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Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Call Interception additional network feature

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseau privé à intégration de services — Protocole de signalisation d'interéchange — Facilité de réseau additionnelle d'interception d'appel

Reference number
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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 15054 was prepared by ECMA (as ECMA-221) 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 15054:1997), 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 Call Interception additional network feature. 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 — Call Interception additional network feature

1 Scope

This International Standard specifies the signalling protocol for the support of the additional network feature Call Interception (ANF-CINT) at the Q reference point between Private Integrated services Network eXchanges (PINX) connected together within a Private Integrated Services Network (PISN).

ANF-CINT is an additional network feature which enables calls that cannot be completed due to certain conditions to be redirected to a predetermined intercepted-to user.

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 15053.

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

This International Standard also specifies additional signalling protocol requirements for the support of interactions at the Q reference point between ANF-CINT 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 A.

Conformance to this International Standard includes conforming to those clauses that specify protocol interactions between ANF-CINT and other supplementary services and ANFs for which signalling protocols at the Q reference point are supported in accordance with the stage 3 standards concerned.

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)*

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*

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ISO/IEC 13868:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Name Identification supplementary services*

ISO/IEC 13869:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call Transfer supplementary service*

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 15050:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Advice Of Charge supplementary services*

ISO/IEC 15052:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Recall supplementary service*

ISO/IEC 15053:2003, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Call Interception additional network feature*

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. 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)
- End PINX (ISO/IEC 11582)
- Incoming Gateway PINX (ISO/IEC 11572)
- Outgoing Gateway PINX (ISO/IEC 11572)
- Originating PINX (ISO/IEC 11572)
- Preceding PINX (ISO/IEC 11572)
- Private Integrated Services Network (PISN) (ISO/IEC 11579-1)
- Private Integrated services Network eXchange (PINX) (ISO/IEC 11579-1)
- Signalling (ITU-T Rec. I.112)
- Subsequent PINX (ISO/IEC 11572)
- Supplementary Service (ITU-T Rec. I.210)
- Supplementary Service Control Entity (ISO/IEC 11582)
- Terminating PINX (ISO/IEC 11572)
- Transit PINX (ISO/IEC 11572)
- User (ISO/IEC 11574)

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4.2 Other definitions

4.2.1 Forward switching

Network routeing algorithm which performs the interception by joining together the first connection from the calling user to the Intercepting PINX and the new connection from the Intercepting PINX to the intercepted-to user.

4.2.2 Intercepting PINX

The PINX where the interception is invoked.

4.2.3 Intercepted-to PINX

The PINX serving the intercepted-to user.

4.2.4 Intercepted-to user

The user to whom the intercepted call is directed.

4.2.5 Interception immediate

The redirection of a call to an alternative destination as a result of detecting a call failure condition that prevents the call reaching an alerting or waiting on busy state.

4.2.6 Interception delayed

The redirection of a call to an alternative destination as a result of remaining too long in an alerting or waiting on busy state.

4.2.7 Call failure

In the context of a particular PINX, the inability to route a call or, having routed a call, the receipt of a call clearing message from the Subsequent PINX without the call having reached an alerting or waiting on busy state.

4.2.8 Waiting on busy

A call state in which a call is awaiting answer at a user that is busy on another call.

NOTE - This can arise, for example, as a result of the use of supplementary service Call Offer (SS-CO) during call establishment. A call that is waiting on busy can be transferred.

5 List of acronyms

ANF	Additional Network Feature
APDU	Application Protocol Data Unit
ASN.1	Abstract Syntax Notation no. 1
CINT	Call Interception
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	Supplementary Services

6 Signalling protocol for the support of ANF-CINT

6.1 ANF-CINT description

ANF-CINT is invoked for an unanswered or unsuccessful call, allowing the call to be routed to a special destination in the PISN. The special destination may be dependant of the interception cause.

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The conditions leading to invocation of ANF-CINT are considered as implementation options. Examples of factors that can be taken in to account are:

– the source of the call (e.g. the geographic location of the calling user, the network from which the call has entered the PISN);

– the particular interception cause;

– the type of connection (e.g. the originating user is an attendant);

– the call destination;

– time of the day.

6.2 ANF-CINT operational requirements

6.2.1 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.

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.

6.2.3 Requirements on an Intercepted-to 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.

6.2.4 Requirements on a Transit PINX

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

Generic procedures for the call-related control of supplementary services, as specified in ISO/IEC 11582 for a Transit PINX, shall apply.

6.2.5 Requirements on an Intercepting 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.

Where, as a result of invocation of ANF-CINT, an Intercepting PINX can become a Transit PINX, generic procedures for the call-related control of supplementary services, as specified in ISO/IEC 11582 for a Transit PINX, shall apply.

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6.3 ANF-CINT 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 D.

In addition the operation divertingLegInformation3, as defined in ISO/IEC 13873, shall apply.

Table 1 - Operations in Support of ANF-CINT

```
Call-Interception-Operations-asn1-97 {iso (1) standard (0) pss1-cint (15054) cint-operations-asn1-97 (1) }

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)}

                     PartyNumber, PresentedNumberUnscreened, PresentationAllowedIndicator
                     FROM Addressing-Data-Elements-asn1-97
                     {iso (1) standard (0) pss1-generic-procedures (11582)
                     addressing-data-elements-asn1-97 (20)}

                     Name FROM Name-Operations-asn1-97
                     {iso (1) standard (0) pss1-name (13868) name-operations-asn1-97 (1)};

Call-Interception-Operations OPERATION ::= { cintLegInformation1 | cintLegInformation2 | cintCondition |
cintDisable | cintEnable}


cintLegInformation1  OPERATION ::= {
                          -- Sent from the Intercepting PINX to the Originating PINX --
                          ARGUMENT             CintInformation1Arg
                          RETURN RESULT        FALSE
                          ALWAYS RESPONDS      FALSE
                          CODE                 local: 66}


cintLegInformation2  OPERATION ::= {
                          -- Sent from the Intercepting PINX to the Intercepted-to PINX --
                          ARGUMENT             CintInformation2Arg
                          RETURN RESULT        FALSE
                          ALWAYS RESPONDS      FALSE
                          CODE                 local: 67}
```

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Table 1 - Operations in Support of ANF-CINT (continued)

```
cintCondition           OPERATION ::= {
                                -- Sent to a preceding PINX to indicate a condition for possible interception
                                ARGUMENT            CintCondArg
                                RETURN RESULT       FALSE
                                ALWAYS RESPONDS     FALSE
                                CODE                local: 68}

cintDisable             OPERATION ::= {
                                -- Sent to a Preceding PINX to disable interception delayed --
                                ARGUMENT    CintExtension
                                RETURN RESULT       FALSE
                                ALWAYS RESPONDS     FALSE
                                CODE                local: 69}

cintEnable              OPERATION  ::= {
                                -- Sent to a Preceding PINX to reenable interception --
                                ARGUMENT    CintExtension
                                RETURN RESULT       FALSE
                                ALWAYS RESPONDS     FALSE
                                CODE                local: 70}

CintInformation1Arg     ::=     SEQUENCE
                                {
                                interceptionCause           CintCause,
                                interceptedToNumber         PartyNumber,
                                extension                   CintExtension OPTIONAL
                                }

CintInformation2Arg     ::=     SEQUENCE
                                {
                                interceptionCause       CintCause,
                                calledNumber            [1]PresentedNumberUnscreened OPTIONAL,
                                originalCalledNumber    [2]PresentedNumberUnscreened OPTIONAL,
                                calledName              [3]Name OPTIONAL,
                                originalCalledName      [4]Name OPTIONAL,
                                extension               CintExtension OPTIONAL
                                }


CintCondArg             ::=     SEQUENCE
                                {
                                interceptionCause       Condition,
                                originalCalledNumber    [1]PresentedNumberUnscreened OPTIONAL,
                                calledName              [2]Name OPTIONAL,
                                originalCalledName      [3]Name OPTIONAL,
                                extension               CintExtension OPTIONAL
                                }

CintExtension           ::=     CHOICE
                                {
                                none            NULL,
                                single          [5] IMPLICIT Extension{{CINTExtSet}},
                                multiple        [6] IMPLICIT SEQUENCE OF Extension{{CINTExtSet}}
                                }
```


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Table 1 - Operations in Support of ANF-CINT (concluded)

```
CintCause       ::=     INTEGER  {
                        unknown         (0),
                        cintBnan        (1),    -- timeout in waiting on busy condition
                        cintBus         (2),    -- busy user
                        cintCug         (3),    -- closed user group rejection
                        cintDnd         (4),    -- do not disturb activated
                        cintIbd         (5),    -- incoming barred destination
                        cintInn         (6),    -- invalid number
                        cintMob1        (7),    -- mobile user location not known
                        cintMob2        (8),    -- mobile user no longer registered
                        cintMob3        (9),    -- mobile terminal not responding
                        cintNcmp        (10),   -- no compatible destination
                        cintNcong       (11),   -- network congestion
                        cintNre         (12),   -- no reply (i.e. timeout during alerting)
                        cintOos         (13),   -- called user out of service
                        cintRrs         (14),   -- route restriction (calling user not authorized for
                                                -- the route)
                        cintTbnan       (15),   -- timeout in wait on busy condition after transfer
                        cintTnre        (16),   -- no reply after transfer (i.e. timeout during alerting
                                                -- after transfer
                        cintTrans       (17),   -- upper limit of transit counter reached
                        cintUpl         (18),   -- upper limit of number of diversions reached
                        cintInvDiv      (19),   -- invalid call diversion destination
                        cintHold        (20)    -- timeout after call hold
                        } (0..127)


Condition       ::=     INTEGER  {
                        unknown         (0),
                        cintBus         (2),    -- busy user
                        cintCug         (3),    -- closed user group rejection
                        cintDnd         (4),    -- do not disturb activated
                        cintIbd         (5),    -- incoming barred destination
                        cintInn         (6),    -- invalid number
                        cintMob1        (7),    -- mobile user location not known
                        cintMob2        (8),    -- mobile user no longer registered
                        cintMob3        (9),    -- mobile terminal not responding
                        cintNcmp        (10),   -- no compatible destination
                        cintNcong       (11),   -- network congestion
                        cintOos         (13),   -- called user out of service
                        cintRrs         (14),   -- route restriction (calling user not authorized for
                                                -- the route
                        cintTrans       (17),   -- upper limit of transit counter reached
                        cintUpl         (18),   -- upper limit of number of diversions
                                                -- reached
                        cintInvDiv      (19)    -- invalid call diversion destination
                        } (0..127)

CINTExtSet EXTENSION ::= {…}

END     -- of Call-Interception-Operations-asn1-97
```

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6.3.2 Information elements

6.3.2.1 Facility information element

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

When conveying the invoke APDU of the operations defined in 6.3.1 except for cintCondition, the destinationEntity data element of the NFE shall contain value endPINX.

When conveying the invoke APDU of operation cintCondition, the destinationEntity data element of the NFE shall contain value anyTypeOfPINX.

When conveying invoke APDUs of the operations defined in 6.3.1. the Interpretation APDU shall be included and shall contain the value discardAnyUnrecognisedInvokePdu.

6.3.2.2 Other information elements

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

6.3.3 Messages

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

6.4 ANF-CINT state definitions

6.4.1 States at the Originating PINX

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

6.4.1.1 State CINT-orig-idle

Call interception is not in progress.

6.4.2 States at the Intercepting PINX

The procedures for the Intercepting PINX are written in terms of the following conceptual states existing within the ANF-CINT Supplementary Service Control entity in that PINX in association with a particular call.

6.4.2.1 State CINT-intrcp-idle

Call interception is not in progress.

6.4.2.2 State CINT-intercepting

Interception delayed is in progress.

6.4.3 States at the Intercepted-to PINX

The procedures for the Intercepted-to PINX are written in terms of the following conceptual states existing within the ANF-CINT Supplementary Service Control entity in that PINX in association with a particular call.

6.4.3.1 State CINT-intrcpto-idle

ANF-CINT is not in progress.

6.4.3.2 State CINT-intrcpto-presented

An intercepted call has arrived and the PINX is waiting for valid presentation restriction information to become available.

6.4.4 States at a Transit PINX

6.4.4.1 State CINT-transit-idle

ANF-CINT is not in progress.

6.4.5 States at the Terminating PINX

6.4.5.1 State CINT-term-idle

ANF-CINT is not in progress.

6.5 ANF-CINT Signalling procedures for activation, deactivation, registration and interrogation

Not applicable.

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6.6 ANF-CINT Signalling procedures for invocation and operation

Examples of message sequences are shown in annex B.

6.6.1 Actions at a Terminating PINX

The SDL representation of procedures at the Terminating PINX is shown in C.4 of annex C.

If call failure is detected, the Terminating PINX, instead of initiating call clearing towards the preceding PINX, may invoke interception immediate in accordance with the procedures of 6.6.4.

If call failure is detected and interception immediate is not invoked, the Terminating PINX may send a cintCondition invoke APDU in the DISCONNECT message or, if an in-band tone or announcement is applied, in the PROGRESS message.

When the Terminating PINX sends an ALERTING, PROGRESS or FACILITY message indicating that the call is entering an alerting or waiting on busy state and if the Terminating PINX is to become the Intercepting PINX for interception delayed, it shall:

i) send a cintDisable invoke APDU in the ALERTING, PROGRESS or FACILITY message; and

ii) if the call remains unanswered for an implementation-dependent length of time, invoke interception delayed in accordance with the procedures of 6.6.5.

NOTE - The sending of a cintDisable invoke APDU prevents another PINX becoming the Intercepting PINX.

When a call enters an alerting or waiting on busy state, if the Terminating PINX is not to become the Intercepting PINX and requires that interception delayed be disabled, it shall send a cintDisable invoke APDU in the ALERTING, PROGRESS or FACILITY message.

During an alerting or waiting on busy state, if a cintDisable invoke APDU has previously been sent and there is a need to reenable interception delayed, then a cintEnable invoke APDU shall be sent in a FACILITY or ALERTING message.

6.6.2 Actions at a Transit PINX

The SDL representation of procedures at the Transit PINX is shown in C.5 of annex C.

On receipt of a cintCondition invoke APDU from the subsequent PINX in conjunction with a call failure, a Transit PINX may take note of the condition indicated with a view to possible interception immediate.

If call failure is detected, whether or not a cintCondition invoke APDU has been received, a Transit PINX, instead of continuing call clearing towards the Preceding PINX, may invoke interception immediate in accordance with the procedures of 6.6.4, provided that the Transit PINX has not already relayed on any APDUs from the Subsequent PINX to the Preceding PINX.

If call failure is detected, interception immediate is not invoked and a cintCondition invoke APDU has been received from the Subsequent PINX, a cintCondition invoke APDU containing the same interception cause shall be sent in the DISCONNECT or PROGRESS message, as received from the Subsequent PINX, to the Preceding PINX. If call failure is detected, interception immediate is not invoked and a cintCondition invoke APDU has not been received from the Subsequent PINX, a cintCondition invoke APDU may be sent in the DISCONNECT message to the Preceding PINX.

6.6.3 Actions at the Originating PINX

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

On receipt of a cintCondition invoke APDU from the subsequent PINX in conjunction with a call failure, the Originating PINX may take note of the condition indicated with a view to possible interception immediate.

If call failure is detected, whether or not a cintCondition invoke APDU has been received, the Originating PINX may, instead of indicating call failure to the calling user, invoke interception immediate in accordance with the procedures of 6.6.4.

On receipt of a cintDisable invoke APDU in an ALERTING, PROGRESS or FACILITY message, the Originating PINX shall disable interception delayed for the call concerned.

On receipt of a cintEnable invoke APDU in a FACILITY or ALERTING message, the Originating PINX shall cancel the effect of any previously received cintDisable invoke APDU.

When a call remains unanswered in an alerting or waiting on busy state for an implementation-dependent length of time, the Originating PINX may invoke interception delayed in accordance with the procedures of 6.6.5, provided that interception delayed is not disabled.

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On receipt of a cintLegInformation1 invoke APDU in an ALERTING or CONNECT message or in a FACILITY message prior to receipt of a CONNECT message, the Originating PINX shall take account of the information therein. Provided this is the first cintLegInformation1 invoke APDU received or an alerting or waiting on busy state has been reached, the Originating PINX shall inform the calling user of the interception if the capability exists. The intercepted-to number shall not be presented to the calling user at this stage. When the cintLegInformation1 invoke APDU has been received in an ALERTING or CONNECT message, a divertingLegInformation3 invoke APDU in the same message shall be handled as specified below.

After having received at least one cintLegInformation1 invoke APDU, on receipt of a divertingLegInformation3 invoke APDU in an ALERTING or CONNECT message or in a FACILITY message prior to receipt of a CONNECT message, the Originating PINX shall take account of the information therein. The intercepted-to number, as received in the last cintLegInformation1 invoke APDU, shall be presented to the calling user if the capability exists and if element presentationIndicator in the divertingLegInformation3 invoke APDU has the value TRUE. If the divertingLegInformation3 invoke APDU contains element redirectionName, name information may be presented to the calling user if the name information is not marked as presentation restricted in the divertingLegInformation3 invoke APDU.

6.6.4 Actions at an Intercepting PINX for interception immediate

The SDL representation of procedures at the Intercepting PINX is shown in C.2 of annex C.

The following procedures apply to an Originating PINX, a Transit PINX or a Terminating PINX that invokes interception immediate. In the case where the Originating PINX invokes interception immediate, messages specified in this clause and in 6.6.3 as being sent between the Intercepting PINX and the Originating PINX will be an intra-PINX communication and will not appear on any inter-PINX link. In the case where the Intercepting PINX is also the Intercepted-to PINX, messages specified in this clause and in 6.6.6 as being sent between the Intercepting PINX and the Intercepted-to PINX will be an intra-PINX communication and will not appear on any inter-PINX link.

6.6.4.1 Normal procedures

When interception immediate is invoked, the Intercepting PINX shall initiate a new call to the intercepted-to user. The SETUP message shall include a cintLegInformation2 invoke APDU.

The following basic call information elements shall be included in the SETUP message:

– Called party number containing the number of the intercepted-to user;

– Bearer capability, High layer compatibility, Low layer compatibility, Progress indicator as received in the incoming SETUP message;

– Calling party number if received in the incoming SETUP message;

– Calling party subaddress if received in the incoming SETUP message.

The ARGUMENT of the cintLegInformation2 invoke APDU shall contain the following information:

– the interception cause in element interceptionCause;

– if available, the number of the called user in element calledNumber;

– if available, the called user’s name information in element calledName;

– if the call has been diverted prior to interception and if available, the original called number information in element originalCalledNumber and/or the original called name information in element originalCalledName.

No divertingLegInformation2 invoke APDU shall be included in the transmitted SETUP message.

Any other APDUs in the received SETUP message shall be included in the transmitted SETUP message, unless specified to the contrary as part of a protocol interaction requirement.

The Intercepting PINX shall also send a cintLegInformation1 invoke APDU in a FACILITY message to the Originating PINX. Interception immediate shall then be considered complete and the call to the intercepted-to user shall continue in accordance with basic call procedures.

NOTE 1 - After interception, the Intercepting PINX will pass on transparently a divertingLegInformation3 invoke APDU from the Intercepted-to PINX to the Originating PINX in accordance with the procedures of ISO/IEC 11582.

NOTE 2 - If, after interception immediate, a further call failure is detected, this can result in a further invocation of interception immediate or the clearing of the call.

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6.6.4.2 Exceptional procedures

If the Intercepting PINX is unable to initiate a new call to the intercepted-to user, call clearing shall be resumed.

6.6.5 Actions at an Intercepting PINX for interception delayed

The SDL representation of procedures at the Intercepting PINX is shown in C.2 of annex C.

The following procedures apply to an Originating PINX or a Terminating PINX that invokes interception delayed. In the case where the Originating PINX invokes interception delayed, messages specified in this clause and in 6.6.3 as being sent between the Intercepting PINX and the Originating PINX will be an intra-PINX communication and will not appear on any inter-PINX link. In the case where the Intercepting PINX is also the Intercepted-to PINX, messages specified in this clause and in 6.6.6 as being sent between the Intercepting PINX and the Intercepted-to PINX will be an intra-PINX communication and will not appear on any inter-PINX link.

6.6.5.1 Normal procedures

When interception delayed is invoked, the Intercepting PINX shall initiate a new call to the intercepted-to user. The SETUP message shall include a cintLegInformation2 invoke APDU.

The following basic call information elements shall be included in the SETUP message:

- Called party number containing the number of the intercepted-to user;
- Bearer capability, High layer compatibility, Low layer compatibility, Progress indicator as received in the incoming SETUP message;
- Calling party number as received in the incoming SETUP message;
- Calling party subaddress if received in the incoming SETUP message.

The ARGUMENT of the cintLegInformation2 invoke APDU shall contain the following information:

- the interception cause in element interceptionCause;
- if available, the number of the called user in element calledNumber;
- if available, the called user's name information in element calledName;
- if the call has been diverted prior to interception and if available, the original called number information in element originalCalledNumber and/or the original called name information in element originalCalledName.

No divertingLegInformation2 invoke APDU shall be included in the transmitted SETUP message.

Any other APDUs in the received SETUP message shall be included in the transmitted SETUP message, unless specified to the contrary as part of a protocol interaction requirement.

The Intercepting PINX shall then enter state CINT-intercepting.

In state CINT-intercepting, on receipt of an ALERTING message from the Intercepted-to PINX, the Intercepting PINX shall send a cintLegInformation1 invoke APDU in a FACILITY message or, if an ALERTING message is to be sent, in the ALERTING message to the Originating PINX, release the call towards the called user, connect the call from the calling user to the newly established call to the intercepted-to user, and enter state CINT-idle. Interception delayed shall then be considered completed and the call to the intercepted-to user shall continue in accordance with basic call procedures.

As an implementation option, the leg towards the called user may be retained until the reception of a CONNECT message. Further procedures in this case are outside the scope of the International Standard.

NOTE - The Intercepting PINX will pass on transparently a divertingLegInformation3 invoke APDU from the Intercepted-to PINX to the Originating PINX in accordance with the procedures of ISO/IEC 11582. If a divertingLegInformation3 invoke APDU is present in the ALERTING message, this will be sent in a FACILITY or in an ALERTING message to the Originating PINX.

In state CINT-intercepting, on receipt of a CONNECT message from the Intercepted-to PINX, the Intercepting PINX shall send a cintLegInformation1 invoke APDU in a CONNECT message to the Originating PINX, release the call towards the called user, connect the call from the calling user to the newly established call to the intercepted-to user, and enter state CINT-idle. Interception delayed shall then be considered complete and the call to the intercepted-to user shall continue in accordance with basic call procedures.

NOTE 1 - The Intercepting PINX will pass on transparently a divertingLegInformation3 invoke APDU from the Intercepted-to PINX to the Originating PINX in accordance with the procedures of ISO/IEC 11582.

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NOTE 2 - If, after interception delayed, the call still fails to be answered, this can result in a further invocation of interception delayed.

In state CINT-intercepting, on receipt of a cintLegInformation1 invoke APDU on the call to the intercepted-to user (indicating a further interception by another PINX involved in that call), the Intercepting PINX shall retain the new intercepted-to number and use it as the intercepted-to number in the cintLegInformation1 invoke APDU sent to the Originating PINX in the event that an ALERTING or CONNECT message is subsequently received from the Intercepted-to PINX. However, the interception cause received in the cintLegInformation1 invoke APDU shall not be retained for use in the cintLegInformation1 invoke APDU to the Originating PINX.

6.6.5.2 Exceptional procedures

If the Intercepting PINX does not succeed in establishing a new call to the intercepted-to user, interception delayed shall be aborted, and the call shall remain alerting or waiting on busy at the called user. If the PINX has already entered state CINT-intercepting it shall return to state CINT-idle.

In state CINT-intercepting, if a CONNECT message is received from the Terminating PINX, the Intercepting PINX shall clear the call towards the intercepted-to user and enter state CINT-idle. Further processing of the CONNECT message shall be in accordance with ISO/IEC 11572.

In state CINT-intercepting, if a call clearing message is received from the Originating PINX, the Intercepting PINX shall clear the call towards the intercepted-to user and enter state CINT-idle. Further processing of the call clearing message shall be in accordance with ISO/IEC 11572.

6.6.6 Actions at an Intercepted-to PINX

The SDL representation of procedures at the Intercepted-to PINX is shown in C.3 of annex C.

6.6.6.1 Normal procedures

On receipt of a SETUP message with a cintLegInformation2 invoke APDU, the Intercepted-to PINX shall execute the following actions:

– send a notification of interception together with other relevant information received in the invoke APDU to the intercepted-to user, if able and authorised to receive this notification; and

– enter state CINT-intrcpto-presented and wait for the presentation restriction information from the intercepted-to user.

In state CINT-intrcpto-presented, when it is known whether presentation restriction applies to the intercepted-to user's number, the Intercepted-to PINX shall execute the following actions:

– send to the Originating PINX a divertingLegInformation3 invoke APDU in a FACILITY, ALERTING or CONNECT message. This information shall indicate whether the presentation of the intercepted-to number is restricted and may also indicate the name of the intercepted-to user in element interceptedToName and whether its presentation is restricted.

– The Intercepted-to PINX shall not send a FACILITY message with a divertingLegInformation3 invoke APDU unless an ALERTING message has already been sent or a FACILITY or PROGRESS message has been sent indicating that the call is waiting on busy as result of a supplementary service. The APDU shall be sent in the CONNECT message if it has not already been sent in a FACILITY or ALERTING message.

– enter state CINT-intrcpto-idle.

6.6.6.2 Exceptional procedures

On call clearing during state CINT-intrcpto-presented, the Intercepted-to PINX shall enter state CINT-intrcpto-idle.

6.7 ANF-CINT Impact of interworking with a public ISDN

6.7.1 Incoming Gateway PINX

The requirements of 6.6.3 (for an Originating PINX) shall apply.

6.7.2 Outgoing Gateway PINX

The requirements of 6.6.1 (for a Terminating PINX) shall apply.

When the Outgoing Gateway PINX also provides Intercepted-to PINX functionality, in support of call interception, the requirements of 6.6.6 shall apply.

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6.8 ANF-CINT Impact of interworking with a non-ISDN

6.8.1 Incoming Gateway PINX

When interworking with another network which supports an equivalent additional network feature, the incoming Gateway PINX may provide conversion between the signalling specified in this International Standard and the signalling protocol of the other network.

When interworking with another network that does not support an equivalent additional network feature, the requirements of 6.6.3 (for an Originating PINX) shall apply.

6.8.2 Outgoing Gateway PINX

When interworking with another network which supports an equivalent additional network feature, the outgoing Gateway PINX may provide conversion between the signalling specified in this International Standard and the signalling protocol of the other network.

When interworking with another network that does not support an equivalent additional network feature, the requirements of 6.7.2 shall apply.

6.9 Protocol interaction between ANF-CINT and other supplementary services and ANFs

This clause specifies protocol interactions with 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 - Simultaneous conveyance of APDUs for ANF-CINT 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.

6.9.1 Interaction with Calling Name Identification Presentation (SS-CNIP)

No interactions.

6.9.2 Interaction with Connected Name Identification Presentation (SS-CONP)

No interactions.

6.9.3 Interaction with Call Forwarding Unconditional (SS-CFU)

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

6.9.3.1 CFU has been encountered before the call is intercepted

6.9.3.1.1 Actions at the Diverted-to PINX

The information elements originalCalledNr and originalCalledName, if present in the received divertingLegInformation2 invoke APDU, shall be included in the argument of the cintCondition invoke APDU if this APDU is sent.

6.9.3.1.2 Actions at the Intercepting PINX

The interaction is described in clauses 6.6.4 and 6.6.5 of this document.

6.9.3.1.3 Actions at the Intercepted-to PINX

The interaction is described in clause 6.6.6 of this document.

6.9.3.2 CFU is encountered after the call has been intercepted

6.9.3.2.1 Actions at the served user / Intercepted-to PINX

When SS-CFU is invoked following receipt of a SETUP message containing a cintLegInformation2 invoke APDU, the FACILITY message conveying the callRerouting invoke APDU shall include the received cintLegInformation2 invoke APDU without elements originalCalledNumber and originalCalledName.

The elements originalCalledNumber and originalCalledName, received in the cintLegInformation2 invoke APDU, shall be included in the callRerouting invoke APDU.

6.9.3.2.2 Actions at the Rerouteing PINX

When executing SS-CFU, the Rerouteing PINX shall include a cintLegInformation2 invoke APDU in the SETUP message to the Diverted-to PINX, if present in the FACILITY message in which the callRerouting invoke APDU was received.

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6.9.3.2.3 Actions at the Diverted-to PINX

The procedures of ISO/IEC 13873 for a Diverted-to PINX shall apply. In addition, the PINX shall send a notification of interception together with other relevant information received in the cintLegInformation2 invoke APDU to the diverted-to user, if able and authorised to receive this information. Apart from this notification, the procedures of 6.6.6.1 of this International Standard shall apply.

6.9.3.2.4 Actions at the Intercepting PINX for interception delayed

In state CINT-intercepting, on receipt of a divertingLegInformation1 invoke APDU on the call to the intercepted-to user, the Intercepting PINX shall retain the diverted-to number and use it as the intercepted-to number in the cintLegInformation1 invoke APDU sent to the Originating PINX in the event that an ALERTING or CONNECT message is subsequently received from the Diverted-to PINX. The interception cause sent in the cintLegInformation1 invoke APDU shall not be affected by the diversion.

In state CINT-intercepting, on receipt of a callRerouting invoke APDU on the call to the intercepted-to user, the Intercepting PINX shall also act as the Rerouteing PINX in accordance with the procedures of ISO/IEC 13873. However, the PINX shall not send a divertingLegInformation1 invoke APDU but shall instead retain the diverted-to number and use it as the intercepted-to number in the cintLegInformation1 invoke APDU sent to the Originating PINX in the event that an ALERTING or CONNECT message is subsequently received from the Diverted-to PINX. The interception cause sent in the cintLegInformation1 invoke APDU shall not be affected by the diversion.

6.9.3.3 Actions at the Originating PINX

If both ANF-CINT and SS-CFU are in progress at the Originating PINX, a received divertingLegInformation3 invoke APDU shall be processed in accordance with 6.6.3 of this International Standard and 6.5.1 of ISO/IEC 13873.

6.9.4 Interaction with Call Forwarding Busy (SS-CFB)

If SS-CFB is supported in accordance with ISO/IEC 13873, the procedures specified in 6.9.3 of this International Standard shall apply, with SS-CFU replaced by SS-CFB.

6.9.5 Interaction with Call Forwarding No Reply (SS-CFNR)

If SS-CFNR is supported in accordance with ISO/IEC 13873, the procedures specified in 6.9.3 of this International Standard, with the exception of 6.9.3.2.4, shall apply with SS-CFU replaced by SS-CFNR.

In addition, if in state CINT-intercepting at an Intercepting PINX a callRerouting invoke APDU is received from the called user's PINX (with value cfnr in element reroutingReason), the decision to reject SS-CFNR (by sending a callRerouting return error APDU) or to abort interception and proceed with SS-CFNR is an implementation matter.

6.9.6 Interaction with Do Not Disturb (SS-DND)

No interactions.

6.9.7 Interaction with Do Not Disturb Override (SS-DNDO)

No interactions.

6.9.8 Interaction with Call Completion To Busy Subscriber (SS-CCBS)

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

6.9.8.1 Actions at the Originating PINX

If SS-CCBS is to be invoked at a busy intercepted-to user, the Originating PINX shall store the content of element interceptedToNumber received in the argument of operation cintLegInformation1, and use it:

– as element numberB in the argument of any SS-CCBS operation which requires this element;

– as the Called party number information element in the SETUP message of any call independent signalling connection;

– as the Called party number information element in the SETUP message of the CC Call.

The address of the called user before interception shall not be used for SS-CCBS.

6.9.9 Interaction with Call Completion On No Reply (SS-CCNR)

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

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6.9.9.1 Actions at the Originating PINX

If SS-CCNR is to be invoked at an alerting intercepted-to user, the Originating PINX shall store the content of element interceptedToNumber received in the argument of operation cintLegInformation1, and use it:

- as element numberB in the argument of any SS-CCNR operation which requires this element;
- as the Called party number information element in the SETUP message of any call independent signalling connection;
- as the Called party number information element in the SETUP message of the CC Call.

The address of the called user before interception shall not be used for SS-CCNR.

6.9.10 Interaction with Call Offer (SS-CO)

No interactions.

6.9.11 Interaction with Call Intrusion (SS-CI)

No interactions.

6.9.12 Interaction with Call Transfer (SS-CT)

The following interaction shall apply if SS-CT is supported in accordance with ISO/IEC 13869.

If interception delayed is invoked for an unanswered, transferred call (waiting on busy or alerting), either the Transferring PINX can act as the Intercepting PINX (call transfer by join only) or the Primary PINX can act as the Intercepting PINX or the Secondary PINX can act as the Intercepting PINX.

6.9.12.1 Actions at a Transferring PINX for rerouteing and ANF-CINT Originating PINX

The Transferring PINX shall not pass on a received cintLegInformation1 invoke APDU or divertingLegInformation3 invoke APDU after initiating call transfer by rerouteing.

The Transferring PINX shall not become an Intercepting PINX while involved in transfer by rerouteing.

6.9.12.2 Actions at a Transferring PINX for join or rerouteing and ANF-CINT Intercepting PINX

The Transferring PINX shall not initiate signalling for SS-CT while in state CINT-intercepting, but shall start signalling for SS-CT, when an ALERTING message or a CONNECT message (from called or intercepted-to user) is received.

6.9.12.3 Actions at a Secondary PINX for rerouteing and ANF-CINT Intercepting PINX

On receipt of a callTransferIdentify invoke APDU after initiating call interception, the Intercepting PINX shall send a callTransferIdentify return error APDU containing error value supplementaryServiceInteractionNotAllowed to the Transferring PINX.

The Secondary PINX shall not become an Intercepting PINX while involved in transfer by rerouteing.

6.9.12.4 Actions at a Secondary PINX for join and ANF-CINT Intercepting PINX

On receipt of a callTransferComplete, callTransferUpdate or subaddressTransfer invoke APDU after initiating call interception in the Secondary PINX, the Intercepting PINX shall not pass on the APDU to the Intercepted-to PINX while interception is in progress. After receipt of an ALERTING or CONNECT message from the Intercepted-to PINX and if the called user has not already answered the call, the information received in callTransferComplete, callTransferUpdate or subaddressTransfer invoke APDUs shall be passed on to the Intercepted-to PINX.

6.9.12.5 Actions at a Transferring PINX for join

In state CT-Await-Answer-From-UserC the Transferring PINX shall convey any received cintLegInformation1, divertingLegInformation3, cintEnable or cintDisable invoke APDUs from the Secondary PINX to the Primary PINX.

In state CT-Await-Answer-From-UserC, if call interception is invoked, any cintLegInformation1 invoke APDU generated in accordance with Intercepting PINX procedures shall be sent to the Primary PINX.

6.9.12.6 Actions at a Primary PINX for join

The actions at an Originating PINX specified in 6.6.3 for receipt of a cintLegInformation1, divertingLegInformation3, cintEnable or cintDisable invoke APDU and for invocation of interception delayed shall apply also to a Primary PINX that has received a callTransferComplete invoke APDU with element callStatus having the value “alerting” and has not received a callTransferActive invoke APDU. If interception delayed is invoked the procedures of 6.6.5 shall apply.

NOTE - The basic call protocol control state in which the actions concerned apply is “active”.

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6.9.13 Interaction with Path Replacement (ANF-PR)

No interactions.

6.9.14 Interaction with Recall (SS-RE)

The following interaction shall apply if SS-RE is supported in accordance with ISO/IEC 15052.

6.9.14.1 Actions at a SS-RE Served User PINX

If recall fails or remains unanswered and if call interception is invoked, any cintLegInformation1, divertingLegInformation3, cintDisable or cintEnable invoke APDUs generated or received in accordance with ANF-CINT procedures shall be sent to the SS-RE Primary PINX.

6.9.14.2 Actions at a SS-RE Primary PINX

The actions at an ANF-CINT Originating PINX specified in 6.6.3 of this International Standard shall apply also to the SS-RE Primary PINX.

NOTE - The basic call protocol control state in which a cintLegInformation1, divertingLegInformation3, cintEnable or cintDisable invoke APDU can be received is “active”.

6.9.15 Interaction with Advice Of Charge (SS-AOC)

The following interaction shall apply if SS-AOC is supported in accordance with ISO/IEC 15050.

6.9.15.1 Actions at an ANF-CINT Intercepting PINX

When executing ANF-CINT, the Intercepting PINX shall include a chargeRequest invoke APDU in the SETUP message to the Intercepted-to PINX, if this was included in the SETUP message to the Intercepting PINX.

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Annex A
(normative)

Protocol Implementation Conformance Statement (PICS) proforma

A.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 PICSs;
- by a protocol tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

A.2 Instructions for completing the PICS proforma

A.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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A.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.

A.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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A.3 PICS proforma for ISO/IEC 15054

A.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 the requirement for full identification.

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

A.3.2 Protocol summary

Protocol version	1.0
Addenda implemented (if applicable)	
Amendments implemented	
Have any exception items been required (see A.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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A.3.3 General

Item	Question/feature	Reference	Status	N/A	Support
A1	Behaviour as Terminating PINX for ANF-CINT		o.1		o: Yes [ ] No [ ]
A2	Behaviour as Transit PINX for ANF-CINT		o.1		o: Yes [ ] No [ ]
A3	Behaviour as Originating PINX for ANF-CINT		o.1		o: Yes [ ] No [ ]
A4	Behaviour as Incoming Gateway PINX for ANF-CINT		o.1		o: Yes [ ] No [ ]
A5	Behaviour as Outgoing Gateway PINX for ANF-CINT		o.1		o: Yes [ ] No [ ]
A6	Intercepting PINX behaviour at Terminating PINX		A1:o	[ ]	o: Yes [ ] No [ ]
A7	Intercepting PINX behaviour at Transit PINX		A2:o	[ ]	o: Yes [ ] No [ ]
A8	Intercepting PINX behaviour at Originating PINX		A3:o	[ ]	o: Yes [ ] No [ ]
A9	Intercepting PINX behaviour at Incoming Gateway PINX		A4:o	[ ]	o: Yes [ ] No [ ]
A10	Intercepting PINX behaviour at Outgoing Gateway PINX		A5:o	[ ]	o: Yes [ ] No [ ]

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A.3.4 Procedures

Item	Question/feature	Reference	Status	N/A	Support
B1	Procedures at the Terminating PINX	6.6.1 6.2.2	A1:m	[ ]	m:Yes [ ]
B2	Procedures at the Transit PINX	6.6.2 6.2.4	A2:m	[ ]	m: Yes [ ]
B3	Procedures at the Originating PINX	6.6.3 6.2.1	A3:m	[ ]	m: Yes [ ]
B4	Procedures at the Intercepting PINX for interception immediate	6.6.4 6.2.5	c.1	[ ]	o: Yes [ ] No [ ]
B5	Procedures at the Intercepting PINX for interception delayed	6.6.5 6.2.5	c.3	[ ]	o: Yes [ ] No [ ]
B6	Procedures at the Intercepted-to PINX	6.6.6 6.2.3	c.2	[ ]	m: Yes [ ]
B7	Procedures at the Incoming Gateway PINX (from the public ISDN)	6.7.1	A4:o.3	[ ]	o: Yes [ ] No [ ]
B8	Procedures at the Outgoing Gateway PINX (to the public ISDN)	6.7.2	A5:o.4	[ ]	o: Yes [ ] No [ ]
B9	Procedures at the Incoming Gateway PINX (non- ISDN)	6.8.1	A4:o.3	[ ]	o: Yes [ ] No [ ]
B10	Procedures at the Outgoing Gateway PINX (non- ISDN)	6.8.2	A5:o.4	[ ]	o: Yes [ ] No [ ]

c.1: if (A6 or A7 or A8 or A9 or A10) then o.2 else N/A
c.2: if (A1 or A5) then m else N/A
c.3: if (A6 or A8 or A9 or A10) then o.2 else N/A

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A.3.5 Coding

Item	Question/feature	Reference	Status	N/A	Support
C1	Sending of cintLegInformation1 invoke APDU	6.3.1	c.1	[ ]	m: Yes [ ]
C2	Receipt of cintLegInformation1 invoke APDU	6.3.1	c.2	[ ]	m: Yes [ ]
C3	Sending of cintLegInformation2 invoke APDU	6.3.1	c.1	[ ]	m: Yes [ ]
C4	Receipt of cintLegInformation2 invoke APDU	6.3.1	B6:m	[ ]	m: Yes [ ]
C5	Sending of divertingLegInformation3 invoke APDU	6.3.1	B6:m	[ ]	m:Yes [ ]
C6	Receipt of divertingLegInformation3 invoke APDU	6.3.1	c.2	[ ]	m:Yes [ ]
C7	Sending of cintCondition invoke APDU	6.3.1	c.3	[ ]	o:Yes [ ] No[ ]
C8	Receipt of cintCondition invoke APDU	6.3.1	c.4	[ ]	m:Yes [ ]
C9	Sending of cintDisable invoke APDU	6.3.1	c.5	[ ]	m:Yes [ ] o: Yes [ ] No [ ]
C10	Receipt of cintDisable invoke APDU	6.3.1	c.2	[ ]	m:Yes [ ]
C11	Sending of cintEnable invoke APDU	6.3.1	C9:o	[ ]	o:Yes [ ] No[ ]
C12	Receipt of cintEnable invoke APDU	6.3.1	c.2	[ ]	m:Yes [ ]

c.1: if (B4 or B5) then m else N/A
c.2: if (B3 or B7 or B9) then m else N/A
c.3:if (B1 or B2 or B8 or B10) then o else N/A
c.4:if (B2 or B3 or B7 or B9) then m else N/A
c.5: if (B1 or B8 or B10) then (if B5 then m else o) else N/A

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A.3.6 Interactions between ANF-CINT and SS-CFU

Item	Question/feature	Reference	Status	N/A	Support
D1	Support of SS-CFU at a Diverted-to PINX		o		Yes [ ] No [ ]
D2	Support of SS-CFU at a Rerouteing PINX		o		Yes [ ] No [ ]
D3	Support of SS-CFU at a Served User PINX		o		Yes [ ] No [ ]
D4	Support of SS-CFU at an Originating PINX		o		Yes [ ] No [ ]
D5	Interactions at a Diverted-to PINX	6.9.3.1.1 6.9.3.2.3	c.1	[ ]	m: Yes [ ]
D6	Interactions at a Rerouteing PINX	6.9.3.2.2	D2:m	[ ]	m: Yes [ ]
D7	Interactions at a Served User / Intercepted-to PINX	6.9.3.2.1	c.2	[ ]	m: Yes [ ]
D8	Interactions at an Originating PINX	6.9.3.3	c.3	[ ]	m: Yes [ ]
D9	Interactions at the Intercepting PINX for interception delayed	6.9.3.2.4	D2:m	[ ]	m: Yes [ ]

c.1: if D1 and (A1 or A5) then m, else N/A
c.2: if D3 and A1 then m else N/A
c.3: if D4 and (A3 or A4) then m else N/A

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A.3.7 Interactions between ANF-CINT and SS-CFB

Item	Question/feature	Reference	Status	N/A	Support
E1	Support of SS-CFB at a Diverted-to PINX		o		Yes [ ] No [ ]
E2	Support of SS-CFB at a Rerouteing PINX		o		Yes [ ] No [ ]
E3	Support of SS-CFB at a Served User PINX		o		Yes [ ] No [ ]
E4	Support of SS-CFB at an Originating PINX		o		Yes [ ] No [ ]
E5	Interactions at a Diverted-to PINX	6.9.3.1.1 6.9.3.2.3	c.1	[ ]	m: Yes [ ]
E6	Interactions at a Rerouteing PINX	6.9.3.2.2	E2:m	[ ]	m: Yes [ ]
E7	Interactions at a Served User / Intercepted-to PINX	6.9.3.1.3	c.2	[ ]	m: Yes [ ]
E8	Interactions at an Originating PINX	6.9.3.3	c.3	[ ]	m: Yes [ ]
E9	Interactions at the Intercepting PINX for interception delayed	6.9.3.2.4	E2:m	[ ]	m: Yes [ ]

c.1: if E1 and (A1 or A5) then m, else N/A
c.2: if E3 and A1 then m else N/A
c.3: if E4 and (A3 or A4) then m else N/A

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A.3.8 Interactions between ANF-CINT and SS-CFNR

Item	Question/feature	Reference	Status	N/A	Support
F1	Support of SS-CFNR at a Diverted-to PINX		o		Yes [ ] No [ ]
F2	Support of SS-CFNR at a Rerouteing PINX		o		Yes [ ] No [ ]
F3	Support of SS-CFNR at a Served User PINX		o		Yes [ ] No [ ]
F4	Support of SS-CFNR at an Originating PINX		o		Yes [ ] No [ ]
F5	Interactions at a Diverted-to PINX	6.9.3.1.1 6.9.3.2.3	c.1	[ ]	m: Yes [ ]
F6	Interactions at a Rerouteing PINX	6.9.3.2.2	F2:m	[ ]	m: Yes [ ]
F7	Interactions at a Served User / Intercepted-to PINX	6.9.3.1.3	c.2	[ ]	m: Yes [ ]
F8	Interactions at an Originating PINX	6.9.3.3	c.3	[ ]	m: Yes [ ]
F9	Rejection of SS-CCNR, when a call Rerouting request is received in state CINT-intercepting at an Intercepting PINX	6.9.5	F2:o.1	[ ]	o: Yes [ ]
F10	Abortion of SS-CCNR, when a call Rerouting request is received in state CINT-intercepting at an Intercepting PINX	6.9.5	F2:o.1	[ ]	o: Yes [ ]

c.1: if F1 and (A1 or A5) then m, else N/A
c.2: if F3 and A1 then m else N/A
c.3: if F4 and (A3 or A4) then m else N/A

A.3.9 Interactions between ANF-CINT and SS-CCBS

Item	Question/feature	Reference	Status	N/A	Support
G1	Support of SS-CCBS		o		Yes [ ] No [ ]
G2	Interactions at an Originating PINX	6.9.8.1	c.1	[ ]	m: Yes [ ]

c.1: if G1 and A3 then m, else N/A

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A.3.10 Interactions between ANF-CINT and SS-CCNR

Item	Question/feature	Reference	Status	N/A	Support
H1	Support of SS-CCNR		o		Yes [ ] No [ ]
H2	Interactions at an Originating PINX	6.9.9.1	c.1	[ ]	m: Yes [ ]

c.1: if H1 and A3 then m, else N/A

A.3.11 Interactions between ANF-CINT and SS-CT

Item	Question/feature	Reference	Status	N/A	Support
I1	Support of SS-CT by join		o		Yes [ ] No [ ]
I2	Support of SS-CT by rerouteing		o		Yes [ ] No [ ]
I3	Interaction at a Transferring PINX for rerouteing and an ANF-CINT Originating PINX	6.9.12.1	c.1	[ ]	m: Yes [ ]
I4	Interactions at a Transferring PINX for join	6.9.12.5	I1:m	[ ]	m:Yes [ ]
I5	Interaction at a Transferring PINX for join or rerouteing and an ANF-CINT Intercepting PINX	6.9.12.2	c.2	[ ]	m: Yes [ ]
I6	Interaction at a Secondary PINX for rerouteing and an ANF-CINT Intercepting PINX	6.9.12.3	c.3	[ ]	m: Yes [ ]
I7	Interaction at a Secondary PINX for join and an ANF-CINT Intercepting PINX	6.9.12.4	c.4	[ ]	m: Yes [ ]
I8	Interaction at a Primary PINX for join	6.9.12.6	I1:m	[ ]	m: Yes [ ]

c.1: if I2 and (A3 or A4) then m else N/A
c.2: if ((I1 or I2) and A8 and B5) then m else N/A
c.3: if (I2 and (A6 or A10) and B5) then m else N/A
c.4: if (I1 and (A6 or A10) and B5) then m else N/A

A.3.12 Interactions between ANF-CINT and SS-RE

Item	Question/feature	Reference	Status	N/A	Support
J1	Support of SS-RE		o		Yes [ ] No [ ]
J2	Interaction at a SS-RE Served User PINX	6.9.14.1	J1:m	[ ]	m: Yes [ ]
J3	Interaction at a SS-RE Primary PINX	6.9.14.2	c.1	[ ]	m: Yes [ ]

c.1: if J1 and (A3 or A4) then m else N/A

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A.3.13 Interactions between ANF-CINT and SS-AOC

Item	Question/feature	Reference	Status	N/A	Support
K1	Support of SS-AOC		o		Yes [ ] No [ ]
K2	Interaction at an ANF-CINT Intercepting PINX	6.9.15.1	K1:m	[ ]	m: Yes [ ]

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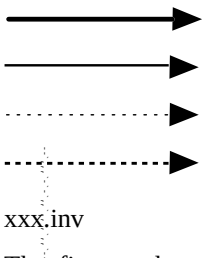
Annex B
(informative)

Examples of message sequences

This annex describes some typical message flows for ANF-CINT. The following conventions are used in the figures of this annex.

1. The following notation is used:



Message containing ANF-CINT information

Basic call message without ANF-CINT information

Symbolic primitive without ANF-CINT information

Symbolic primitive with ANF-CINT information

xxx.inv Invoke APDU for operation xxx

2. The figures show messages exchanged via Protocol Control between PINXs involved in ANF-CINT. Only messages relevant to ANF-CINT are shown. RELEASE, RELEASE COMPLETE and CONNECT ACKNOWLEDGE are not shown.
3. Only the relevant information content (ANF-CINT APDUs) is listed below each message name. Information with no impact on ANF-CINT is not shown.
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.

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B.1 Message sequences for ANF-CINT using interception immediate procedures

Figure B.1.1 shows an example of successful invocation of ANF-CINT using interception immediate procedures for the particular case that the called user has do not disturb active.

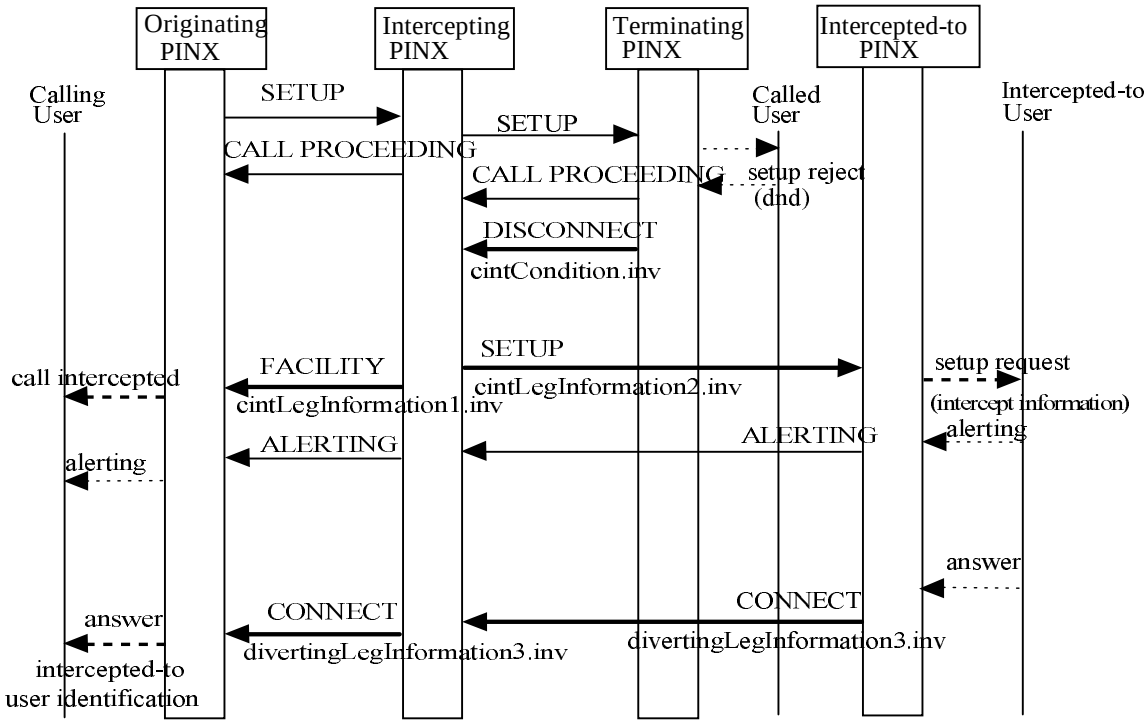

Figure B.1.1 - Message sequence for successful invocation of ANF-CINT using interception immediate procedures

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B.2 Message sequences for invocation of ANF-CINT using interception delayed procedures

In the figures of this clause, the Intercepting PINX coincides with the Originating PINX or the Terminating PINX.

Figure B.2.1 shows an example of successful invocation of ANF-CINT using interception delayed procedures.

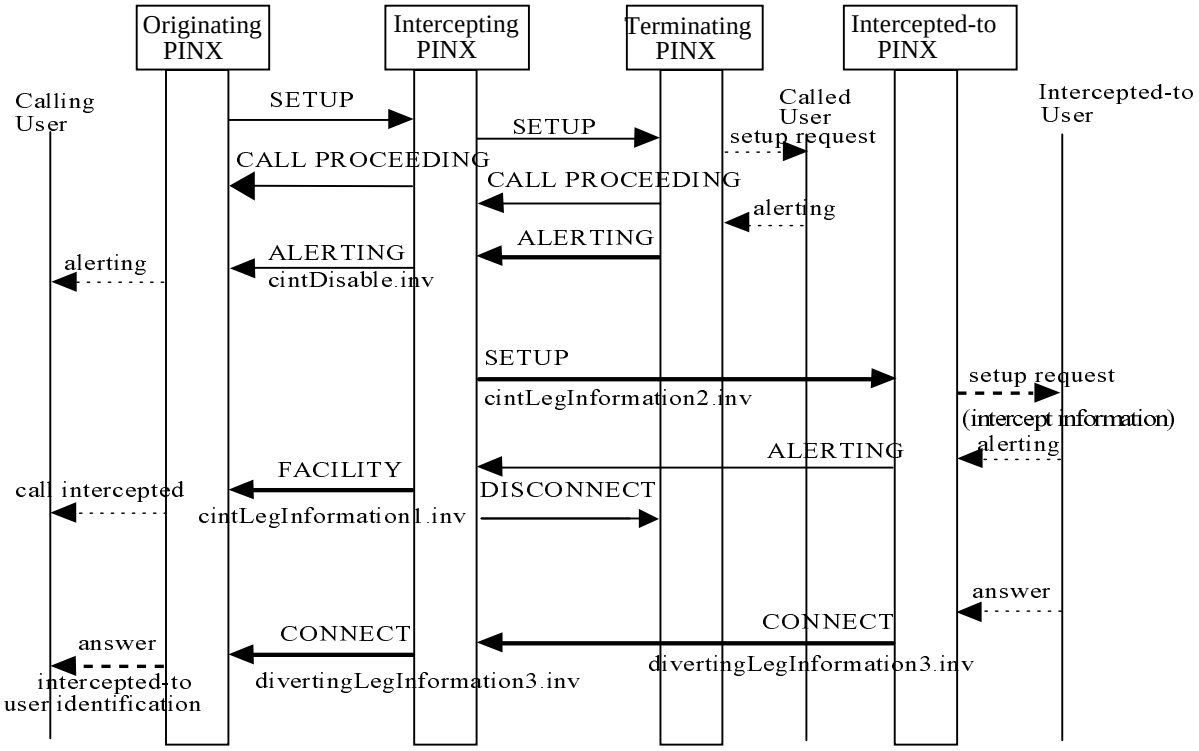

Figure B.2.1 - Message sequence for successful invocation of ANF-CINT using interception delayed procedures

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Figure B.2.2 shows an example of unsuccessful invocation of ANF-CINT using interception delayed procedures: Failure of the intercepted-to call.

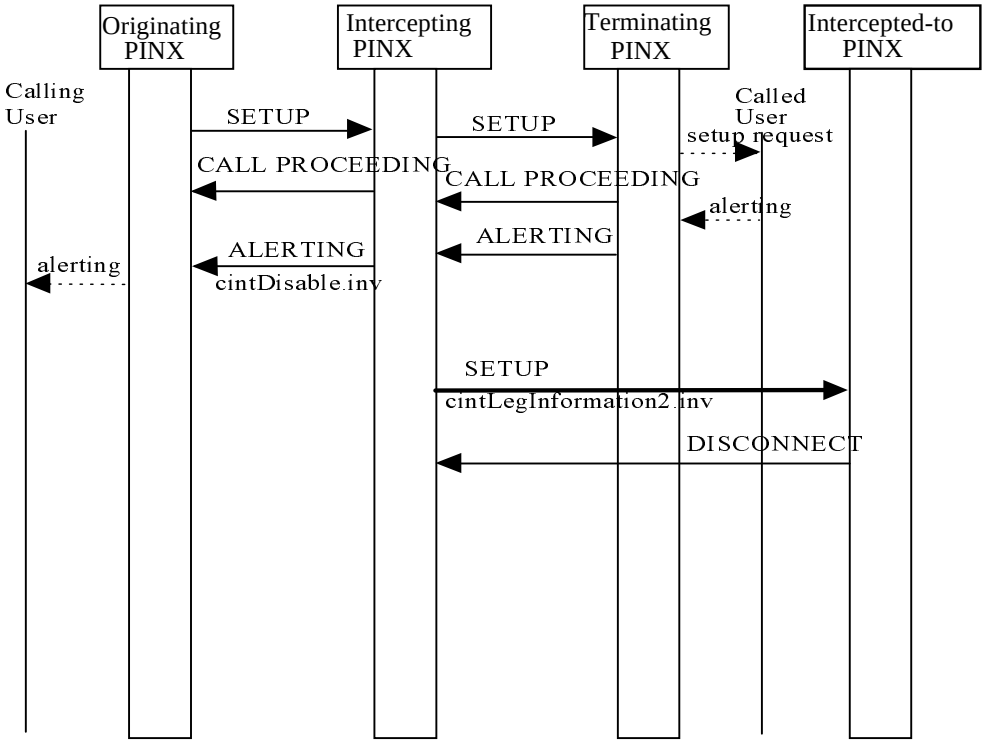

Figure B.2.2 - Message sequence for unsuccessful invocation of ANF-CINT using interception delayed procedures: Failure of the intercepted-to call

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Figure B.2.3 shows an example of ANF-CINT invocation using interception delayed procedures when the called user answers before alerting of the intercepted-to user.

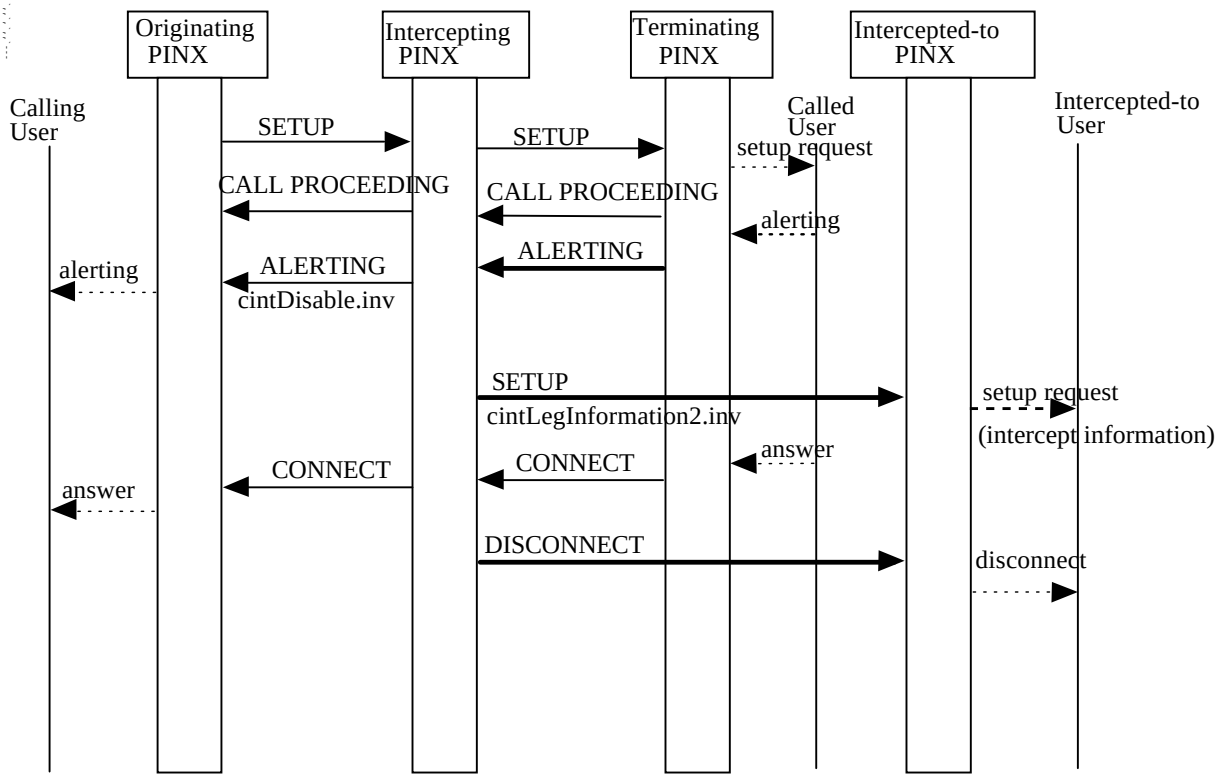

Figure B.2.3 - Message sequence for ANF-CINT invocation using interception delayed procedures when the called user answers before alerting of the intercepted-to user

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Figure B.2.4 shows an example of ANF-CINT invocation using interception delayed procedures when the calling user clears before alerting of the intercepted-to user.

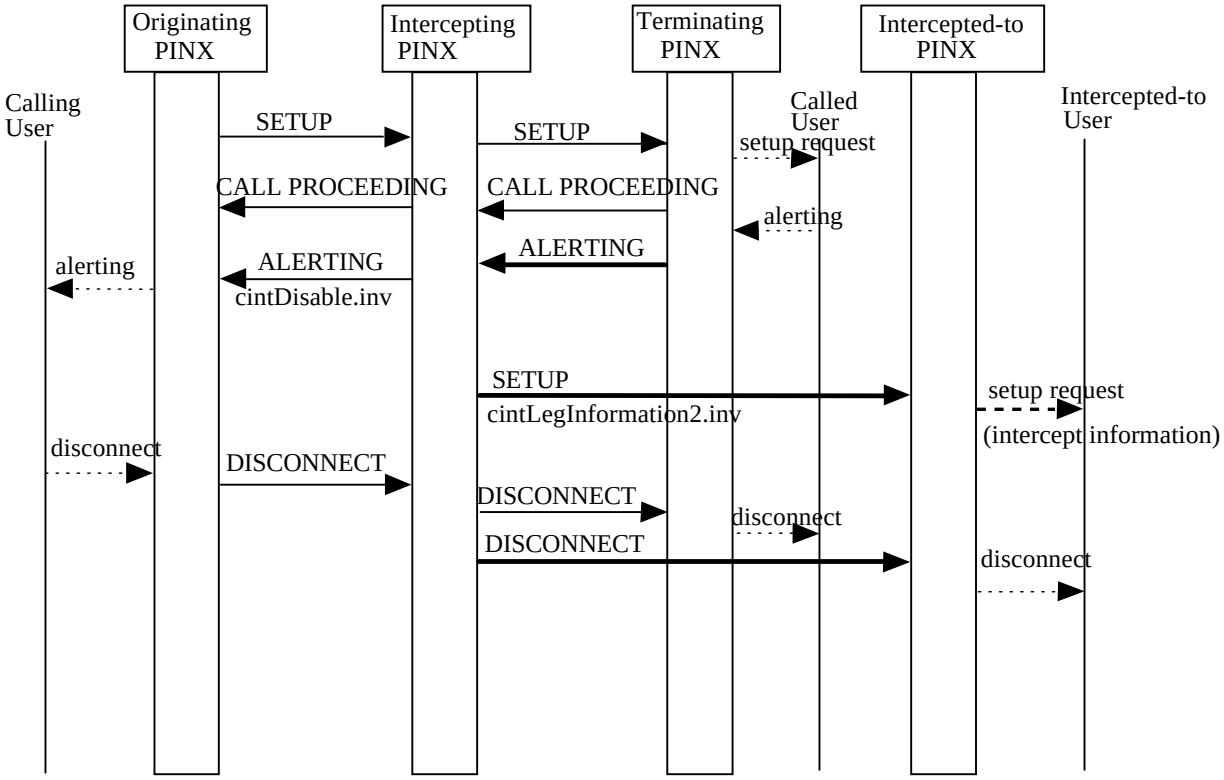

Figure B.2.4 - Message sequence for ANF-CINT invocation using interception delayed procedures when the calling user clears before alerting of the intercepted-to user

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Annex C
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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 ANF-CINT Supplementary Service Control entity at a particular type of PINX. In accordance with the protocol model described in ISO/IEC 11582, the ANF-CINT 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 QSIG 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 QSIG 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 abbreviation are used:

inv. invoke APDU

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C.1 SDL Representation of ANF-CINT at the Originating PINX

Figure C.1 shows the behaviour of an ANF-CINT Supplementary Service Control entity within the Originating PINX.

Output signals to the left represent primitives to the user. Input signals from the right represent primitives from the Coordination Function in respect of messages received via Protocol Control.

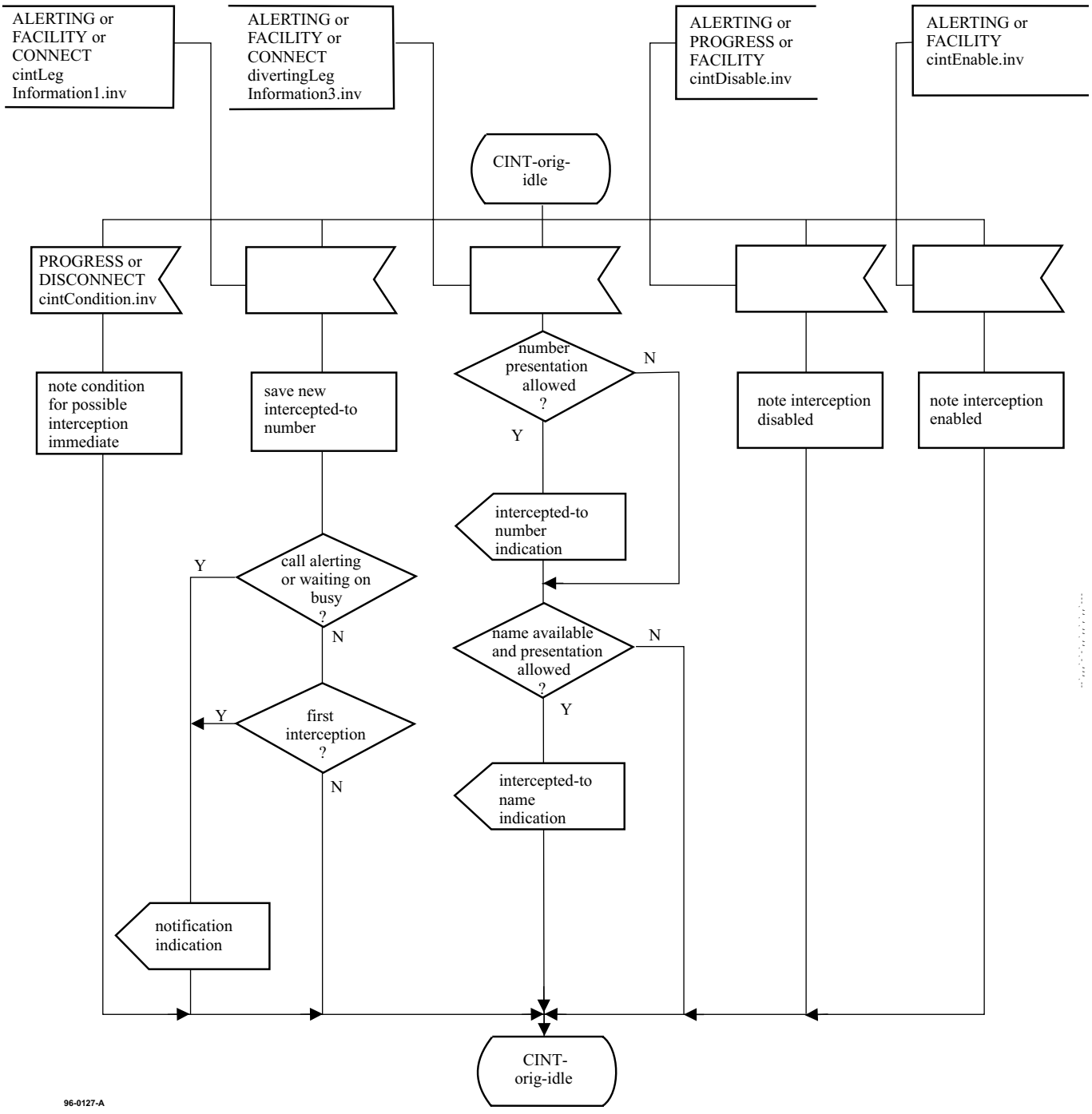

Figure C.1 - SDL Representation of ANF-CINT at the Originating PINX

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C.2 SDL Representation of ANF-CINT at the Intercepting PINX

Figure C.2 shows the behaviour of an ANF-CINT entity within the Intercepting PINX.

Output signals to the left represent primitives to the Coordination Function in respect of messages sent via the incoming side Protocol Control. Output signals to the right represent primitives to the Coordination Function in respect of messages sent via the outgoing side Protocol Control. Input signals from the left represent primitives from the Coordination Function in respect of messages received via the incoming side Protocol Control or internal primitives. Input signals from the right represent primitives from the Coordination Function in respect of messages received via the outgoing side Protocol Control.

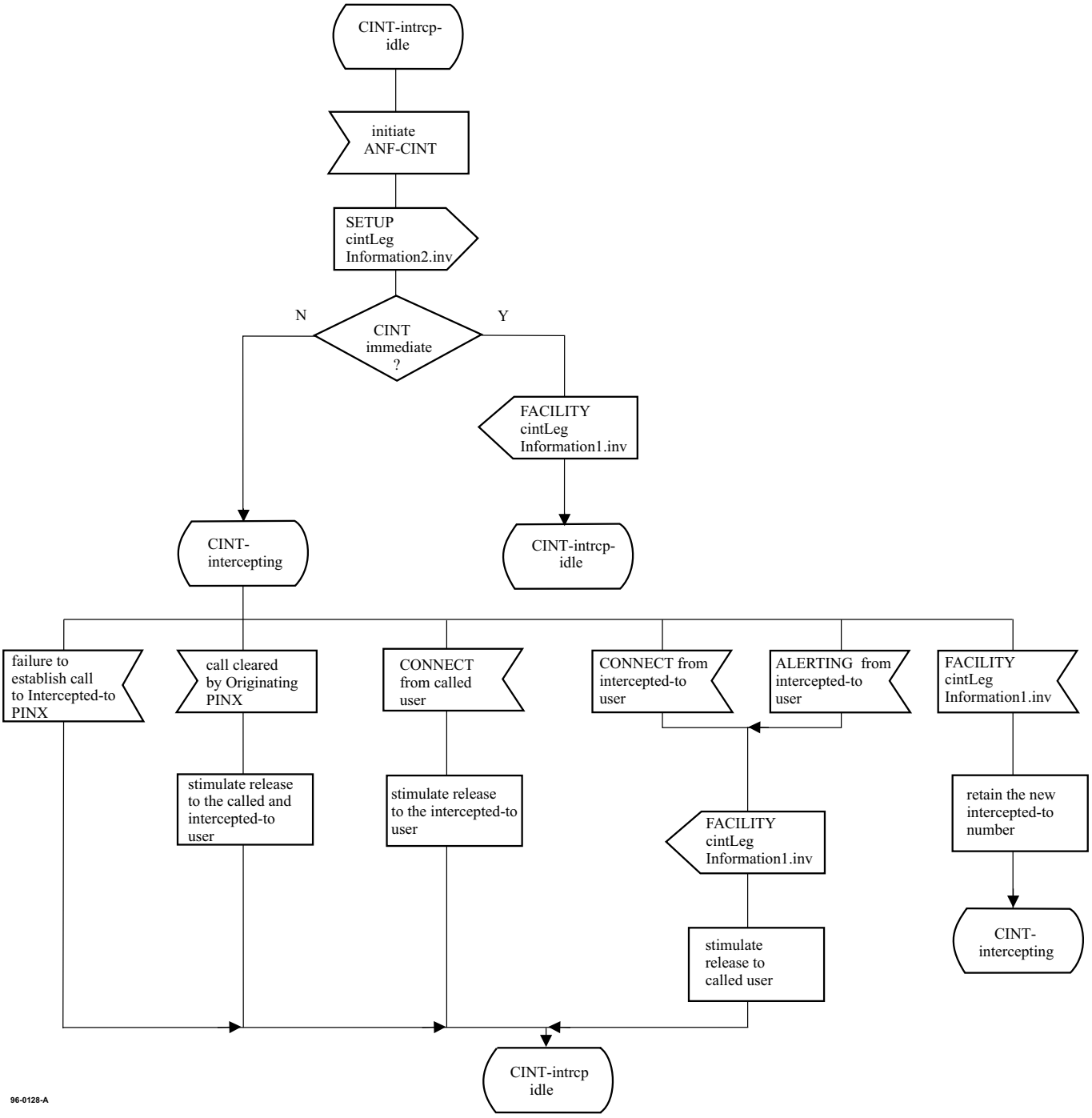

Figure C.2 - SDL Representation of ANF-CINT at the Intercepting PINX

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C.3 SDL Representation of ANF-CINT at the Intercepted-to PINX

Figure C.3 shows the behaviour of an ANF-CINT Supplementary Service Control entity within the Intercepted-to PINX.

Output signals to the left represent primitives to the Coordination Function in respect of messages sent via the incoming side Protocol Control. Output signals to the right represent primitives to the intercepted-to user. Input signals from the left represent primitives from the Coordination Function in respect of messages received via the incoming side Protocol Control. Input signals from the right represent internal primitives.

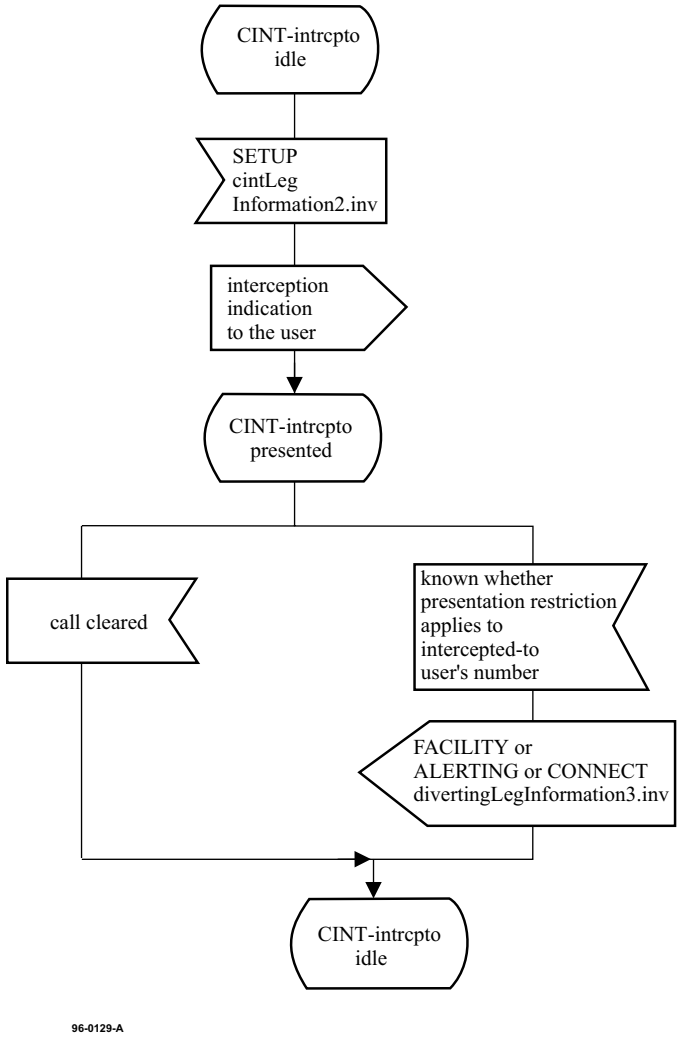

Figure C.3 - SDL Representation of ANF-CINT at the Intercepted-to PINX

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C.4 SDL Representation of ANF-CINT at the Terminating PINX

Figure C.4 shows the behaviour of an ANF-CINT Supplementary Service Control entity within the Terminating PINX.

Output signals to the left represent primitives to the Coordination Function in respect of messages sent via the incoming side Protocol Control. Input signals from the right represent internal primitives.

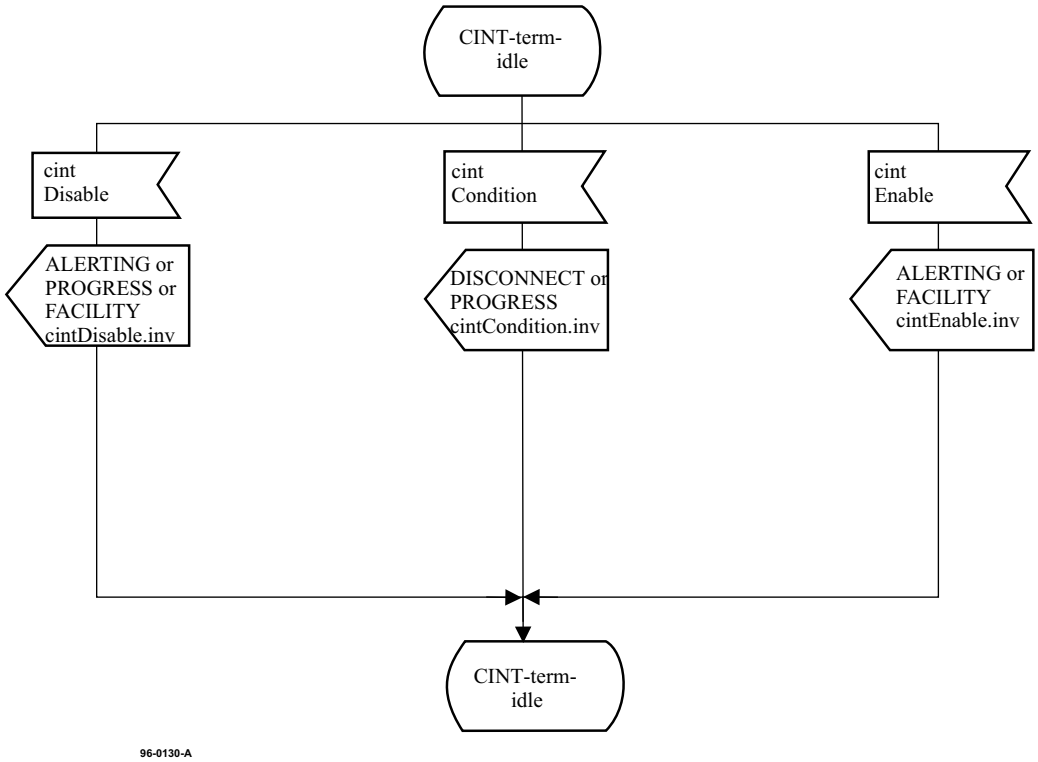

Figure C.4 - SDL Representation of ANF-CINT at the Terminating PINX

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C.5 SDL Representation of ANF-CINT at a Transit PINX

Figure C.5 shows the behaviour of an ANF-CINT Supplementary Service Control entity within a Transit PINX.

Input signals from the right represent primitives from the Coordination Function. Output signals to the left represent messages sent via Protocol Control.

Output signals to the left represent primitives to the Coordination Function in respect of messages sent via the incoming side Protocol Control.

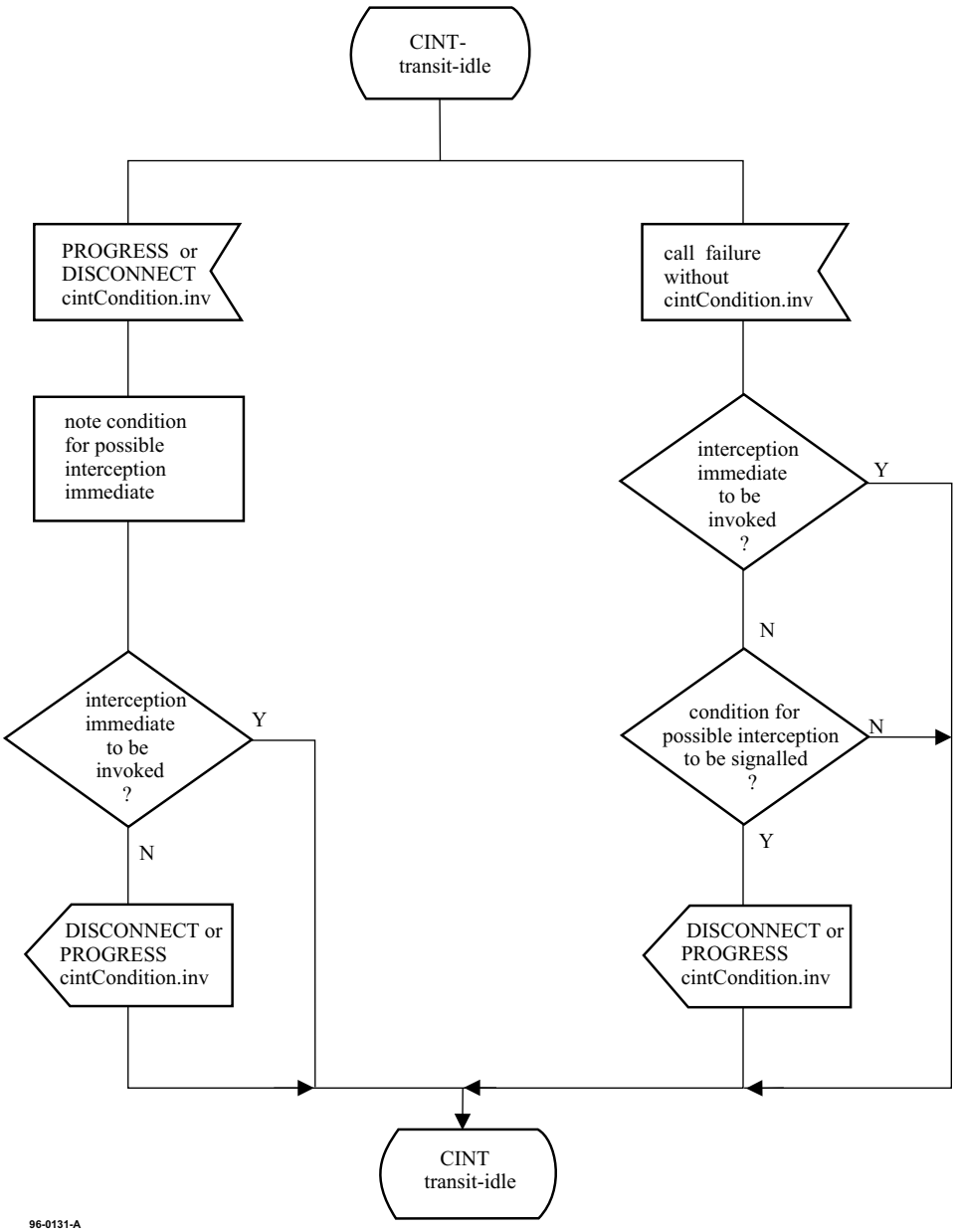

Figure C.5 - SDL Representation of ANF-CINT at a Transit PINX

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Annex D
(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 15054, i.e. based on ITU-T Recommendations X.208 / X.209. Starting with this edition the ASN.1 modules within ISO/IEC 15054 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 D.1 - Call-Interception-Operations – based on ITU-T Recs. X.208 / X.209

```
Call-Interception-Operations {iso (1) standard (0) pss1-cint (15054) cint-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)}

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

                                        Name FROM Name-Operations
                                        {iso (1) standard (0) pss1-name (13868) name-operations (0)};


CintLegInformation1::=  OPERATION
                                        -- Sent from the  Intercepting PINX to the Originating PINX --

                                        ARGUMENT     CintInformation1Arg

CintLegInformation2::=  OPERATION
                                        -- Sent from the  Intercepting PINX to the Intercepted-to PINX --

                                        ARGUMENT     CintInformation2Arg


CintCondition::=        OPERATION
                                        -- Sent to a preceding PINX to indicate a condition for possible --
                                        -- interception --

                                        ARGUMENT     CintCondArg
```


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Table D.1 - Call-Interception-Operations – based on ITU-T Recs. X.208 / X.209 (continued)

```
CintDisable             ::=     OPERATION
                                -- Sent to a Preceding  PINX to disable interception delayed --

                                ARGUMENT    CintExtension


CintEnable              ::=     OPERATION
                                -- Sent to a Preceding  PINX to reenable interception --

                                ARGUMENT    CintExtension

CintInformation1Arg     ::=     SEQUENCE
                                {
                                interceptionCause           CintCause,
                                interceptedToNumber         PartyNumber,
                                extension                   CintExtension OPTIONAL
                                }

CintInformation2Arg     ::=     SEQUENCE
                                {
                                interceptionCause       CintCause,
                                calledNumber            [1]PresentedNumberUnscreened OPTIONAL,
                                originalCalledNumber    [2]PresentedNumberUnscreened OPTIONAL,
                                calledName              [3]Name OPTIONAL,
                                originalCalledName      [4]Name OPTIONAL,
                                extension               CintExtension OPTIONAL
                                }


CintCondArg             ::=     SEQUENCE
                                {
                                interceptionCause       Condition,
                                originalCalledNumber    [1]PresentedNumberUnscreened OPTIONAL,
                                calledName              [2]Name OPTIONAL,
                                originalCalledName      [3]Name OPTIONAL,
                                extension               CintExtension OPTIONAL
                                }

CintExtension           ::=     CHOICE
                                {
                                none            NULL,
                                single          [5] IMPLICIT Extension,
                                multiple        [6] IMPLICIT SEQUENCE OF Extension
                                }
```

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Table D.1 - Call-Interception-Operations – based on ITU-T Recs. X.208 / X.209 (concluded)

```
CintCause       ::=     INTEGER  {
                                unknown         (0),
                                cintBnan        (1),    -- timeout in waiting on busy condition
                                cintBus         (2),    -- busy user
                                cintCug         (3),    -- closed user group rejection
                                cintDnd         (4),    -- do not disturb activated
                                cintIbd         (5),    -- incoming barred destination
                                cintInn         (6),    -- invalid number
                                cintMob1        (7),    -- mobile user location not known
                                cintMob2        (8),    -- mobile user no longer registered
                                cintMob3        (9),    -- mobile terminal not responding
                                cintNcmp        (10),   -- no compatible destination
                                cintNcong       (11),   -- network congestion
                                cintNre         (12),   -- no reply (i.e. timeout during alerting)
                                cintOos         (13),   -- called user out of service
                                cintRrs         (14),   -- route restriction (calling user not authorized for
                                                        -- the route)
                                cintTbnan       (15),   -- timeout in wait on busy condition after transfer
                                cintTnre        (16),   -- no reply after transfer (i.e. timeout during alerting
                                                        -- after transfer
                                cintTrans       (17),   -- upper limit of transit counter reached
                                cintUpl         (18),   -- upper limit of number of diversions reached
                                cintInvDiv      (19),   -- invalid call diversion destination
                                cintHold        (20)    -- timeout after call hold
                                } (0..127)

Condition               ::=     INTEGER  {
                                unknown         (0),
                                cintBus         (2),    -- busy user
                                cintCug         (3),    -- closed user group rejection
                                cintDnd         (4),    -- do not disturb activated
                                cintIbd         (5),    -- incoming barred destination
                                cintInn         (6),    -- invalid number
                                cintMob1        (7),    -- mobile user location not known
                                cintMob2        (8),    -- mobile user no longer registered
                                cintMob3        (9),    -- mobile terminal not responding
                                cintNcmp        (10),   -- no compatible destination
                                cintNcong       (11),   -- network congestion
                                cintOos         (13),   -- called user out of service
                                cintRrs         (14),   -- route restriction (calling user not authorized for
                                                        -- the route
                                cintTrans       (17),   -- upper limit of transit counter reached
                                cintUpl         (18),   -- upper limit of number of diversions
                                                        -- reached
                                cintInvDiv      (19)    -- invalid call diversion destination
                                } (0..127)

cintLegInformation1             CintLegInformation1     ::=     66
cintLegInformation2             CintLegInformation2     ::=     67

cintCondition                   CintCondition           ::=     68
cintDisable                     CintDisable             ::=     69
cintEnable                      CintEnable              ::=     70

END     -- of Call-Interception-Operations
```


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