

# ECMA

Standardizing Information and Communication Systems

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**Private Integrated Services Network  
(PISN) -  
Inter-Exchange Signalling Protocol -  
Call Interception  
Additional Network Feature**

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**(QSIG-CINT)**



## Brief History

This Standard is one of a series of ECMA 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 particular 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 Standard forms part of the PSS1 protocol (informally known as QSIG).

This 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 JTC1, ITU-T, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

Compared to the 1st Edition of Standard ECMA-221 (published by ECMA in March 1995), the 2nd Edition incorporated changes in order to achieve complete alignment with International Standard ISO/IEC 15054:1997(E) published by ISO/IEC in May 1997.

Compared to the 2nd Edition of Standard ECMA-221 (published by ECMA in June 1997), this 3rd Edition incorporates migration to ASN.1 version 1997.



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## 1 Scope

This 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 ECMA-133.

Service specifications are produced in three stages and according to the method specified in ETS 300 387. This 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 ECMA-220.

The signalling protocol for ANF-CINT operates on top of the signalling protocol for basic circuit switched call control, as specified in ECMA-143, and uses certain aspects of the generic procedures for the control of supplementary services specified in ECMA-165.

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

## 2 Conformance

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

Conformance to this 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 References (normative)

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

In the case of references to ECMA Standards that are aligned with ISO/IEC International Standards, the number of the appropriate ISO/IEC International Standard is given in brackets after the ECMA reference.

ECMA-133	Private Integrated Services Network (PISN) - Reference Configuration for PISN Exchanges (PINX) (International Standard ISO/IEC 11579-1)
ECMA-142	Private Integrated Services Network (PISN) - Circuit-mode 64 kbit/s Bearer Services - Service Description, Functional Capabilities and Information Flows (International Standard ISO/IEC 11574)
ECMA-143	Private Integrated Services Network (PISN) - Circuit-mode Bearer Services - Inter-Exchange Signalling Procedures and Protocol (International Standard ISO/IEC 11572)
ECMA-164	Private Integrated Services Network (PISN) - Inter-Exchange Signalling Protocol - Name Identification Supplementary Services (International Standard ISO/IEC 13868)
ECMA-165	Private Integrated Services Network (PISN) - Generic Functional Protocol for the Support of Supplementary Services - Inter-Exchange Signalling Procedures and Protocol (International Standard ISO/IEC 11582)

ECMA-174	Private Integrated Services Network (PISN) - Inter-Exchange Signalling Protocol - Call Diversion Supplementary Services (International Standard ISO/IEC 13873)
ECMA-178	Private Integrated Services Network (PISN) - Inter-Exchange Signalling Protocol - Call Transfer Supplementary Services (International Standard ISO/IEC 13869)
ECMA-186	Private Integrated Services Network (PISN) - Inter-Exchange Signalling Protocol - Call Completion Supplementary Services (International Standard ISO/IEC 13870)
ECMA-212	Private Integrated Services Network (PISN) - Inter-Exchange Signalling Protocol - Advice of Charge Supplementary Services (International Standard ISO/IEC 15050)
ECMA-214	Private Integrated Services Network (PISN) - Inter-Exchange Signalling Protocol - Recall Supplementary Service (International Standard ISO/IEC 15052)
ECMA-220	Private Integrated Services Network (PISN) - Specification, Functional Model and Information Flows - Call Interception Additional Network Feature (International Standard ISO/IEC 15053)
ETS 300 387	Private Telecommunication Network (PTN); Method for the specification of basic and supplementary services (1994)
ITU-T Rec. I.112	Vocabulary of terms for ISDNs (1993)
ITU-T Rec. I.210	Principles of telecommunication services supported by an ISDN and the means to describe them (1993)
ITU-T Rec. Z.100	Specification and description language (1999)

## 4 Definitions

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

### 4.1 External definitions

This Standard uses the following terms defined in other documents:

– Application Protocol Data Unit (APDU)	(ECMA-165)
– Basic Service	(ITU-T Rec. I.210)
– Call, Basic Call	(ECMA-165)
– End PINX	(ECMA-165)
– Incoming Gateway PINX	(ECMA-143)
– Outgoing Gateway PINX	(ECMA-143)
– Originating PINX	(ECMA-143)
– Preceding PINX	(ECMA-143)
– Private Integrated Services Network (PISN)	(ECMA-133)
– Private Integrated services Network eXchange (PINX)	(ECMA-133)
– Signalling	(ITU-T Rec. I.112)
– Subsequent PINX	(ECMA-143)
– Supplementary Service	(ITU-T Rec. I.210)
– Supplementary Service Control Entity	(ECMA-165)
– Terminating PINX	(ECMA-143)
– Transit PINX	(ECMA-143)
– User	(ECMA-142)

## 4.2 Other definitions

### 4.2.1 Forward switching

Network routing 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.

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 ECMA-143, shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ECMA-165 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 ECMA-143, shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ECMA-165 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 ECMA-143, shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ECMA-165 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 ECMA-143, shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ECMA-165 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 ECMA-143, shall apply.

Generic procedures for the call-related control of supplementary services, as specified in ECMA-165 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 ECMA-165 for a Transit PINX, shall apply.

## 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 ECMA-174, 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}

**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}} }

**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	

## **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 ECMA-165.

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 ECMA-143.

## **6.3.3 Messages**

The Facility information element shall be conveyed in the messages specified in clause 10 of ECMA-165. The basic call messages shall be used for call establishment and release as specified in ECMA-143.

## **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-intrep-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-intrepto-idle**

ANF-CINT is not in progress.

#### **6.4.3.2 State CINT-intrepto-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.

## **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.

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 ECMA-165.*

*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.*

#### **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 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 ECMA-165. 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 ECMA-165.*

*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 ECMA-143.

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 ECMA-143.

## **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.

## **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 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 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 Standard. For interactions with supplementary services and ANFs for which stage 3 standards are published subsequent to the publication of this 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 ECMA-174.

#### **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.

##### **6.9.3.2.3 Actions at the Diverted-to PINX**

The procedures of ECMA-174 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 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 Rerouting PINX in accordance with the procedures of ECMA-174. 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 Standard and 6.5.1 of ECMA-174.

### **6.9.4 Interaction with Call Forwarding Busy (SS-CFB)**

If SS-CFB is supported in accordance with ECMA-174, the procedures specified in 6.9.3 of this 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 ECMA-174, the procedures specified in 6.9.3 of this 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 ECMA-186.

#### **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 ECMA-186.

#### **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 ECMA-178.

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”.*

**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 ECMA-214.

**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 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 ECMA-212.

**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.



## **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 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 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).

### **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 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.

### A.3 PICS proforma for ECMA-221

#### 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 Standard)

Date of Statement	
-------------------	--

### A.3.3 General

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

### 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

### 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



### 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

### 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 <input type="checkbox"/> No <input type="checkbox"/>
E2	Support of SS-CFB at a Rerouteing PINX		o		Yes <input type="checkbox"/> No <input type="checkbox"/>
E3	Support of SS-CFB at a Served User PINX		o		Yes <input type="checkbox"/> No <input type="checkbox"/>
E4	Support of SS-CFB at an Originating PINX		o		Yes <input type="checkbox"/> No <input type="checkbox"/>
E5	Interactions at a Diverted-to PINX	6.9.3.1.1 6.9.3.2.3	c.1	<input type="checkbox"/>	m: Yes <input type="checkbox"/>
E6	Interactions at a Rerouteing PINX	6.9.3.2.2	E2:m	<input type="checkbox"/>	m: Yes <input type="checkbox"/>
E7	Interactions at a Served User / Intercepted-to PINX	6.9.3.1.3	c.2	<input type="checkbox"/>	m: Yes <input type="checkbox"/>
E8	Interactions at an Originating PINX	6.9.3.3	c.3	<input type="checkbox"/>	m: Yes <input type="checkbox"/>
E9	Interactions at the Intercepting PINX for interception delayed	6.9.3.2.4	E2:m	<input type="checkbox"/>	m: Yes <input type="checkbox"/>

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

### 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

### 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

### 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 [ ]

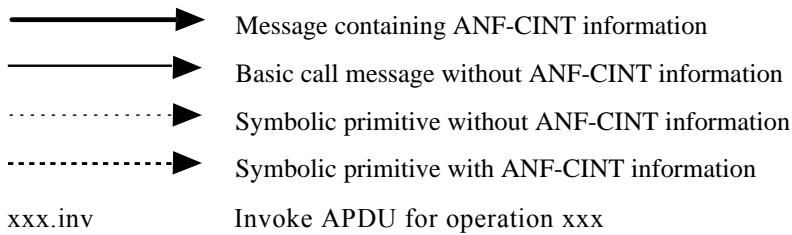


**Annex B**  
(informative)

**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.

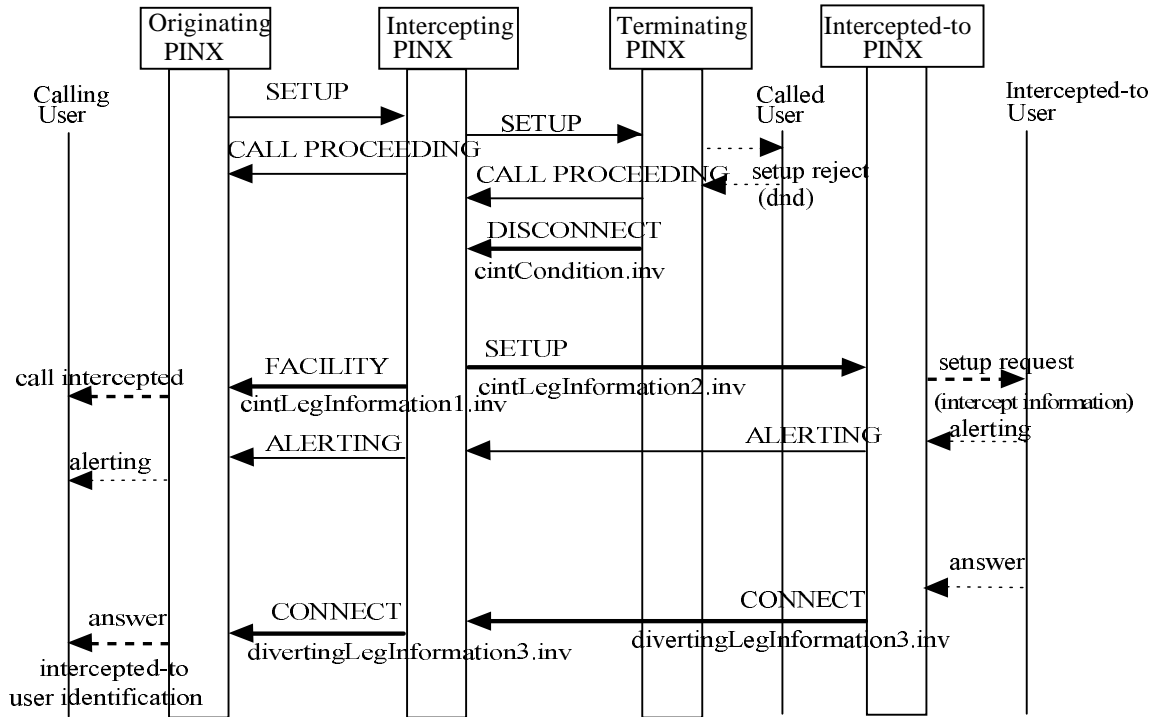
1. The following notation is used:



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 Standard.

### 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.



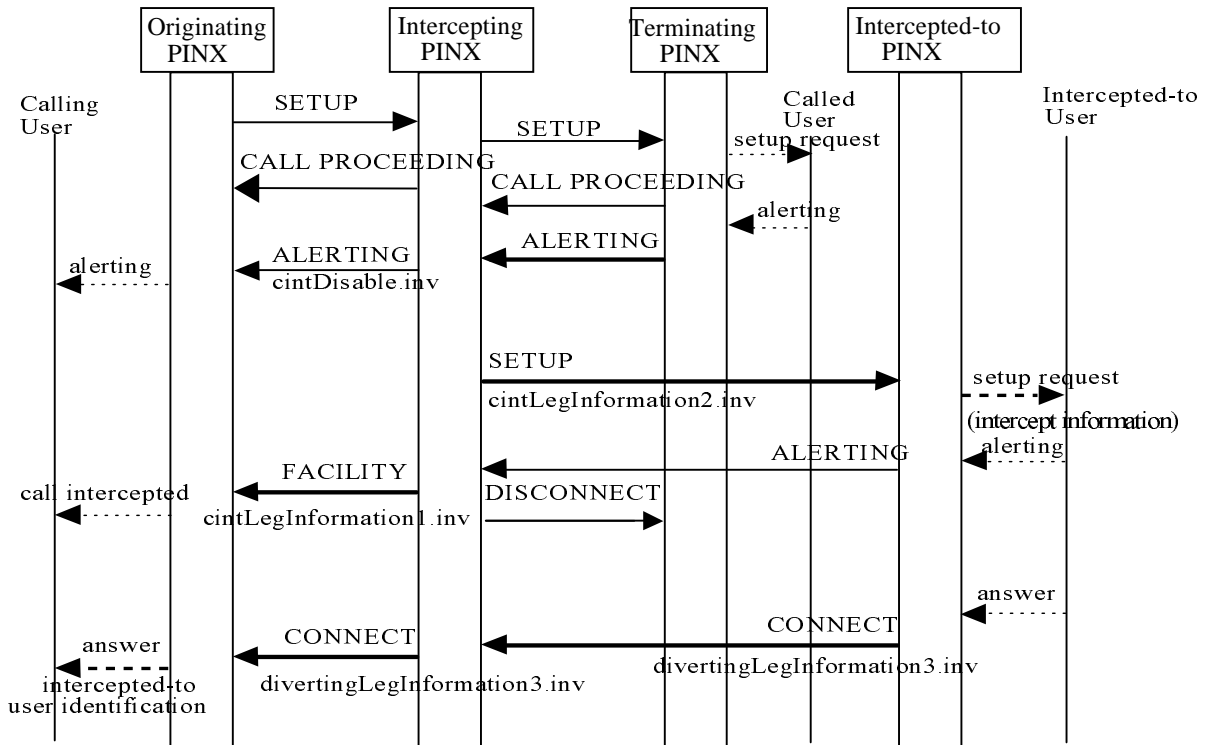
**Figure B.1.1 - Message sequence for successful invocation of ANF-CINT using interception immediate procedures**



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

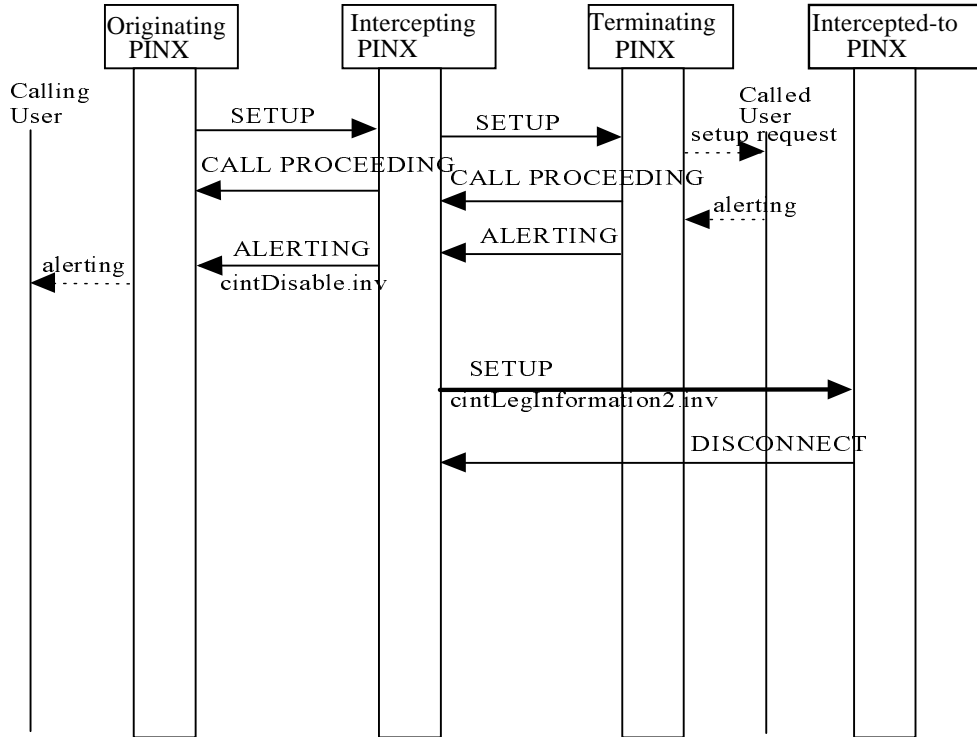
In the figures of this clause, the Intercepting PINX coincides with the Originating PINX or the Terminating PINX.

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



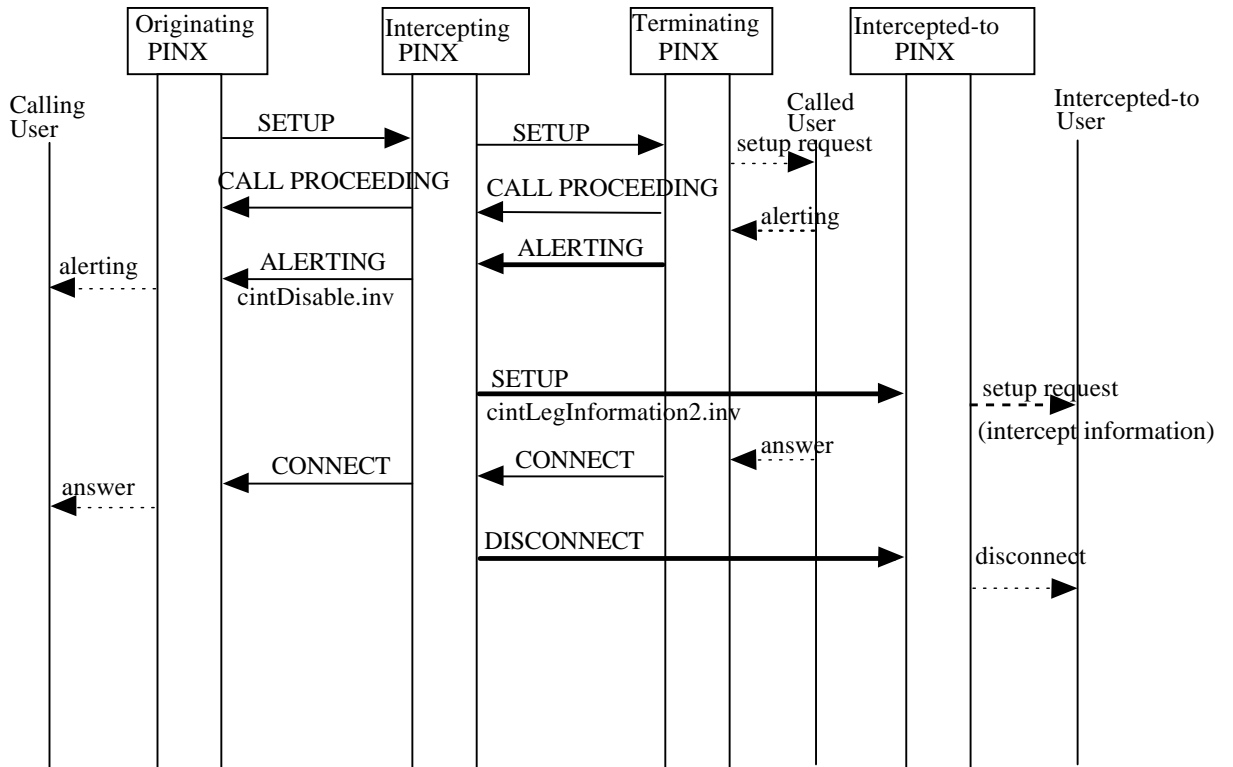
**Figure B.2.1 - Message sequence for successful invocation of ANF-CINT using interception delayed procedures**

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



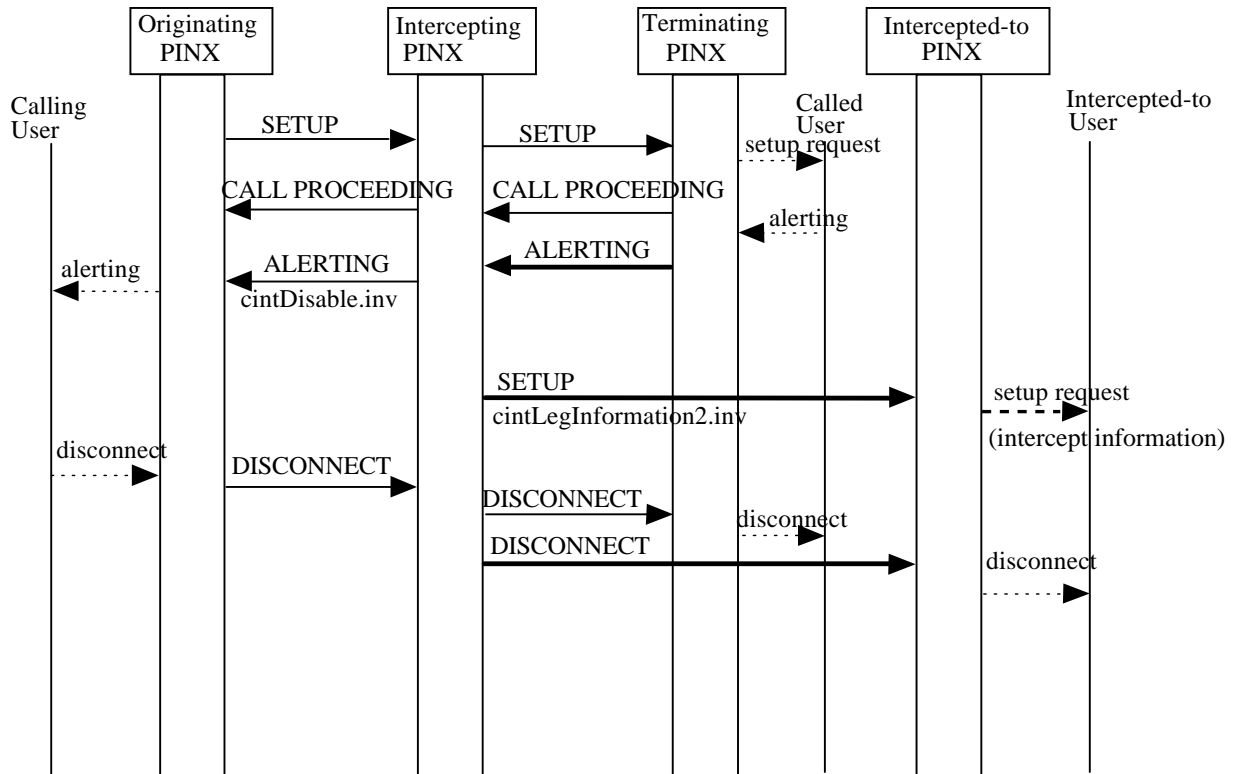
**Figure B.2.2 - Message sequence for unsuccessful invocation of ANF-CINT using interception delayed procedures: Failure of the intercepted-to call**

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**

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**

**Annex C**  
(informative)

**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 ECMA-165, 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 ECMA-143, 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 ECMA-143, basic call actions associated with the receipt of that message are deemed to have occurred.

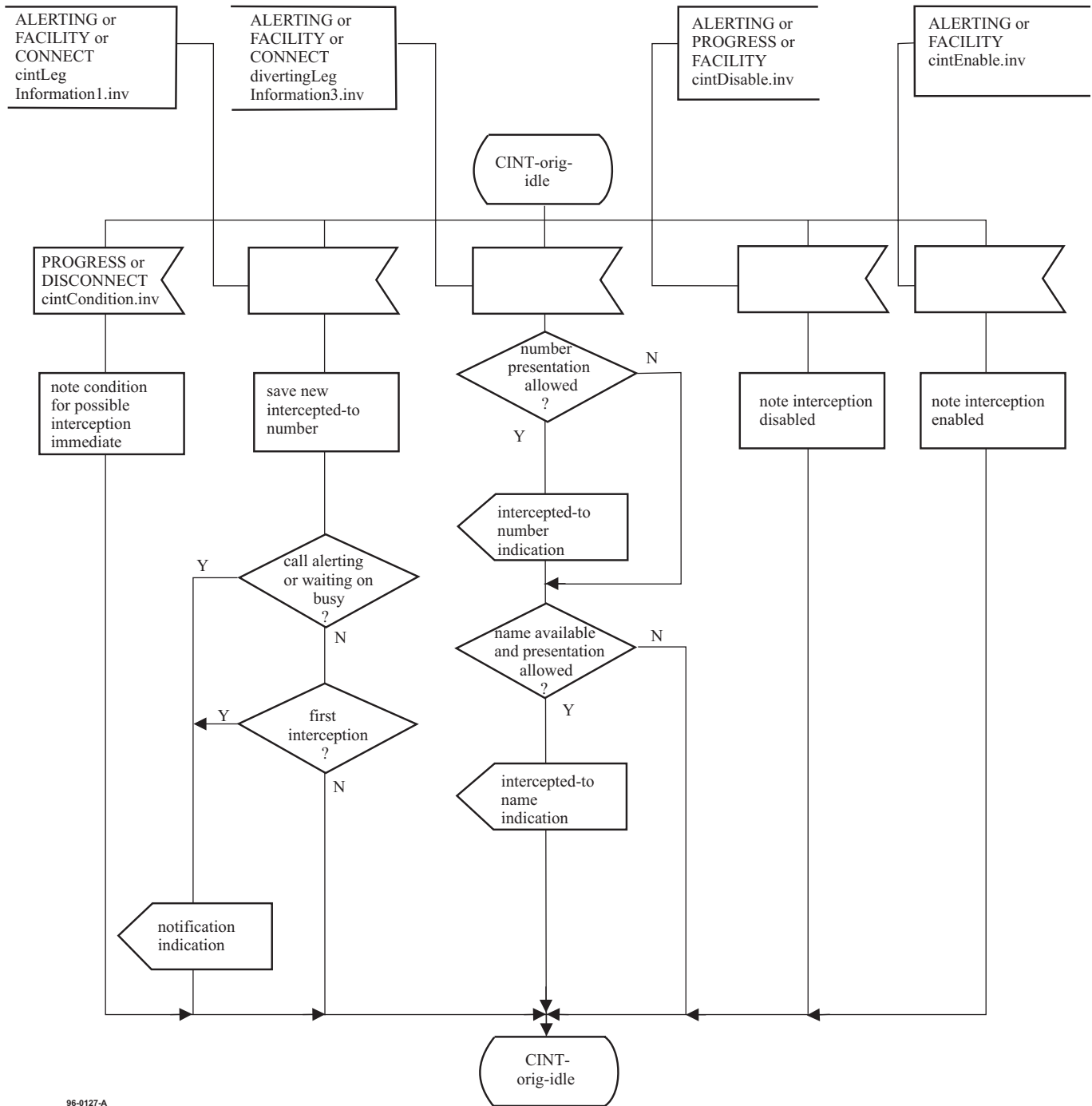
The following abbreviations are used:

inv.                    invoke APDU

### 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.



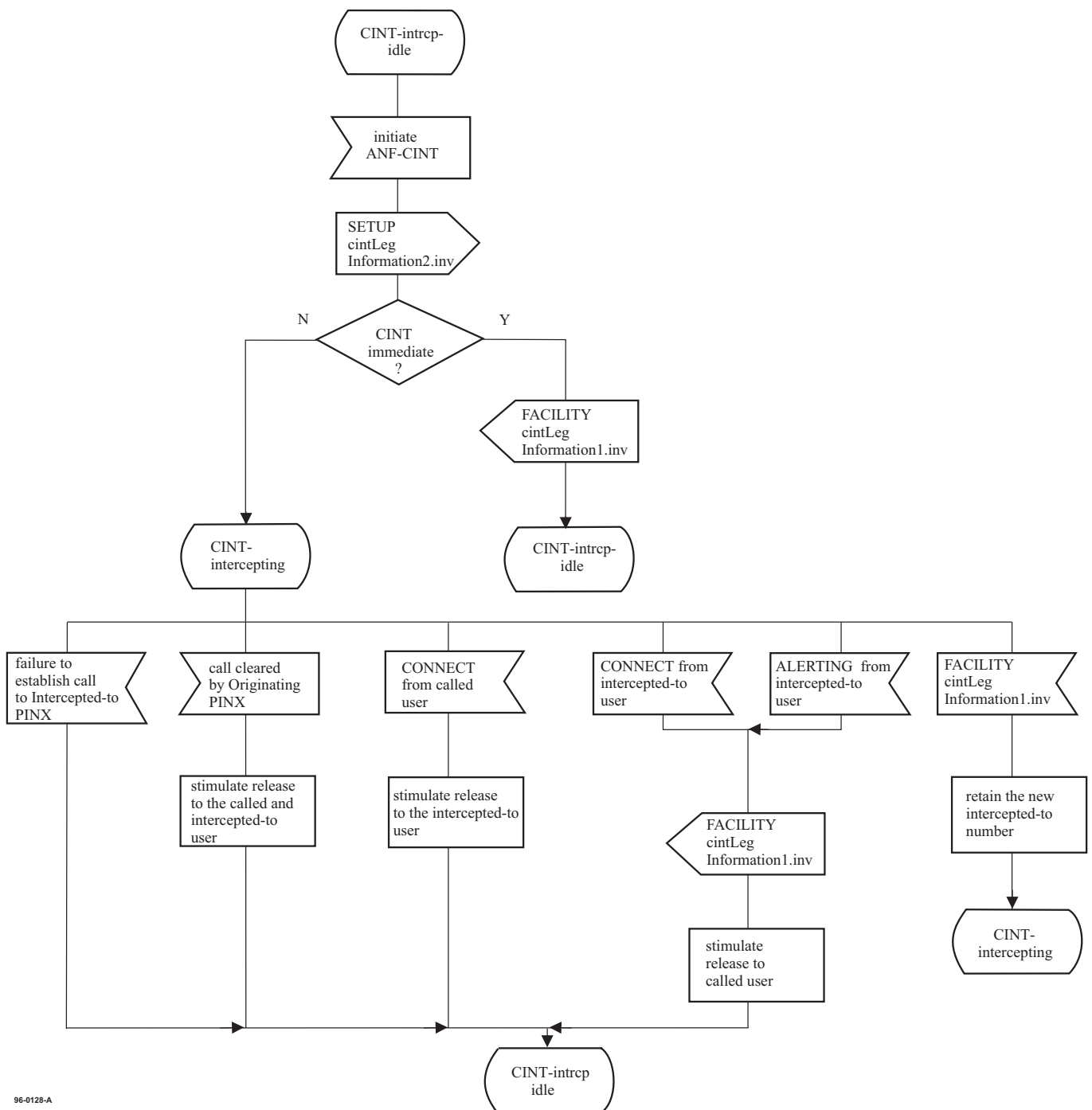
96-0127-A

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

## 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.



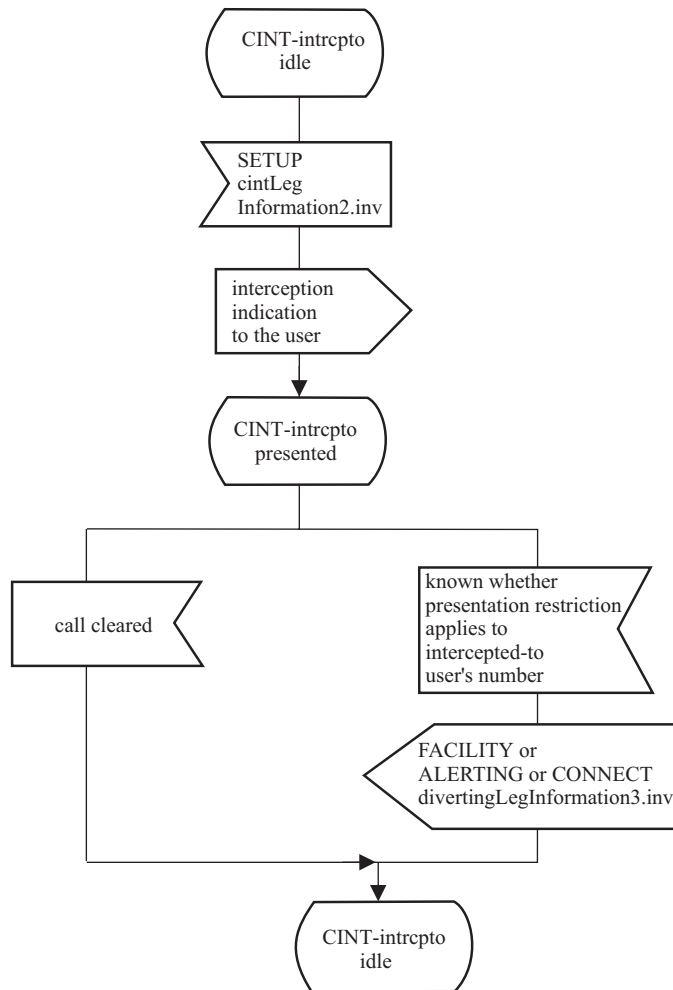
96-0128-A

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

### 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.



96-0129-A

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



### 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.

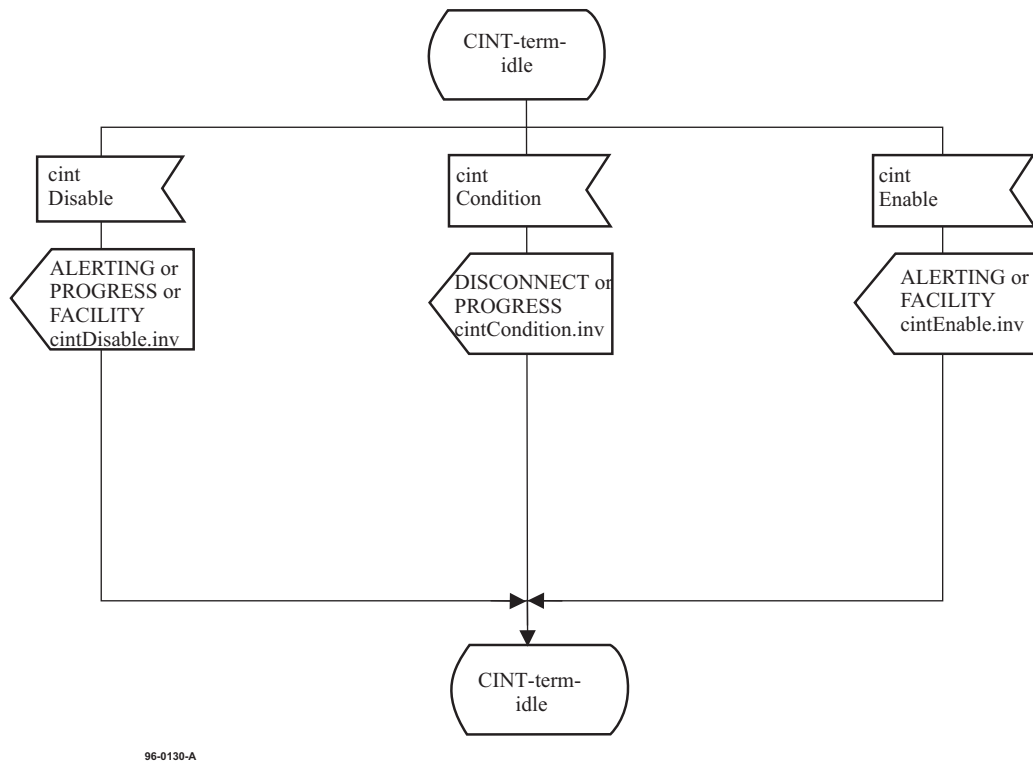


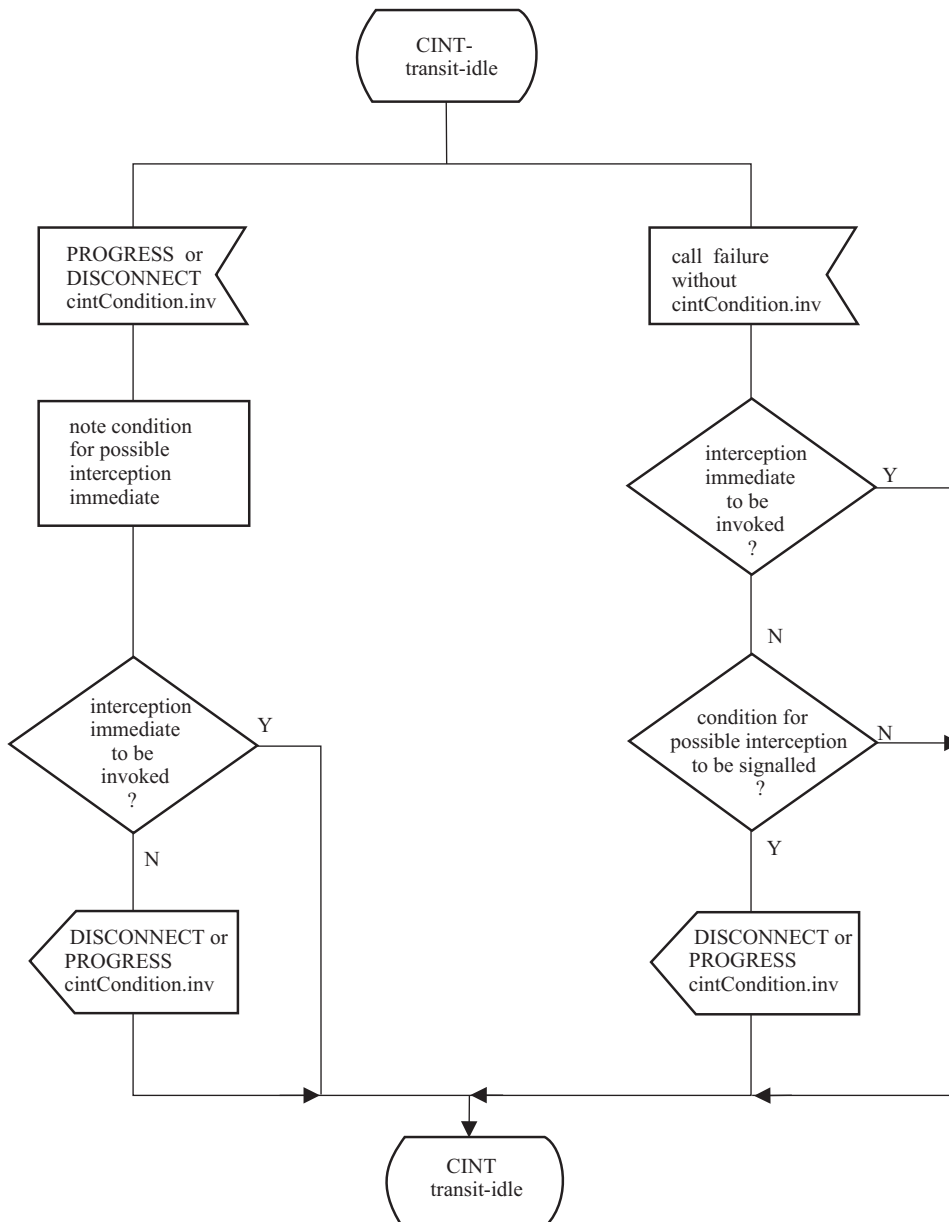
Figure C.4 - SDL Representation of ANF-CINT at the Terminating PINX

### 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.



96-0131-A

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

**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 second edition of ECMA-221, i.e. based on ITU-T Recommendations X.208 / X.209. Starting with the third edition the ASN.1 modules within ECMA-221 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)}
PresentationAllowedIndicator	PartyNumber, PresentedNumberUnscreened,  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

**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 }

**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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