Incoming calls

On a call to a PTN from a public ISDN, which encounters SS-DND in the PTN, the Incoming Gateway PTNX 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 12

At the time of publication of this ETS, an equivalent service was not specified for public ISDNs.

6.7.2.1 Incoming calls

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

6.7.2.2 Outgoing calls

On a call from a PTN to a public ISDN that does not support an equivalent service, the Outgoing Gateway PTNX shall behave as specified in subclause 6.6.1 for a Terminating PTNX 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 PTNX functionality or the Terminating PTNX functionality will be provided in the non-ISDN. The Incoming or Outgoing Gateway PTNX shall provide conversion between the signalling protocol specified in this ETS 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 PTNX functionality or the Terminating PTNX functionality will be provided in the non-ISDN. The Incoming or Outgoing Gateway PTNX shall provide conversion between the signalling protocol specified in this ETS and the signalling protocol of the other network.

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

The following timers apply:

6.9.1 Timer T1

Timer T1 operates at the Activating PTNX 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.

6.9.2 Timer T2

Timer T2 operates at the Deactivating PTNX 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.

6.9.3 Timer T3

Timer T3 operates at the Interrogating PTNX 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.

6.9.4 Timer T4

Timer T4 operates at the Originating PTNX 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.

Annex A (normative): Signalling protocol for the support of path retention

This annex is applicable to Originating PTNXs that support SS-DNDO with path retention and to Terminating PTNXs 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 PTNX 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 PTNX encounters conditions in which it is appropriate to invoke that supplementary service. The Originating PTNX 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 PTNX following a single invocation of path retention by the Originating PTNX are possible as a result of different conditions being encountered at the Terminating PTNX. 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 PTNX and at the Terminating PTNX.

A.2 Path Retention operational requirements

A.2.1 Requirements on the Originating PTNX

Call establishment procedures for the outgoing side of an inter-PTNX link, as specified in ETS 300 172, shall apply.

Generic procedures for the call related control of supplementary services, as specified in ETS 300 239 for an End PTNX, shall apply.

A.2.2 Requirements on the Terminating PTNX

Call establishment procedures for the incoming side of an inter-PTNX link, as specified in ETS 300 172, shall apply.

Generic procedures for the call related control of supplementary services, as specified in ETS 300 239 for an End PTNX, shall apply.

A.2.3 Requirements on a Transit PTNX

Call establishment procedures, as specified in ETS 300 172, shall apply.

Generic procedures for the call related control of supplementary services, as specified in ETS 300 239 for a Transit PTNX, 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 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.

A.3.2 Information elements

APDUs of the operations pathRetain and serviceAvailable shall be coded in the Facility information element in accordance with ETS 300 239.

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 endPTNX.

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 ETS 300 239. The basic call messages shall be used for call establishment as specified in ETS 300 172.

A.4 Path Retention state definitions

A.4.1 States at the Originating PTNX

The procedures at the Originating PTNX are written in terms of the following conceptual states existing within the Path Retention entity in that PTNX 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 PTNX is waiting for a serviceAvailable invoke APDU from the Terminating PTNX.

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 PTNX

The procedures at the Terminating PTNX are written in terms of the following conceptual states existing within the Path Retention entity in that PTNX 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 PTNX 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 PTNX

The SDL representation of procedures at the Originating PTNX is shown in A.9.

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 PTNX, the Originating PTNX 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.

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

In state PRTO-Requested, if the Originating PTNX 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 PTNX shall enter state PRTO-Invoking.

In state PRTO-Invoking, if the supplementary service concerned is successfully invoked, the Originating PTNX 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 PTNX 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 PTNX

On receipt of a pathRetain invoke APDU in a SETUP message, the Terminating PTNX 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 PTNX shall retain the network connection, send a serviceAvailable invoke APDU to the Originating PTNX, 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 A.1

It is necessary that this Progress description be sent, as a means of ensuring that basic call timer T310 is stopped at other PTNXs. 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 PTNX 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 PTNX for any of the supplementary services for which the network connection has been retained, the Terminating PTNX shall stop timer PRT1 and enter state PRTT-Invoking.

In state PRTT-Invoking, if the supplementary service concerned is successfully invoked, the Terminating PTNX 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.

In state PRTT-Invoking, if the supplementary service concerned fails to be invoked successfully, the Terminating PTNX 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 PTNX to indicate failure of the requested supplementary service shall be sent in a FACILITY message.

On expiry of timer PRT1, the Terminating PTNX shall enter state PRTT-Idle and initiate call clearing in accordance with ETS 300 172.

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 PTNX

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 PTNX.

On a call from a PTN to a public ISDN that does not support an equivalent mechanism, the Outgoing Gateway PTNX 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 A.2

If invocation of a supplementary service is requested while the network connection is retained, the Outgoing Gateway PTNX 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 PTNX to reject the supplementary service and release the call.

NOTE A.3

At the time of publication of this ETS, 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 PTNX functionality or the Terminating PTNX functionality will be provided in the non-ISDN. The Incoming or Outgoing Gateway PTNX shall provide conversion between the signalling protocol specified in this ETS and the signalling protocol of the other network.

A.8 Path Retention parameter values (timers)

Timer PRT1 operates at the Terminating PTNX 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 60s.

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

The diagrams in this annex use the Specification and Description Language defined in CCITT Recommendation Z.100 (1988).

Each diagram represents the behaviour of a Path Retention entity at a particular type of PTNX. In accordance with the protocol model described in ETS 300 239, 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.

Where an output symbol represents a primitive to other parts of the coordination function, and that primitive results in a QSIG 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 ETS 300 172, 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 QSIG 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 ETS 300 172, basic call actions associated with the receipt of that message are deemed to have occurred.

The following abbreviation is used:

inv. invoke APDU.

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

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

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.

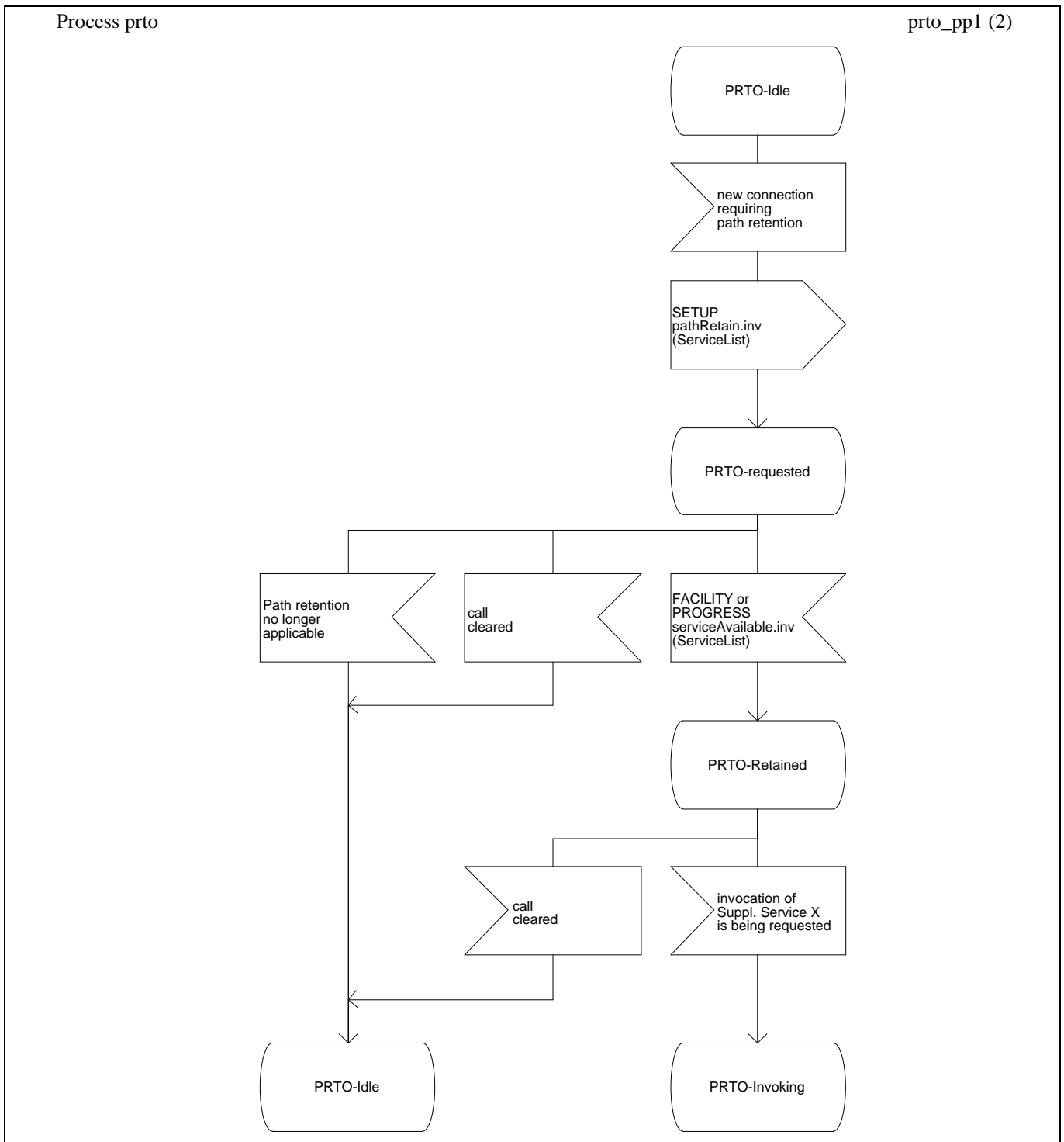


Figure A.1 (sheet 1 of 2) - SDL representation of Path Retention at the Originating PTNX

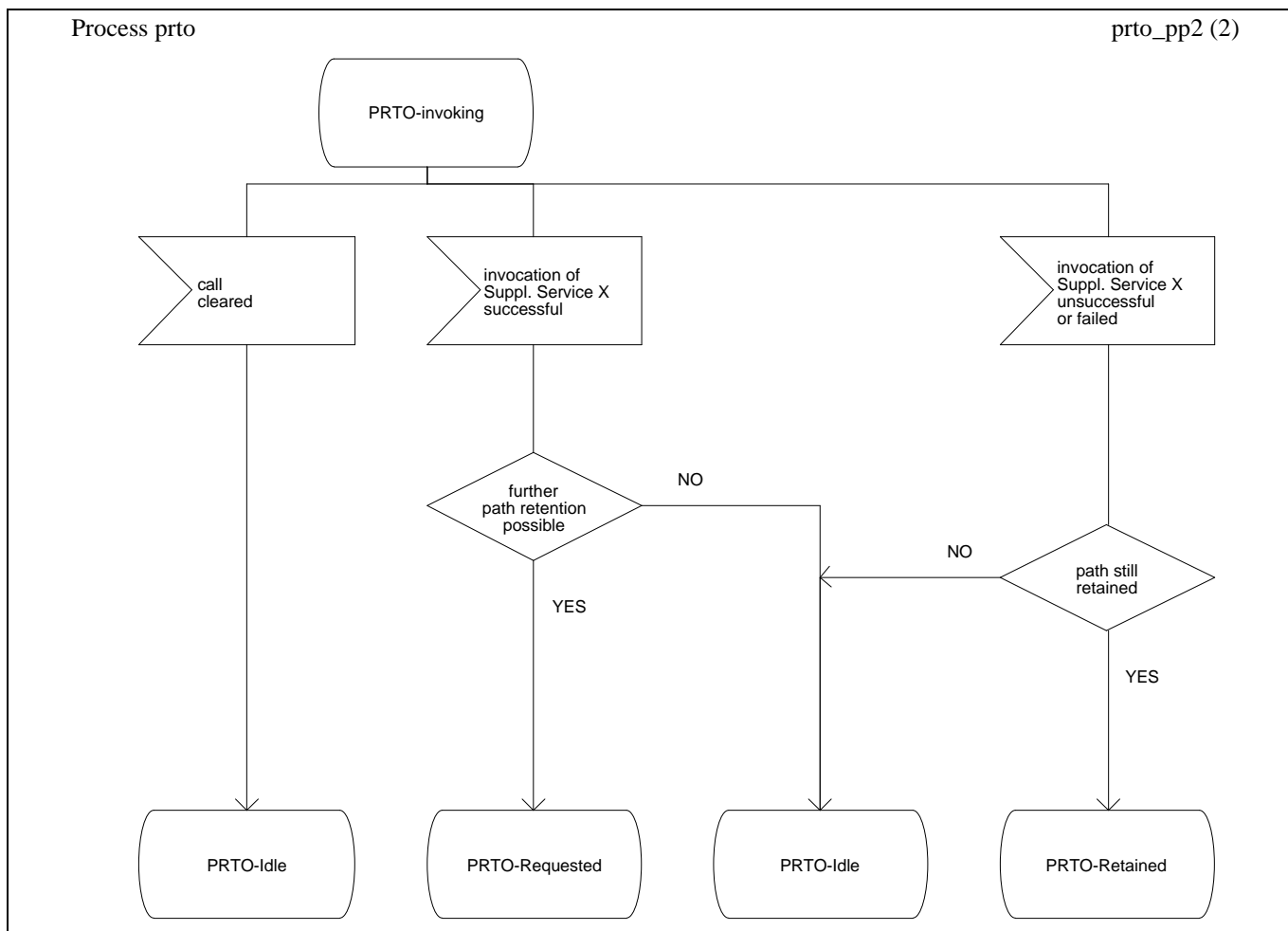


Figure A.1 (sheet 2 of 2) - SDL representation of Path Retention at the Originating PTNX

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

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

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.

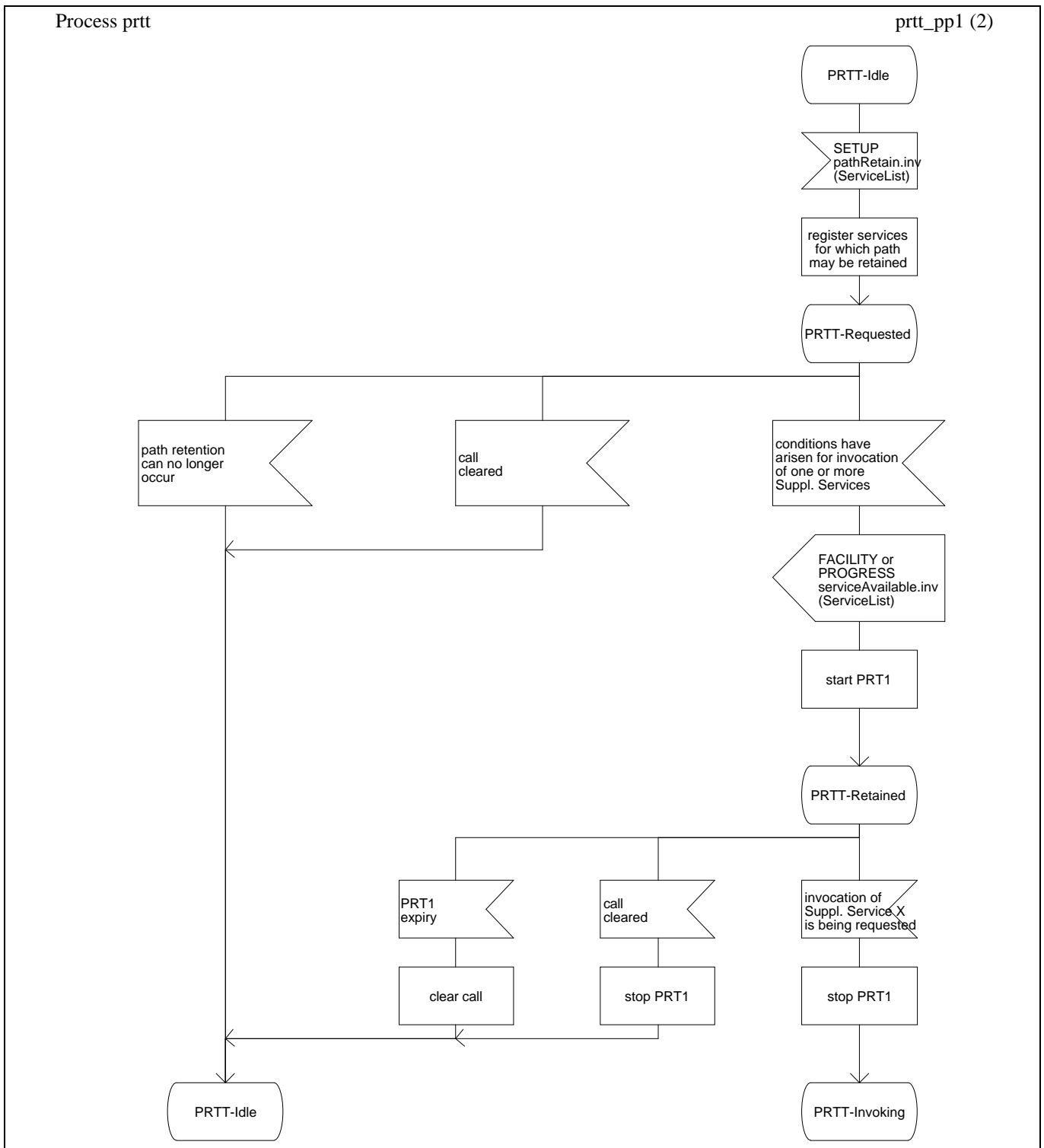


Figure A.2 (sheet 1 of 2) - SDL representation of Path Retention at the Terminating PTNX

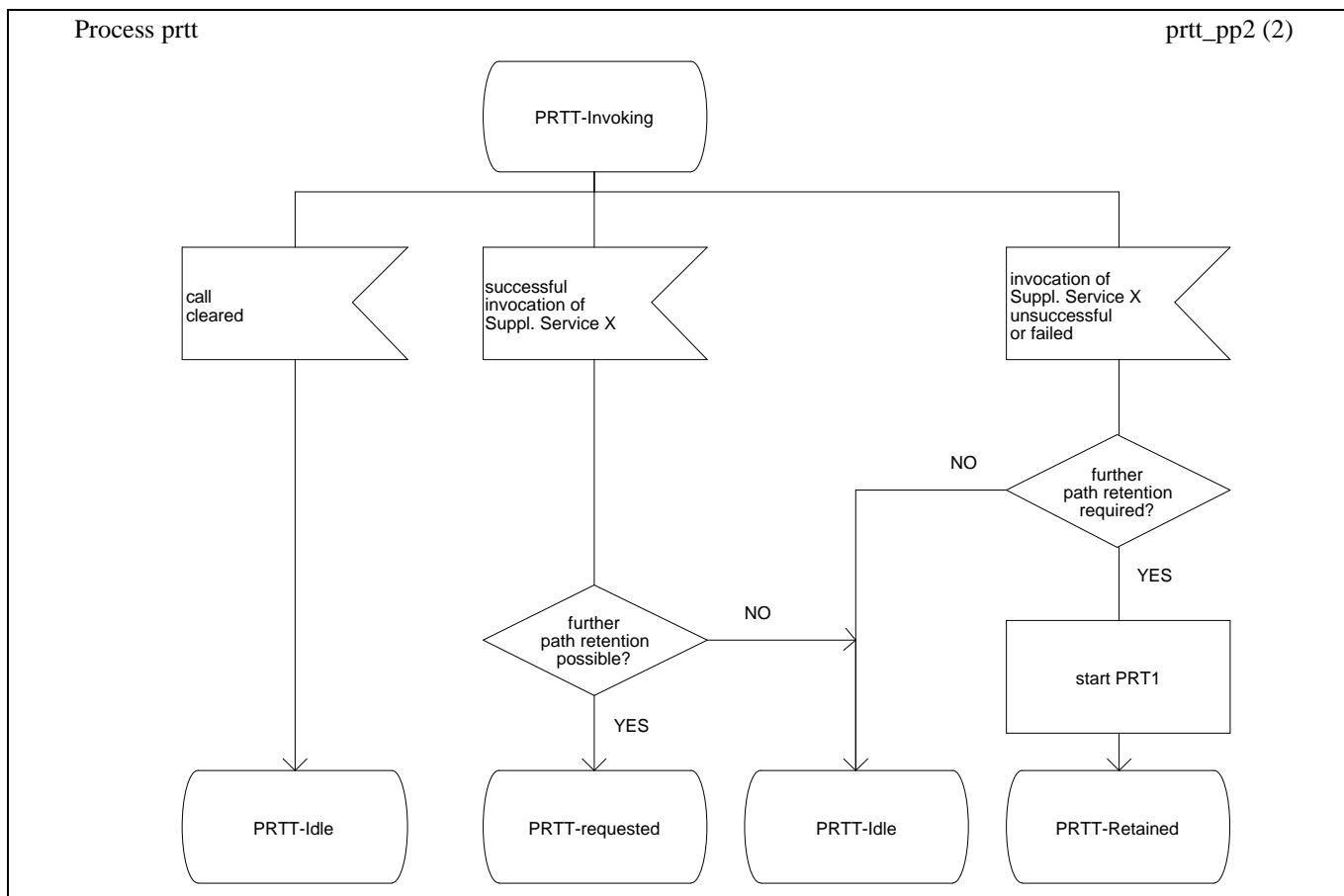


Figure A.2 (sheet 2 of 2) - SDL representation of Path Retention at the Terminating PTNX

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 ETS 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 ETS 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 ETS's PICS proforma;
- by the user or potential user of an 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 PICSs;
- 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 subclauses 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 ETS.

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 restricted choice (Yes or No), or in the "Not Applicable" column (N/A).

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 that a large quantity will be supplied, and a PICS can be considered complete without 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 ETS. A possible reason for the situation described above is that a defect in the ETS has been reported, a correction for which is expected to change the requirement not met by the implementation.

B.3 PICS proforma for SS-DND of ETS 300 364

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 <input type="checkbox"/> Yes <input type="checkbox"/> (The answer Yes means that the implementation does not conform to this ETS)

Date of statement	
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B.3.3 General

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

B.3.4 Procedures

Item	Question/feature	References	Status	N/A	Support
B1	Support of relevant ETS 300 172 and ETS 300 239 procedures at a Terminating PTNX	6.2.2	A1:m	[]	m: Yes []
B2	Support of relevant ETS 300 172 and ETS 300 239 procedures at an Activating PTNX	6.2.4	A2:m	[]	m: Yes []
B3	Support of relevant ETS 300 172 and ETS 300 239 procedures at a Deactivating PTNX	6.2.5	A3:m	[]	m: Yes []
B4	Support of relevant ETS 300 172 and ETS 300 239 procedures at an Interrogating PTNX	6.2.6	A4:m	[]	m: Yes []
B5	Support of relevant ETS 300 172 and ETS 300 239 procedures at a Served User PTNX	6.2.7	A5:m	[]	m: Yes []
B6	Signalling procedures at a Terminating PTNX, invocation	6.5.1	A1:m	[]	m: Yes []
B7	Signalling procedures at an Activating PTNX	6.5.3	A2:m	[]	m: Yes []
B8	Signalling procedures at a Deactivating PTNX	6.5.4	A3:m	[]	m: Yes []
B9	Signalling procedures at an Interrogating PTNX	6.5.5	A4:m	[]	m: Yes []
B10	Signalling procedures at a Served User PTNX, activation	6.5.6.1.1 6.5.6.2.1	A5:o	[]	Yes [] No []
B11	Signalling procedures at a Served User PTNX, deactivation	6.5.6.1.2 6.5.6.2.2	A5:o	[]	Yes [] No []
B12	Signalling procedures at a Served User PTNX, interrogation	6.5.6.1.3 6.5.6.2.3	A5:o	[]	Yes [] No []

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	6.9.1	A2:m	[]	m: Yes [] Value []
E2	Support of timer T2	6.9.2	A3:m	[]	m: Yes [] Value []
E3	Support of timer T3	6.9.3	A4:m	[]	m: Yes [] Value []

B.4 PICS proforma for SS-DNDO of ETS 300 364

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 ETS)

Date of statement	
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B.4.3 General

Item	Question/feature	References	Status	N/A	Support
F1	Behaviour as Terminating PTNX for SS-DNDO		o.1		Yes [] No []
F2	Behaviour as Originating PTNX for SS-DNDO		o.1		Yes [] No []
F3	Behaviour as Incoming Gateway PTNX for SS-DNDO	6.7.2 6.8.2	o		Yes [] No []
F4	Behaviour as Outgoing Gateway PTNX 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 ETS 300 172 and ETS 300 239 procedures at a Terminating PTNX	6.2.2	F1:m	[]	m: Yes []
G2	Support of relevant ETS 300 172 and ETS 300 239 procedures at an Originating PTNX	6.2.3	F2:m	[]	m: Yes []
G3	Signalling procedures without path retention at a Terminating PTNX	6.6.1	F1:m	[]	m: Yes []
G4	Signalling procedures with path retention at a Terminating PTNX	6.6.1 A.5.2	F1:m	[]	m: Yes []
G5	Signalling procedures at an Originating PTNX in support of DNDO without path retention	6.6.2.1.1	F2:o.2	[]	Yes [] No []
G6	Signalling procedures at an Originating PTNX in support of DNDO with path retention	6.6.2.1.2 A.5.1 6.6.2.2	F2:o.2	[]	Yes [] No []

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	6.9.4	G6:m	[]	m: Yes [] Value []
I2	Support of timer PRT1	A.8	F1:m	[]	m: Yes [] Value []

Annex C (informative): Imported ASN.1 definitions relating to numbers

Table C.1 is an extract from module General-Errors in ETS 300 196.

Table C.1 - Imported ASN.1 definitions General-Errors

notSubscribed	ERROR ::= 0
notAvailable	ERROR ::= 3
invalidServedUserNr	ERROR ::= 6
basicServiceNotProvided	ERROR ::= 8

Table C.2 is an extract from module Basic-Service-Elements in ETS 300 196.

Table C.2 - Imported ASN.1 definition Basic-Service-Elements

BasicService	::= ENUMERATED {
	allServices (0),
	speech (1),
	unrestrictedDigitalInformation (2),
	audio3k1Hz (3),
	telephony3k1Hz (32),
	teletex (33),
	telefaxGroup4Class1 (34),
	videotexSyntaxBased (35),
	videotelephony (36) }

Table C.3 is an extract from module Addressing-Data-Elements in ETS 300 196.


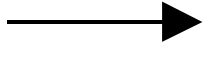


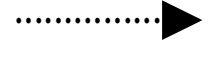
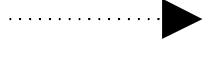
Table C.3 - Imported ASN.1 definition of address and number data types

PartyNumber	::= CHOICE { unknownPartyNumber [0] IMPLICIT NumberDigits, -- the numbering plan is the default numbering plan of the network publicPartyNumber [1] IMPLICIT PublicPartyNumber, -- the numbering plan is according to Recommendation E.164 or E.163 dataPartyNumber [3] IMPLICIT NumberDigits, -- not used, value reserved telexPartyNumber [4] IMPLICIT NumberDigits, -- not used, value reserved privatePartyNumber [5] IMPLICIT PrivatePartyNumber, -- the numbering plan is a Private Numbering Plan according to ECMA-155 nationalStandardPartyNumber [8] IMPLICIT NumberDigits } -- not used, value reserved
PublicPartyNumber	::= SEQUENCE { publicTypeOfNumber PublicTypeOfNumber, publicNumberDigits NumberDigits }
PrivatePartyNumber	::= SEQUENCE { privateTypeOfNumber PrivateTypeOfNumber, privateNumberDigits NumberDigits }
NumberDigits	::= NumericString (SIZE(1..20))
PublicTypeOfNumber	::= ENUMERATED { unknown (0), -- if used, number digits carry prefix indicating type of number according -- to national recommendations internationalNumber (1), nationalNumber (2), networkSpecificNumber (3), -- not used, value reserved subscriberNumber (4), abbreviatedNumber (6) } -- valid only for called party at the outgoing access, -- network substitutes appropriate number
PrivateTypeOfNumber	::= ENUMERATED { unknown (0), level2RegionalNumber (1), level1RegionalNumber (2), pTNSpecificNumber (3), localNumber (4), abbreviatedNumber (6) }

Annex D (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 PTNXs involved in SS-DND and SS-DNDO. Only messages relevant to SS-DND or SS-DNDO are shown.

3 Only the relevant information content (e.g. remote operation APDUs, notifications, information elements) is listed below each message name. The Facility and Notification indicator information elements containing remote operation APDUs and notifications 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 ETS.

5 The following abbreviations are used:

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

Example message sequences for normal operation

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

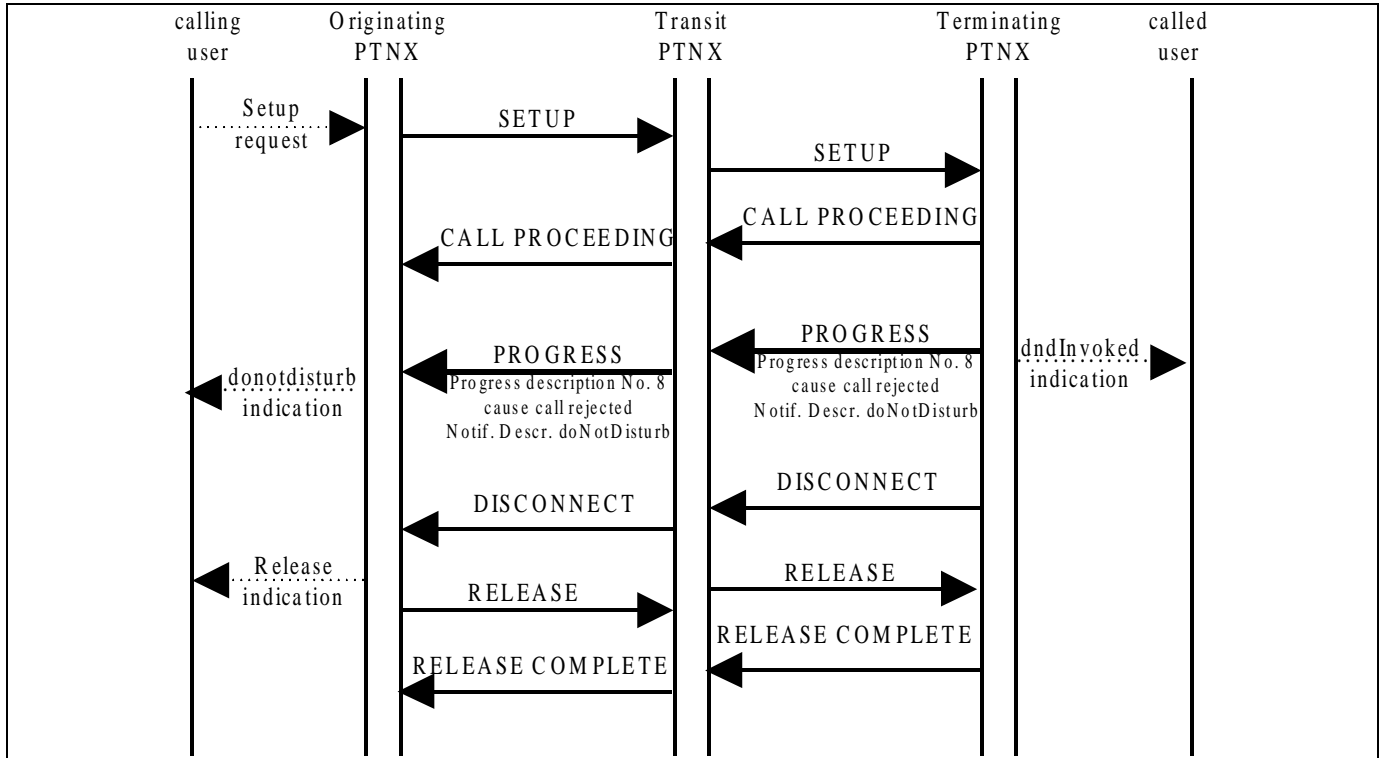


Figure D.1 - Normal operation of SS-DND with tone or announcement to Originating PTNX

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

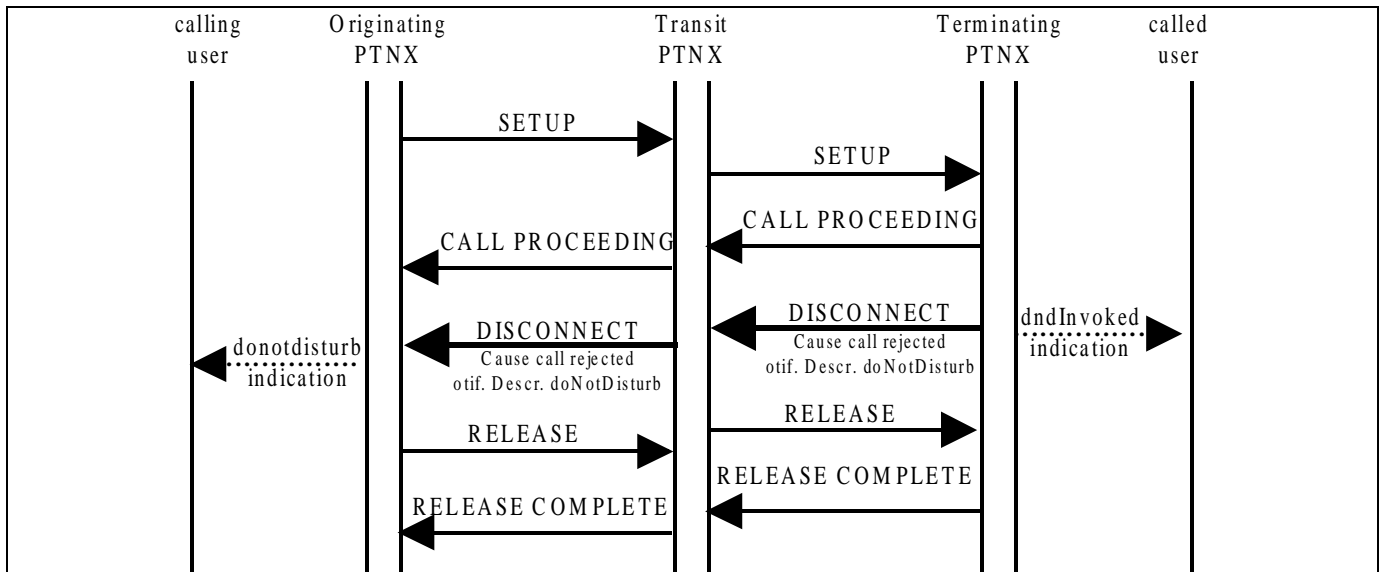


Figure D.2 - Normal operation of SS-DND with no tone or announcement to Originating PTNX

Figure D.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.

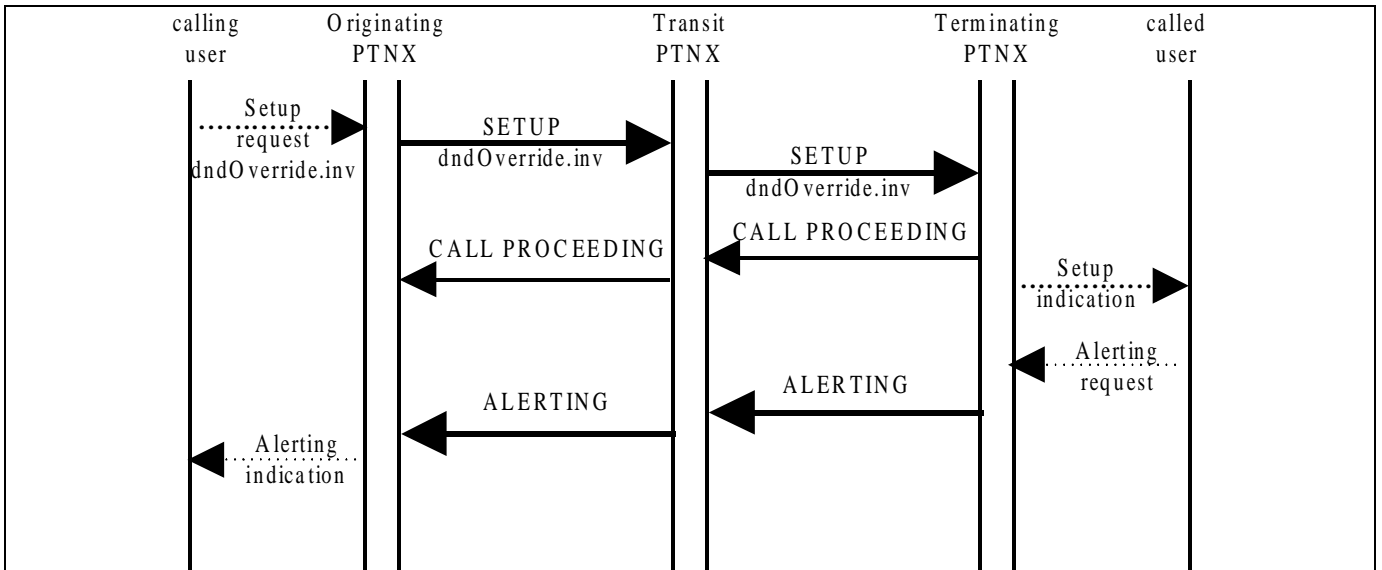


Figure D.3 - Normal operation of SS-DNDO without using Path Retention, override successful

Figure D.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.

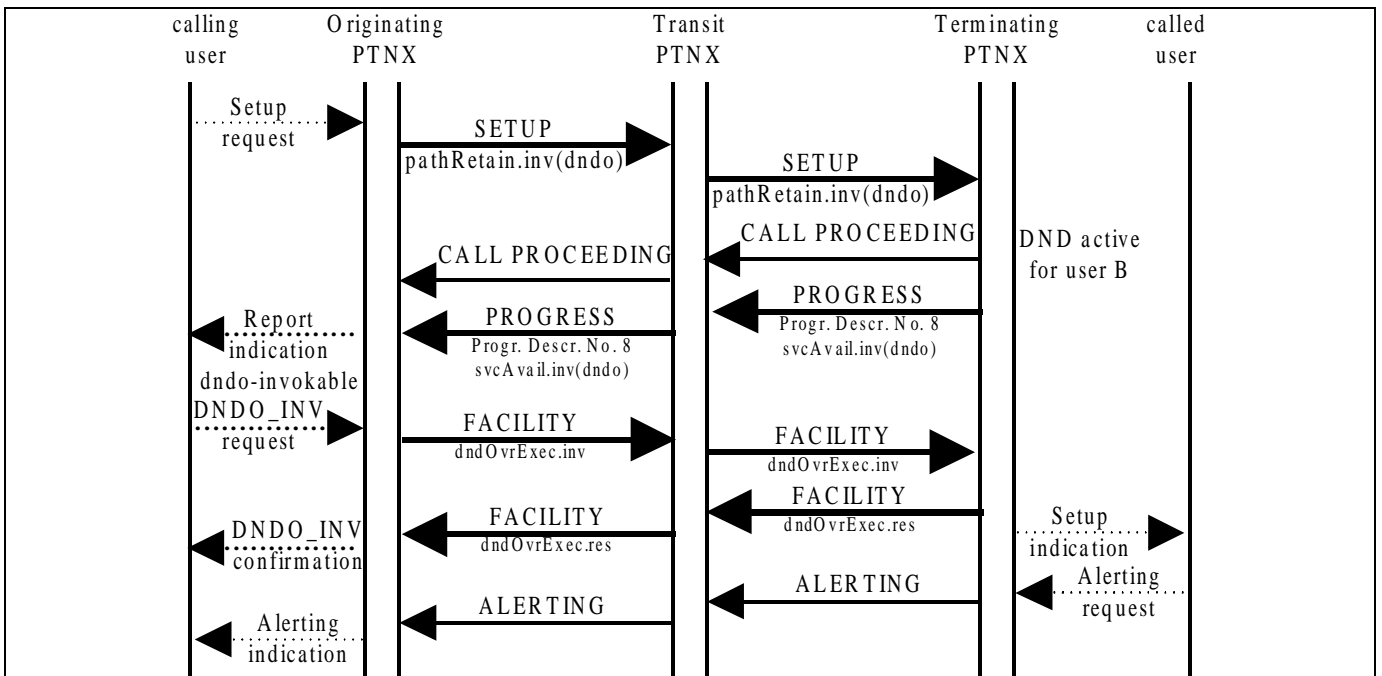


Figure D.4 - Normal operation of SS-DNDO using Path Retention, consultation, override is allowed

Figure D.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.

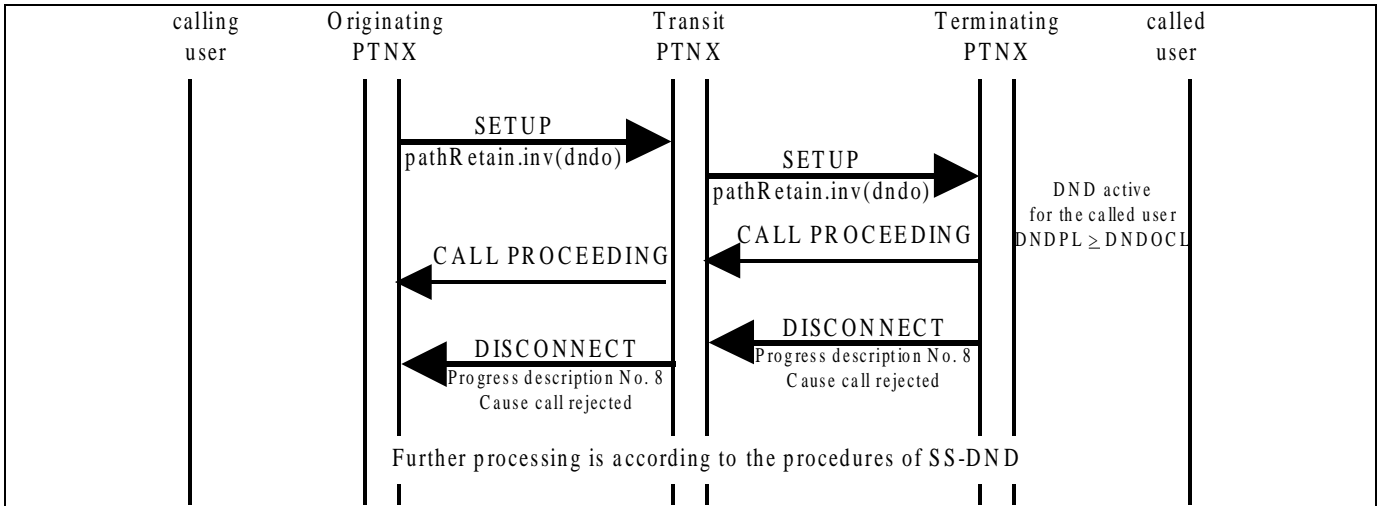


Figure D.5 - Normal operation of SS-DNDO with Path Retention, override is not allowed

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

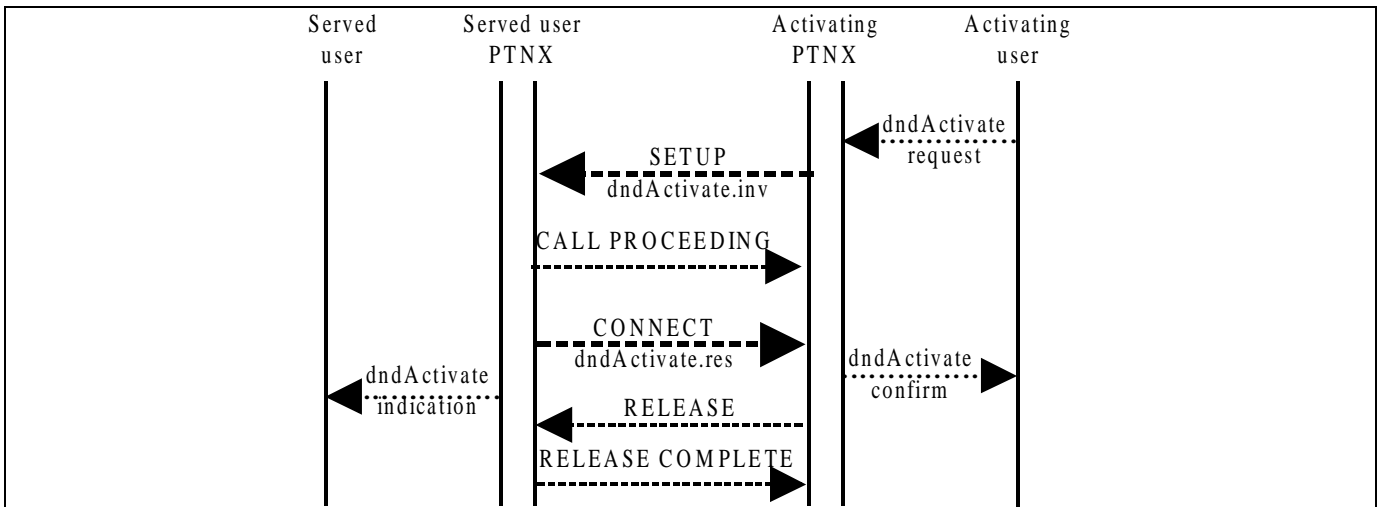


Figure D.6 - Remote activation of SS-DND

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

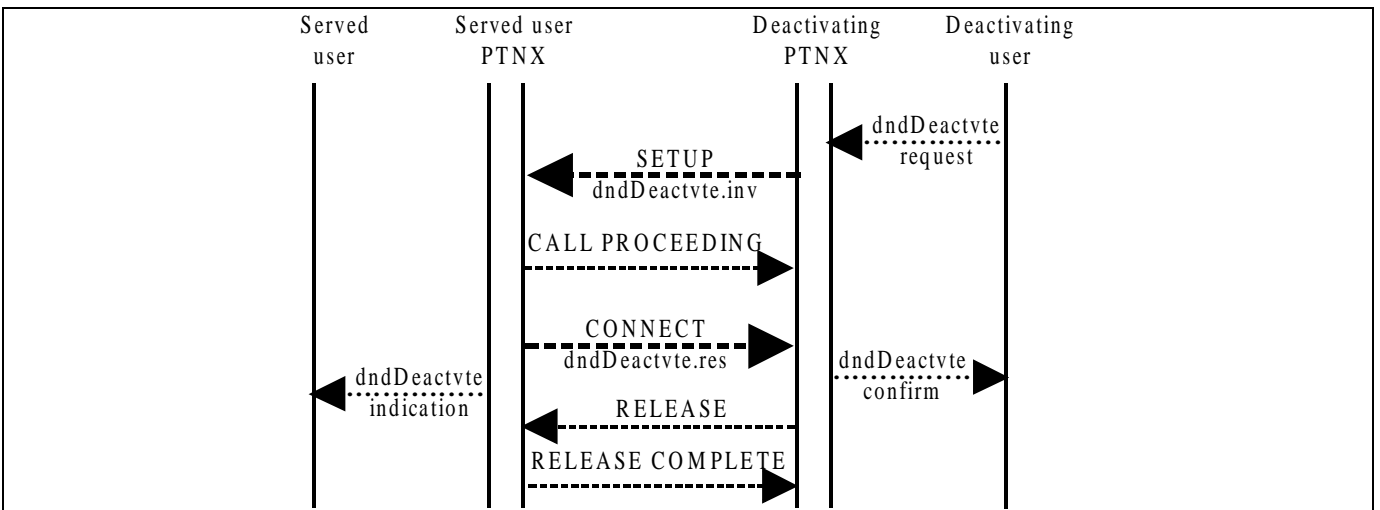


Figure D.7 - Remote deactivation of SS-DND

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

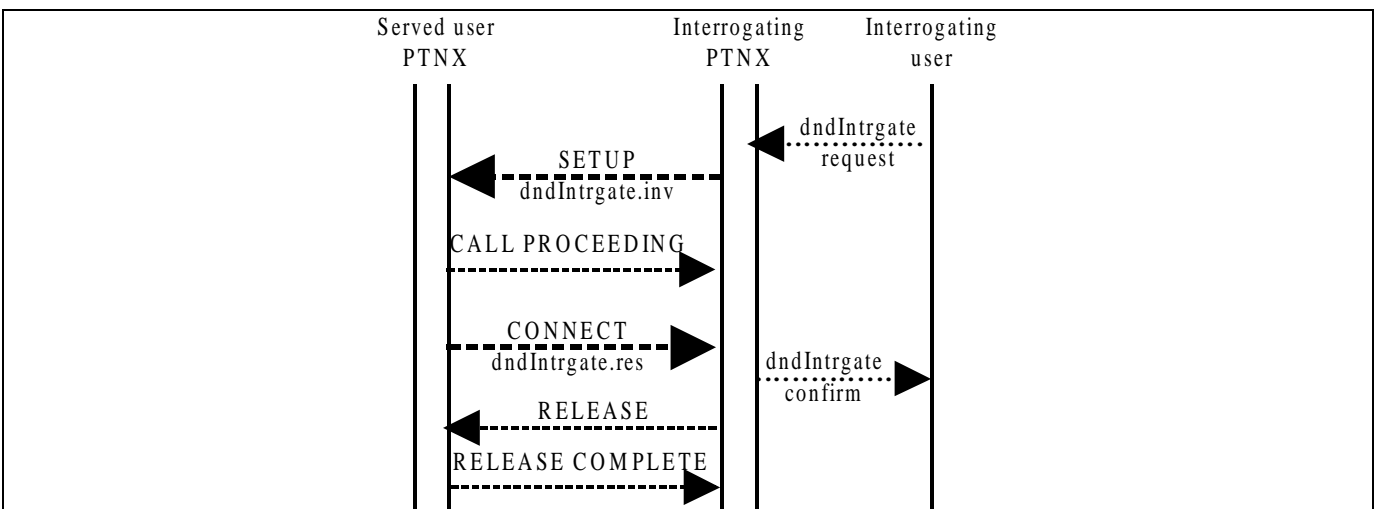


Figure D.8 - Remote interrogation of SS-DND

Annex E (informative): Specification and Description Language (SDL) representation of procedures

The diagrams in this annex use the Specification and Description Language defined in CCITT Recommendation Z.100 (1988).

Each diagram represents the behaviour of a SS-DND Supplementary Service Control entity at a particular type of PTNX. In accordance with the protocol model described in ETS 300 239, the Supplementary Service Control entity uses, via the Coordination Function, the services of Generic Functional Procedures 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 operation APDU(s) or notification(s) contained in that message. In the case of a message specified in ETS 300 172, 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 operation APDU(s) or notification(s) contained in that message. In the case of a message specified in ETS 300 172, 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.

E.1 SDL representation of SS-DND and SS-DNDO at a Terminating PTNX

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

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

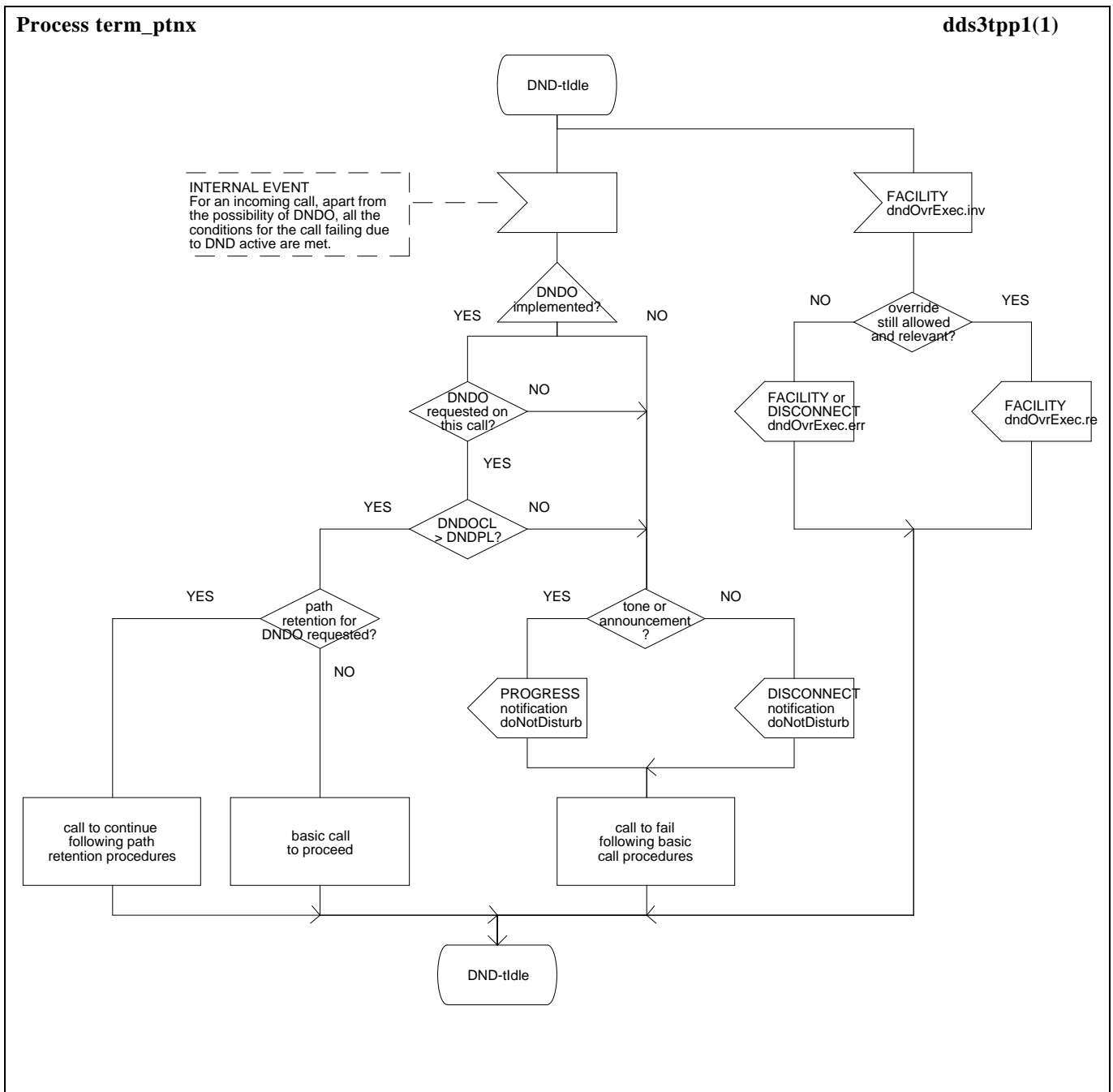


Figure E.1 - Terminating PTNX behaviour

E.2 SDL representation of SS-DNDO at an Originating PTNX

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

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.

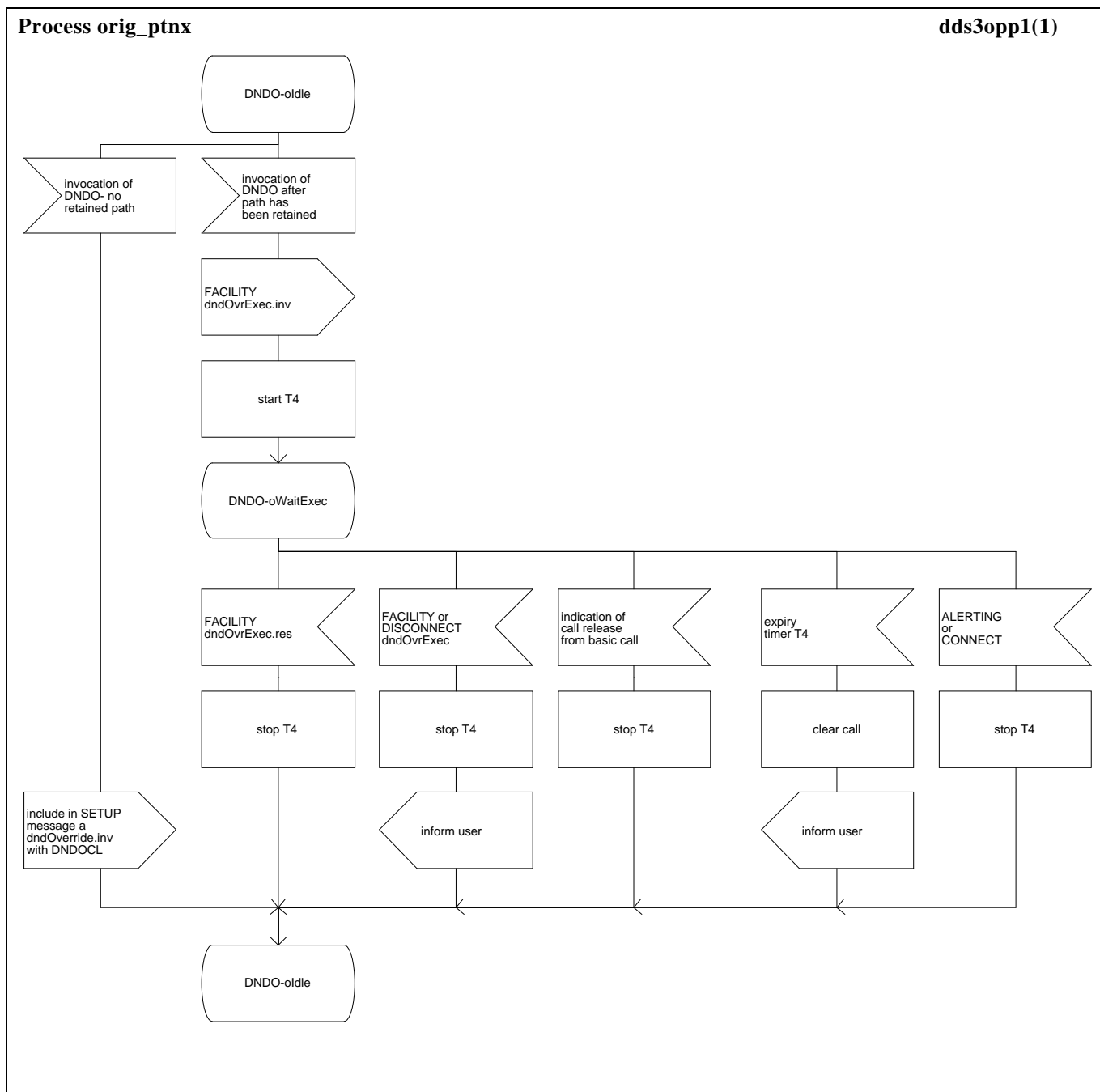


Figure E.2 - Originating PTNX behaviour

E.3 SDL representation of SS-DND at an Activating PTNX

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

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.

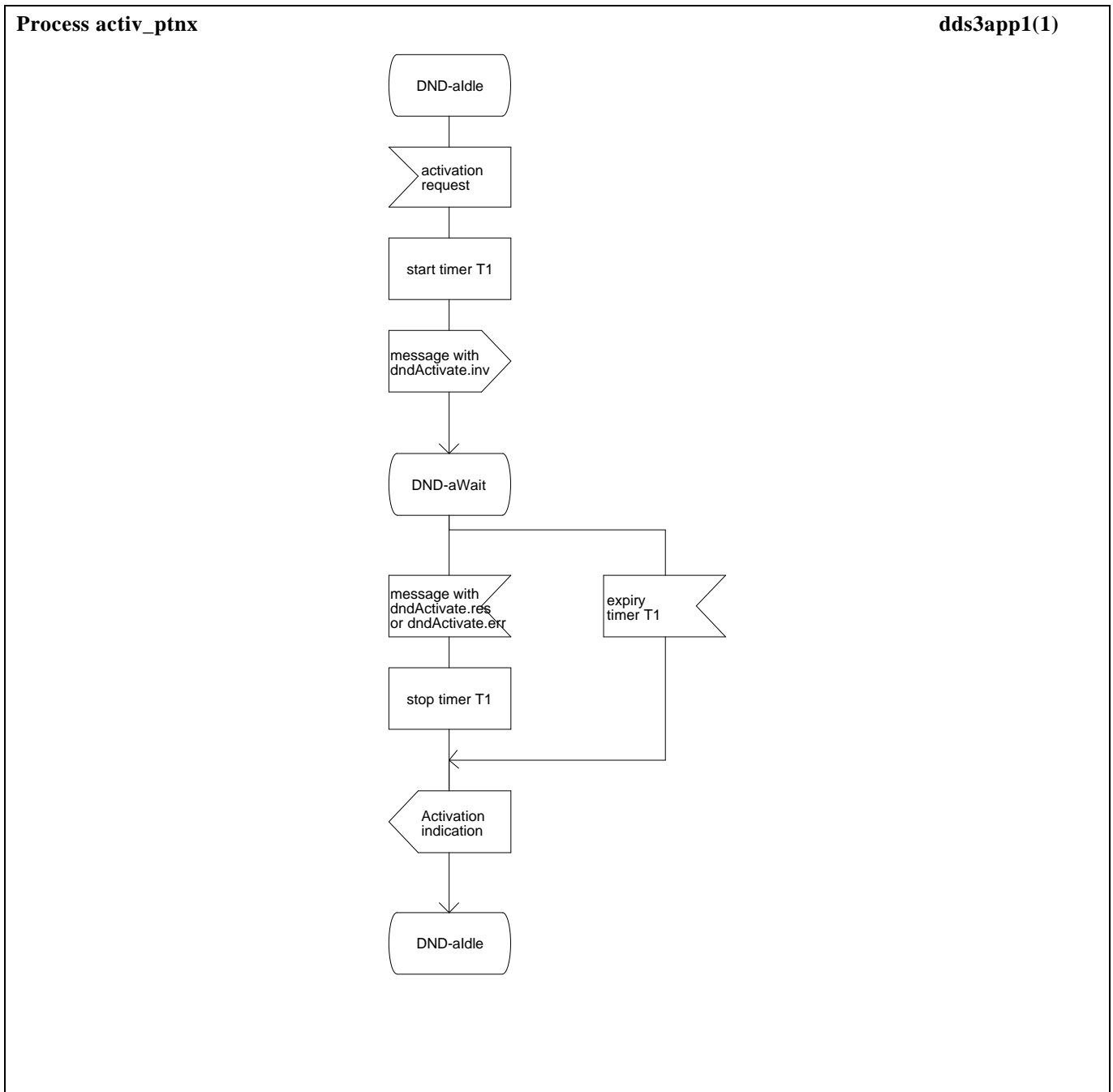


Figure E.3 - Activating PTNX behaviour

E.4 SDL representation of SS-DND at a Deactivating PTNX

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

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.

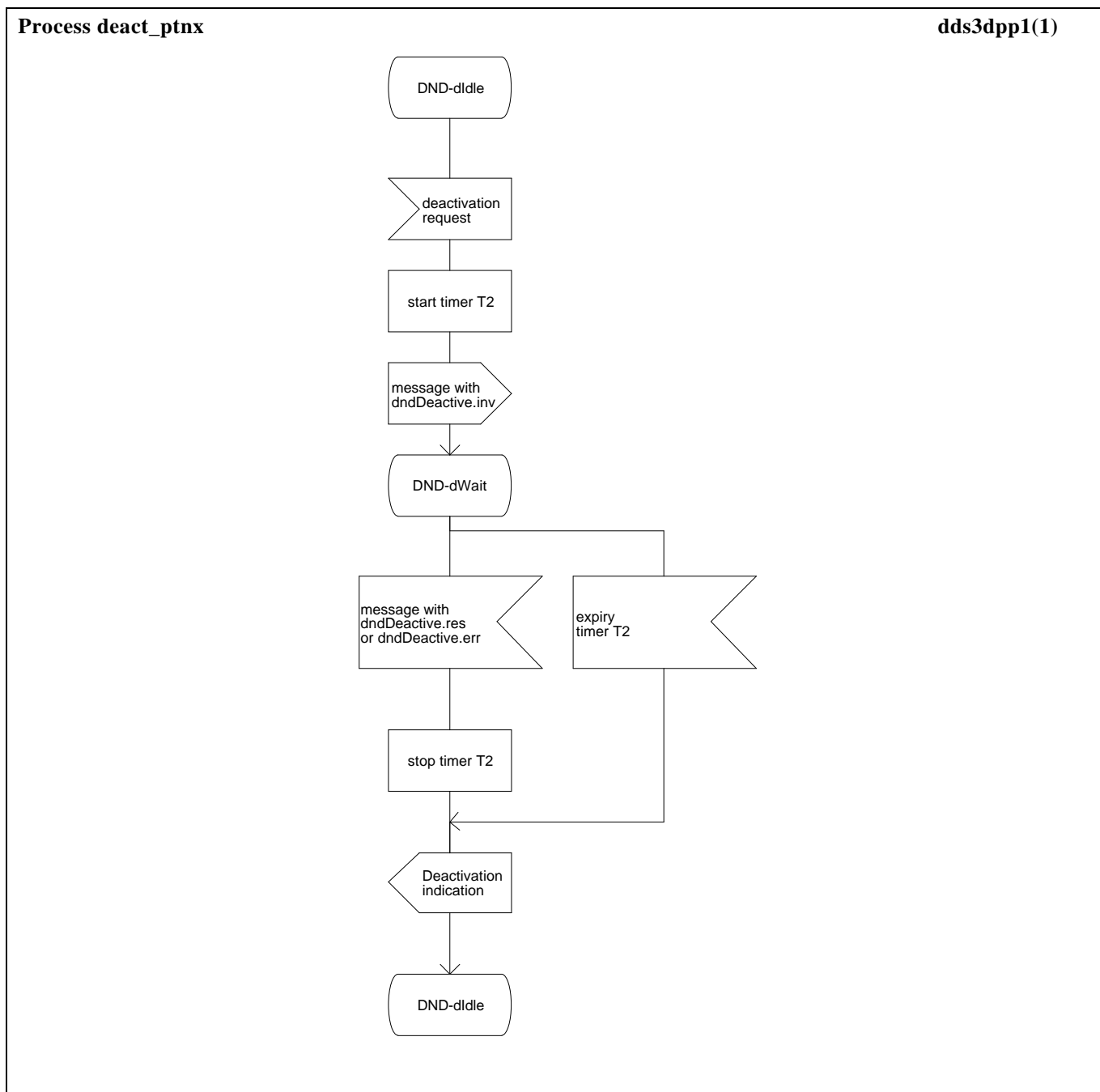


Figure E.4 - Deactivating PTNX behaviour

E.5 SDL representation of SS-DND at an Interrogating PTNX

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

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.

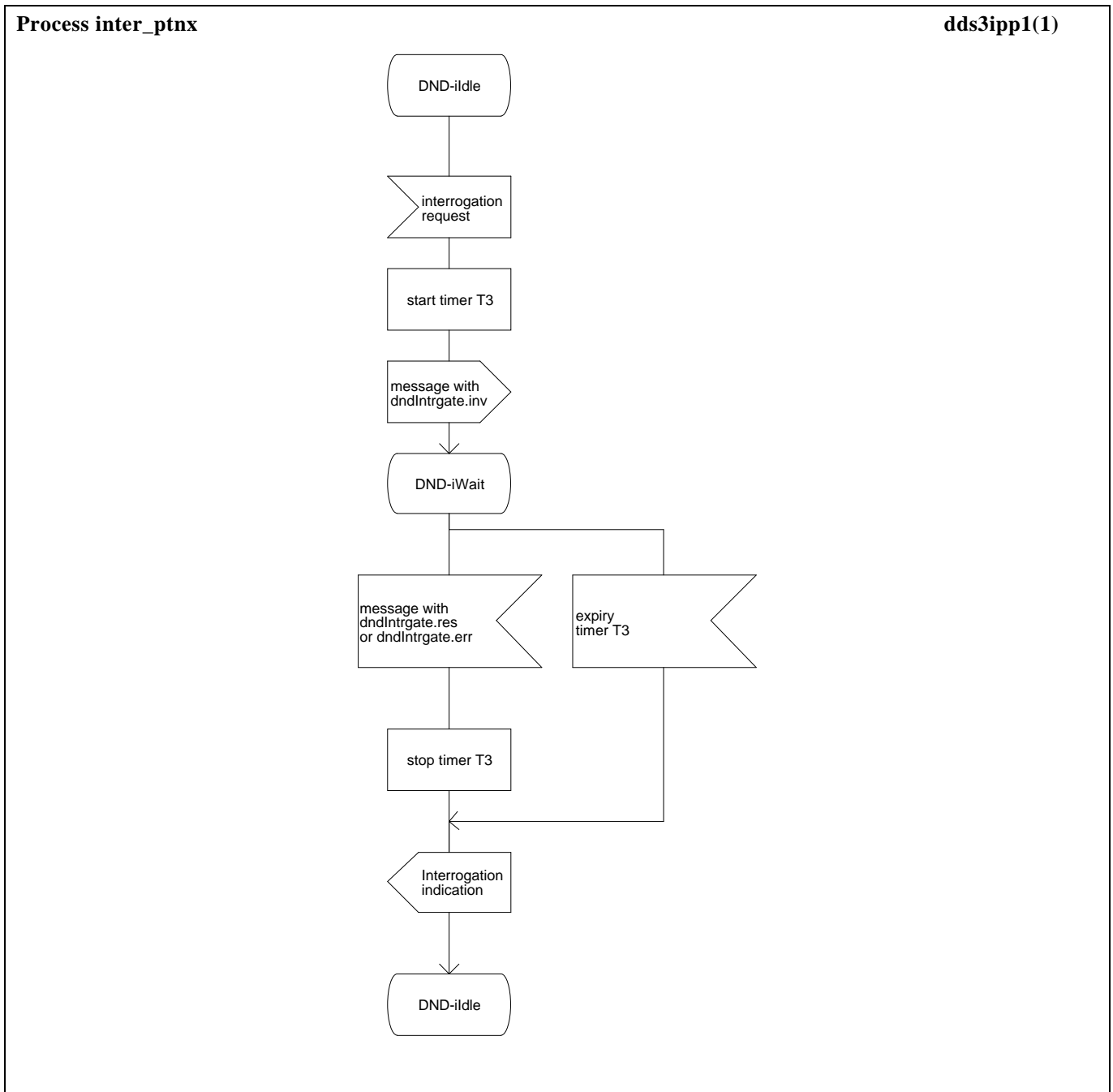


Figure E.5 - Interrogating PTNX behaviour

E.6 SDL representation of SS-DND at a Served User PTNX

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

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

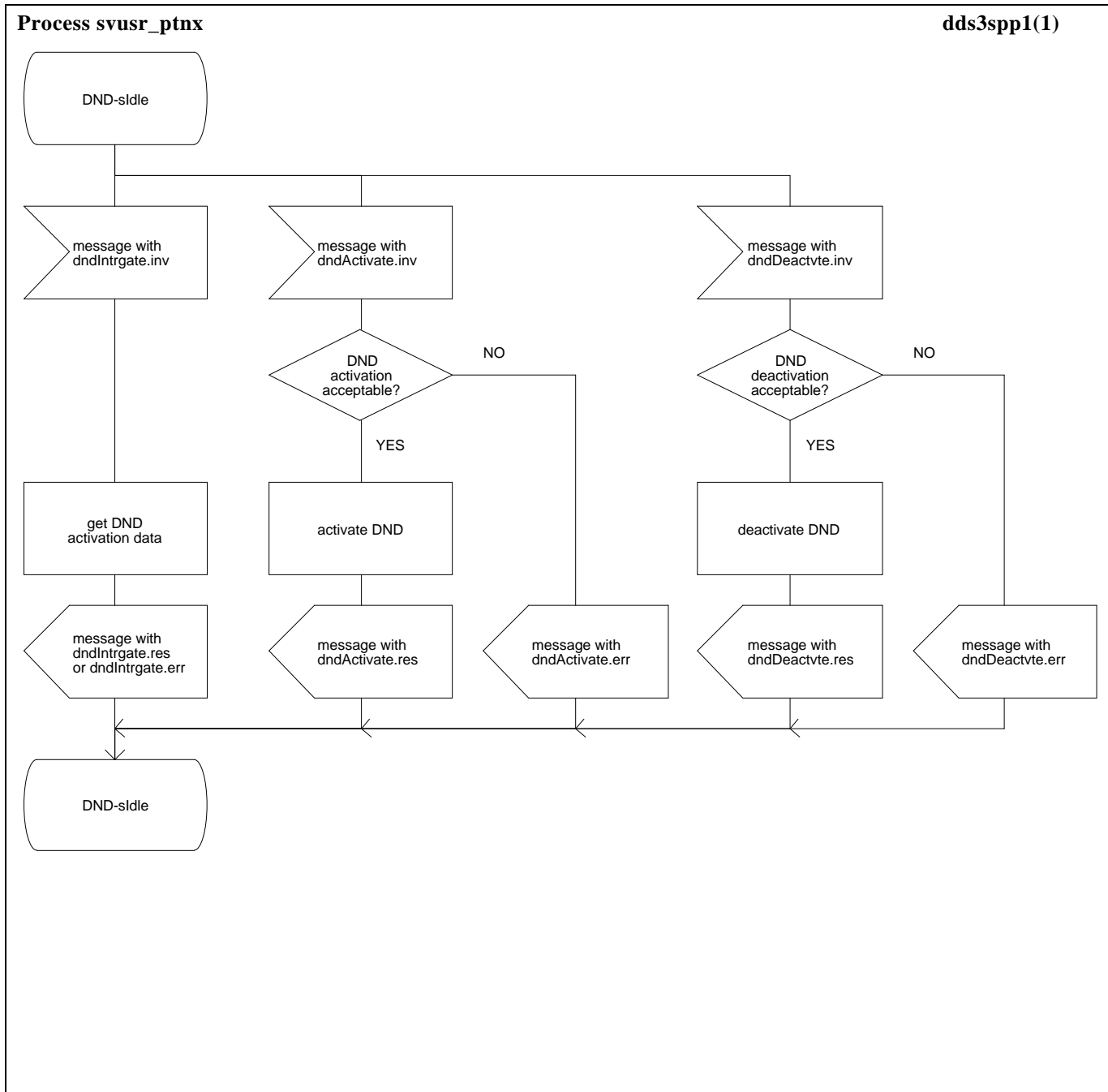


Figure E.6 - Served User PTNX behaviour

History

Document history	
November 1994	First Edition
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