INTERNATIONAL STANDARD

**ISO/IEC 11582**

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# 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

*Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseau privé à intégration de services — Protocole générique fonctionnel pour le support de compléments de service — Procédures et protocole de signalisation entre commutateurs*

Reference number
ISO/IEC 11582:2002(E)

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# Foreword

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

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard 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 11582 was prepared by ECMA (as ECMA-165) 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 11582:1995), which has been technically revised.

Annexes A and B form a normative part of this International Standard. Annexes C to L are for information only.


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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 Digital Networks (PISNs). The series uses ISDN concepts as developed by ITU-T and conforms to the framework of International Standards on Open Systems Interconnection as defined by ISO/IEC.

This International Standard defines the signalling protocol for use at the Q reference point between two PINXs for the transport of protocol information as part of Supplementary Services and/or Additional Network Features (ANFs) within a PISN. The protocol defined in this International Standard forms part of the PSS1 protocol (informally known as QSIG).

The generic functional procedures provide a flexible and open ended approach to the provision of supplementary service and ANF protocols. These procedures provide:

– generic protocols which may be utilised in the provision of supplementary services and ANFs, both related to existing calls and separate from existing calls where appropriate to the capability required;

– a dialogue identification protocol to enable supplementary service or ANF information flows to be tied together to form a dialogue;

– supplementary service and ANF transparency across a PISN, whereby transit PINXs need have no knowledge of the capability provided to the PISN user or PISN itself unless involved in the provision of that capability; and

– the capability for standardised and manufacturer specific capabilities to coexist in both single and multi-vendor PISNs.

The protocol defined in this International Standard is based upon that described in ITU-T Recommendation Q.932 (1993).

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 — Generic functional protocol for the support of supplementary services — Inter-exchange signalling procedures and protocol

## 1 Scope

This International Standard defines the signalling protocol for the control of Supplementary Services and Additional Network Features (ANFs) at the Q reference point. The protocol is part of Private Signalling System no. 1 (PSS1), known informally as QSIG. The Q reference point exists between Private Integrated services Network eXchanges (PINXs) connected together within a Private Integrated Services Network (PISN) and is defined in ISO/IEC 11579-1. Detailed procedures applicable to individual supplementary services and ANFs are beyond the scope of this International Standard and will be specified by other standards for those services which are standardised and by individual manufacturers for proprietary services using the capabilities defined in this International Standard.

ISO/IEC 11572 defines the Layer 3 protocol for circuit-switched call control at the Q reference point. This International Standard defines additional protocol procedures, to be used in conjunction with those defined in ISO/IEC 11572 for the control of supplementary services and ANFs.

NOTE 1 - Typical examples of the application of these generic functional procedures to some supplementary services are provided in annex C, for explanatory and illustrative purposes only.

NOTE 2 - Specific supplementary services and Additional Network Features may require additional information transfer mechanisms which are service or feature specific and are beyond the scope of this International Standard.

## 2 Conformance

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

## 3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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 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 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 11571:1998, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Networks — Addressing*

ISO/IEC 15056:1997, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Inter-exchange signalling protocol — Transit counter additional network feature*

ISO/IEC 6523-1:1998, *Information technology — Structure for the identification of organizations and organization parts — Part 1: Identification of organization identification schemes*

ISO/IEC 6523-2:1998, *Information technology — Structure for the identification of organizations and organization parts — Part 2: Registration of organization identification schemes*

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

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

ITU-T Rec. Q.932:1998, *Digital subscriber signalling system No. 1 — Generic procedures for the control of ISDN supplementary services*

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ITU-T Rec. X.217:1995 | ISO/IEC 8649:1996, *Information technology — Open Systems Interconnection — Service definition for the Association Control Service Element*

ITU-T Rec. X.227:1995 | ISO/IEC 8650-1:1996, *Information technology — Open Systems Interconnection — Connection-oriented protocol for the Association Control Service Element: Protocol specification*

ITU-T Rec. X.680:1997 | ISO/IEC 8824-1:1998, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ITU-T Rec. X.681:1997 | ISO/IEC 8824-2:1998, *Information technology — Abstract Syntax Notation One (ASN.1): Information object specification*

ITU-T Rec. X.682:1997 | ISO/IEC 8824-3:1998, *Information technology — Abstract Syntax Notation One (ASN.1): Constraint specification*

ITU-T Rec. X.683:1997 | ISO/IEC 8824-4:1998, *Information technology — Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications*

ITU-T Rec. X.690:1997 | ISO/IEC 8825-1:1998, *Information technology — ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

ITU-T Rec. X.880:1994 | ISO/IEC 13712-1:1995, *Information technology — Remote Operations: Concepts, model and notation*

ITU-T Rec. X.881:1994 | ISO/IEC 13712-2:1995, *Information technology — Remote Operations: OSI realizations — Remote Operations Service Element (ROSE) service definition*

ITU-T Rec. X.882:1994 | ISO/IEC 13712-3:1995, *Information technology — Remote Operations: OSI realizations — Remote Operations Service Element (ROSE) protocol specification*

## 4 Definitions

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

### 4.1 External definitions

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

- Object Identifier (ITU-T Rec. X.680)
- Private Integrated services Network eXchange (PINX) (ISO/IEC 11579-1)
- Private Integrated Services Network (ISO/IEC 11579-1)
- Service (ITU-T Rec. I.112)
- Signalling (ITU-T Rec. I.112)
- User (ISO/IEC 11574)

### 4.2 ACSE APDU

An APDU defined by the Association Control Service Element (ACSE).

### 4.3 Additional Network Feature (ANF)

A capability provided by a PISN, not generally directly to a User, over and above that of the Basic call.

### 4.4 Adjacent PINX

A PINX as considered from another PINX to which it is directly connected via one or more inter-PINX links.

### 4.5 Application Protocol Data Unit (APDU)

A sequence of data elements exchanged between peer application layer entities, e.g. ACSE APDUs, DSE APDUs and ROSE APDUs.

### 4.6 Call, Basic call

An instance of the use of a basic service.

### 4.7 Call independent signalling connection

A signalling connection established between SS-Control entities located in different PINXs that does not have an associated user-information connection.


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### 4.8 Call independent

A property of information which is conveyed across the Q reference point in a message which does not use a call reference which has an associated user-information connection (that is, using a Connectionless or Connection oriented transport mechanism as defined in 7.2 or 7.3).

### 4.9 Call related

A property of information which is conveyed across the Q reference point in a message which uses a call reference which has an associated user-information connection.

### 4.10 Connection oriented

Communication between peer protocol entities by means of a connection or association established by an underlying layer.

### 4.11 Connectionless

Communication between peer protocol entities by means of an unacknowledged, unidirectional transport mechanism provided by an underlying layer.

### 4.12 Coordination Function

An entity which provides coordination between various SS-Control entities, ROSE, ACSE, DSE, GFT-Control and Call Control for different supplementary services (see clause 6).

### 4.13 Destination PINX

In the context of a single one-way exchange of information between two SS-Control entities, the PINX where the receiving SS-Control entity is located.

### 4.14 DSE APDU

An APDU defined by the Dialogue Service Element.

### 4.15 Dialogue Service Element (DSE)

A service element which provides services to SS-Control via the Coordination Function that associate ROSE or ACSE APDUs which are not implicitly associated by an underlying network layer connection.

### 4.16 End PINX

In the context of a particular call, an Originating or Terminating PINX. It can also be a Gateway PINX, dependent on the capabilities of the signalling system being interworked (i.e. unless it transports APDUs unchanged to or from the other signalling system).

### 4.17 Gateway PINX

Sub-clause 4.6 of ISO/IEC 11572 shall apply. Dependent on the capabilities of the signalling system being interworked by the Gateway PINX, it can act as a Transit or an End PINX in the context of the supplementary services APDUs. That is, it can either transport the APDUs unchanged to or from the other signalling system, perhaps embedded in some other protocol unit, or process the APDUs and perform an interworking function of the information flows and encoding of the supplementary service concerned.

### 4.18 Generic Functional Transport Control (GFT-Control) entity

The entity that exists within a PINX and provides a range of services (defined in clause 6) to SS-Control, ROSE, ACSE and DSE via the Coordination Function.

### 4.19 Incoming side

In the context of a Call independent signalling connection, the Side which receives the request for connection establishment from the Preceding PINX.

### 4.20 Interpretation APDU

An APDU defined by the Coordination Function.

### 4.21 Inter-PINX link

The totality of a signalling channel and a number ($\geq 0$) of user information channels (which may have different characteristics) at the Q reference point.

### 4.22 Invocation

A request by a SS-Control entity to perform an operation in a remote SS-Control entity.

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### 4.23 Link significance

A property of a Facility information element which does not contain a Network Facility Extension octet group. It indicates that the element has only significance on a single inter-PINX link - i.e. only between two Adjacent PINXs.

### 4.24 Mistyped

A property of an APDU whose structure does not conform to the structure defined in clause 11 of this International Standard or the structure defined for a particular supplementary service.

### 4.25 Network significance

A property of a Facility information element which includes a Network Facility Extension octet group. It indicates that the element has significance between two PINXs which are not necessarily Adjacent.

### 4.26 Next PINX

An Adjacent PINX to which an APDU is to be sent in the context of an existing signalling connection (related to a call or independent of a call).

### 4.27 Notification

A piece of protocol information which has the following properties:

– it is intended to be delivered only to terminals and is therefore passed on transparently by PINXs;

– it does not cause a change of state on either side of the Q reference point;

– it represents a one-way flow of information that requires no response; and

– it provides additional information that can be discarded without the need for significant error recovery if it is unrecognised by the terminal.

### 4.28 Originating PINX

Sub-clause 4.5 of ISO/IEC 11572 shall apply. In addition, the term is also applied to a PINX which originates a Call independent signalling connection.

### 4.29 Outgoing side

In the context of a Call independent signalling connection, the Side which sends the request for connection establishment to the Next PINX.

### 4.30 PINX address

A PISN number as defined in ISO/IEC 11571 that is a complete number and that unambiguously identifies the addressed PINX or an addressable entity associated with that PINX.

### 4.31 Preceding PINX

Sub-clause 4.7 of ISO/IEC 11572 shall apply. In addition, the term is also applied in a similar way to a PINX participating in a Call independent signalling connection.

### 4.32 Private Signalling System No.1

The generic name given to the signalling protocol that exists conceptually at the 'Q' reference point and is defined in this and other Standards. This protocol is visible and indirectly testable at the 'C' reference point (see ISO/IEC 11579-1).

### 4.33 Protocol Control

An entity which exists within a PINX and provides a range of services (defined in clause 6) to the Generic Functional Transport Control entity.

### 4.34 ROSE APDU

An APDU defined by the Remote Operations Service Element (ROSE).

### 4.35 Side

The Protocol Control entity within a PINX at one end of an inter-PINX link.

### 4.36 Signalling Carriage Mechanism (SCM)

The infrastructure that transports messages between Protocol Control entities in two interconnected PINXs.

### 4.37 Source PINX

In the context of a single one-way exchange of information between two SS-Control entities, the PINX where the sending SS-Control entity is located.


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### 4.38 Subsequent PINX

Sub-clause 4.7 of ISO/IEC 11572 shall apply. In addition, the term is also applied in a similar way to a PINX participating in a Call independent signalling connection.

### 4.39 Supplementary service

Section 2.4 of ITU-T Recommendation I.210 shall apply.

For the purpose of this International Standard, ANFs shall be regarded as supplementary services.

### 4.40 Supplementary Services Control (SS-Control) entity

An entity that exists within a PINX and provides the procedures associated with the support of a particular supplementary service.

### 4.41 Terminating PINX

Sub-clause 4.5 of ISO/IEC 11572 shall apply. In addition, the term is also applied to a PINX which terminates a Call independent signalling connection.

### 4.42 Terminal, Terminal Equipment

An item of equipment attached to a telecommunication network to provide access for a user to one or more services.

### 4.43 Transit PINX

Sub-clause 4.5 of ISO/IEC 11572 shall apply. In addition, the term is also applied to a PINX which participates in the provision of a Call independent signalling connection, but does not originate or terminate that connection.

### 4.44 Unrecognised

A property of a message, information element, APDU or operation value whose type identifier is not one supported by the Destination PINX.

## 5 List of acronyms

| | |
|---|---|
| ACSE | Association Control Service Element |
| AE | Application Entity |
| ANF | Additional Network Feature |
| APDU | Application Protocol Data Unit |
| ASN.1 | Abstract Syntax Notation One |
| BER | Basic Encoding Rules |
| DSE | Dialogue Service Element |
| DSS1 | Digital Subscriber Signalling no. 1 |
| FIE | Facility information element |
| GFT | Generic Functional Transport |
| ICD | International Code Designator |
| MSI | Manufacturer Specific Information |
| NFE | Network Facility Extension |
| PC | Protocol Control |
| PICS | Protocol Implementation Conformance Statement |
| PINX | Private Integrated services Network eXchange |
| PISN | Private Integrated Services Network |
| PSS1 | Private Signalling System no. 1 |
| RO | Remote Operations |
| ROSE | Remote Operations Service Element |
| RTSE | Reliable Transfer Service Element |
| SCM | Signalling Carriage Mechanism |
| SS | Supplementary Service |

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# 6 General principles

The generic functional protocol defined in this International Standard provides the means to exchange signalling information for the control of supplementary services over a PISN. It does not by itself control any supplementary service but rather provides generic services to specific SS-Control entities. Procedures for individual supplementary services based on these generic procedures are defined in other standards or may be manufacturer-specific.

The generic functional protocol operates at the Q reference point between two PINXs in conjunction with a Layer 3 protocol for Basic call control (ISO/IEC 11572). Together these use the services of the Signalling Carriage Mechanism (SCM).

The generic functional protocol provides mechanisms for the support of supplementary services which relate to existing basic calls or are entirely independent of any existing basic calls. In performing a supplementary service, whether Call independent or Call related, use may be made of both the Call related (7.1) and Call independent (7.2 and 7.3) information transfer procedures.

If a particular supplementary service comprises Call related and Call independent information transfer procedures or relates to several basic calls at the same time it is - for the purpose of this International Standard - deemed to consist of separate instances of Call related (one for each call) and Call independent services respectively. The combined use of two or more instances of Call related and/or Call independent procedures in support of a particular supplementary service is outside the scope of this International Standard.

## 6.1 Application Association

Supplementary service operations require an association between the respective peer SS-Control entities. This International Standard provides three means by which this association can be achieved:

a) implicitly by the network layer connection in the case of Call related connections and for call-independent signalling connections;

b) implicitly by the application layer dialogue service, in which case the association is independent of the underlying network layer connections and can use a combination of different mechanisms, including Call independent Connectionless information transfer or,

c) explicitly by use of the Association Control Service Element (ACSE, X.217/227) in conjunction with the underlying mechanisms provided in (a) and (b).

## 6.2 Protocol Model

Figure 1 shows the conceptual model for the generic functional protocol and its relation to the Basic call model defined in ISO/IEC 11572.


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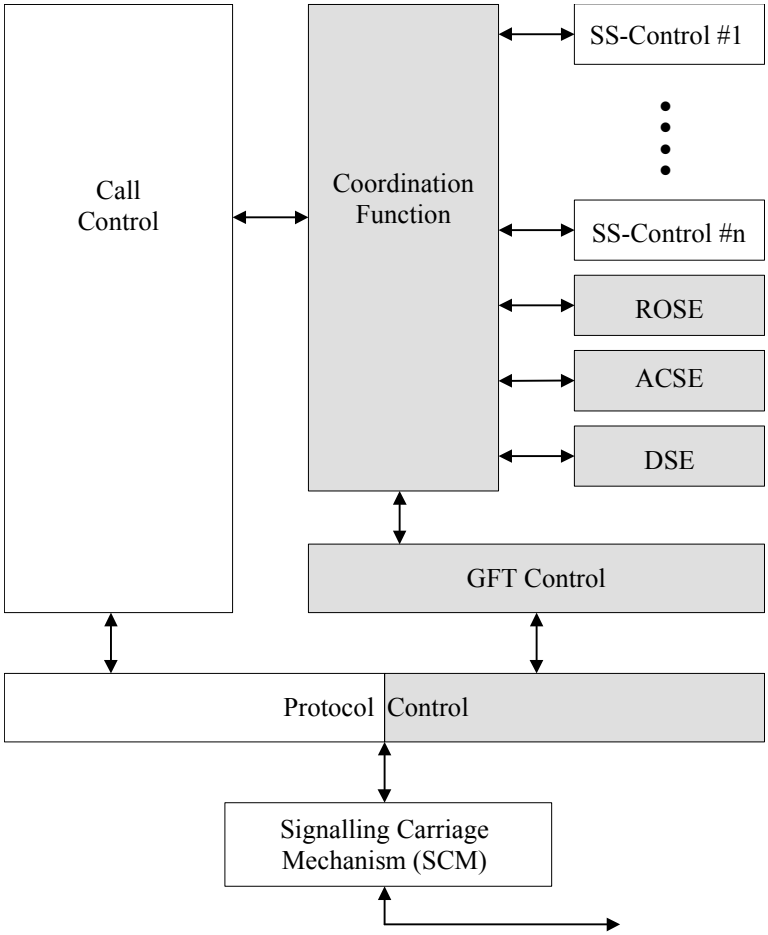


NOTE - The capabilities defined in this International Standard are indicated by shading, i.e. GFT-Control, DSE, ACSE, ROSE and extensions to Protocol Control. Part of the functions of the Coordination Function are also defined in this International Standard, but the remainder of this element governs supplementary service specific interactions which are beyond the scope of this International Standard.

**Figure 1 — PSS1 Protocol Model**

At the top layer (the application layer) the actual supplementary service protocol operates between peer Supplementary Services Control (SS-Control) entities which are service-specific. The operation of specific SS-Control entities is beyond the scope of this International Standard.

SS-Control entities use the services of the Remote Operations Service Element (ROSE), the Association Control Service Element (ACSE) and the Dialogue Service Element (DSE) at the application layer via the Coordination Function. These entities use the services of Generic Functional Transport Control (GFT-Control) at the network layer via the Coordination Function. GFT-Control uses the services of Protocol Control at the network layer.

The Remote Operations Service Element (ROSE) is defined in ITU-T Rec. X.881.

The Association Control Service Element (ACSE) is defined in ITU-T Rec. X.217.

NOTE - In the application of ROSE for the support of supplementary services in PSS1 the underlying services used by ROSE are those provided by GFT-Control or those provided by the Association Control Service Entity (ACSE). No use is made of the services of the Reliable Transport Service Element (RTSE).

The Dialogue Service Element (DSE) provides a means of associating ACSE or ROSE APDUs which are not implicitly associated by an underlying network layer connection.

The Coordination Function provides coordination between GFT-Control, the various SS-Control entities, ROSE, ACSE, DSE and Call Control for different supplementary services. The relationships it coordinates are beyond the scope of this International Standard. It also provides functions to support the handling of unrecognised APDUs.

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GFT-Control provides two distinct types of service via the Coordination Function:

– transport services for the carriage of Notifications, ROSE APDUs, ACSE APDUs and DSE APDUs between SS-Control entities in different PINXs, including transparent relaying through Transit PINXs. These services can be related to a Call or independent of a Call; and,

– establishment and release of Call independent signalling connections.

Protocol Control is an extension of the existing Protocol Control entity. It provides services to GFT-Control for:

– the transport of APDUs between Adjacent PINXs;

– the establishment and release of signalling connections (Call independent Connection oriented service) between Adjacent PINXs.

This entity builds on the ISO/IEC 11572 (Basic call) Protocol Control in the following way:

– the Call related transfer of APDUs uses the call reference established for the call by Protocol Control. This can be either by:

  • the combination of Basic call control information and APDUs in the same ISO/IEC 11572 message if they appear concurrently at the Protocol Control service access points; or,

  • the transfer of APDUs in a message defined in this International Standard associated with the call reference, when no Call Control primitive appears at the Protocol Control service access point.

– Call independent signalling connections use the call reference mechanism of Protocol Control and some of the messages and procedures.

### 6.3 Application of the protocol model to communication between SS-Control entities in non-Adjacent PINXs

Figure 2 shows the application of the protocol model to the case where communication occurs between SS-Control entities in two PINXs via a single Transit PINX. It may be applied to communication via more than one Transit PINX by simple replication.

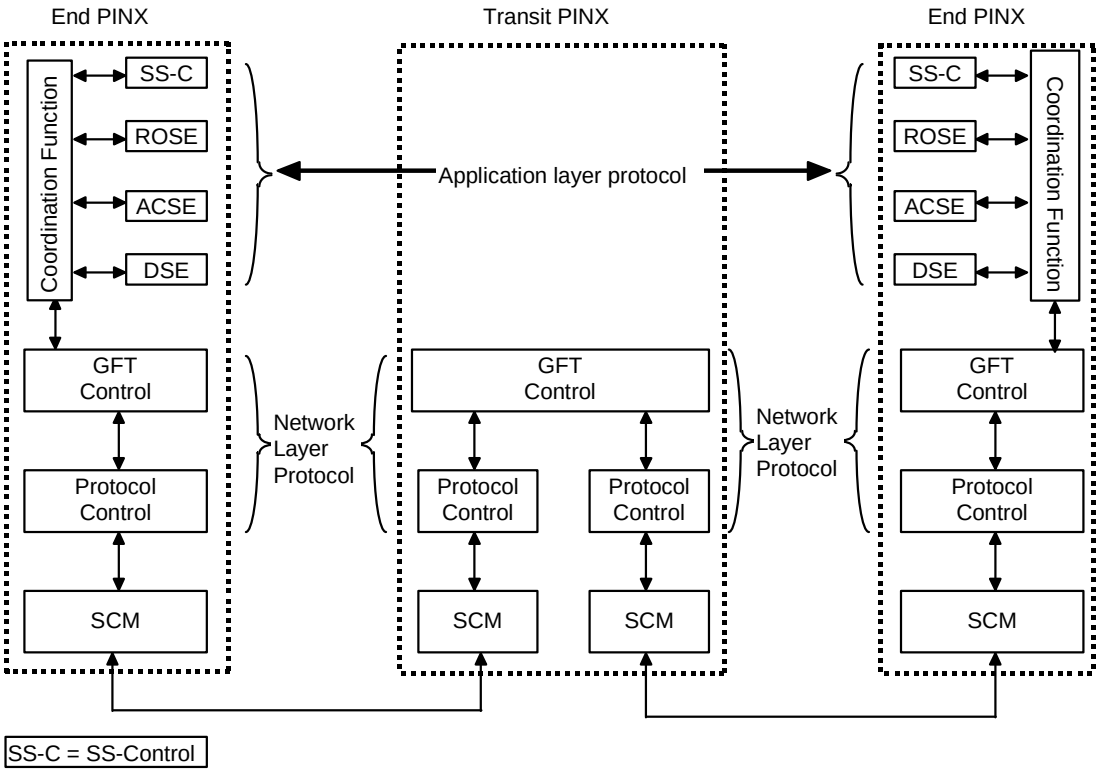


**Figure 2 — Application of the protocol model to communication between non-Adjacent PINXs**

In figure 2, relaying functions at the Transit PINX are performed by GFT-Control.



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If communication is Call related, each of the PINXs in which the SS-Control entities are located may be either an End or a Transit PINX. For simplicity, the Call Control entities are not shown.

If communication is in the context of a Call independent signalling connection, one of the PINXs in which the SS-Control entities are located is the Originating PINX and the other is the Terminating PINX.

The Signalling Carriage Mechanism (SCM) is described in ISO/IEC 11572.

### 6.4 Services provided by ROSE

ROSE provides a set of services to SS-Control to support the ROSE protocol. Primitives for these services are specified in X.881 and relate to the following ROSE APDUs: Invoke, ReturnResult, ReturnError and Reject.

### 6.5 Services provided by ACSE

ACSE provides a set of services to establish and release an explicit Application association. Primitives for these services are specified in X.217 and relate to the following ACSE APDUs: Associate request, Associate response, Release request, Release response and Abort.

### 6.6 Services provided by DSE

DSE provides the services shown in table 1 to SS-Control via the Coordination Function, with their contents indicated as either Mandatory (M) or Optional (O). These services are used for creating and terminating a Dialogue which associates peer SS-Control entities and for exchanging ACSE or ROSE APDUs within such an association.

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**Table 1 — Services provided by DSE**

| | |
|---|---|
| – **Dialog Begin** | Req/Ind |
| Originating Dialog Identifier | M |
| ROSE APDU(s) (Note) | O |
| – **Dialog Continue** | Req/Ind |
| Originating Dialog Identifier | M |
| Destination Dialog Identifier | M |
| ROSE APDU(s) (Note) | O |
| – **Dialog End** | Req/Ind |
| Destination Dialog Identifier | M |
| ROSE APDU(s) (Note) | O |
| – **Dialog Abort** | Req/Ind |
| Destination Dialog Identifier | M |
| User Abort Cause | M |

NOTE - This element can contain one or more ACSE or ROSE APDUs.

### 6.7 Services provided by GFT-Control

This entity provides the following services to SS-Control, ACSE, ROSE and DSE via the Coordination Function, with their contents indicated as either Mandatory (M) or Optional (O).

#### 6.7.1 Connection oriented services

The services shown in table 2 are provided for the control of the establishment and clearing of a Call independent signalling connection between the PINXs in which the peer SS-Control entities exist.

NOTE 1 - It is envisaged that the majority of supplementary services requiring call independent APDU transport will make use of a Call independent signalling connection via the use of the services shown in tables 2 and 3.

**Table 2 — Connection oriented services**

| | | |
|---|---|---|
| – **GF-Setup** | Req/Ind | Resp/Conf |
| Origination Address | O | - |
| Destination Address | M | O |
| Data (Note 2) | O | O |
| – **GF-Release** | Req/Ind | |
| Cause | M | |
| Data (Note 2) | O | |
| – **GF-Reject** | Req/Ind | |
| Cause | M | |
| Data (Note 2) | O | |

NOTE 2 - This element shall contain one or more APDUs and an indication of the destination of these APDUs on the connection path. APDUs may be ACSE APDUs, DSE APDUs or ROSE APDUs. It may also contain an interpretationAPDU generated by the Coordination Function.

The service shown in table 3 is provided and is used for the conveyance of APDUs on a signalling connection (Call related or Call independent) between the PINXs in which the peer SS-Control entities exist.

**Table 3 — Connection oriented services**

| | |
|---|---|
| – **GF-Data** | Req/Ind |
| Data (Note 3) | M |
| Basic Call Correlation (Note 4) | O |

NOTE 3 - This element shall contain one or more APDUs and an indication of the destination of these APDUs on the connection path. APDUs may be ACSE APDUs, DSE APDUs or ROSE APDUs. It may also contain an interpretationAPDU generated by the Coordination Function.

NOTE 4 - This element shall be included if SS-Control requires that the Data to be conveyed is to be conveyed in conjunction with a specific basic call control message.


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### 6.7.2 Connectionless transport services

The service shown in table 4 is provided to effect the transport of APDUs between two peer SS-Control entities without the use of a network layer connection. It is an unconfirmed service.

**Table 4 — Connectionless services**

| | |
|---|---|
| – **GF-Unitdata** | Req/Ind |
| Origination Address | M |
| Destination Address | M |
| Data (Note) | M |

NOTE - This element shall contain one or more APDUs. APDUs may be ACSE APDUs, DSE APDUs or ROSE APDUs. It may also contain an interpretationAPDU generated by the Coordination Function.

### 6.7.3 Notification services

The service in table 5 is provided to SS-Control via the Coordination Function. This service is used to effect the transport of notifications associated with the network layer signalling connection of a Call.

**Table 5 — Notification services**

| | |
|---|---|
| – **GF-Notify** | Req/Ind |
| Notification | M |
| Basic Call Correlation (Note) | O |

NOTE - This element shall be included if SS-Control requires that the Notification is conveyed in conjunction with a specific basic call control message.

## 6.8 Services provided by Protocol Control to GFT-Control

The following services are provided, with their contents indicated as either Mandatory (M) or Optional (O).

### 6.8.1 Connection oriented transport services

The services in table 6 provide the Connection oriented network service for Call independent supplementary service control. These services are used for the establishment and clearing of Call independent signalling connections between Adjacent PINXs.

**Table 6 — Connection oriented transport services**

| | | |
|---|---|---|
| – **PC-Setup** | Req/Ind | Resp/Conf |
| Origination Address | O | - |
| Destination Address | M | O |
| Data (Note 1) | O | O |
| – **PC-Release** | Req/Ind | |
| Cause | M | |
| Data (Note 1) | O | |
| – **PC-Reject** | Req/Ind | |
| Cause | M | |
| Data (Note 1) | O | |

NOTE 1 - This element shall contain one or more APDUs and an indication of the destination of these APDUs on the connection path.

NOTE 2 - These primitives are similar to the primitives defined in 6.2 of ISO/IEC 11572 for provision of services to Call Control.

The service in table 7 is provided to GFT-Control for the conveyance of APDUs between Adjacent PINXs in association with a Basic call or Call independent signalling connection.

**Table 7 — Connection oriented transport services**

| | |
|---|---|
| – **PC-Data** | Req/Ind |
| Data (Note 3) | M |
| Basic Call Correlation (Note 4) | O |

NOTE 3 - This element shall contain one or more APDUs and an indication of the destination of these APDUs on the connection path.

NOTE 4 - This element shall be included if the APDUs to be conveyed are to be conveyed in conjunction with a specific basic call control message.

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### 6.8.2 Connectionless transport service

The service in table 8 is provided to GFT-Control to effect the transport of APDUs between two Adjacent PINXs without the use of a network layer connection.

**Table 8 — Connectionless transport services**

| | |
|---|---|
| – **PC-Unitdata** | Req/Ind |
| Origination Address | M |
| Destination Address | M |
| Data (Note) | M |

NOTE - This element shall contain one or more APDUs.

### 6.8.3 Notification services

The service in table 9 is provided to GFT-Control. This service is used to effect the transport of notifications between Adjacent PINXs in association with the network layer signalling connection of a Call.

**Table 9 — Notification transport services**

| | |
|---|---|
| – **PC-Notify** | Req/Ind |
| Notification | M |
| Basic Call Correlation (Note) | O |

NOTE - This element shall be included if the Notification is to be conveyed in conjunction with a specific basic call control message.

### 6.9 Services required of the Signalling Carriage Mechanism

The services required by Protocol Control are as specified in 6.3 of ISO/IEC 11572.

## 7 Protocol Control and GFT-Control Requirements

### 7.1 Call related Procedures for the transport of APDUs

This clause describes the procedures required to transport Call related APDUs.

NOTE - The APDUs need not directly relate to the provision or state of the Call which provides the signalling connection over which the information is carried. If the Call fails and the connection is cleared down for any reason, APDUs that are in the process of being sent may never reach their destination. In such a case, the APDUs will be discarded. It is the responsibility of the supplementary service protocol to cater for this eventuality.

### 7.1.1 Protocol Control requirements

#### 7.1.1.1 Sending the Facility information element

When requested by GFT-Control, the Facility information element may be sent at any time during a call (i.e. where a call reference exists) subject to the following conditions:

– If a call establishment or a call clearing message that may contain a Facility information element (see clause 10) or a PROGRESS message is to be sent in the context of a Basic call and GFT-Control has requested that the Facility information element be carried in that message, the Facility information element shall be included in that message.

– otherwise, the Facility information element shall be carried in a FACILITY message.

Four exceptions where the Facility information element shall not be sent in a FACILITY message and an indication of transmission failure given to GFT-Control are:

– when no response has been received to a previously sent SETUP message (as defined in 10.1 of ISO/IEC 11572);

– when no response has been sent to a previously received SETUP message (as defined in 10.1 of ISO/IEC 11572);

– when the Facility information element is of network significance and a call clearing message has already been sent or received on the inter-PINX link; or

– if no call establishment or clearing message is to be sent and a RELEASE or RELEASE COMPLETE message has been sent or received on the inter-PINX link.

NOTE 1 - Further actions by the GFT-Control entity in such a situation (e.g. if the Facility information element was received from the Subsequent PINX) are implementation dependent. In designing protocols for supplementary services in a PISN, account should be taken of the fact that an end to end Call related signalling relationship cannot be guaranteed until the receipt of the first end to end Basic call message.


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NOTE 2 - In the case where the Facility information element is sent to a PINX which does not conform to this International Standard, the Facility information element will be discarded by that PINX and a STATUS message may be received (see clause 9 in ISO/IEC 11572). The STATUS message will indicate that either: the Facility information element was unrecognised; or, that the message (FACILITY) was unrecognised. In such cases, the recovery action, if any, is an implementation specific matter.

#### 7.1.1.2 Receiving the Facility information element

A PINX receiving a Facility information element in a valid call clearing or call establishment message (see clause 10) or a PROGRESS or FACILITY message shall pass the entire contents of that information element to GFT-Control.

Protocol Control shall treat any value in octets 3.1 onwards as valid, and therefore the ISO/IEC 11572 procedures for information elements with invalid contents shall not apply to these octets.

### 7.1.2 GFT-Control requirements

#### 7.1.2.1 Actions at a Source PINX

On receipt of a request for APDU transport from the Coordination Function, the APDUs to be transported shall be encoded in a Facility information element, as defined in 11.3.3.

APDUs may be of two basic types:

– Those which have only Link significance, i.e. over a single link of the PISN, between two Adjacent PINXs; or,

– Those which have Network significance, between two PINXs in the PISN which are not necessarily adjacent, and which can be, but need not be, the End PINXs involved in the call.

If the APDUs have link significance, the Network Facility Extension (NFE), defined in 11.3.3.1, need not be included in the Facility information element (although it may optionally be included, explicitly identifying the Adjacent PINX).

If the APDUs have network significance, the NFE shall be included, encoded as described in table 10.

NOTE 1 - The Facility information element may contain one or more APDUs. If more than one APDU is contained in a single Facility information element, they will all be processed by the Destination PINX. How and if these requests are related is beyond the scope of this International Standard.

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**Table 10 — Encoding of NFE**

| Case No. | Communication between .. | Required coding of NetworkFacilityExtension for each identified case | | | |
|---|---|---|---|---|---|
| | | Encoding of sourceEntity | Encoding of sourceEntityAddress | Encoding of destinationEntity | Encoding of destinationEntityAddress |
| 1 | End PINX (Originating or Terminating) => End PINX (Terminating or Originating, depending on direction of FIE) | endPINX (Note) | NOT included | endPINX | NOT included |
| 2 | End PINX (Originating or Terminating) => addressed PINX | endPINX (Note) | NOT included | anyTypeOfPINX | PINX Address |
| 3 | End PINX (Originating or Terminating) => Next PINX which understands contents | endPINX (Note) | NOT included | anyTypeOfPINX | NOT included |
| 4 | Transit PINX => Terminating or Originating PINX (depending on direction of FIE) | anyTypeOfPINX | PINX Address | endPINX | NOT included |
| 5 | Transit PINX => addressed PINX | anyTypeOfPINX | PINX Address | anyTypeOfPINX | PINX Address |
| 6 | Transit PINX => Next PINX | anyTypeOfPINX | PINX Address | anyTypeOfPINX | NOT included |

NOTE - The value endPINX for the sourceEntity should be avoided if there is any possibility that the PINX can cease to be an End PINX (e.g. through the use of certain supplementary services) prior to a response (e.g. a Reject APDU) being received.

The Facility information element shall be delivered to Protocol Control.

#### 7.1.2.2 Actions at a Receiving PINX

A PINX receiving a Facility information element (in one of the messages listed in clause 10) shall determine whether or not it is the Destination PINX for that Facility information element.

It shall accomplish this by determining whether the Protocol Profile (octet 3) has the value ‘Networking Extensions’ and if so, whether octet 3 is immediately followed by an NFE (as determined by the tag value).

If the Facility information element does not contain an NFE, the PINX shall become the Destination PINX for that Facility information element.

If the Facility information element contains an NFE, the PINX shall determine whether it is a Transit PINX or End PINX in the context of the Basic call and act as described below.


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#### 7.1.2.2.1 End PINX actions

If the receiving PINX is an End PINX, and the encoding of the received NFE complies with the encoding and structure defined in clause 11, the following actions shall apply:

– if the destinationEntity element of the NFE indicates endPINX or anyTypeOfPINX and no destinationEntityAddress element is included, it shall become the Destination PINX for that Facility information element;

– if the destinationEntity element of the NFE indicates anyTypeOfPINX and includes a destinationEntityAddress element, it shall compare the received address to its own address. If the addresses match, the PINX shall become the Destination PINX for that Facility information element;

– if the destinationEntity element of the NFE indicates endPINX and erroneously includes a destinationEntityAddress element, the PINX shall become the Destination PINX for that Facility information element;

– in all other cases, the received Facility information element shall be discarded.

If the received NFE does not conform to the encoding and structure defined in clause 11, the entire Facility information element shall be discarded.

#### 7.1.2.2.2 Transit PINX actions

If the receiving PINX is a Transit PINX, and the encoding of the received NFE complies with the encoding and structure defined in clause 11, the following actions shall apply:

– if the destinationEntity element of the NFE indicates anyTypeOfPINX and a destinationEntityAddress element is included, it shall compare the received address to its own address. If the addresses match, the PINX shall become the Destination PINX for that Facility information element;

– if the destinationEntity element of the NFE indicates anyTypeOfPINX and no destinationEntityAddress element is included, the PINX may become the Destination PINX for that Facility information element if it understands the contents;

– if the destinationEntity element of the NFE indicates endPINX and erroneously includes a destinationEntityAddress element, the PINX shall ignore the contents of the destinationEntityAddress field and treat the contents of the Facility information element as if only the destinationEntity element was present;

– if the destinationEntity element of the NFE indicates endPINX, and the Transit PINX is capable of acting as an End PINX for all services indicated in the Facility information element, it may become the Destination PINX for that Facility information element;

NOTE 1 - In this case, the source of the information will have no knowledge that the information has been intercepted, as the Transit PINX will act as if it were an End PINX. This may occur, for example, when a PINX at a PISN numbering domain boundary wishes to translate numbering information contained within an APDU.

– in all cases where the PINX does not become the Destination PINX, the Facility information element shall be passed on unchanged to the Next PINX.

If the received NFE does not conform to the encoding and structure defined in clause 11, the entire Facility information element shall be discarded and no Facility information element shall be passed on to the Next PINX.

NOTE 2 - Processing of a Facility information element at a Transit PINX does not preclude another Facility information element, which may have similar contents to that received by the Transit PINX, being sent to the Next PINX as a result of that internal processing.

### 7.1.2.3 Actions at a Destination PINX

All APDUs in the received Facility information element shall be delivered to the Coordination Function at a Destination PINX in the order in which they were received in the Facility information element together with an indication of the protocol profile.

If the Protocol Profile (octet 3) in the received Facility information element does not indicate 'Networking Extensions', the indication of the protocol profile to the Coordination Function shall reflect the contents of the Protocol Profile.

If the Protocol profile (octet 3) in the received Facility information element indicates 'Networking Extensions', and a Network Protocol Profile (as determined by the tag value) is present in the received Facility information element immediately following the NFE, if present, or immediately following octet 3, the indication of protocol profile to the Coordination Function shall reflect the contents of the Network Protocol Profile.

If the Protocol profile (octet 3) in the received Facility information element indicates 'Networking Extensions', and a Network Protocol Profile is not present in the received Facility information element, the indication of protocol profile to the Coordination Function shall be the default (ROSE).

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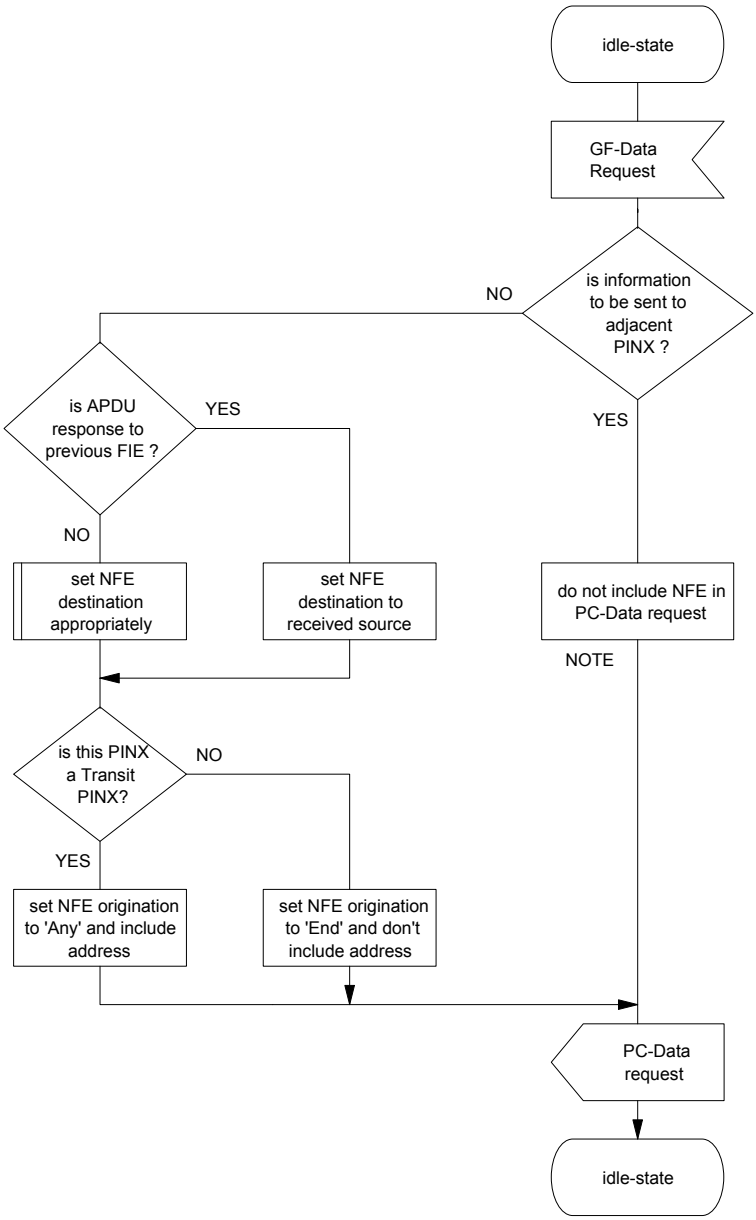


The Facility information element shall be discarded under any of the following circumstances:

– the Network Protocol Profile is present but incorrectly coded;

– subsequent octets do not comprise one or more concatenated APDUs, each in the form of an encoded ASN.1 value (comprising tag, length and contents).

#### 7.1.2.4 Dynamic description (SDL) of Generic Functional Transport Control

Figures 4 to 7 show SDL diagrams describing the actions of the GFT-Control entity, as specified in 7.1.2. Figure 3 is the key to these SDL diagrams.

**Figure 3 — Key to SDL diagrams in figures 4, 5, 6 and 7**


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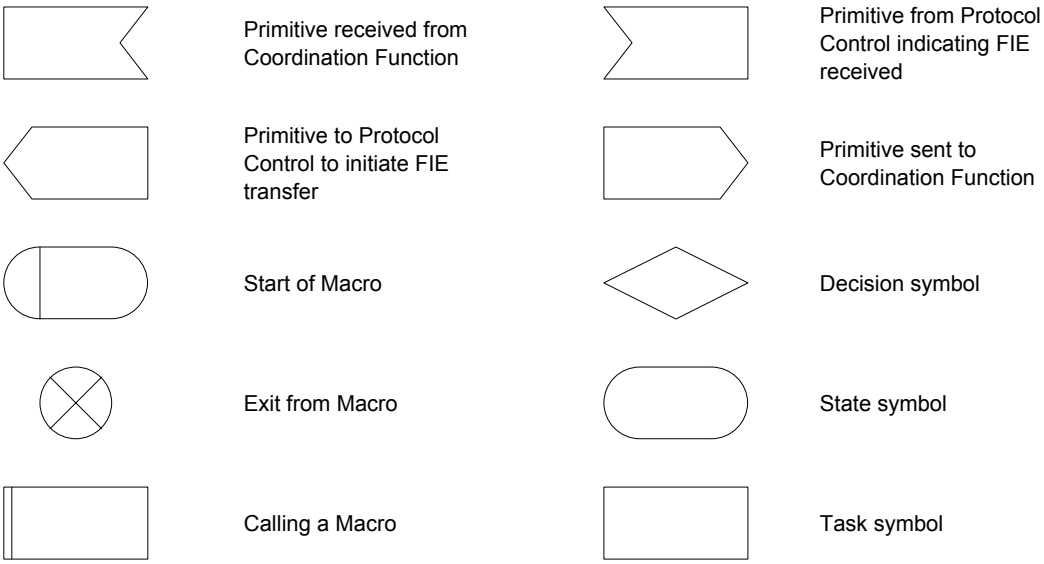


NOTE - In principle, including the NFE to explicitly identify the Adjacent PINX is not precluded by the procedures in this International Standard.

**Figure 4 — Actions at a Source PINX (sheet 1 of 2)**

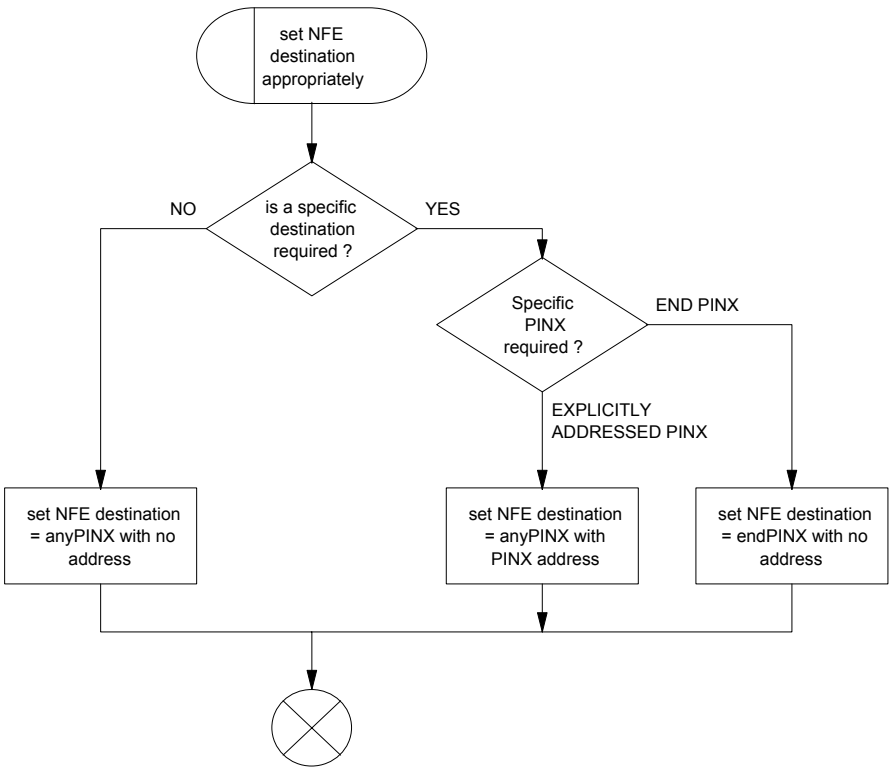


**Figure 5 — Actions at a Source PINX (sheet 2 of 2)**

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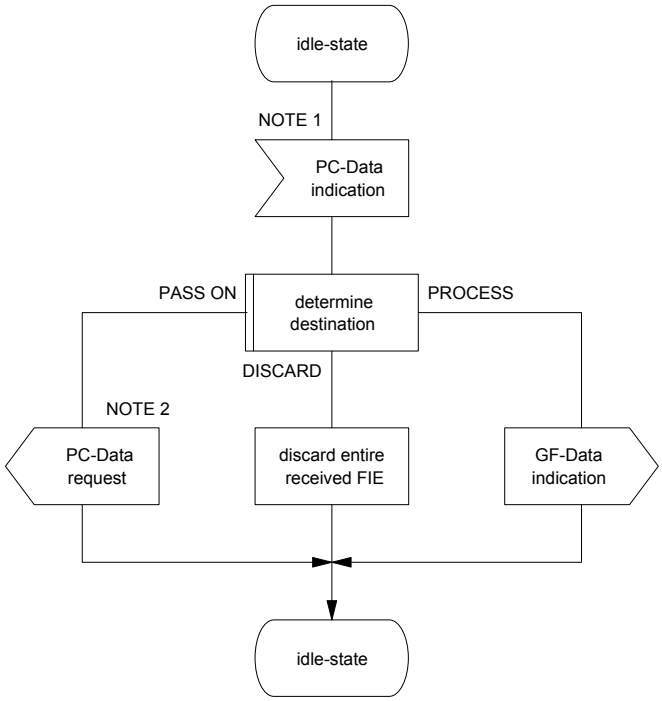


NOTE 1 - This primitive indicates that Protocol Control has received a Facility information element from an Adjacent PINX.

NOTE 2 - This primitive to the Protocol Control entity causes a Facility information element to be sent to the Next PINX in the direction of the Destination PINX.

**Figure 6 — Actions at a Receiving PINX (sheet 1 of 2)**


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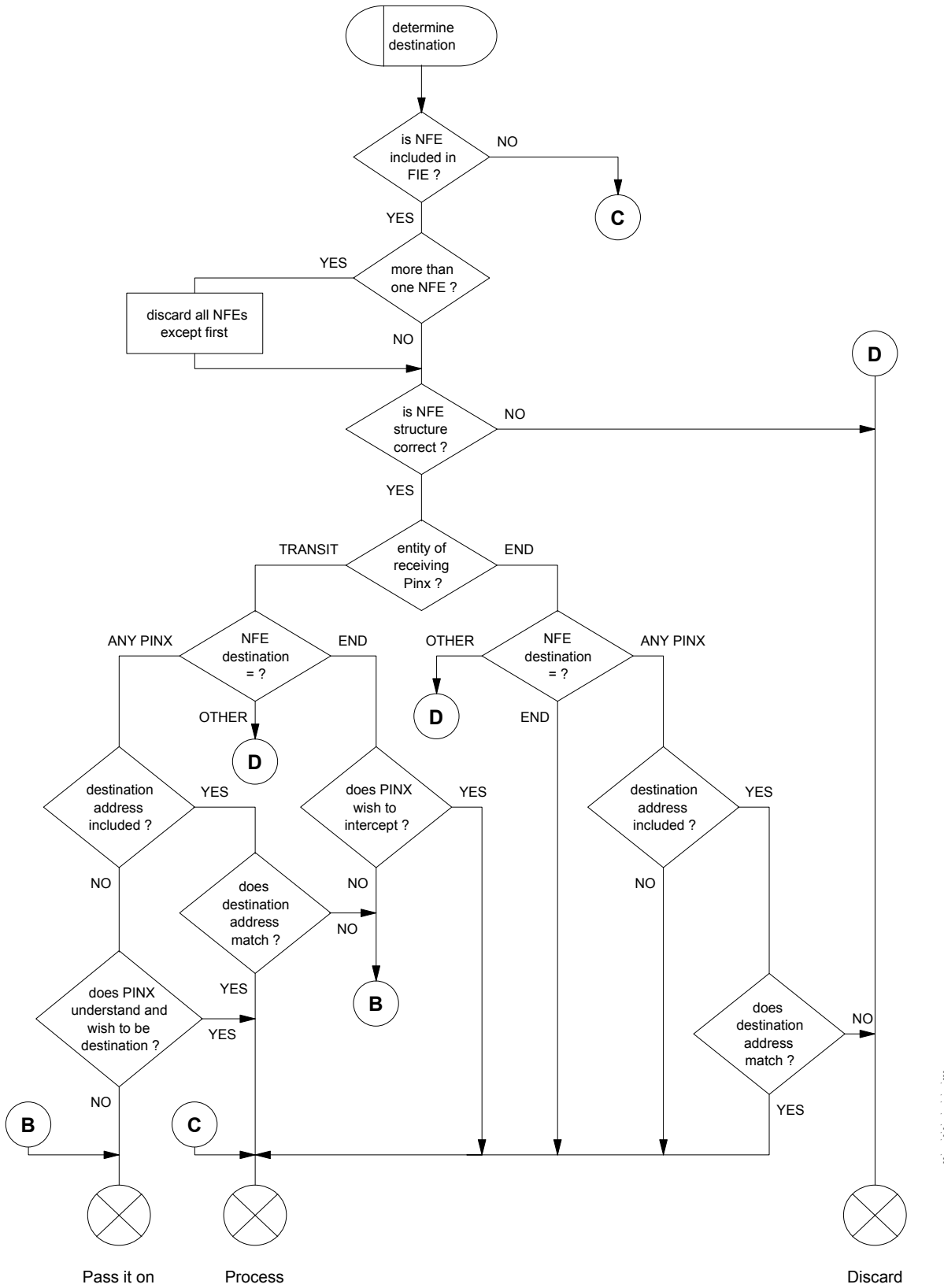


**Figure 7 — Actions at a Receiving PINX (sheet 2 of 2)**

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### 7.2 Connectionless APDU Transport Mechanism

The procedures defined in this clause describe a Connectionless network layer service which provides APDU transfer between PINXs outside the context of a call.

#### 7.2.1 Protocol Control requirements

##### 7.2.1.1 Requirements for sending a Connectionless message

When requested by GFT-Control to send APDUs using Connectionless transport, Protocol Control shall first ensure that an SCM connection exists on the relevant inter-PINX link. If an SCM connection does not exist, Protocol Control shall establish an SCM connection according to the procedures described in 9.1.1 of ISO/IEC 11572. Once this Data Link is established, Protocol Control shall transfer the APDUs (encoded in a Facility information element) across the interface by sending a FACILITY message (defined in 10.7) containing the Dummy call reference (defined in 11.2), and the Calling and Called party number information elements as provided by GFT-Control.

NOTE - In the case where the FACILITY message is sent to a PINX which does not support Connectionless APDU transport, the FACILITY message will be discarded by that PINX in accordance with 9.2.3 of ISO/IEC 11572.

##### 7.2.1.2 Requirements for receiving a Connectionless message

On receipt of a valid FACILITY message containing the Dummy call reference the Facility information element shall be passed to GFT-Control.

If a FACILITY message containing the Dummy call reference contains any of the following errors, it shall be discarded:

– unrecognised information element which is encoded ‘comprehension required’;

– missing mandatory information element; or,

– mandatory information element content error.

If a FACILITY message containing the Dummy call reference contains any unrecognised information elements that are not encoded "comprehension required"; or optional information elements with invalid contents, these information elements shall be discarded and the remainder of the FACILITY message processed as valid.

On receipt of any messages containing the dummy call reference, other than the FACILITY message, the message shall be discarded.

#### 7.2.2 Control requirements

##### 7.2.2.1 Actions at a Source PINX

On receipt of a request from the Coordination Function to send APDUs using Connectionless transport, accompanied by the address of the Destination PINX, GFT-Control shall:

– if a route to the destination can be selected, select the appropriate inter-PINX link based on the destination address given in the request from the Coordination Function and inform Protocol Control to send a FACILITY message which shall contain:

  - a Calling party number information element, identifying the address of the Source PINX;
  - a Called party number information element identifying the address of the Destination PINX; and,
  - a Facility information element which shall not contain an NFE.

– if no route to the Destination PINX can be selected, ignore the request.

##### 7.2.2.2 Actions at a Receiving PINX

If a PINX receives a FACILITY message containing the Dummy call reference on an inter-PINX link from an Adjacent PINX, it shall examine the contents of the Called party number information element to determine whether or not the FACILITY message is to be terminated at that PINX. If the Called party number identifies another PINX, and the receiving PINX can route the FACILITY message based on this Called party number, the FACILITY message (with contents as received) shall be sent on the appropriate inter-PINX link. If the Called party number information element contains an address identifying the receiving PINX, it shall act as the Destination PINX for the FACILITY message.

If a received FACILITY message containing the Dummy call reference contains a Called Party number information element that does not identify the receiving PINX or a PINX to which the FACILITY message can be passed on, the PINX shall discard the FACILITY message.

NOTE - It is the responsibility of the appropriate specification for the supplementary service utilising these transport procedures to ensure that the service can cope gracefully if the FACILITY message is discarded during routing.

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#### 7.2.2.3 Actions at a Destination PINX

If the received FACILITY message is destined for the receiving PINX, the contents of the Facility information element and the address of the Source PINX shall be passed to the appropriate SS-Control entity via the Coordination Function.

NOTE - It is the responsibility of SS-Control (i.e. the specific supplementary service) in the Destination PINX to store the Calling party number information element to enable response to the service request to be made using a further Connectionless message.

If the received Facility information element contains an NFE, the receiving PINX shall ignore the contents of that NFE.

### 7.3 Connection oriented call independent APDU transport mechanism

The procedures in this clause describe a Connection oriented network layer service which provides APDU transfer between PINXs outside the context of a call.

#### 7.3.1 Protocol Control requirements

The description of the Protocol Control requirements for Connection oriented APDU transport uses a subset of the states defined in 7.1 of ISO/IEC 11572.

#### 7.3.1.1 Actions in the Null state

When asked to initiate a Call independent signalling connection by GFT-Control, the Outgoing side Protocol Control shall:

– ensure that an SCM connection exists on the relevant inter-PINX link. If an SCM connection does not exist, Protocol Control shall establish an SCM connection according to the procedures described in 9.1.1 of ISO/IEC 11572;

– send a SETUP message on the appropriate inter-PINX link which shall contain only:

- a Call reference, selected according to 14.3 of ISO/IEC 11572;
- a Bearer capability information element indicating the additional codepoints defined in 11.3.1, i.e. Coding standard indicating ‘other international standard’, Information transfer capability indicating ‘unrestricted digital information’, Transfer mode indicating ‘circuit mode’, and Information transfer rate indicating ‘Call independent signalling connection’;
- a Channel identification information element indicating ‘no-channel’ in the channel selection field, 'channel indicated is the signalling channel' in the signalling channel indication field and ‘exclusive’ in the preferred/exclusive field, as defined in 11.3.2;
- a Called party number information element containing a number at least sufficient to identify the Terminating PINX;
- optionally, a Sending complete information element, as defined in 14.5 of ISO/IEC 11572;
- optionally, a Calling party number information element containing a number at least sufficient to identify the Originating PINX; and,
- optionally, one or more Facility information elements; and,

– start timer T303; and,

– enter the Call initiated state.

On receipt of a SETUP message relating to establishment of a Call independent signalling connection, the Incoming side shall:

– if the request is valid and can be processed, return a CALL PROCEEDING message to the Outgoing side, indicate the connection request to GFT-Control and enter the Incoming call proceeding state; or,

– if the request is invalid or cannot be accepted by the PINX, return a RELEASE COMPLETE message to the Outgoing side, release the call reference and remain in the Null state.

#### 7.3.1.2 Actions in the Call initiated state

On receipt of a CALL PROCEEDING message from the Incoming side, the Outgoing side shall stop T303, start timer T310, if applicable, and enter the Outgoing call proceeding state.

If no response is received from the Incoming side before timer T303 expires, the SETUP message may optionally be retransmitted and timer T303 restarted. If no response is received before timer T303 expires for a second time (or for the first time if the SETUP message is not to be retransmitted), the Outgoing side shall send a RELEASE COMPLETE message to the Incoming side; inform GFT-Control of the failure of the signalling connection request; and enter the Null state.

NOTE 1 - The RELEASE COMPLETE message should contain cause no. 102 “Recovery on Timer Expiry”.

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NOTE 2 - If the Connection oriented procedures are not supported by a PINX which receives a SETUP message requesting a Call independent signalling connection, it will respond with a call clearing message indicating, for example, that the Bearer capability cannot be provided or that the message has contained an information element content error. This will initiate connection release in accordance with 7.3.1.7.

#### 7.3.1.3 Actions in the Incoming call proceeding state

When receiving an indication that the Call independent signalling connection is established from GFT-Control, the Incoming side shall: send a CONNECT message to the Outgoing side and either: enter the Active state, or start timer T313 and enter the Connect request state.

#### 7.3.1.4 Actions in the Outgoing call proceeding state

On receipt of a CONNECT message from the Incoming side, the Outgoing side shall: stop timer T310 (if applicable), inform GFT-Control that the signalling connection is established, send a CONNECT ACKNOWLEDGE message to the Incoming side and enter the Active state.

If timer T310 expires, the Outgoing side shall indicate that the signalling connection request has failed to GFT-Control and initiate release of the connection as described in 7.3.1.7.

NOTE - The cause sent to the Incoming side should be no. 102 “Recovery on Timer Expiry”.

#### 7.3.1.5 Actions in the Connect request state

On receipt of a CONNECT ACKNOWLEDGE message, the Incoming side shall: stop timer T313 and enter the Active state.

If timer T313 expires before a CONNECT ACKNOWLEDGE message is received the Incoming side shall: indicate failure of connection establishment to GFT-Control and initiate release of the connection as described in 7.3.1.7.

NOTE - The cause sent to the Outgoing side should be no. 102 “Recovery on Timer Expiry”.

#### 7.3.1.6 Actions in the Active state

On receipt of a FACILITY message from a peer Protocol Control entity, an indication shall be given to GFT-Control.

On receipt of a request to send supplementary services related information by GFT-Control, Protocol Control shall send a FACILITY message to the peer Protocol Control entity.

A received CONNECT ACKNOWLEDGE message shall be ignored.

#### 7.3.1.7 Connection release

When Protocol Control is requested by GFT-Control to release a Call independent signalling connection, Protocol Control shall:

– if in the Release request state, ignore the request from GFT-Control; or

– if in any other Protocol Control state, send a RELEASE message with an appropriate cause value, start timer T308 and enter the Release request state.

When Protocol Control makes a local decision to release a Call independent signalling connection (e.g. due to a protocol error), it shall, if not in the Release request state: inform GFT-Control that the signalling connection has been released, send a RELEASE message with an appropriate cause value, start timer T308 and enter the Release request state.

On receipt of a RELEASE message in any state other than the Release request state, Protocol Control shall indicate to GFT-Control that the signalling connection has been released, send a RELEASE COMPLETE message, release the call reference and enter the Null state.

On receipt of a RELEASE COMPLETE message in any state other than the Release request state, Protocol Control shall indicate to GFT-Control that the signalling connection has been released, release the call reference and enter the Null state.

#### 7.3.1.8 Actions in the Release request state

On receipt of a RELEASE or a RELEASE COMPLETE message, Protocol Control shall: stop timer T308, release the call reference and enter the Null state.

If timer T308 expires for the first time, the RELEASE message shall be retransmitted and timer T308 shall be restarted. If timer T308 expires a second time, Protocol Control shall release the call reference and enter the Null state.


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#### 7.3.1.9 Transport of APDUs associated with a Call independent signalling connection

When requested by GFT-Control, the Facility information element may be sent in a call establishment or a call clearing message (see clause 10) of the connection oriented, call independent signalling connection or in a FACILITY message during Active state of the connection oriented, call independent signalling connection.

#### 7.3.1.10 Protocol error handling

Sub-clause 9.2 of ISO/IEC 11572 shall apply with the following modifications:

– actions regarding the handling of B-channels are not applicable;

– actions regarding the handling of the DISCONNECT message (not defined for use with Call independent connections) are not applicable;

– on SCM failure, for connections in the Active state, Protocol Control may release all resources, release the call reference, enter the Null state and inform GFT-Control of the failure of the connection, as an alternative to the procedures specified for active connections in 9.2.9 of ISO/IEC 11572;

– if a SETUP ACKNOWLEDGE, ALERTING, INFORMATION, DISCONNECT or PROGRESS message (defined in ISO/IEC 11572) is received in any state (except the Null state, where invalid call reference error procedures apply) it shall be treated as an unexpected or unrecognised message in accordance with 9.2.4 of ISO/IEC 11572.

Sub-clause 9.3 of ISO/IEC 11572 shall apply for the generation and request of Call independent connection state information.

#### 7.3.1.11 Procedures for layer management

Clause 11 of ISO/IEC 11572 shall apply. In the case that the Restart indicator information element indicates restart of a single channel, call independent signalling connections shall not be affected. In the case that the Restart indicator information element indicates 'all channels', Protocol Control shall return all call independent signalling connections to the idle state and inform GFT-Control.

#### 7.3.1.12 Protocol timer values

Table 11 defines the values and attributes of the protocol timers required for Connection oriented Protocol Control.

In table 11, the following conventions are used to indicate the applicability of the protocol timers to an incoming or outgoing side Protocol Control entity in a PINX:

| | |
|---|---|
| M: | The support of the timer is Mandatory |
| O: | The support of the timer is Optional |
| M(I): | The support of the timer is Mandatory if the associated (optional) procedures are implemented. |

All timer values given in table 11 shall have a tolerance of 10%. Where minimum and maximum values are given, the choice of value is an implementation matter, within the range specified, with a tolerance of 10% below the minimum value and 10% above the maximum value.

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**Table 11 — Protocol Control timer values**

| Timer Number | Timer Value | Call State | Cause for start | Normally terminated | Action to be taken when timer expires | Incoming side | Outgoing side |
|---|---|---|---|---|---|---|---|
| T303 | Minimum 4 s, Maximum 6 s | Call initiated | On Sending SETUP | On receipt of CALL PROCEEDING or RELEASE COMPLETE | Retransmit SETUP and restart T303 or release the connection as specified in 7.3.1.7 | - | M |
| Second T303 | Minimum 4 s, Maximum 6 s | Call initiated | On retransmission of SETUP | On receipt of CALL PROCEEDING or RELEASE COMPLETE | Release connection as specified in 7.3.1.7 | | O |
| T308 | Minimum 4 s, Maximum 6 s | Release request | On sending RELEASE | On receiving RELEASE or RELEASE COMPLETE | Retransmit RELEASE, restart T308. | M | M |
| Second T308 | Minimum 4 s, Maximum 6 s | Release request | On expiry of T308 | On receiving RELEASE or RELEASE COMPLETE | Release call reference | M | M |
| T309 | 90 s | Any state | SCM disconnection. Connections in Stable states are not lost. | On SCM re-establishment | Release connection and call reference | O | O |
| T310 | Implemen-tation dependent | Outgoing call proceeding | On receipt of CALL PROCEEDING | On receipt of CONNECT or RELEASE | Release connection as specified in 7.3.1.7 | - | M (Optional for a Transit PINX) |
| T313 | Minimum 4 s, Maximum 6 s | Connect request | On sending CONNECT | On receipt of CONNECT ACKNOWLEDGE | Release connection as specified in 7.3.1.7 | O | - |
| T322 | Minimum 4 s, Maximum 6 s | Any connection state except Null | STATUS ENQUIRY sent | STATUS, RELEASE or RELEASE COMPLETE received. | STATUS ENQUIRY may be retransmitted several times - implementation dependant | M (I) | M (I) |


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### 7.3.2 Dynamic Description (SDL) of Connection oriented Protocol Control procedures

Figures 9 contains a dynamic description of the Connection oriented Protocol Control procedures in 7.3.1. It is based on the SDL description of the Basic call, defined in annex E of ISO/IEC 11572 and is not intended to be complete. It is to be used as an aid to the interpretation of the text, which shall be the prime source should a conflict occur.

Figure 8 shows the key to the symbols used in figure 9. Table 12 describes the naming convention used for primitives shown in the SDL diagram.

**Table 12 — Key to primitive names used in figure 9**

| Prefix | Primitive from/to: |
|---|---|
| Event_ | An entity which provides Protocol Control with notification of protocol related events other than receipt of incoming messages or primitives from GFT-Control or the SCM. |
| PC_ | Primitives from / to GFT-Control to / from Protocol Control |
| DL_ | Primitives from / to the SCM to / from Protocol Control |

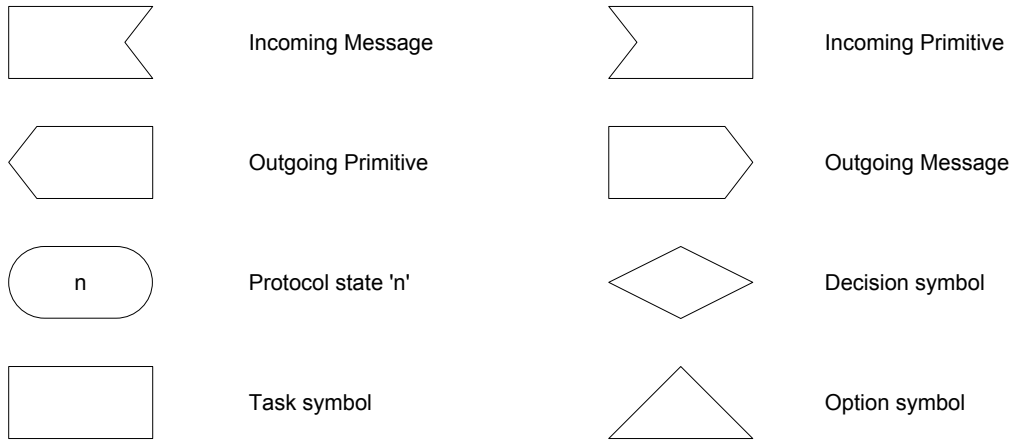


**Figure 8 — Key to symbols used in the SDL diagram for Connection oriented Protocol Control**

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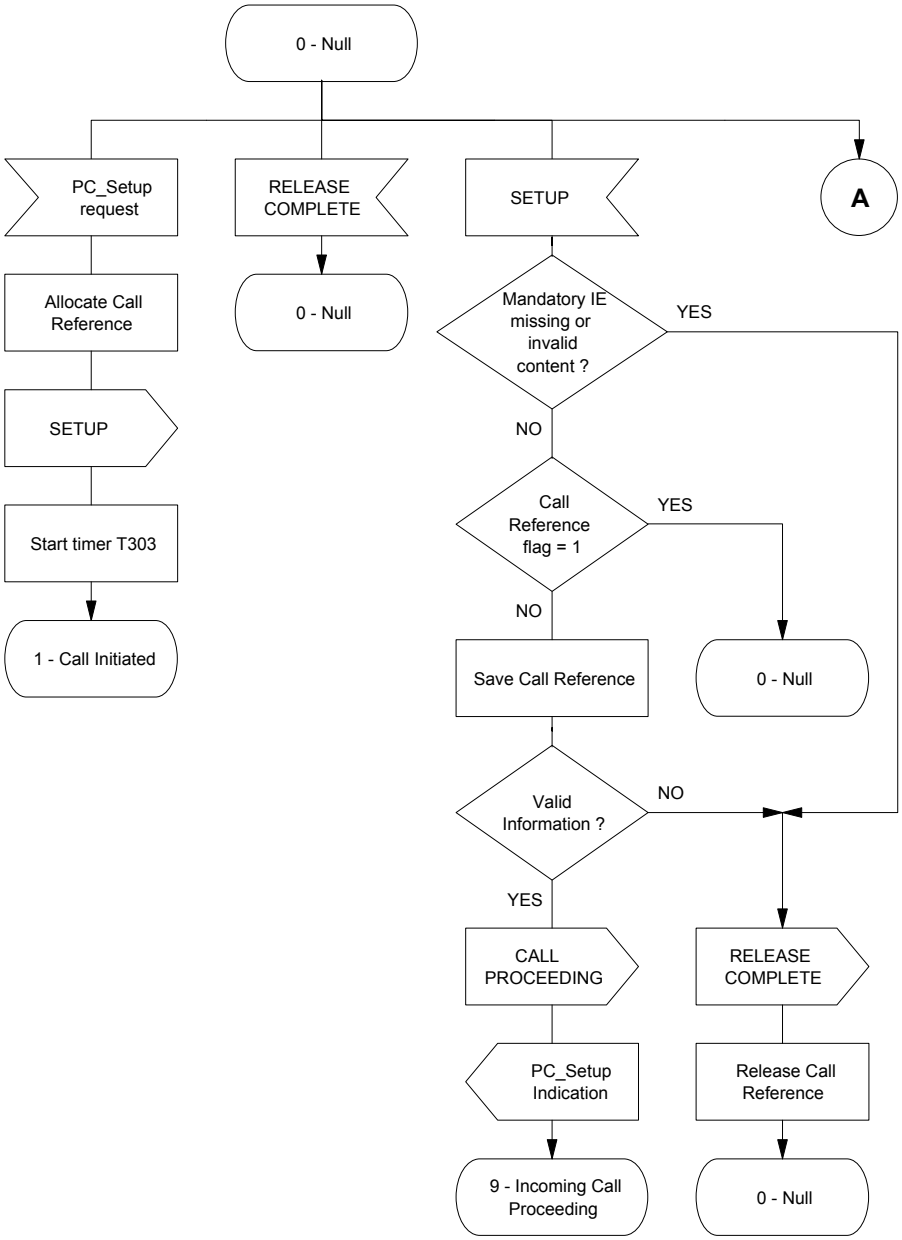


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 1 of 10)**


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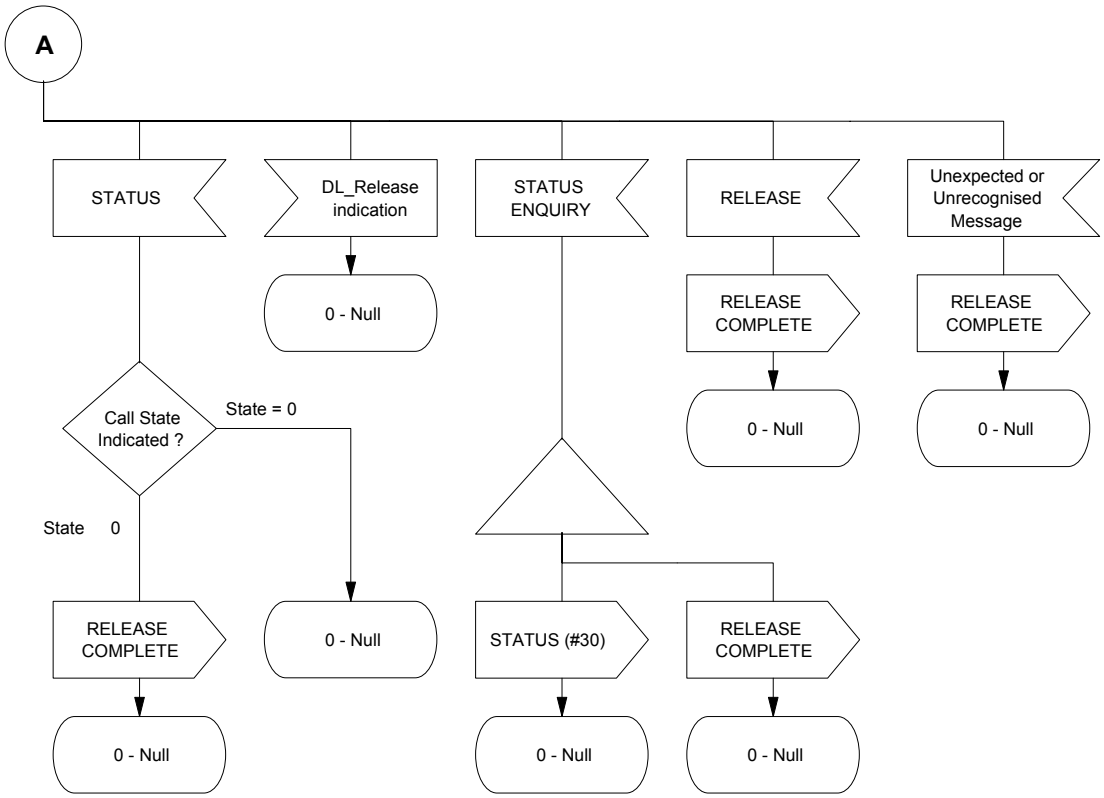


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 2 of 10)**

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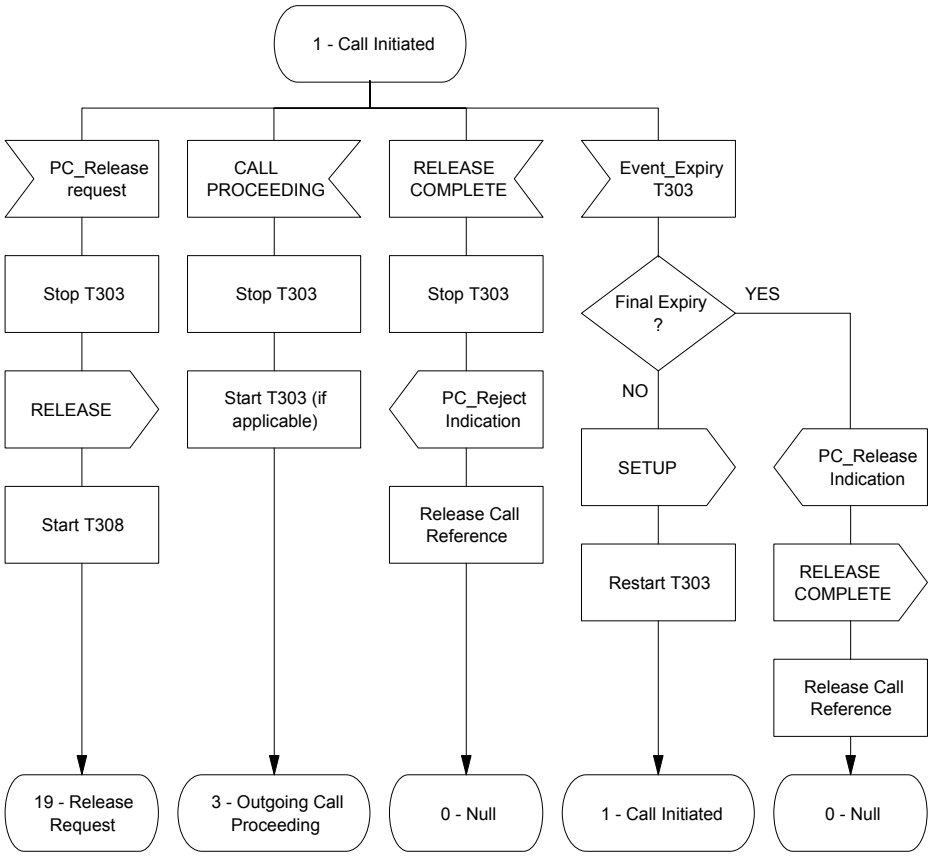


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 3 of 10)**

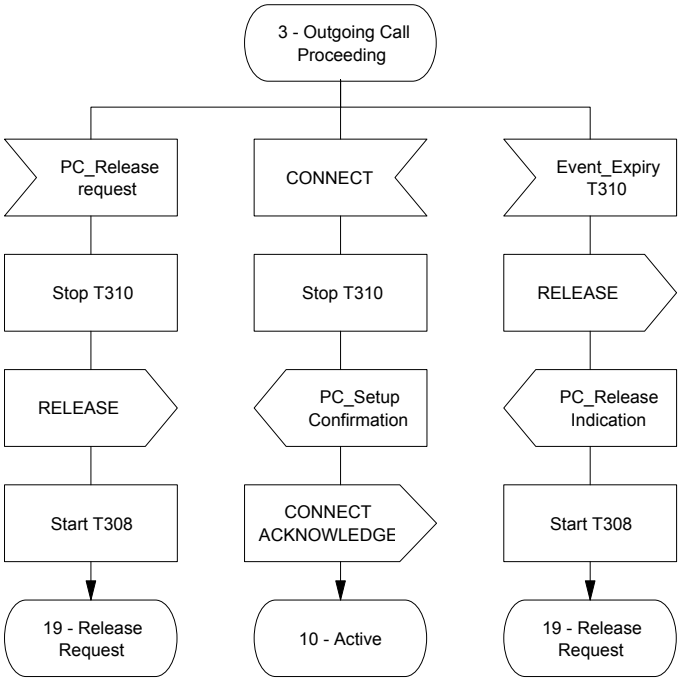


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 4 of 10)**


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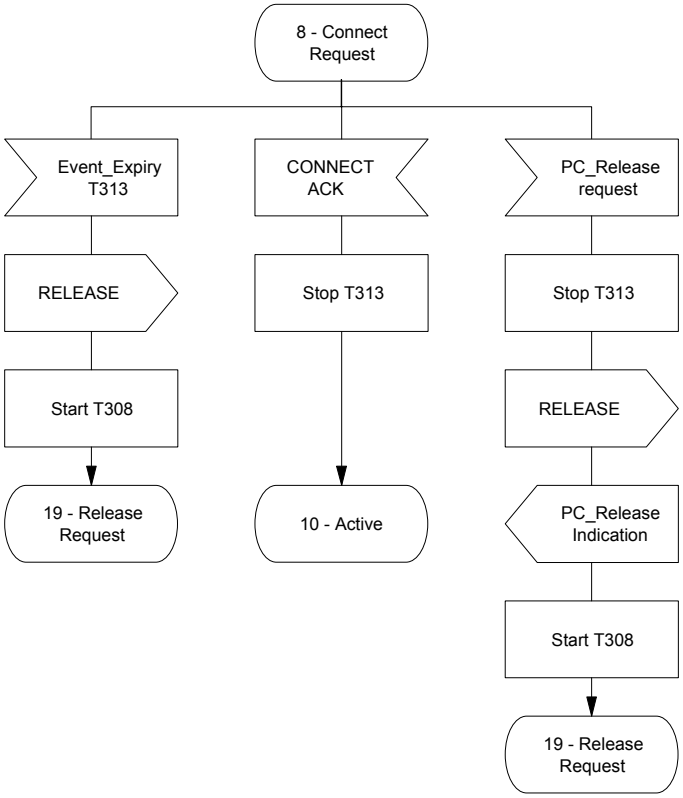


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 5 of 10)**

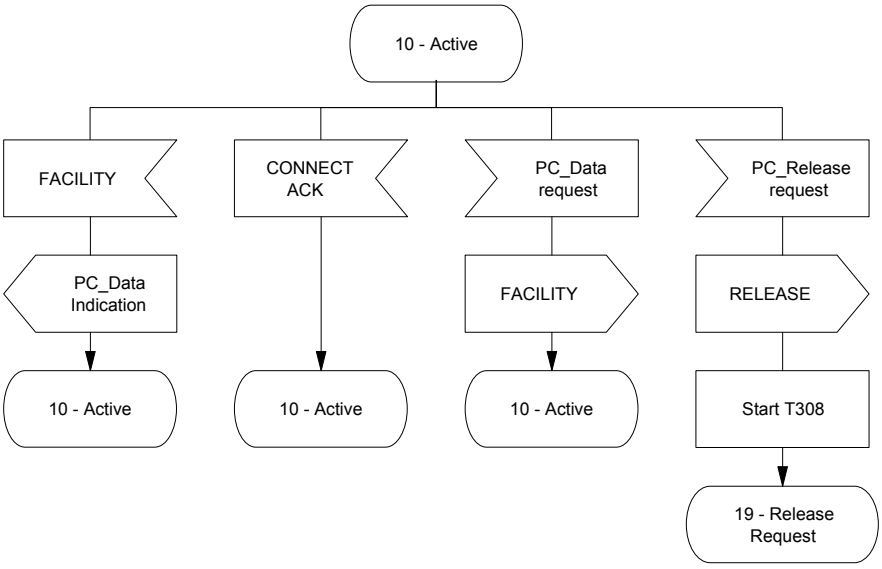


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 6 of 10)**

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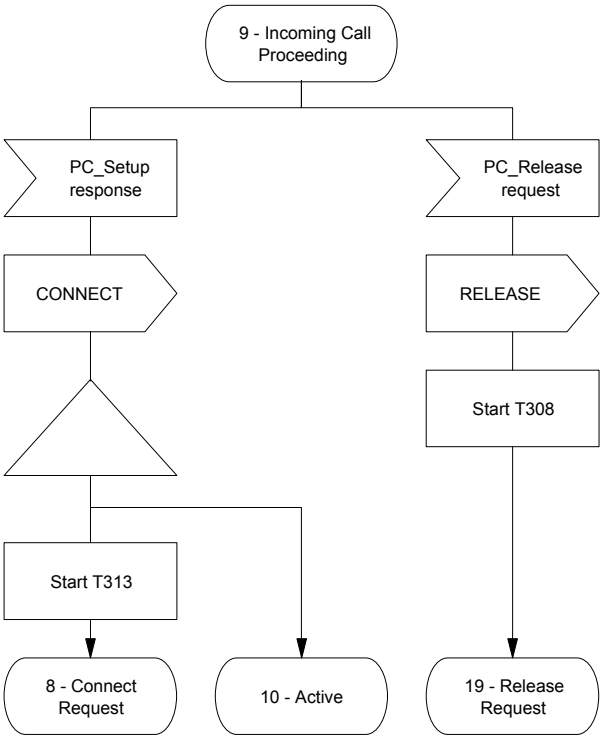


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 7 of 10)**

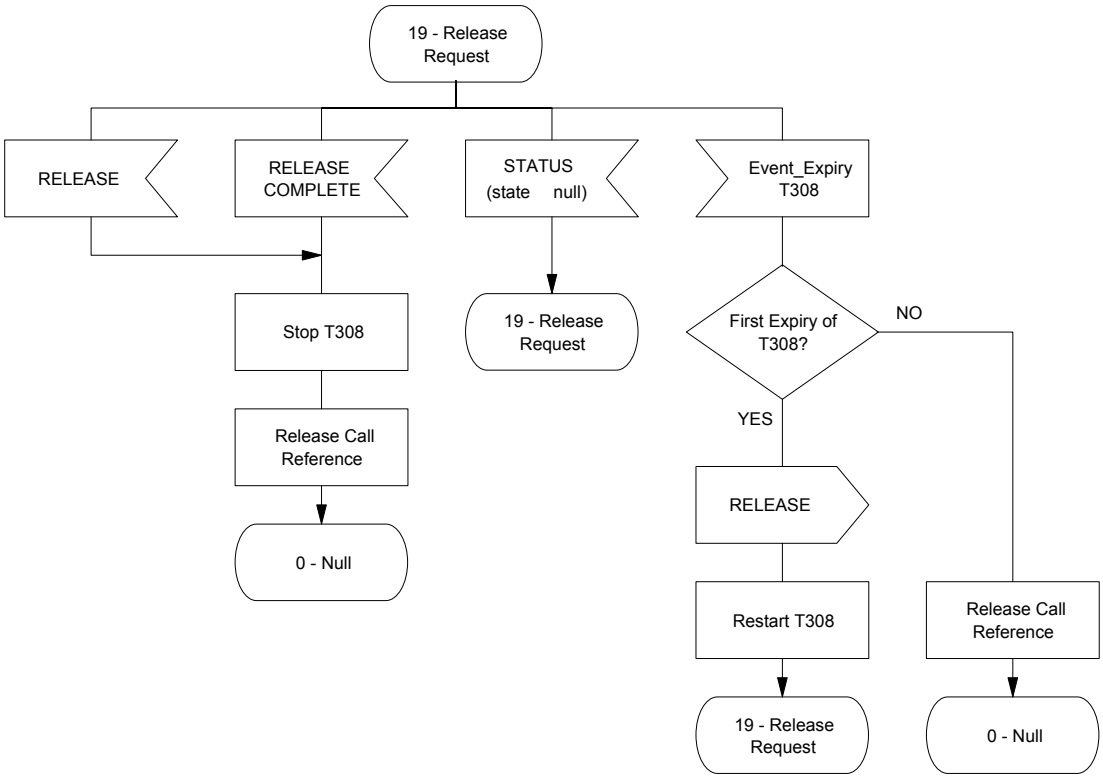


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 8 of 10)**


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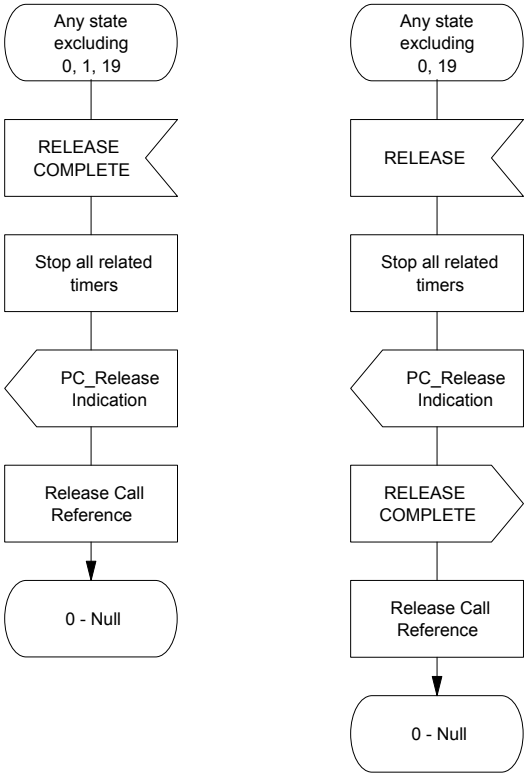


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 9 of 10)**

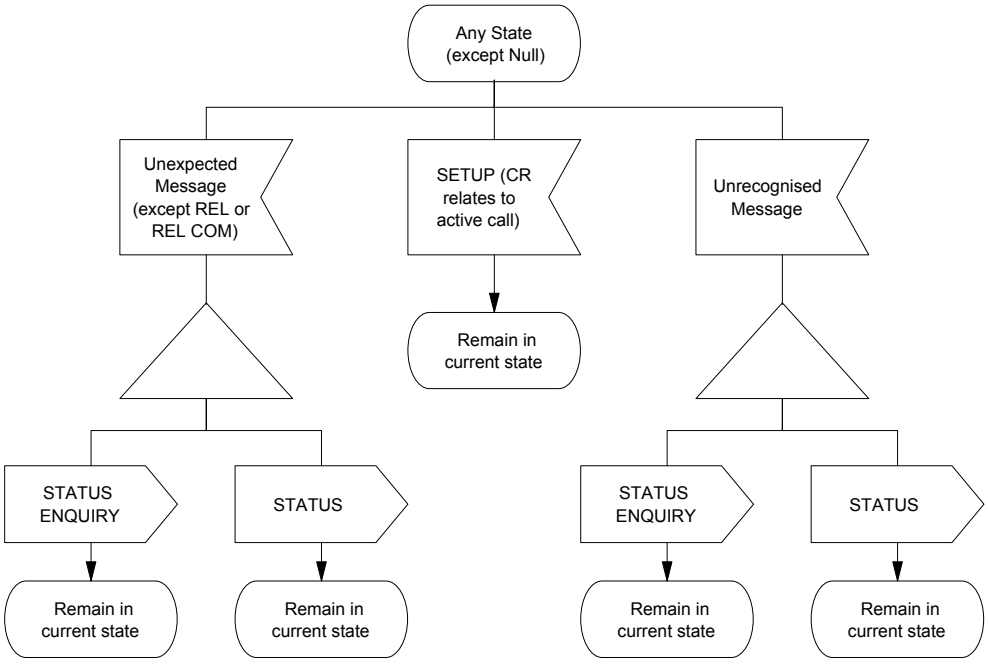


**Figure 9 — Connection oriented Protocol Control SDL (Sheet 10 of 10)**

### 7.3.3 Generic Functional Transport Control requirements

The procedures describing the requirements of the GFT-Control entity for Call independent signalling connection control are defined in terms of a number of states. These states are conceptual states that are used to enable straightforward description of the dynamic aspects of the GFT-Control procedures.

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The states used are separated into states that exist at an Originating PINX, a Transit PINX and a Terminating PINX. A brief description of the states is as follows:

– Originating PINX GFT-Control States:

- Originating_connection_idle: no connection exists.
- Originating_connection_request: connection establishment has been requested, but no response has been received from the Terminating PINX.
- Originating_connection_active: the connection is active.

– Transit PINX GFT-Control States:

- Transit_connection_idle: no connection exists.
- Transit_connection_request: connection establishment request has been received from the Preceding PINX and forwarded to the Subsequent PINX, but no response has been received from the Subsequent PINX.
- Transit_connection_active: the connection is active.

– Terminating PINX GFT-Control States:

- Incoming_connection_idle: no connection exists.
- Incoming_connection_active: the connection is active.

#### 7.3.3.1 Actions at an Originating PINX

##### 7.3.3.1.1 Actions in the Originating_connection_idle state

When a request for establishment of a Call independent signalling connection to a remote PINX is received from the Coordination Function, GFT-Control shall: request the Outgoing side Protocol Control to send a SETUP message, including the address of the Terminating PINX and enter the Originating_connection_request state.

##### 7.3.3.1.2 Actions in the Originating_connection_request state

If Protocol Control informs GFT-Control that a RELEASE or RELEASE COMPLETE message has been received, GFT-Control shall inform the Coordination Function that the connection has failed and enter the Originating_connection_idle state.

If Protocol Control informs GFT-Control that a CONNECT message has been received, GFT-Control shall enter the Originating_connection_active state.

##### 7.3.3.1.3 Actions in the Originating_connection_active state

If a request for transfer of APDUs on the connection is received from the Coordination Function, GFT-Control shall instruct Protocol Control to send a FACILITY message to the Subsequent PINX, containing a Facility information element in accordance with 7.3.3.4.

If Protocol Control informs GFT-Control that a FACILITY message has been received, the PINX shall become the Destination PINX for the received Facility information element in accordance with 7.3.3.5.

If Protocol Control informs GFT-Control that a RELEASE message has been received, GFT-Control shall inform the Coordination Function that the connection has been released and enter the Originating_connection_idle state.

If a request that the connection be released is received from the Coordination Function, GFT-Control shall: request that Protocol Control send a RELEASE message and enter the Originating_connection_idle state.

#### 7.3.3.2 Actions at a Transit PINX

If GFT-Control receives indication from Protocol Control of a received SETUP message from the Preceding PINX, it shall examine the contents of the Called party number information element. If the Called party number information element matches that of the Receiving PINX, the PINX shall become a Terminating PINX, otherwise it shall follow the procedures of this clause.

If GFT-Control receives any APDUs from Protocol Control in any of the messages which may contain a Facility information element (see clause 10), it shall examine the header of the Facility information element for the presence of an NFE. The treatment of the Facility information element based on this NFE shall be as defined in clause 7.1.2.2.


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#### 7.3.3.2.1 Actions in the Transit_connection_idle state

If the Called party number contained in the SETUP message is that of another PINX and a connection to that PINX is possible, GFT-Control shall: request Protocol Control to send a SETUP message on the appropriate inter-PINX link to the Subsequent PINX, associate the incoming and outgoing connections and enter the Transit_connection_request state.

If the contents of the Called party number information element contained in the SETUP message is not sufficient to enable routing onto a further inter-PINX link, GFT-Control shall: request Protocol Control to release the connection by sending a RELEASE message to the Preceding PINX and remain in the Transit_connection_idle state.

#### 7.3.3.2.2 Actions in the Transit_connection_request state

When Protocol Control informs GFT-Control of a CONNECT message received from the Subsequent PINX, GFT-Control shall: request Protocol Control to send a CONNECT message to the Preceding PINX and enter the Transit_connection_active state.

When Protocol Control informs GFT-Control that a RELEASE or RELEASE COMPLETE message has been received from the Subsequent PINX, GFT-Control shall: request Protocol Control to send a RELEASE message to the Preceding PINX and enter the Transit_connection_idle state.

When Protocol Control informs GFT-Control that a RELEASE message has been received from the Preceding PINX, GFT-Control shall: request Protocol Control to send a RELEASE message to the Subsequent PINX and enter the Transit_connection_idle state.

#### 7.3.3.2.3 Actions in the Transit_connection_active state

If Protocol Control informs GFT-Control of the receipt of a FACILITY message from the Subsequent PINX, and if it contains a Facility information element that is to be passed on to the Preceding PINX (in accordance with 7.1.2.2), GFT-Control shall request Protocol Control to send a FACILITY message containing that Facility information element to the Preceding PINX.

If Protocol Control informs GFT-Control of the receipt of a FACILITY message from the Preceding PINX, and it contains a Facility information element that is to be passed on to the Subsequent PINX (in accordance with 7.1.2.2), GFT–Control shall request Protocol Control to send a FACILITY message containing that Facility information element to the Subsequent PINX.

If Protocol Control informs GFT-Control of the receipt of a RELEASE message from the Subsequent PINX, GFT-Control shall request Protocol Control to send a RELEASE message to the Preceding PINX and shall enter the Transit_connection_idle state.

If Protocol Control informs GFT-Control of the receipt of a RELEASE message from the Preceding PINX, GFT-Control shall request Protocol Control to send a RELEASE message to the Subsequent PINX and shall enter the Transit_connection_idle state.

### 7.3.3.3 Actions at a Terminating PINX

If GFT-Control receives any APDUs from Protocol Control in any of the messages which may contain a Facility information element (see clause 10), it shall examine the header of the Facility information element for the presence of an NFE. The treatment of the Facility information element based on this NFE shall be as defined in clause 7.1.2.2.

#### 7.3.3.3.1 Actions in the Incoming_connection_idle state

If Protocol Control notifies GFT-Control of a received SETUP message that is to be terminated on the receiving PINX, and resources for the connection are available, GFT-Control shall request Protocol Control to send a CONNECT message and enter the Incoming_connection_active state.

NOTE 1 - Before sending the CONNECT message GFT-Control should determine from the coordination function if any APDUs are to be included in the CONNECT message.

If no resources for the connection are available, GFT-Control shall: request Protocol Control to send a RELEASE message; and remain in the Incoming_connection_idle state.

NOTE 2 - The RELEASE message is used in this case as Protocol Control has already returned a CALL PROCEEDING message to the Preceding PINX.

#### 7.3.3.3.2 Actions in the Incoming_connection_active state

If the Coordination Function requests transfer of APDUs on the connection, GFT-Control shall instruct Protocol Control to send a FACILITY message to the Preceding PINX containing a Facility information element in accordance with 7.3.3.4.

If Protocol Control informs GFT-Control that a FACILITY message has been received from the Preceding PINX, GFT-Control shall remain in the same state.

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If Protocol Control informs GFT-Control that a RELEASE message has been received from the Preceding PINX, it shall inform the Coordination Function that the connection has been released and enter the Incoming_connection_idle state.

If the Coordination Function requests that the connection be released, GFT-Control shall: request that Protocol Control send a RELEASE message; and enter the Incoming_connection_idle state.

#### 7.3.3.4 Actions at a Source PINX

The actions defined in 7.1.2.1 shall apply.

#### 7.3.3.5 Actions at a Destination PINX

The actions defined in 7.1.2.3 shall apply.

### 7.4 Call related procedures for the transport of Notifications

This clause defines the functional signalling procedures that support the delivery of notifications over the PISN in association with a Basic call.

#### 7.4.1 Categories of notifications

Procedures are defined for the delivery of three types of notification information as follows:

– the delivery of simple notification indicators based on the Notification Indicator information element as described in 11.3.4;

– the delivery of notification 'parameters' that are specified as information elements using the encoding scheme defined in clause 14 of ISO/IEC 11572 within the pss1IeNotification Notification defined in annex B;

– the delivery of notification components using an extension codepoint in octet 3 of the Notification indicator information element and ASN.1 encoded data structure in subsequent octets.

#### 7.4.2 Protocol Control requirements

#### 7.4.2.1 Sending notification information

The transport of notifications shall make use of the call reference of a Basic call and its underlying SCM connection. Notifications shall be sent using the Notification indicator information element.

If the delivery of the notification information coincides with the sending of the FACILITY message or any of the Basic call messages listed in clause 10 in which the Notification indicator information element is permitted, the notification may be carried in that message. Otherwise, the notification shall be delivered in a NOTIFY message.

However:

– if a SETUP message has been sent, but no response has been received from the Next PINX (i.e. the B-channel has not yet been agreed on the Outgoing side of the PINX);

– if a SETUP message has been received from the Preceding PINX, but no response has been sent (i.e. the B-channel has not yet been agreed on the Incoming side of the PINX); or,

– if a clearing message has already been sent to or received from the Next PINX

the notification information shall be discarded.

No state change shall occur on sending a NOTIFY message.

NOTE - In the case where the Notification indicator information element is sent to a PINX which does not conform to this International Standard, the Notification indicator information element will be discarded by that PINX and a STATUS message (see 13 in ISO/IEC 11572) can be received. The STATUS message will indicate that either: the Notification indicator information element was unrecognised; or, that the message (NOTIFY or FACILITY) was unrecognised. In such cases, no further action should be taken.

#### 7.4.2.2 Receiving notification information

On receipt of a Notification indicator information element, in the NOTIFY message or in any of the other messages listed in clause 10 in which the Notification indicator information element is permitted, it shall be passed to GFT-Control.

No state change shall occur on receipt of a NOTIFY message.

#### 7.4.3 GFT-Control requirements

#### 7.4.3.1 Actions at a PINX which generates notifications

A PINX which wishes to generate a notification shall request Protocol Control to send a Notification indicator information element.


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#### 7.4.3.2 Actions at a Transit PINX

If a Transit PINX receives a Notification indicator information element from the Preceding PINX, it shall request Protocol Control to send the Notification indicator information element to the Subsequent PINX.

If a Transit PINX receives a Notification indicator information element from the Subsequent PINX, it shall request Protocol Control to send the Notification indicator information element to the Preceding PINX.

#### 7.4.3.3 Actions at a Receiving End PINX

If an End PINX receives a Notification indicator information element, at any time during a Call, it shall convey the information it contains to the PISN user - dependent on the ability of the PISN user's equipment to receive such information.

NOTE - Further (implementation specific) actions of a PINX receiving a notification (e.g. changing the state of a local non-Standard state machine) are not precluded and are beyond the scope of this International Standard.

## 8 Application layer requirements

### 8.1 Coordination Function requirements

The behaviour of the Coordination Function in passing information between the various SS-Control entities, ROSE, DSE, ACSE, Call Control and GFT-Control is beyond the scope of this International Standard, with the exception of the provisions in 8.1.1 and 8.1.2 relating to the handling of the Interpretation APDU, the routeing of APDUs received from GFT-Control and error handling at a Destination PINX.

#### 8.1.1 Inclusion of an Interpretation APDU at a Source PINX

If a Source PINX wishes to include additional information to facilitate handling of unrecognised ROSE APDUs of type InvokePDU (see 11.3.3.4) at a Destination PINX, it shall include an Interpretation APDU (see 11.3.3.2) as the first APDU in the sequence of APDUs sent to GFT-Control.

NOTE - Where two or more ROSE APDUs of type InvokePDU are to be sent simultaneously and the unrecognised InvokePDU handling requirements of each differs, the ROSE APDUs should be grouped in multiple Facility information elements, each with its own Interpretation APDU.

#### 8.1.2 Handling of APDUs at a Destination PINX

The Coordination function shall process the APDUs received from GFT-Control based on the indication of protocol profile from GFT-Control:

– if the indication of protocol profile has the value 'ROSE', the Coordination Function shall deliver the remainder of the APDUs to ROSE, excluding the first APDU, if, according to its tag value, it is an Interpretation APDU;

– if the indication of protocol profile has the value 'ACSE', and ACSE is supported, the Coordination Function shall deliver the APDUs to ACSE, excluding the first APDU, if, according to its tag value, it is an Interpretation APDU;

– if the indication of protocol profile has the value 'DSE', and DSE is supported, the Coordination Function shall deliver the APDUs to DSE, excluding the first APDU, if, according to its tag value, it is an Interpretation APDU;

– in all other cases, the Coordination Function shall discard all the APDUs received from GFT-Control.

If the first APDU is an Interpretation APDU, the Coordination Function shall examine any ROSE APDU of type RejectPDU generated by ROSE as a result of the processing of these APDUs. If the element problem in the RejectPDU is of type InvokeProblem and has value unrecognisedOperation the action taken shall depend on the contents of the Interpretation APDU as follows:

– If the Interpretation APDU indicates rejectUnrecognisedInvokePdu the ROSE APDU of type RejectPDU shall be delivered to the destination indicated by ROSE;

– If the Interpretation APDU indicates clearCallIfAnyInvokePduNotRecognised the ROSE APDU of type RejectPDU shall be delivered to the destination indicated by ROSE, and Call Control shall be requested to clear the Basic call or Call independent signalling connection to which the InvokePDU was related;

– If the Interpretation APDU indicates discardAnyUnrecognisedInvokePDU the ROSE APDU of type RejectPDU shall be discarded.

If no Interpretation APDU is received, any ROSE APDUs of type RejectPDU shall be delivered to the destination indicated by ROSE.

### 8.2 ROSE requirements

Service APDUs shall be formed according to ROSE as defined in X.880 and X.881.

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The procedures specified in section 7 of X.882 for sending and receiving ROSE APDUs shall apply, with the exception that sub-sections 7.1 to 7.3 do not apply and that the Transfer services used shall be those provided by GFT-Control or those provided by ACSE or DSE.

As a minimum, a Destination PINX shall recognise received ROSE APDUs and reject those whose operation values are not supported. Additional requirements relating to the use of ROSE are supplementary service specific and are beyond the scope of this International Standard.

### 8.3 ACSE requirements

The ACSE may be used to create an explicit application-association between two supplementary services control entities. When used, the procedures specified in section 7 of X.227 for sending and receiving ACSE APDUs shall apply, with the exception that the underlying services used shall be those provided implicitly by GFT-Control or DSE, and not those provided by the presentation-service.

As a minimum, a PINX which supports ACSE shall recognise received ACSE APDUs and reject those whose association context names are not recognised. Additional requirements relating to the use of ACSE are supplementary service specific and beyond the scope of this International Standard.

### 8.4 DSE requirements

The DSE may be used to create a dialogue between two PINXs, to enable service requests and responses to be correlated, particularly when they do not exist within the context of the same network layer connection.

The DSE uses the underlying services provided by GFT-Control via the Coordination Function.

The coding requirements for the DSE APDUs are defined in 11.3.3.3.

Any DSE APDU, with the exception of a DialogAbortPDU, may contain one or more ROSE APDUs or one or more ACSE APDUs.

A state machine shall be associated with each dialogue within a PINX. Four dialogue states are defined:

– Idle: no dialogue exists;

– Initiate sending: a DialogBeginPDU has been sent, a DialogContinuePDU is awaited from the peer PINX;

– Initiate receiving: a DialogBeginPDU has been received, a request from the Coordination Function is awaited to continue or terminate the dialogue;

– Active: the dialogue is established.

#### 8.4.1 Actions at the PINX which initiates the dialogue (PINX A)

##### 8.4.1.1 Idle state procedures

When a request from the Coordination Function to initiate a dialogue is received, PINX A shall:

– send a DialogBeginPDU to the PINX identified in the request (PINX B). The element of type OriginationDialogId shall contain a dialogue identifier selected by PINX A that is sufficient to distinguish the dialogue from any others in which PINX A is involved. The DialogBeginPDU may also contain one or more ROSE APDUs or one or more ACSE APDUs relating to a particular supplementary service or services;

– start timer T_Originating_Dialogue (T_OD); and,

– enter the Initiate sending state.

The selected dialogue identifier shall be included in the element of type OriginationDialogId in all further DialogContinuePDUs sent from PINX A to PINX B for the duration of the dialogue.

##### 8.4.1.2 Initiate sending state procedures

On receipt of a DialogContinuePDU, PINX A shall:

– cancel timer T_Originating_Dialogue;

– store the value of the element of type OriginationDialogID. This is the dialogue identifier selected by PINX B and shall be included in all DSE APDUs sent from PINX A to PINX B in the element of type DestinationDialogId for the duration of the dialogue;

– provide an indication of dialogue continuation to the Coordination Function; and,

– enter the Active state.


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On receipt of a DialogEndPDU, PINX A shall consider the dialogue to be terminated, release the locally assigned dialogue identifier, inform the Coordination Function, cancel timer T_Originating_Dialogue and enter the Idle state.

On receipt of a DialogAbortPDU, PINX A shall consider the dialogue to be aborted, inform the Coordination Function, cancel timer T_Originating_Dialogue and enter the Idle state.

If a request to abort the dialogue is received from the Coordination Function, PINX A shall cancel timer T_Originating_Dialogue, release the locally assigned dialogue identifier and enter the Idle state.

If timer T_Originating_Dialogue expires, PINX A shall consider the dialogue to be aborted, inform the Coordination Function that the dialogue has been aborted, release the dialogue identifier assigned locally by PINX A and enter the Idle state.

### 8.4.2 Actions at the PINX which terminates the dialogue (PINX B)

#### 8.4.2.1 Idle state procedures

On receipt of a DialogBeginPDU from PINX A, PINX B shall:

– check that the value of the element of type OriginationDialogId in the DialogBeginPDU is valid. If it is not valid, PINX B shall discard the DialogBeginPDU and remain in the idle state;

– save the value of the element of type OriginationDialogId in the DialogBeginPDU. This is the dialogue identifier selected by PINX A and shall be included in all DSE APDUs sent from PINX B to PINX A in the element of type DestinationDialogId for the duration of the dialogue;

– inform the Coordination Function; and,

– enter the Initiate receiving state.

#### 8.4.2.2 Initiate receiving state procedures

If PINX B wishes to continue the dialogue, it shall:

– send a DialogContinuePDU to PINX A containing, in the element of type OriginationDialogId, a dialogue identifier selected by PINX B to be sufficient to distinguish the dialogue from any others in which PINX B is involved, and in the element of type DestinationDialogId the value received in the element of type OriginationDialogId in the DialogBeginPDU from PINX A; and,

– enter the Active state.

If PINX B cannot accept the dialogue, it shall send DialogAbortPDU to PINX A, release the stored dialogue identifier and enter the Idle state.

If PINX B wishes to end the dialogue, it shall send DialogEndPDU to PINX A, release the stored dialogue identifier and enter the Idle state.

### 8.4.3 Dialogue Continuation in the Active State

If a PINX wishes to continue the dialogue, it shall: send a DialogContinuePDU to the peer PINX and remain in the active state. The DialogContinuePDU may also contain one or more ROSE APDUs or one or more ACSE APDUs.

On receipt of a DialogContinuePDU, the PINX shall indicate dialogue continuation to the Coordination Function, together with any ROSE APDUs or ACSE APDUs contained in the received DialogContinuePDU.

On receipt of a DialogEndPDU, the PINX shall consider the dialogue to be terminated, inform the Coordination Function, release the dialogue identifier assigned locally and the identifier received from the peer PINX, and enter the Idle state.

On receipt of a DialogAbortPDU, the PINX shall consider the dialogue to be aborted, inform the Coordination Function, release the dialogue identifier assigned locally and the identifier received from the peer PINX, and enter the Idle state.

If a request to terminate the dialogue is received from the Coordination Function, the PINX shall send a DialogEndPDU to the peer PINX, release the dialogue identifier assigned locally and the identifier received from the peer PINX, and enter the idle state.

If a request to abort the dialogue is received from the Coordination Function, the PINX shall send a DialogAbortPDU to the peer PINX, release the dialogue identifier assigned locally and the identifier received from the peer PINX, and enter the idle state.

### 8.4.4 Dialogue Protocol Timers

Table 13 defines the protocol timers for the Dialogue procedures.

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**Table 13 — Dialogue Protocol Timers**

| Timer | State | Value | Normal Start | Normal Termination | Actions on expiry |
|---|---|---|---|---|---|
| T_OD | Initiate sending | Implementation dependent | On sending DialogBeginPDU | On receipt of a DialogContinuePDU, DialogEndPDU or DialogAbortPDU | Indicate to the Coordination Function that dialogue is aborted. Enter idle state. |

### 8.4.5 Error procedures relating to dialogue control

If a PINX receives any DSE APDUs relating to the same dialogue from the peer PINX that are incorrectly formatted they shall be discarded.

If a PINX receives a DialogEndPDU or a DialogAbortPDU in the Idle state, the APDU shall be discarded and it shall remain in the Idle state.

If a PINX receives a DialogContinuePDU in the Idle state, it shall send a DialogAbortPDU containing an element of type DestinationDialogId which has the same value as the element of type OriginationDialogId in the received DialogContinuePDU, and remain in the Idle state. If a PINX receives a DialogContinuePDU in the Active state which contains, in the element of type OriginationDialogId an unrecognised dialogue identifier, it shall send a DialogAbortPDU containing an element of type DestinationDialogId which has the same value as the element of type OriginationDialogId in the received DialogContinuePDU, and remain in the Active state.

### 8.4.6 Example of a dialogue

Figure 10 shows an example of a dialogue between two PINXs, illustrating the usage and values of the origination and destination dialogue identifiers.

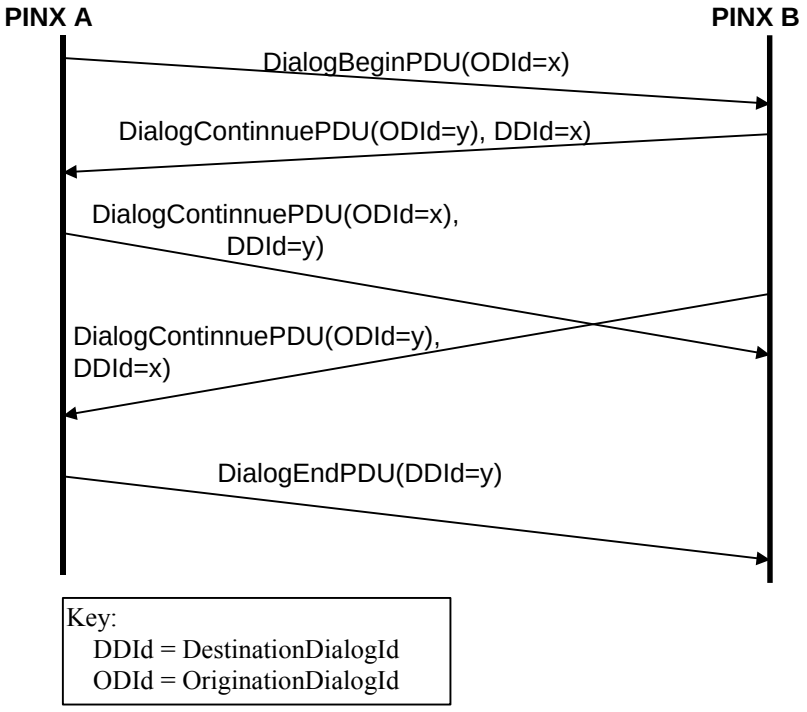


**Figure 10 — A simple example of a Dialogue**

### 8.4.7 Dynamic Description (SDL) of Dialogue Identification Protocol Procedures

Figure 12 provides an SDL representation of the dynamic aspects of the DSE protocol. Figure 11 contains a description of the elements used in figure 12.


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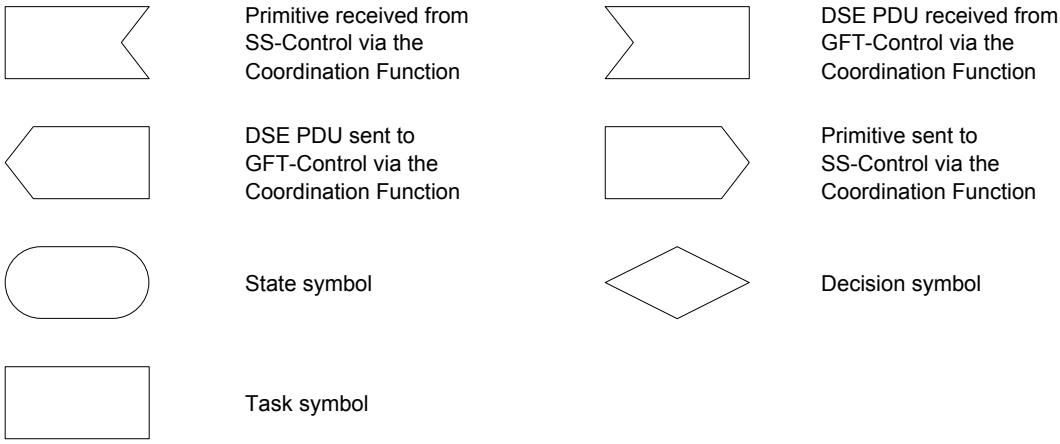


**Figure 11 — Key to Dialogue SDL diagram in figure 12**

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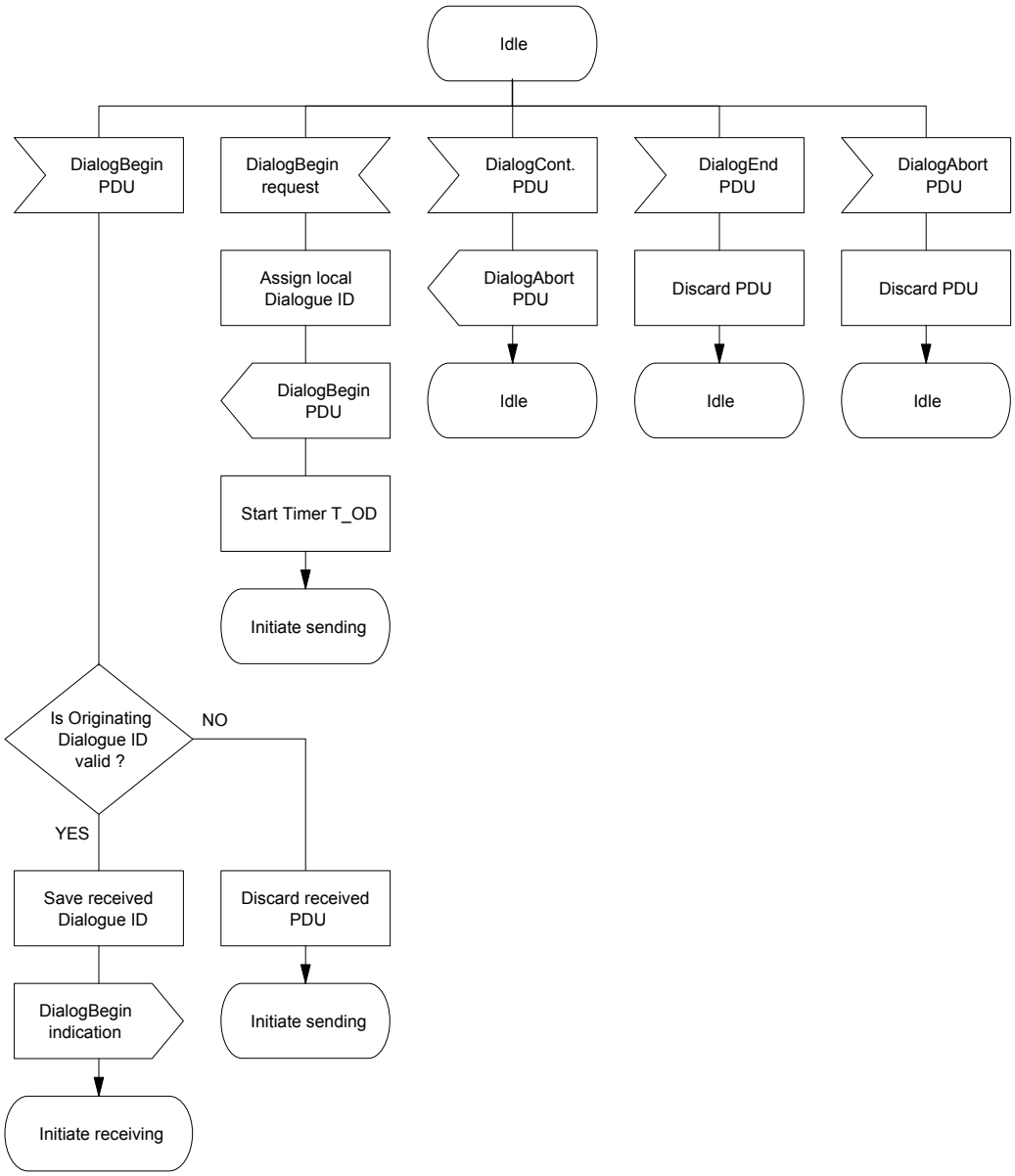


**Figure 12 — Dialogue procedures dynamic description (sheet 1 of 4)**

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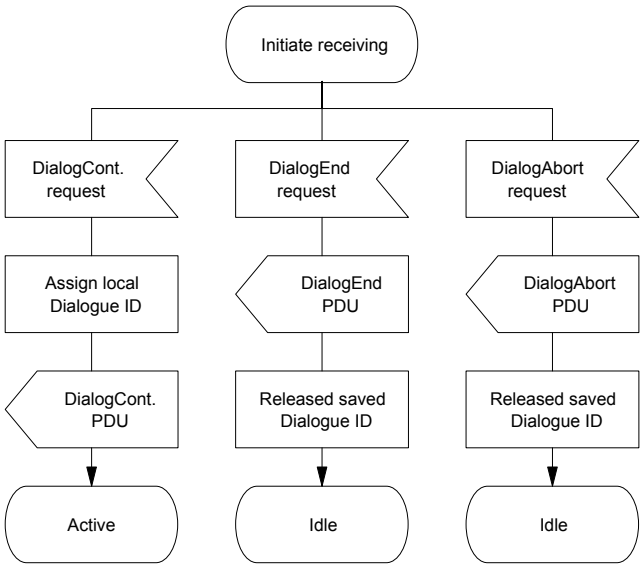


**Figure 12 — Dialogue procedures dynamic description (sheet 2 of 4)**

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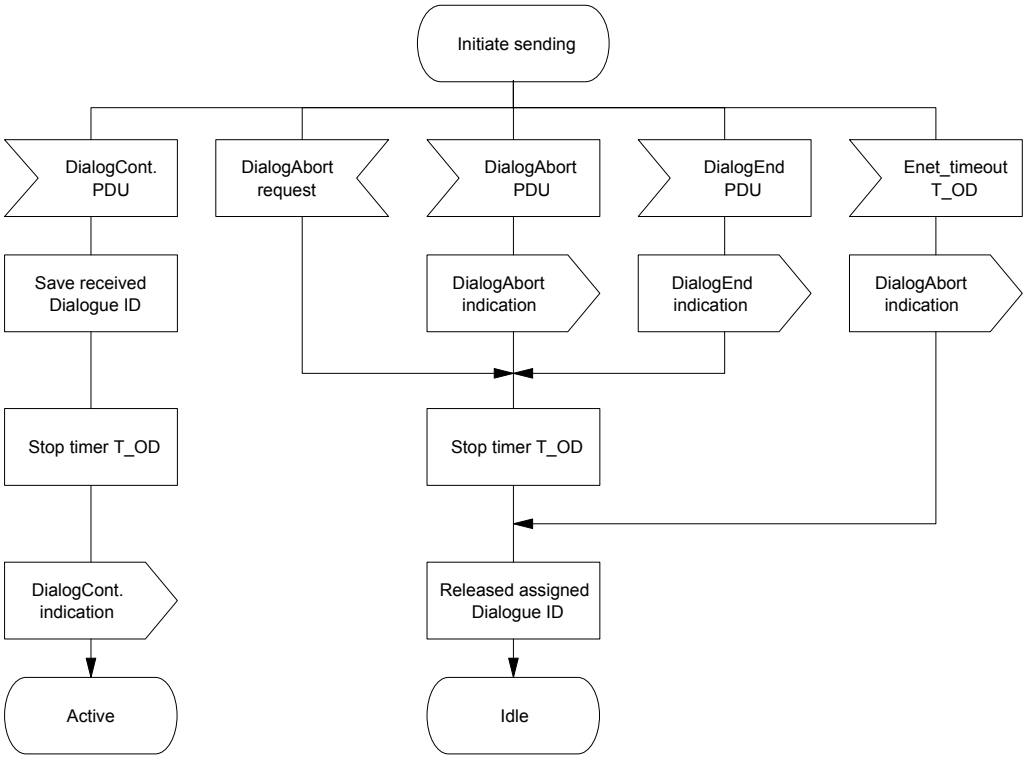


**Figure 12 — Dialogue procedures dynamic description (sheet 3 of 4)**


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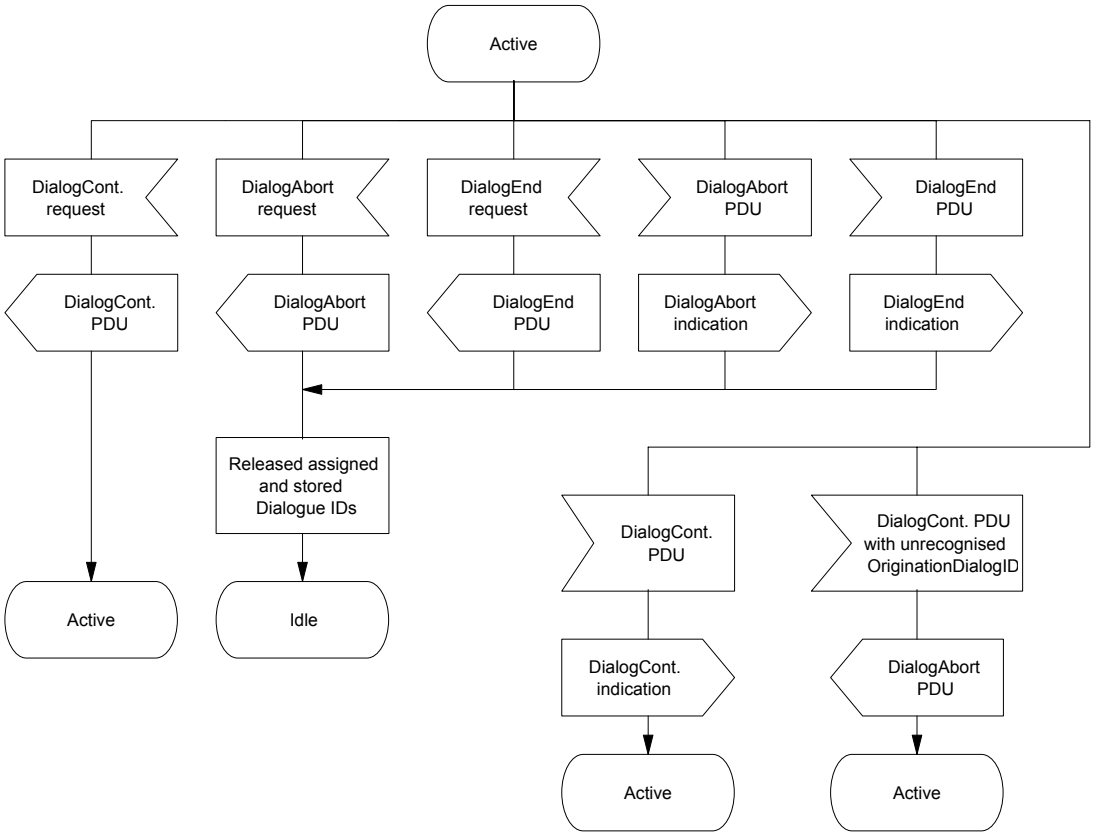


**Figure 12 — Dialogue procedures dynamic description (sheet 4 of 4)**

### 8.5 SS-Control requirements

The requirements for SS-Control are supplementary service specific and are beyond the scope of this International Standard.

## 9 Manufacturer Specific Information

PSS1 permits the inclusion in messages of non-standardised information which is specific to a particular design of PINX or a particular network etc. This information is known as Manufacturer Specific Information (MSI).

Manufacturer specific information may exist in the PISN as a result of the following:

– manufacturer specific supplementary services;

– manufacturer specific extensions to Standard supplementary services; or

– manufacturer specific notifications.

In all these cases, any information which is manufacturer specific shall be encoded in such a way that it can be uniquely identified. Apart from the use of information elements belonging to codesets 6 or 7, as described in ISO/IEC 11572 for conveyance of MSI to an Adjacent PINX, any manufacturer specific information generated by a PINX conforming to this International Standard shall be encoded in conformance with the contents of this clause.

### 9.1 Manufacturer specific operations

Manufacturer specific operations shall conform to the encoding and transport rules defined for standardised operations in other clauses of this International Standard, but in addition shall make use of operation values which are unique to that manufacturer - i.e. of type OBJECT IDENTIFIER. If any non-standardised error values are to be included in a manufacturer specific operation, they shall be of type OBJECT IDENTIFIER. Examples of how manufacturer specific operations may be encoded are shown in annex F.

### 9.2 Manufacturer specific additions to standardised operations

As an alternative to the definition of a manufacturer specific operation, a manufacturer may wish to use an enhanced form of a standardised operation.

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NOTE - This may be used, for example, to include additional parameters which are manufacturer specific as part of the Standard service (e.g. information describing the detailed location of a party involved in the service).

To allow for this possibility, Standards for supplementary services will include 'placeholders' for manufacturer specific extensions. Each placeholder will be an optional CHOICE construct containing an element of type Extension or a sequence of elements of type Extension (as defined in table 14) with the argument, result or error parameter of an operation. This placeholder may be included in the ROSE APDU if MSI is to be conveyed. An element of type Extension shall contain an element of type OBJECT IDENTIFIER to uniquely identify the MSI.

If the Destination PINX identifies an element of type Extension or a sequence of elements of type Extension in a standardised operation, when processing the contents of a received Facility information element in accordance with the relevant supplementary service standard, it shall act on an element of type Extension only if it recognises the value in the element of type OBJECT IDENTIFIER (see table 14). Otherwise the entire element of type Extension shall be discarded. In the case of a sequence of elements of type Extension (i.e. where multiple extensions to the service are defined) the PINX shall consider each element of type Extension separately - that is, only those elements of type Extension containing an unrecognised value in the element of type OBJECT IDENTIFIER shall be discarded.

**Table 14 — Manufacturer specific extension mechanism**

```
Manufacturer-specific-service-extension-class-asn1-97
{ iso( 1) standard( 0) pss1-generic-procedures( 11582) msi-class-asn1-97( 11) }

DEFINITIONS     ::=
BEGIN

EXTENSION ::= CLASS
{
  &ArgumentType,
  &extensionId              OBJECT IDENTIFIER
}
WITH SYNTAX
{
  ARGUMENT          &ArgumentType
  IDENTIFIER        &extensionId
}

Extension {EXTENSION:ExtensionSet} ::= SEQUENCE
  {
       extensionId          EXTENSION.&extensionId({Extensionset}),
       extensionArgument EXTENSION.&ArgumentType({ExtensionSet}{@extensionId})
  }

Extensionset       EXTENSION ::= {...}

-- ExtensionSet is a set of objects of class EXTENSION. Element extensionId is constrained to be
-- the identifier of an object from that set, and element extensionArgument is constrained to be the
-- argument type for that particular object.

END  -- of Manufacturer-specific-service-extension-class-asn1-97
```

An example of the use of the Extension type is shown in annex F.

### 9.3 Manufacturer specific notifications

Manufacturer specific notifications may occur in the PISN as part of manufacturer specific supplementary services or as additions to standardised supplementary services. If provided, they shall be encoded and transported across the PISN in accordance with the rules for standardised notifications (see 7.4, 10 and 11.3.4).

Manufacturer specific notifications shall be conveyed using ASN.1 type NotificationDataStructure in octet 3.1 of the Notification indicator information element, as specified in 11.3.4.

Manufacturer specific notifications shall not make use of the notification description field (octet 3) of the Notification indicator information element, other than to include the 'discriminator for notification extension' codepoint (see 11.3.4).

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## 10 Message functional definitions and contents

This clause describes additions to the call control messages defined in clause 13 of ISO/IEC 11572 and a number of new messages. The tables in this clause follow the conventions described in the introduction of clause 13 of ISO/IEC 11572.

Table 15 summarises the messages that may also be used for the transport of APDUs and notification information, including those already defined in ISO/IEC 11572.

**Table 15 — PSS1 messages used for the transport of APDUs and notification information**

| | |
|---|---|
| *Call establishment messages* | *Reference:* |
| ALERTING | 10.1 |
| CONNECT | 10.3 |
| SETUP | 10.4 |
| *Call clearing messages* | *Reference:* |
| DISCONNECT | 10.5 |
| RELEASE | 10.6 |
| RELEASE COMPLETE | 10.7 |
| *Miscellaneous messages* | *Reference:* |
| FACILITY | 10.8 |
| NOTIFY | 10.9 |
| PROGRESS | 10.10 |

### 10.1 ALERTING

Sub-clause 13.2.1 of ISO/IEC 11572 shall apply, with the following modification:

– the information elements shown in table 16 may also be included:

**Table 16 — ALERTING message content**

| Information Element | Reference | Type | Length |
|---|---|---|---|
| Facility | 11.3.3 | O | 3 - * |
| Notification indicator | 11.3.4 | O | 3 - * |

### 10.2 CALL PROCEEDING

Sub-clause 13.2.2 of ISO/IEC 11572 shall apply.

NOTE - Because of additional coding possibility in 11.3.2, the minimum length of the Channel identification information element can be 3 octets.

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### 10.3 CONNECT

Sub-clause 13.2.3 of ISO/IEC 11572 shall apply, with the following modification:

– the information elements shown in table 17 may also be included:

**Table 17 — CONNECT message content**

| Information Element | Reference | Type | Length |
|---|---|---|---|
| Facility | 11.3.3 | O | 3 - * |
| Notification indicator | 11.3.4 | O | 3 - * |

NOTE - In case of establishment of Call Independent Signalling Connection the following information elements are not included:

Channel identification,
Connected subaddress,
Notification indicator,
Low layer compatibility,
Progress indicator.

### 10.4 SETUP

Sub-clause 13.2.10 of ISO/IEC 11572 shall apply, with the following modification:

– the information elements shown in table 18 may also be included:

**Table 18 — SETUP message content**

| Information Element | Reference | Type | Length |
|---|---|---|---|
| Facility | 11.3.3 | O | 3 - * |
| Notification indicator | 11.3.4 | O | 3 - * |

NOTE - Because of additional coding possibility in 11.3.2, the minimum length of the Channel identification information element can be 3 octets.

### 10.5 DISCONNECT

Sub-clause 13.2.5 of ISO/IEC 11572 shall apply, with the following modification:

– the information elements shown in table 19 may also be included:

**Table 19 — DISCONNECT message content**

| Information Element | Reference | Type | Length |
|---|---|---|---|
| Facility | 11.3.3 | O | 3 - * |
| Notification indicator | 11.3.4 | O | 3 - * |

### 10.6 RELEASE

Sub-clause 13.2.8 of ISO/IEC 11572 shall apply, with the following modification:

– the information elements shown in table 20 may also be included:

**Table 20 — RELEASE message content**

| Information Element | Reference | Type | Length |
|---|---|---|---|
| Facility | 11.3.3 | O | 3 - * |


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### 10.7 RELEASE COMPLETE

Sub-clause 13.2.9 of ISO/IEC 11572 shall apply, with the following modification:

– the information elements shown in table 21 may also be included:

**Table 21 — RELEASE COMPLETE message content**

| Information Element | Reference | Type | Length |
|---|---|---|---|
| Facility | 11.3.3 | O | 3 - * |

### 10.8 FACILITY

This message, as shown in table 22, may be sent to transport APDUs. For the use of this message, refer to clause 7.

**Table 22 — FACILITY message content**

Message Type: FACILITY

Direction: both

| Information Element | Reference | Type | Length |
|---|---|---|---|
| Protocol discriminator | 14.2 - ISO/IEC 11572 | M | 1 |
| Call reference | 11.2 | M | 1 - 3 (note 1) |
| Message type | 11.1 | M | 1 |
| Facility | 11.3.3 | M | 3 - * |
| Notification indicator | 11.3.4 | O | 3 - * |
| Calling party number | 14.5 - ISO/IEC 11572 | O (note 2) | |
| Called party number | 14.5 - ISO/IEC 11572 | O (note 2) | 4-32 |

NOTE 1 - When the FACILITY message is used in a Connectionless manner, the dummy call reference (see 11.2) shall be used.

NOTE 2 - This information element is mandatory when the FACILITY message is used in a Connectionless manner, otherwise it shall not be included.

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### 10.9 NOTIFY

This message, as shown in table 23 may be sent by a PINX to provide notifications to a user, in association with a Basic call.

For the use of this message, see 7.4.

**Table 23 — NOTIFY message content**

Message Type: NOTIFY

Direction: both

| Information Element | Reference | Type | Length |
|---|---|---|---|
| Protocol discriminator | 14.2 - ISO/IEC 11572 | M | 1 |
| Call reference | 11.2 | M | 3 |
| Message type | 11.1 | M | 1 |
| Notification indicator | 11.3.4 | M | 3 - * |

### 10.10 PROGRESS

Sub-clause 13.2.7 of ISO/IEC 11572 shall apply, with the following modification:

– the information elements shown in table 24 may also be included:

**Table 24 — PROGRESS message content**

| Information Element | Reference | Type | Length |
|---|---|---|---|
| Facility | 11.3.3 | O | 3 - * |
| Notification indicator | 11.3.4 | O | 3 - * |

## 11 General message format and information element coding

This clause describes information element coding in addition to that defined in clause 14 of ISO/IEC 11572.

Where the contents of an information element field are described using ASN.1 notation, the encoding of this field shall be as defined in 11.4.

### 11.1 Message Type

The following message type codings are additional to those defined in 14.4 of ISO/IEC 11572 and are used for the supplementary service specific messages defined in clause 10.

**Table 25 — Message types applicable over the PISN**

| **Bits** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | |
| | 0 | 1 | 1 | | | | | | *Miscellaneous messages* |
| | | | | 0 | 0 | 0 | 1 | 0 | FACILITY |
| | | | | 0 | 1 | 1 | 1 | 0 | NOTIFY |



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### 11.2 Call reference

Sub-clause 14.3 of ISO/IEC 11572 shall apply, with the following addition:

– The dummy call reference defined in figure 13 shall be used when a FACILITY message is sent in accordance with the procedures of 7.2.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | octet 1 |

**Figure 13 — Dummy call reference**

### 11.3 Other information elements

For the information elements defined in this clause, the coding and presentation rules defined in 14.5 of ISO/IEC 11572 shall apply. Table 26 lists the information element codings in codeset zero defined in this International Standard in addition to those defined in table 22, 14.5 of ISO/IEC 11572.

**Table 26 — Additional codeset zero information elements**

| Bits 8 7 6 5 4 3 2 1 | |
|---|---|
| 0 | *Variable length information elements* |
| 0 0 1 1 1 0 0 | Facility |
| 0 1 0 0 1 1 1 | Notification indicator |
| All other values are reserved | |

#### 11.3.1 Bearer capability

Sub-clause 14.5.5 of ISO/IEC 11572 shall apply with the additional codepoints in table 27.

**Table 27 — Bearer capability**

Coding standard (octet 3)

**Bits**

| 7 | 6 | |
|---|---|---|
| 0 | 1 | Other international standard (note 1) |

Information transfer capability (octet 3) for coding standard 'other international standard'

**Bits**

| 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|
| 0 | 1 | 0 | 0 | 0 | Unrestricted digital information |
| All other values are reserved | | | | | |

Transfer mode(octet 4) for coding standard 'other international standard'

**Bits**

| 7 | 6 | |
|---|---|---|
| 0 | 0 | Call independent signalling connection |
| All other values are reserved | | |

Information transfer rate (octet 4, bits 5 to 1) for coding standard 'other international standard'

**Bits**

| 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | Call independent signalling connection |
| All other values are reserved | | | | | |

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NOTE 1 - When this coding standard is indicated, the coding defined in 14.5.5 of ISO/IEC 11572 shall apply for octets 1 to 2 and bit 8 of octets 3 to 4. Information transfer capability, Transfer mode and Information transfer rate shall be encoded as indicated and no other octets shall be included.

### 11.3.2 Channel identification

Sub-clause 14.5.12 of ISO/IEC 11572 shall apply with the additional codepoints in table 28.

**Table 28 — Channel identification information element (note 1)**

| |
|---|
| Signalling channel indicator (octet 3)<br>**Bit**<br>**3**<br>1 The channel identified is the signalling channel<br><br>Information channel selection (octet 3)<br>**Bits**<br>**2 1**<br>0 0 No channel (note 2) |

NOTE 1 - Bits 8-4 of this octet are defined in accordance with sub-clause 14.5.12 of ISO/IEC 11572 and used in accordance with sub-clause 7.3.1.1 of this International Standard.

NOTE 2 - When this coding is indicated, octets 3.2 and 3.3 shall be omitted.

### 11.3.3 Facility

This clause defines only the structure and coding of the Facility information element. The purpose of Facility information element is to convey an optional Interpretation APDU and one or more ROSE APDUs, ACSE APDUs or DSE APDUs.

All APDUs contained in the Facility information element will be delivered to the same PINX (as identified by the NFE). If the different APDUs are to be processed by different PINXs, they shall be included in different Facility information elements.

The Facility information element may be repeated in a given message. The maximum length of the Facility information element is application dependent. The Facility information element is defined in figure 14 and tables 29 and 30.

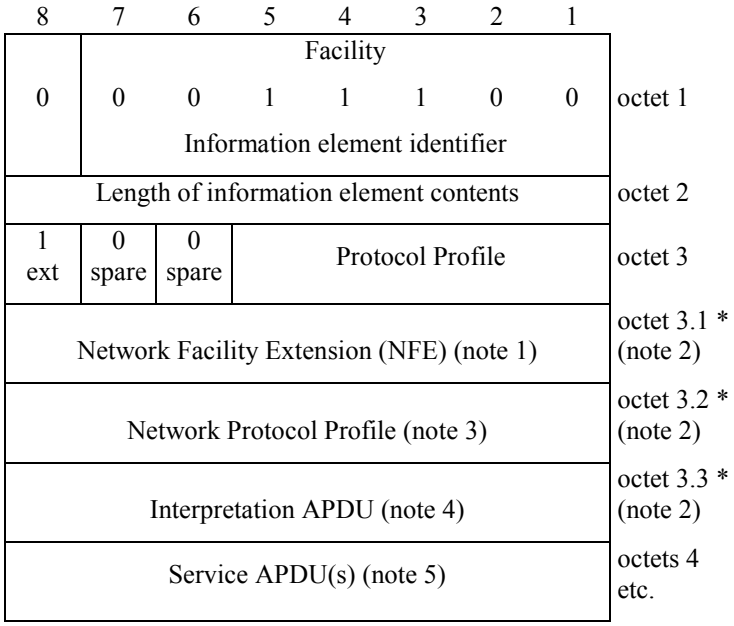


**Figure 14 — Facility information element**

NOTE 1 - The Network Facility Extension (NFE), as defined in 11.3.3.1, may be included, in accordance with the procedures of clause 7.

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NOTE 2 - Each of octet groups 3.1, 3.2 and 3.3 comprises an ASN.1 type encoded as defined in 11.4. The presence or absence of each of these octet groups can be determined from the presence or absence of the tag values concerned in the appropriate position in the Facility information element.

NOTE 3 - The Network Protocol Profile may be included to specify the contents of the Service APDUs. If it is not included, the contents of all the Service APDUs shall be assumed to be ROSE.

NOTE 4 - The Interpretation APDU, as defined in 11.3.3.2, may be included, in accordance with the procedures in 8.1.

NOTE 5 - Octets 4 onwards shall comprise one of the following:

– one or more ROSE APDUs as defined in 11.3.3.4;

– one or more ACSE APDUs as defined in 11.3.3.5; or,

– one or more DSE APDUs as defined in 11.3.3.3.

The Network Protocol Profile shall comprise ASN.1 type NetworkProtocolProfile as defined in table 29 and encoded as defined in 11.4.

The Protocol Profile in octet 3 of the Facility information element shall be encoded as shown in table 30.

**Table 29 — Network Protocol Profile**

```
Network-Protocol-Profile-definition-asn1-97
    { iso( 1) standard( 0) pss1-generic-procedures( 11582)
                    network-protocol-profile-definition-asn1-97( 19) }
    DEFINITIONS                 ::=
    BEGIN

    NetworkProtocolProfile      ::=     [18] IMPLICIT INTEGER
                                            {   acse( 19),
                                                dse( 32) } (0..254)
    END -- of Network-Protocol-Profile-definition-asn1-97
```

**Table 30 — Protocol Profile Coding (octet 3)**

| Bits 5 4 3 2 1 | |
|---|---|
| 1 1 1 1 1 | Networking Extensions |
| All other values are reserved | |

### 11.3.3.1 Network Facility Extension (NFE)

The NFE shall comprise ASN.1 type NetworkFacilityExtension as defined in table 31 and encoded in accordance with 11.4. This provides a means of routing the contents of the Facility information element within the context of a call or a call independent signalling connection across the PISN, and a means of identifying the origin and destination of the information, in accordance with the procedures of clause 7.

Table 10 in 7.1.2.1 describes the use of the particular elements of the NFE.

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**Table 31 — Network Facility Extension**

```
Network-Facility-Extension-asn1-97
{ iso( 1) standard( 0) pss1-generic-procedures( 11582) network-facility-extension-asn1-97( 13) }

DEFINITIONS   ::=

BEGIN

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

NetworkFacilityExtension    ::=     [10] IMPLICIT SEQUENCE
                {   sourceEntity                [0] IMPLICIT EntityType,
                    sourceEntityAddress         [1] AddressInformation      OPTIONAL,
                    destinationEntity           [2] IMPLICIT EntityType,
                    destinationEntityAddress    [3] AddressInformation      OPTIONAL
                }

EntityType  ::=     ENUMERATED
                        {   endPINX( 0),
                            anyTypeOfPINX( 1)
                        }

AddressInformation ::=      PartyNumber

END     -- of Network-Facility-Extension-asn1-97
```

### 11.3.3.2 Interpretation APDU

The Interpretation ADPU shall comprise ASN.1 type InterpretationAPDU as defined in table 32, encoded in accordance with 11.4. This APDU provides a means whereby the originator can include optional instructions to the receiving PINX for use in the event that it does not understand the operation value of an Invoke APDU contained in octets 4 onwards of the Facility information element.

Sub-clause 8.1 describes the use of the Interpretation APDU.

**Table 32 — Interpretation APDU**

```
Interpretation-Apdu-asn1-97
{ iso( 1) standard( 0) pss1-generic-procedures( 11582) interpretation-apdu-asn1-97( 14) }

DEFINITIONS             ::=
BEGIN
InterpretationApdu  ::=     [11] IMPLICIT ENUMERATED
            {   discardAnyUnrecognisedInvokePdu( 0),
                clearCallIfAnyInvokePduNotRecognised( 1),
                -- this value also applies to Call independent signalling connections
                -- see clause 8.1.2
                rejectAnyUnrecognisedInvokePdu( 2)
                -- this coding is implied by the absence of an
                -- interpretation APDU.
            }

END     -- of Interpretation-Apdu-asn1-97
```


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#### 11.3.3.3 DSE APDU

A DSE APDU shall comprise ASN.1 type DseAPDU as defined in table 33 and encoded in accordance with 11.4.

**Table 33 — DSE APDUs (sheet 1 of 2)**

```
Dialog-Service-Pdus-asn1-97
{iso( 1) standard( 0) pss1-generic-procedures( 11582) dialog-service-pdus-asn1-97( 15) }

DEFINITIONS          ::=
BEGIN
IMPORTS
   RoseAPDU, InvokeId, InvokeIdSet   FROM       PSS1-Service-APDUs-asn1-97
   { iso( 1) standard( 0) pss1-generic-procedures( 11582) pss1-service-apdus-asn1-97( 16)}

   AcseAPDU                          FROM  Association-Control-Apdus-asn1-97
   {iso( 1) standard( 0) pss1-generic-procedures( 11582) association-control-apdus-asn1-97( 12)}


   EXTENSION, Extension{}        FROM  Manufacturer-specific-service-extension-class-asn1-97
       { iso( 1) standard( 0) pss1-generic-procedures( 11582) msi-class-asn1-97( 11)}


   OPERATION                     FROM  Remote-Operations-Information-Objects
       {joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)};

DseAPDU ::=       CHOICE
                  {   begin       [12] IMPLICIT DialogBeginPDU,
                      end         [14] IMPLICIT DialogEndPDU,
                      continue    [15] IMPLICIT DialogContinuePDU,
                      abort       [17] IMPLICIT DialogAbortPDU          }

DialogBeginPDU    ::= SEQUENCE
                      {   originationDialogId         OriginationDialogId,
                          remoteOperationsPortion     RemoteOperationsPortion   OPTIONAL     }

DialogEndPDU      ::= SEQUENCE
                      {   destinationDialogId         DestinationDialogId,
                          remoteOperationsPortion     RemoteOperationsPortion   OPTIONAL     }

DialogContinuePDU ::= SEQUENCE
                      {   originationDialogId         OriginationDialogId,
                          destinationDialogId         DestinationDialogId,
                          remoteOperationsPortion     RemoteOperationsPortion   OPTIONAL     }

DialogAbortPDU    ::= SEQUENCE
                      {   destinationDialogId         DestinationDialogId,
                          abortChoice     CHOICE
                          {   p-AbortCause            P-AbortCause,
                              userAbortInformation    UserAbortInformation   }          }

OriginationDialogId   ::= [0]  IMPLICIT OCTET STRING (SIZE(0..8))

DestinationDialogId   ::= [1]  IMPLICIT OCTET STRING (SIZE(0..8))

P-AbortCause      ::= [2]  IMPLICIT INTEGER
                      {   unrecognisedDseApdu( 0),
                          unrecognisedDialogId( 1),
                          badlyFormattedDseApdu( 2),
                          incorrectDseApdu( 3),
                          resourceLimitation( 4)                    } (0..255)

UserAbortInformation  ::= [3] IMPLICIT Extension{{DSE-Extension-Set}}

DSE-Extension-Set     EXTENSION ::= {...}
```

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**Table 33 — DSE APDUs (sheet 2 of 2)**

```
RemoteOperationsPortion ::= [4] IMPLICIT SEQUENCE OF CHOICE
                    {
                    roseAPDU [17] RoseAPDU{{InvokeIdSet},{OperationSet},{OperationSet}},
                    acseAPDU [19] AcseAPDU
                    }

OperationSet  OPERATION ::= {...}

END  -- of Dialog-Service-Pdus-asn1-97
```

#### 11.3.3.4 ROSE APDU

A ROSE APDU shall comprise ASN.1 type RoseAPDU as defined in table 34 and encoded in accordance with 11.4.

In accordance with X.880, ROSE APDUs are of four types:

– Invoke APDU (ASN.1 type Invoke in X.880);

– Return result APDU (ASN.1 type ReturnResult in X.880);

– Return error APDU (ASN.1 type ReturnError in X.880);

– Reject APDU (ASN.1 type Reject in X.880).

Invoke APDUs, return result APDUs and return error APDUs used in the context of a supplementary service will be implicitly defined by the operations and errors used by that supplementary service. These operations and errors will be defined using ASN.1 in the relevant supplementary service specifications (standardised or manufacturer specific).

Certain supplementary services may require the use within ROSE APDUs of existing information elements encoded according to the rules of 14.5 of ISO/IEC 11572 within the argument of an invoke APDU, the result of a return result APDU, or the parameter of a return error APDU (with the exception of the Facility information element, which shall not be included in this way). In such a case, these information elements shall be included within an element of type PSS1InformationElement within the argument or result of the operation concerned or the parameter of the error concerned. In this way, the ISO/IEC 11572 encoding for these information elements can be retained.

If more than one information element is to be included as part of the same argument, result or parameter, all the information elements shall be grouped together within the same element of type PSS1InformationElement. The type PSS1InformationElement is encoded as shown in table B.3.


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**Table 34 — PSS1 Service APDUs (sheet 1 of 4)**

```
PSS1-Service-APDUs-asn1-97
{ iso( 1) standard( 0) pss1-generic-procedures( 11582) pss1-service-apdus-asn1-97( 16)}

DEFINITIONS

IMPLICIT TAGS ::=
BEGIN
-- exports everything

IMPORTS    OPERATION, ERROR FROM
                Remote-Operations-Information-Objects
                {joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)};

RoseAPDU {InvokeId:InvokeIdSet, OPERATION:Invokable, OPERATION:Returnable} ::=  CHOICE
    {
        invoke          [1]  Invoke {{InvokeIdSet}, {Invokable}},
        returnResult    [2]  ReturnResult {{Returnable}},
        returnError     [3]  ReturnError {{Errors{{Returnable}}}},
        reject          [4]  Reject
    }
(CONSTRAINED BY { -- must conform to the above definition -- }
! RejectProblem : general-unrecognisedPDU)

Invoke {InvokeId:InvokeIdSet, OPERATION:Operations} ::=    SEQUENCE
    {
        invokeId    InvokeId    (InvokeIdSet)
                        (CONSTRAINED BY {-- must be unambiguous --}
                        ! RejectProblem : invoke-duplicateInvocation),
        linkedId    [0]  InvokeId
                    (CONSTRAINED BY {-- must identify an outstanding operation --}
                    ! RejectProblem : invoke-unrecognisedLinkedId)
                (CONSTRAINED BY {-- which has one or more linked operations--}
                    ! RejectProblem : invoke-linkedResponseUnexpected)
                        OPTIONAL,
        opcode      OPERATION.&operationCode
                        ({Operations}
                        ! RejectProblem : invoke-unrecognisedOperation),
        argument    OPERATION.&ArgumentType
                        ({Operations} {@opcode}
                        ! RejectProblem : invoke-mistypedArgument)
                            OPTIONAL
    }
(CONSTRAINED BY { -- must conform to the above definition -- }
! RejectProblem : general-mistypedPDU)

(
    WITH COMPONENTS
    {...,
        linkedId ABSENT
    } |
```

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**Table 34 — PSS1 Service APDUs (sheet 2 of 4)**

```
WITH COMPONENTS
      {...,
            linkedId PRESENT,
            opcode
            (CONSTRAINED BY {-- must be in the &Linked field of the associated operation --}
            ! RejectProblem : invoke-unexpectedLinkedOperation)
      }
)

ReturnResult {OPERATION:Operations}::=    SEQUENCE
      {
            invokeId      InvokeId
                  (CONSTRAINED BY {-- must be that for an outstanding operation  --}
                  ! RejectProblem : returnResult-unrecognisedInvocation)
                  (CONSTRAINED BY {-- which returns a result --}
                  ! RejectProblem : returnResult-resultResponseUnexpected),
            result    SEQUENCE
                  {
                  opcode OPERATION.&operationCode
                        ({Operations})(CONSTRAINED BY {-- identified by invokeId --}
                        ! RejectProblem : returnResult-unrecognisedInvocation),
                  result    OPERATION.&ResultType
                        ({Operations} {@.opcode}
                        ! RejectProblem : returnResult-mistypedResult)
                  }
                OPTIONAL
      }
(CONSTRAINED BY { -- must conform to the above definition -- }
! RejectProblem : general-mistypedPDU)

ReturnError {ERROR:Errors} ::=  SEQUENCE
      {
            invokeId      InvokeId
                  (CONSTRAINED BY {-- must be that for an outstanding operation --}
                  ! RejectProblem : returnError-unrecognisedInvocation)
                  (CONSTRAINED BY {-- which returns an error --}
                  ! RejectProblem : returnError-errorResponseUnexpected),
            errcode ERROR.&errorCode
                        ({Errors}
                        ! RejectProblem : returnError-unrecognisedError)
                        (CONSTRAINED BY
                        {--must be in the &Errors field of the associated operation --}
                        ! RejectProblem : returnError-unexpectedError),
            parameter ERROR.&ParameterType
                        ({Errors}{@errcode}
                        ! RejectProblem : returnError-mistypedParameter) OPTIONAL
      }
(CONSTRAINED BY { -- must conform to the above definition -- }
! RejectProblem : general-mistypedPDU)
```


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**Table 34 — PSS1 Service APDUs (sheet 3 of 4)**

```
Reject ::=     SEQUENCE
     {
          invokeId     InvokeIdOrNull,
          problem      CHOICE
                    {
                    general          [0]  GeneralProblem,
                    invoke           [1]  InvokeProblem,
                    returnResult     [2]  ReturnResultProblem,
                    returnError      [3]  ReturnErrorProblem
                    }
     }
(CONSTRAINED BY { -- must conform to the above definition -- }
! RejectProblem : general-mistypedPDU)

GeneralProblem       ::=  INTEGER
     {
          unrecognisedPDU(0),
          mistypedPDU (1),
          badlyStructuredPDU (2)
     }

InvokeProblem        ::=  INTEGER
     {
          duplicateInvocation (0),
          unrecognisedOperation (1),
          mistypedArgument (2),
          resourceLimitation (3),
          initiatorReleasing (4),
          unrecognisedLinkedId (5),
          linkedResponseUnexpected (6),
          unexpectedChildOperation (7)
     }

ReturnResultProblem      ::=  INTEGER
     {
          unrecognisedInvocation (0),
          resultResponseUnexpected (1),
          mistypedResult (2)
     }

ReturnErrorProblem   ::= INTEGER
     {
          unrecognisedInvocation (0),
          errorResponseUnexpected (1),
          unrecognisedError (2),
          unexpectedError (3),
          mistypedParameter (4)
     }
```

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**Table 34 — PSS1 Service APDUs (sheet 4 of 4)**

```
RejectProblem          ::=       INTEGER
     {
          general-unrecognisedPDU (0),
          general-mistypedPDU (1),
          general-badlyStructuredPDU (2),
          invoke-duplicateInvocation (10),
          invoke-unrecognisedOperation (11),
          invoke-mistypedArgument (12),
          invoke-resourceLimitation (13),
          invoke-releaseInProgress (14),
          invoke-unrecognisedLinkedId (15),
          invoke-linkedResponseUnexpected (16),
          invoke-unexpectedLinkedOperation (17),
          returnResult-unrecognisedInvocation (20),
          returnResult-resultResponseUnexpected (21),
          returnResult-mistypedResult (22),
          returnError-unrecognisedInvocation (30),
          returnError-errorResponseUnexpected (31),
          returnError-unrecognisedError (32),
          returnError-unexpectedError (33),
          returnError-mistypedParameter (34)
     }

InvokeId      ::=  INTEGER

InvokeIdOrNull              ::= CHOICE
     {
          present InvokeId (InvokeIdSet),
          absent  NULL
     }

InvokeIdSet  INTEGER   ::= {INTEGER(-32768..32767)}

Errors {OPERATION:Operations} ERROR ::= {Operations.&Errors}

END     -- PSS1-Service-APDUs-asn1-97
```

#### 11.3.3.5 ACSE APDU

An ACSE APDU shall comprise ASN.1 type AcseAPDU as defined in table 35 and encoded in accordance with 11.4. Type ACSE-apdu is defined in section 9 of X.227.

**Table 35 — ACSE APDUs**

```
Association-Control-Apdus-asn1-97
  {iso( 1) standard( 0) pss1-generic-procedures( 11582) association-control-apdus-asn1-97( 12) }

DEFINITIONS                 ::=

BEGIN

IMPORTS        ACSE-apdu      FROM        ACSE-1
     { joint-iso-itu-t association-control(2) modules(0) apdus(0) version1( 1) };

AcseAPDU       ::=  ACSE-apdu

END --of Association-Control-Apdus-asn1-97
```

### 11.3.4 Notification indicator

The purpose of the Notification indicator information element is to convey a notification.



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The Notification indicator information element is coded as shown in figure 15 and tables 36 and 37. The maximum length of the information element is application dependent.

The Notification indicator information element may be repeated in a message.

| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|
| 0 | Notification indicator<br>0 | 0 | 1 | 0 | 0 | 1 | 1 | 1<br>Information element identifier | octet 1 |
| Length of information element contents | | | | | | | | octet 2 |
| 1<br>ext | Notification Description (table 36) | | | | | | | octet 3 |
| ASN.1 encoded Notification Data Structure (table 37) | | | | | | | | octet 4 *<br>(note 1) |

**Figure 15 — Notification indicator information element**

NOTE 1 - Octet 4 shall only be included when the notification description indicates the “discriminator for notification extension” or "discriminator for extension to ASN.1 notification data structure".

**Table 36 — Notification Description encoding (octet 3)**

| Bits | | | | | | | |
|---|---|---|---|---|---|---|---|
| **7** | **6** | **5** | **4** | **3** | **2** | **1** | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | | | to | | | | reserved for notification values assigned in ITU-T Recommendation Q.932 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | discriminator for notification extension |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | |
| | | | to | | | | reserved for notification values assigned in ITU-T Recommendation Q.932 |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 | |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | |
| | | | to | | | | reserved for notification values assigned by ISO |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | discriminator for extension to ISO defined ASN.1 encoded notification data structure |
| 1 | 0 | 0 | 0 | 0 | 0 | 1 | |
| | | | to | | | | reserved for notification values assigned in ITU-T Recommendation Q.932 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| All values shall be treated as valid | | | | | | | |

Notification Description value “discriminator for notification extension” shall be used for notifications defined using ASN.1 in which the notification value is either of type INTEGER with a value defined by ITU-T or of type OBJECT IDENTIFIER. Notification values of type OBJECT IDENTIFIER include manufacturer specific notifications (see 9.3). Notification Description value “discriminator for extension to ISO defined ASN.1 encoded data structure” shall be used for notifications defined using ASN.1 in which the notification value is of type INTEGER with a value defined by ISO. In either case, octet 4 shall contain ASN.1 type NotificationDataStructure, as defined in table 37. Element notificationTypeID shall contain the notification value and element notificationArgument shall contain any additional data.

Table B.2 in annex B also defines the notification pss1IeNotification, which can be used to convey PSS1 information elements as a notification. Other notifications will be defined using the NOTIFICATION class in the relevant supplementary services specifications (standardised or manufacturer specific).

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**Table 37 — ASN.1 encoded Notification Data Structure**

```
 Notification-Data-Structure-asn1-97
 { iso( 1) standard( 0) pss1-generic-procedures( 11582) notification-data-structure-asn1-97( 18) }

DEFINITIONS ::=
BEGIN

IMPORTS    NOTIFICATION FROM Notification-Class-asn1-97
               { iso( 1) standard( 0) pss1-generic-procedures( 11582) notification-class-asn1-97( 21)
               };
NotificationDataStructure {NOTIFICATION:NotificationSet}     ::=  SEQUENCE
 {
      notificationValue          NOTIFICATION.&notificationCode
                        ({NotificationSet}),
      notificationArgument     NOTIFICATION.&ArgumentType
                        ({NotificationSet}{@notificationValue})
                        OPTIONAL
 }

 NotificationSet   NOTIFICATION ::= {...}
-- NotificationSet is a set of objects of class NOTIFICATION. Element notificationValue is
-- constrained to be the identifier of an object from that set, and element notificationArgument is
-- constrained to be the argument type for that particular object.

END          -- of Notification-Data-Structure-asn1-97
```

### 11.4 Encoding of information described using ASN.1

Where the contents of an information element field are defined using ASN.1 notation, the encoding of this field shall be in accordance with the Basic Encoding Rules (BER) defined in X.690 with the following restrictions:

– when the definite form is used for length encoding, a data value of length less than 128 octets shall have the length encoded in the short form;

– when the long form is used for length encoding, the minimum number of octets shall be used to encode the length field; and,

– values of the type OCTET STRING or BIT STRING shall be encoded in a primitive form.

Receiving entities shall be able to interpret all length forms of the basic encoding rules.


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# Annex A

(normative)

# Protocol Implementation Conformance Statement (PICS) for ISO/IEC 11582

## A.1 Introduction

The supplier of a protocol implementation which is claimed to conform to ISO/IEC 11582 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 standards PICS proforma;

– by the user or potential user of the implementation, as a basis for initially checking the possibility of interworking with another implementation;

NOTE - While interworking can never be guaranteed, failure to interwork can often be predicted from incompatible PICS's.

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

## 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).

### 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.

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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 ISO/IEC 11582.

NOTE - 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

### A.3.1 Implementation Identification

| | |
|---|---|
| Supplier (note 1) | |
| Contact point for queries about the PICS (note 1) | |
| Implementation Name(s) and Version(s) (note 1, note 2) | |
| Other information necessary for full identification - e.g., name(s) and version(s) for machines and/or operating systems; System name(s) | |

NOTE 1 - Only the first three items are required for all implementations; other information may be completed as appropriate in meeting the requirement for full identification.

NOTE 2 - 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, ISO/IEC 11582

| | |
|---|---|
| Protocol version | 1.0 |
| Addenda Implemented (if applicable) | |
| Amendments Implemented | |
| Have any exception items been required? | No[ ]Yes[ ]<br>(The answer Yes means that the implementation does not conform to ISO/IEC 11582) |
| Date of Statement | |

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### A.3.3 Call Related Protocol Control and GFT-Control requirements

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| A1 | Can the implementation act as a Source PINX for APDUs? | 7.1.1.1 | o | | Yes [ ] No [ ] |
| A3 | Sending the Facility information element | 7.1.1.1 | m | | Yes [ ] |
| A4 | Receiving the Facility information element | 7.1.1.2 | m | | Yes [ ] |
| A5 | Actions at a Source PINX | 7.1.2.1 | A1:m | [ ] | Yes [ ] |
| A6 | Actions at a Receiving PINX | 7.1.2.2 | m | | Yes [ ] |
| A7 | Can the PINX act as an Originating, Terminating, Incoming or Outgoing GatewayPINX as defined in ISO/IEC 11572? | 4 & ISO/IEC 11572 | o.1 | | Yes [ ] No [ ] |
| A8 | End PINX actions | 7.1.2.2.1 | A7:m | [ ] | Yes [ ] |
| A9 | Actions at a Destination PINX | 7.1.2.3 | m | | Yes [ ] |
| A10 | Can the PINX act as a Transit PINX as defined in ISO/IEC 11572? | 4 & ISO/IEC 11572 | o.1 | | Yes [ ] No [ ] |
| A11 | Transit PINX actions | 7.1.2.2.2 | A10:m | [ ] | Yes [ ] |
| A12 | Can the implementation generate notification information? | 7.4 | o | | Yes [ ] No [ ] |
| A13 | Sending notification information | 7.4.2.1 | A12:m | [ ] | Yes [ ] |
| A14 | Receiving notification information | 7.4.2.2 | m | | Yes [ ] |
| A15 | Actions at a PINX which generates notifications | 7.4.3.1 | A12:m | [ ] | Yes [ ] |
| A16 | Actions at a Transit PINX | 7.4.3.2 | A10:m | [ ] | Yes [ ] |
| A17 | Actions at a Receiving End PINX | 7.4.3.3 | A7:m | [ ] | Yes [ ] |

### A.3.4 Connectionless APDU transport mechanism

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| B1 | Does the PINX support Connectionless APDU transport? | 7.2 | o | | Yes [ ] No [ ] |
| B2 | Requirements for sending a Connectionless message | 7.2.1.1 | B1:m | [ ] | Yes [ ] |
| B3 | Requirements for receiving a Connectionless message | 7.2.1.2 | B1:m | [ ] | Yes [ ] |
| B4 | Actions at a Receiving PINX | 7.2.2.2 | B1:m | [ ] | Yes [ ] |
| B6 | Actions at a Destination PINX | 7.2.2.3 | B1:m | [ ] | Yes [ ] No [ ] |
| B7 | Actions at a Source PINX | 7.2.2.1 | B1:o | [ ] | Yes [ ] No [ ] |


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### A.3.5 Connection oriented APDU transport mechanism

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| C1 | Does the PINX support connection-oriented APDU transport? | 7.3 | o | | Yes [ ] No [ ] |
| C2 | Can the implementation act as a Source PINX for APDUs when supporting the Connection oriented APDU transport mechanism? | 7.3 | C1:o | [ ] | Yes [ ] No [ ] |
| C3 | Connection oriented transport mechanism - Protocol Control requirements | 7.3.1 | C1:m | [ ] | Yes [ ] |
| C4 | Actions at an Originating PINX | 7.3.3.1 | C1:o | [ ] | Yes [ ] No [ ] |
| C5 | Actions at a Transit PINX | 7.3.3.2 | c.1 | [ ] | Yes [ ] |
| C6 | Actions at a Terminating PINX | 7.3.3.3 | C1:o | [ ] | Yes [ ] No [ ] |
| C7 | Actions at a Source PINX | 7.3.3.4 | C2:m | [ ] | Yes [ ] |
| C8 | Actions at a Destination PINX | 7.3.3.5 | C1:m | [ ] | Yes [ ] |

c.1 IF (A10 AND C1) THEN m, ELSE N/A

### A.3.6 Coordination Function requirements

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| D1 | Inclusion of an Interpretation APDU at a Source PINX | 8.1.1 | o | | Yes [ ] No [ ] |
| D2 | Handling of APDUs at a Destination PINX | 8.1.2 | m | | Yes [ ] |

### A.3.7 ROSE requirements

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| E1 | ROSE requirements | 8.2 | m | | Yes [ ] |

### A.3.8 ACSE requirements

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| G1 | Does implementation support the ACSE protocol? | 8.3 | o | | Yes [ ] No [ ] |
| G2 | ACSE requirements | 8.3 | G1:m | [ ] | Yes [ ] |

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### A.3.9 DSE requirements

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| F1 | Does implementation support the DSE protocol? | 8.4 | o | | Yes [ ] No [ ] |
| F2 | Actions at the PINX which initiates the dialogue | 8.4.1 | F1:o.2 | [ ] | Yes [ ] No [ ] |
| F3 | Actions at the PINX which terminates the dialogue | 8.4.2 | F1:o.2 | [ ] | Yes [ ] No [ ] |
| F4 | Actions for dialogue continuation | 8.4.3 | F1:m | [ ] | Yes [ ] |
| F5 | T_Originating_Dialogue | 8.4.4 | F2:m | [ ] | Yes [ ]<br>value [ s] |
| F6 | Error procedures relating to dialogue control | 8.4.5 | F1:m | [ ] | Yes [ ] |

### A.3.10 Manufacturer specific information

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| H1 | Manufacturer specific operations | 9.1 | o | | Yes [ ] No[ ] |
| H2 | Manufacturer specific additions to standardised operations | 9.2 | o | | Yes [ ] No[ ] |
| H3 | Manufacturer specific notifications | 9.3 | o | | Yes [ ] No[ ] |

### A.3.11 Messages and information elements

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| I1 | General message format and information element coding | 11 | m | | Yes [ ] |
| I2 | Message type | 11.1 | m | | Yes [ ] |
| I3 | Dummy Call reference | 11.2 | B1:m | [ ] | Yes [ ] |
| I4 | Bearer Capability | 11.3.1 | C1:m | [ ] | Yes [ ] |
| I5 | Channel identification | 11.3.2 | C1:m | [ ] | Yes [ ] |
| I6 | Facility information element structure | 11.3.3 | m | | Yes [ ] |
| I7 | Network Facility Extension | 11.3.3.1 | m | | Yes [ ] |
| I8 | Interpretation APDU | 11.3.3.2 | m | | Yes [ ] |
| I9 | DSE APDUs | 11.3.3.3 | F1:m | [ ] | Yes [ ] |
| I10 | ROSE APDUs | 11.3.3.4 | m | | Yes [ ] |
| I11 | Notification indicator | 11.3.4 | m | | Yes [ ] |
| I12 | ACSE APDUs | 11.3.3.5 | G1:m | [ ] | Yes [ ] |
| I13 | Encoding of ASN.1 defined elements | 11.4 | m | | Yes [ ] |
| I14 | Network Protocol Profile | 11.3.3 | m | | Yes [ ] |


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### A.3.12 Implemented parameters in ISO/IEC 11582 messages

NOTE - In the following clauses, the headings 'Orig' and 'Rx' should be interpreted as follows:

'Orig': the capability to originate the element specified - i.e. create the element and send it on an PSS1link; not relay the element having received it from a Preceding PINX.

'Rx': the capability to correctly receive and process the specified element as a valid element from a Preceding PINX; including relay of the element to a Subsequent PINX if acting as a Transit PINX for the related call or connection.

#### A.3.12.1 ALERTING message

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| J1 | Facility information element - Orig | 10.1, 11.3.3 | A1:o.3 | [ ] | Yes [ ] No [ ] |
| J2 | Facility information element - Rx | 10.1, 11.3.3 | m | | Yes [ ] |
| J3 | Notification indicator information element - Orig | 10.1, 11.3.4 | A12:o.4 | [ ] | Yes [ ] No [ ] |
| J4 | Notification indicator information element - Rx | 10.1, 11.3.4 | m | | Yes [ ] |

#### A.3.12.2 CONNECT message

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| K1 | Facility information element - Orig | 10.3, 11.3.3 | c.2 | [ ] | Yes [ ] No [ ] |
| K2 | Facility information element - Rx | 10.3, 11.3.3 | m | | Yes [ ] |
| K3 | Notification indicator information element - Orig | 10.3, 11.3.4 | A12:o.4 | [ ] | Yes [ ] No [ ] |
| K4 | Notification indicator information element - Rx | 10.3, 11.3.4 | m | | Yes [ ] |

c.2 IF (A1 OR C2) THEN o.3, ELSE N/A

#### A.3.12.3 SETUP message

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| L1 | Facility information element - Orig | 10.4, 11.3.3 | c.2 | [ ] | Yes [ ] No [ ] |
| L2 | Facility information element - Rx | 10.4, 11.3.3 | m | | Yes [ ] |
| L3 | Notification indicator information element - Orig | 10.4, 11.3.4 | A12:o.4 | [ ] | Yes [ ] No [ ] |
| L4 | Notification indicator information element - Rx | 10.4, 11.3.4 | m | | Yes [ ] |

#### A.3.12.4 DISCONNECT message

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| M1 | Facility information element - Orig | 10.5, 11.3.3 | A1:o.3 | [ ] | Yes [ ] No [ ] |
| M2 | Facility information element - Rx | 10.5, 11.3.3 | m | | Yes [ ] |
| M3 | Notification indicator information element - Orig | 10.5, 11.3.4 | A12:o.4 | [ ] | Yes [ ] No [ ] |
| M4 | Notification indicator information element - Rx | 10.5, 11.3.4 | m | | Yes [ ] |

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### A.3.12.5 RELEASE message

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| N1 | Facility information element - Orig | 10.6, 11.3.3 | c.2 | [ ] | Yes [ ] No [ ] |
| N2 | Facility information element - Rx | 10.6, 11.3.3 | m | | Yes [ ] |

### A.3.12.6 RELEASE COMPLETE message

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| O1 | Facility information element - Orig | 10.7, 11.3.3 | c.2 | [ ] | Yes [ ] No [ ] |
| O2 | Facility information element - Rx | 10.7, 11.3.3 | m | | Yes [ ] |

### A.3.12.7 FACILITY message

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| P1 | FACILITY message - Orig | 10.8 | c.3 | [ ] | Yes [ ] No [ ] |
| P2 | Protocol discriminator- Orig | 10.8, (14.2 ISO/IEC 11572) | P1:m | [ ] | Yes [ ] |
| P3 | Protocol discriminator- Rx | 10.8, (14.2 ISO/IEC 11572) | m | | Yes [ ] |
| P4 | Call reference-Orig | 10.8, 11.2 | P1:m | [ ] | Yes [ ] |
| P5 | Call reference-Rx | 10.8, 11.2 | m | | Yes [ ] |
| P6 | Message type-Orig | 10.8, 11.1 | P1:m | [ ] | Yes [ ] |
| P7 | Message type-Rx | 10.8, 11.1 | m | | Yes [ ] |
| P8 | Calling party number - Orig | 10.8, 14.5 of ISO/IEC 11572 | B7:m | [ ] | Yes [ ] |
| P9 | Calling party number - Rx | 10.8, 14.5 of ISO/IEC 11572 | B1:m | [ ] | Yes [ ] |
| P10 | Called party number - Orig | 10.8, 14.5 of ISO/IEC 11572 | B7:m | [ ] | Yes [ ] |
| P11 | Called party number - Rx | 10.8, 14.5 of ISO/IEC 11572 | B1:m | [ ] | Yes [ ] |
| P12 | Facility information element - Orig | 10.8, 11.3.3 | P1:m | [ ] | Yes [ ] |
| P13 | Facility information element - Rx | 10.8, 11.3.3 | m | | Yes [ ] |
| P14 | Notification indicator information element - Orig | 10.8, 11.3.4 | c.4 | [ ] | Yes [ ] No [ ] |
| P15 | Notification indicator information element - Rx | 10.8, 11.3.4 | m | | Yes [ ] |

c.3 IF (A1 OR C2) THEN o.3ELSE IF B7 THEN mELSE N/A

c.4 IF (P1 AND A12) THEN o.4ELSE N/A


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### A.3.12.8 NOTIFY message

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| Q1 | NOTIFY message - Orig | 10.9 | A12:o.4 | [ ] | Yes [ ] No [ ] |
| Q2 | Protocol discriminator - Orig | 10.9, (14.2 of ISO/IEC 11572) | Q1:m | [ ] | Yes [ ] |
| Q3 | Protocol discriminator- Rx | 10.9, (14.2 of ISO/IEC 11572) | m | | Yes [ ] |
| Q4 | Call reference – Orig | 10.9, 11.2 | Q1:m | [ ] | Yes [ ] |
| Q5 | Call reference – Rx | 10.9, 11.2 | m | | Yes [ ] |
| Q6 | Message type – Orig | 10.9, 11.1 | Q1:m | [ ] | Yes [ ] |
| Q7 | Message type – Rx | 10.9, 11.1 | m | | Yes [ ] |
| Q8 | Notification Indicator - Orig | 10.9, 11.3.4 | Q1:m | [ ] | Yes [ ] |
| Q9 | Notification Indicator - Rx | 10.9, 11.3.4 | m | | Yes [ ] |

### A.3.12.9 PROGRESS message

| ITEM | QUESTION/FEATURE | REFERENCE | STATUS | N/A | SUPPORT |
|---|---|---|---|---|---|
| R1 | Facility information element - Orig | 10.10, 11.3.3 | A1:o.3 | [ ] | Yes [ ] No [ ] |
| R2 | Facility information element – Rx | 10.10, 11.3.3 | m | | Yes [ ] |
| R3 | Notification indicator information element – Orig | 10.10, 11.3.4 | A12:o.4 | [ ] | Yes [ ] No [ ] |
| R4 | Notification indicator information element – Rx | 10.10, 11.3.4 | m | | Yes [ ] |

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# Annex B

(normative)

# ASN.1 definitions of generic parameters

This annex contains definitions for generic parameters used in this and other Standards.

## B.1 Addressing information

Table B.1 contains the definition of ASN.1 types for encoding PISN addressing information.

**Table B.1 — Addressing information definitions (sheet 1 of 3)**

```
Addressing-Data-Elements-asn1-97
{iso( 1) standard( 0) pss1-generic-procedures( 11582) addressing-data-elements-asn1-97( 20)}

DEFINITIONS EXPLICIT TAGS ::=
BEGIN

PresentedAddressScreened      ::=      CHOICE {
                presentationAllowedAddress              [0] IMPLICIT AddressScreened,
                presentationRestricted                  [1] IMPLICIT NULL,
                numberNotAvailableDueToInterworking     [2] IMPLICIT NULL,
                presentationRestrictedAddress           [3] IMPLICIT AddressScreened}

PresentedAddressUnscreened   ::=      CHOICE {
                presentationAllowedAddress              [0] IMPLICIT Address,
                presentationRestricted                  [1] IMPLICIT NULL,
                numberNotAvailableDueToInterworking     [2] IMPLICIT NULL,
                presentationRestrictedAddress           [3] IMPLICIT Address}

PresentedNumberScreened      ::=      CHOICE {
                presentationAllowedAddress              [0] IMPLICIT NumberScreened,
                presentationRestricted                  [1] IMPLICIT NULL,
                numberNotAvailableDueToInterworking     [2] IMPLICIT NULL,
                presentationRestrictedAddress           [3] IMPLICIT NumberScreened}

PresentedNumberUnscreened    ::=      CHOICE {
                presentationAllowedAddress              [0] PartyNumber,
                presentationRestricted                  [1] IMPLICIT NULL,
                numberNotAvailableDueToInterworking     [2] IMPLICIT NULL,
                presentationRestrictedAddress           [3] PartyNumber}

AddressScreened         ::=      SEQUENCE {
                                     partyNumber        PartyNumber,
                                     screeningIndicator ScreeningIndicator,
                                     partySubaddress    PartySubaddress OPTIONAL}

NumberScreened                ::=      SEQUENCE {
                partyNumber         PartyNumber,
                screeningIndicator  ScreeningIndicator}

Address                       ::=      SEQUENCE {
                partyNumber         PartyNumber,
                partySubaddress     PartySubaddress OPTIONAL}
```



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**Table B.1 — Addressing information definitions (sheet 2 of 3)**

```
PartyNumber                 ::=     CHOICE {
                    unknownPartyNumber          [0] IMPLICIT NumberDigits,
                    -- the numbering plan is the default numbering
                    -- plan of the network. It is recommended that
                    -- this value is used.
                    publicPartyNumber           [1] IMPLICIT PublicPartyNumber,
                    -- the numbering plan is according to
                    -- Recommendation E.163 and E.164.
                    dataPartyNumber             [3] IMPLICIT NumberDigits,
                    -- not used, value reserved.
                    telexPartyNumber            [4] IMPLICIT NumberDigits,
                    -- not used, value reserved.
                    privateParyNumber           [5] IMPLICIT PrivatePartyNumber,
                    nationalStandardPartyNumber [8] IMPLICIT NumberDigits}
                    -- not used, value reserved.

PublicPartyNumber           ::=     SEQUENCE {
                    publicTypeOfNumber          PublicTypeOfNumber,
                    publicNumberDigits          NumberDigits}

PrivatePartyNumber          ::=     SEQUENCE {
                    privateTypeOfNumber         PrivateTypeOfNumber,
                    privateNumberDigits         NumberDigits}

NumberDigits                ::=     NumericString (SIZE(1..20))

PublicTypeOfNumber          ::=     ENUMERATED {
                    unknown (0),
                    -- if used number digits carry prefix indicating type
                    -- of number according to national recommendations.
                    internationalNumber (1),
                    nationalNumber (2),
                    networkSpecificNumber (3),
                    -- not used, value reserved
                    subscriberNumber (4),
                    abbreviatedNumber (6)}
                    -- valid only for called party number at the outgoing
                    -- access, network substitutes appropriate number.

PrivateTypeOfNumber         ::=     ENUMERATED {
                    unknown (0),
                    level2RegionalNumber (1),
                    level1RegionalNumber (2),
                    pISNSpecificNumber (3),
                    localNumber (4),
                    abbreviatedNumber (6)}

PartySubaddress             ::=     CHOICE {
                    userSpecifiedSubaddress     UserSpecifiedSubaddress,
                    -- not recommended.
                    nSAPSubaddress              NSAPSubaddress}
                    -- according to Recommendation X.213.

UserSpecifiedSubaddress     ::=     SEQUENCE {
                    subaddressInformation       SubaddressInformation,
                    oddCountIndicator           BOOLEAN OPTIONAL}
                    -- used when the coding of subaddress is BCD

NSAPSubaddress              ::=     OCTET STRING (SIZE(1..20))
                    -- specified according to X.213. Some networks may
                    -- limit the subaddress value to some other length
                    -- e.g. 4 octets
```

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**Table B.1 — Addressing information definitions (sheet 3 of 3)**

```
SubaddressInformation          ::=     OCTET STRING (SIZE(1..20))
                    -- coded according to user requirements. Some networks
                    -- may limit the subaddress value to some other length
                    -- e.g. 4 octets

ScreeningIndicator             ::=     ENUMERATED {
                    userProvidedNotScreened (0),
                    -- number was provided by a remote user terminal
                    -- equipment, and has been screened by a network that
                    -- is not the local public or the local private
                    -- network.
                    userProvidedVerifiedAndPassed (1),
                    -- number was provided by a remote user terminal
                    -- equipment (or by a remote private network), and has
                    -- been screened by the local public or the local
                    -- private network.
                    userProvidedVerifiedAndFailed (2),
                    -- not used, value reserved.
                    networkProvided (3)}
                    -- number was provided by local public or local
                    -- private network.

PresentationAllowedIndicator   ::=     BOOLEAN

END -- of Addressing-Data-Elements-asn1-97
```


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## B.2 Notifications

Table B.2 defines the ASN.1 NOTIFICATION class used for defining notifications that can be carried in the Notification indicator as defined in 11.3.4. It also defines the notification value pss1IeNotification, the use of which is described in 11.3.4.

**Table B.2 — NOTIFICATION class definition**

```
Notification-class-asn1-97
{ iso( 1) standard( 0) pss1-generic-procedures( 11582) notification-class-asn1-97( 21) }

DEFINITIONS ::=

BEGIN

 IMPORTS   PSS1InformationElement     FROM
           PSS1-generic-parameters-definition-asn1-97
           { iso( 1) standard( 0) pss1-generic-procedures( 11582)
             pss1-generic-parameters-asn1-97( 17)};

NOTIFICATION ::= CLASS
{
 &ArgumentType              OPTIONAL,
 &argumentTypeOptional      BOOLEAN OPTIONAL,
 &notificationCode          Code UNIQUE
}
WITH SYNTAX
{
 [ARGUMENT          &ArgumentType          [OPTIONAL&argumentTypeOptional]]
 CODE               &notificationCode
}

Code ::= CHOICE
{
 local     INTEGER,
 global    OBJECT IDENTIFIER
}


--  the notification below is used to convey information elements used as notifications across a PISN

pss1IeNotification     NOTIFICATION ::=
{
      ARGUMENT     PSS1InformationElement
      CODE         local: 2001
}


END -- of Notification-class-asn1-97
```

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## B.3 PSS1InformationElement

Table B.3 defines the ASN.1 type PSS1InformationElement, the use of which is described in 11.3.3.4.

**Table B.3 — PSS1 information element**

```
PSS1-generic-parameters-definition-asn1-97
{ iso( 1) standard( 0) pss1-generic-procedures( 11582) pss1-generic-parameters-asn1-97( 17)}


DEFINITIONS                ::=
BEGIN


PSS1InformationElement     ::=  [APPLICATION 0]    IMPLICIT    OCTET STRING

END  -- of PSS1 Generic parameters definition-asn1-97
```



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# Annex C

(informative)

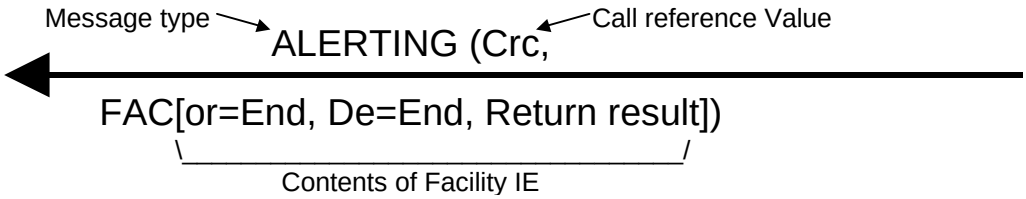
# Application of the functional protocol

## C.1 Examples of the use of the functional protocol over the PISN

This annex contains examples of the use and encoding of the functional protocol (as defined in clauses 6 to 9 of this International Standard. It is intended as an example of the potential application or use of the protocol and is not intended to constrain the definition of particular supplementary services.

## C.2 Call related supplementary services

In the figures in this clause, the notation shown in figure C.1 is used when referring to messages between PINXs.




**Key:**

FAC = Facility information element
Or = 'sourceEntity' in NFE (End=endPINX)
De = 'destinationEntity' in NFE
End = endPINX value of sourceEntity or destinationEntity in NFE (see 7.1.1)
Any = anytypeOfPINX value of sourceEntity or destinationEntity in NFE (see 7.1.1)
RetRes = return result APDU

**Figure C.1 — Notation for Call related supplementary services example message flows**

### C.2.1 Call Establishment

#### C.2.1.1 End to end Service request

In this example, a service invocation is passed between the End PINXs involved in a call, during call establishment. The supplementary service uses, as an example, operation hypotheticalService as defined in module Hypothetical-service-operation in table F.4 in annex F, without any manufacturer specific extension.

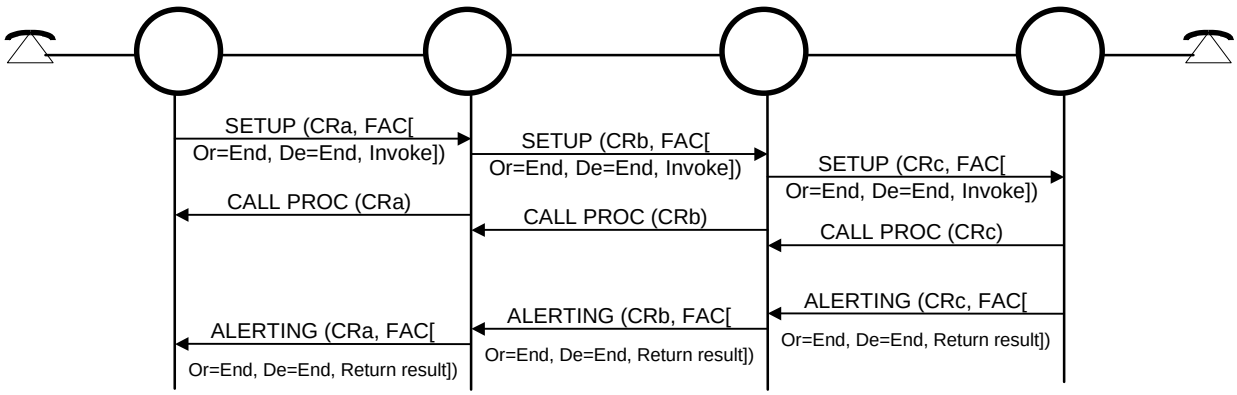



**Figure C.2 — End to end service invocation on call setup**

NOTE - Depending on the particular service, the result of processing the invocation may cause the call setup to fail in some circumstances.

Figure C.2 shows the transport of the end to end service request and response during call setup. Figure C.3 shows the encoding of the Facility information element sent in the original SETUP message. It contains an invoke APDU with a single integer argument (hypotheticalParameter1) and the operation value is given by its object identifier:

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{ iso(1) standard(0)
hypothetical-standard( 2222222)
hypothetical-operation(10) }

This results in an object identifier of 6 octets in length, encoded in accordance with clause 8.19 of X.691.

The invoke identifier chosen for this example was the arbitrary value '2'. This identifier is generated by the originator of the invoke APDU so that any response received via the same underlying association (in this case the Basic call) can be correlated with the originally sent invoke APDU. The encoding of the return result APDU (sent in the ALERTING message of figure C.2) in figure C.4 illustrates the use of the invoke identifier to perform this correlation.

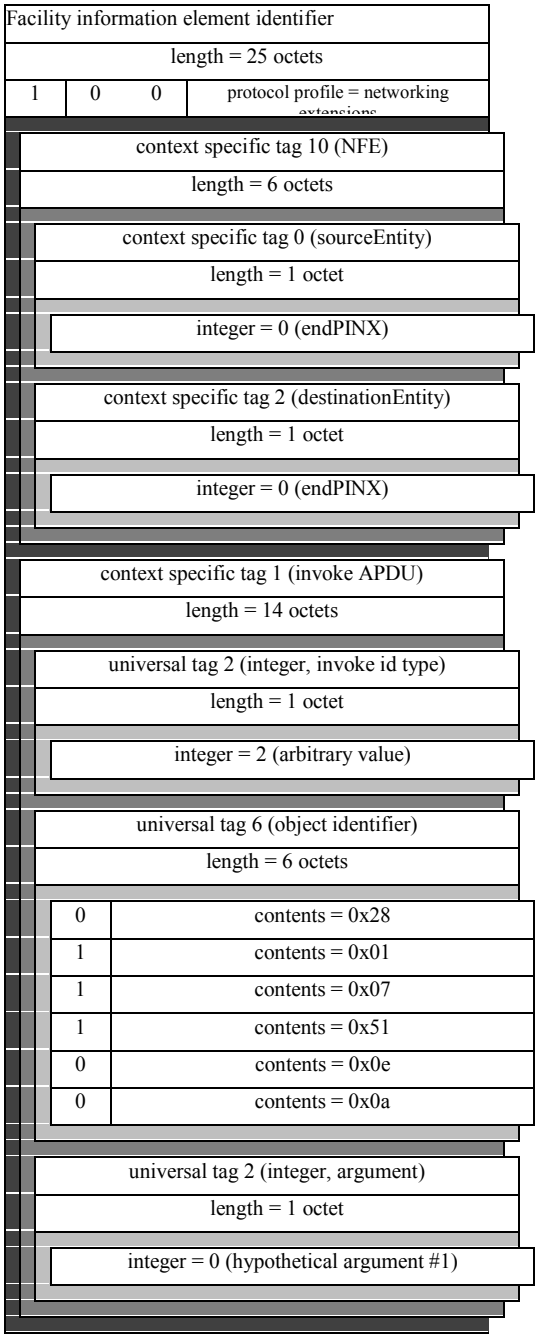


**Figure C.3 — Encoding of invoke APDU from figure C.2**


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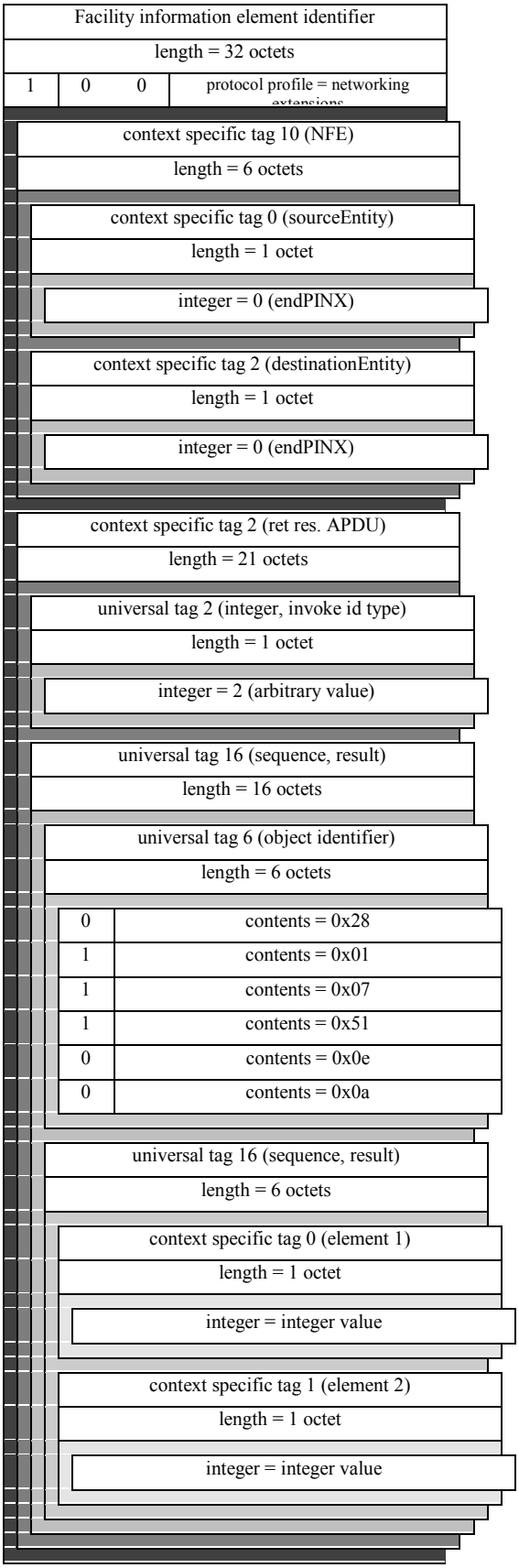


**Figure C.4 — Encoding of return result APDU from ALERTING message of figure C.2**

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### C.2.1.2 Link Service Request

Figure C.5 shows an example of a link by link service request and response during call setup. The service request is between two transit PINXs and does not contain a Network Facility Extension octet group.

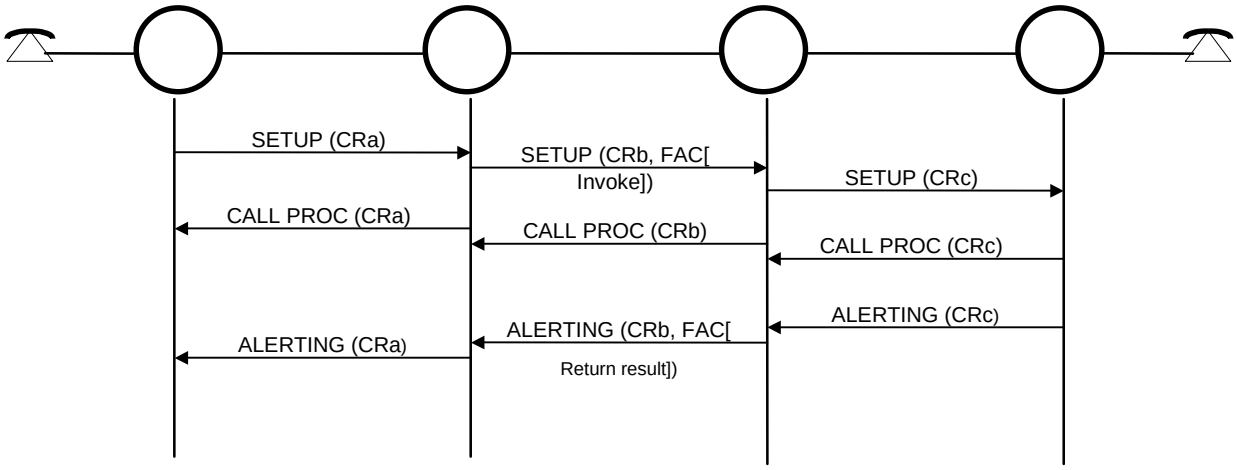


**Figure C.5 — Link service request on call setup**

## C.2.2 Call Clearing

### C.2.2.1 End to End Request

Figure C.6 shows a call being cleared across the network, with an end to end service request. This request is a Class 5 ROSE operation which requires no response.

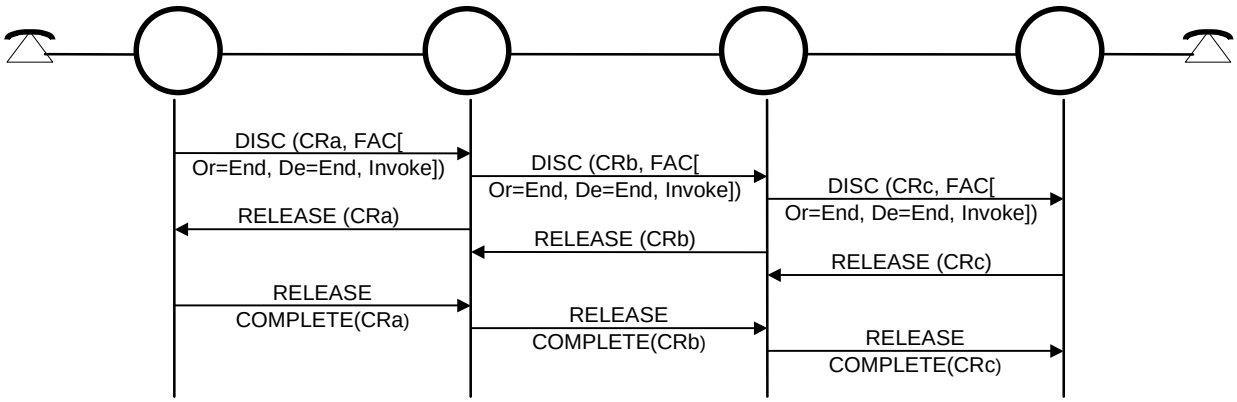


**Figure C.6 — End to end service request on call clearing**


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### C.2.2.2 Link Service Request

Figure C.7 shows a call being cleared across the network, with a link service request between two Transit PINXs.

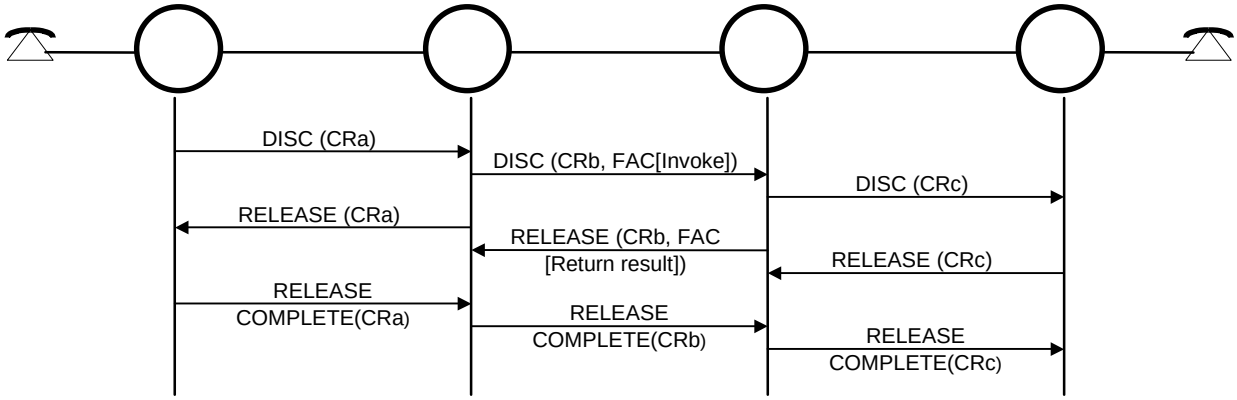


**Figure C.7 — link service request on call clearing**

### C.2.3 Call Active

### C.2.3.1 End to End Request

Figure C.8 shows an end to end service request and response during the active state of a call.

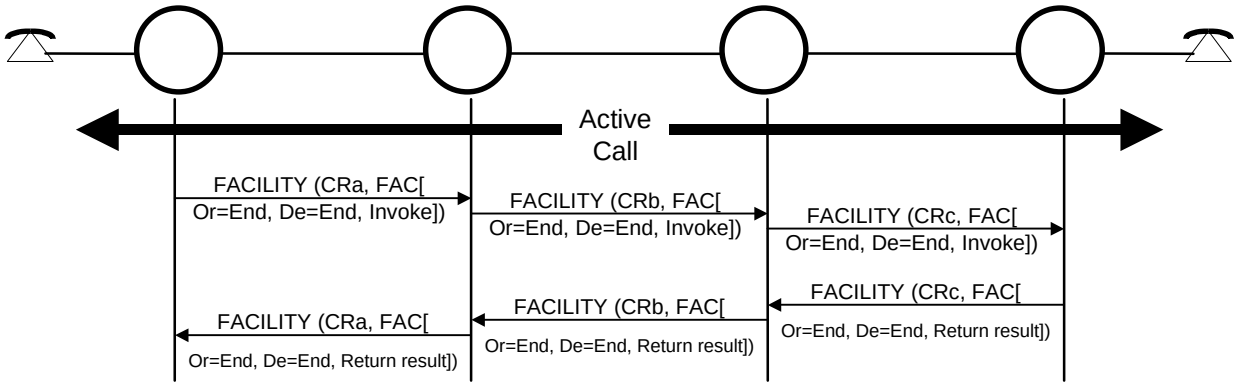


**Figure C.8 — End to End service request during active call**

### C.2.3.2 Link Service Request

Figure C.9 shows a link by link service request and response during the active state of a call.

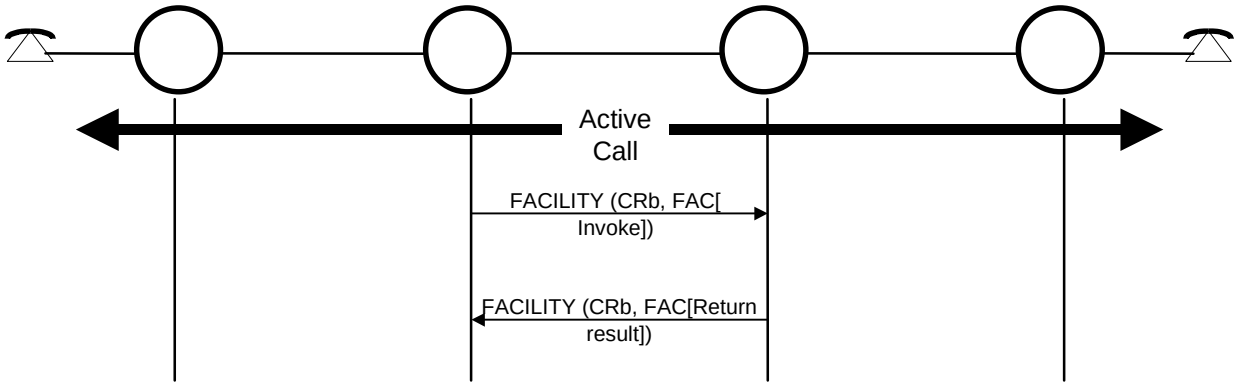


**Figure C.9 — Link by Link service request during active call**

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## C.3 Call independent supplementary services

In this clause, the notation shown in figures C.10 and C.11 is used when referring to messages between PINXs.

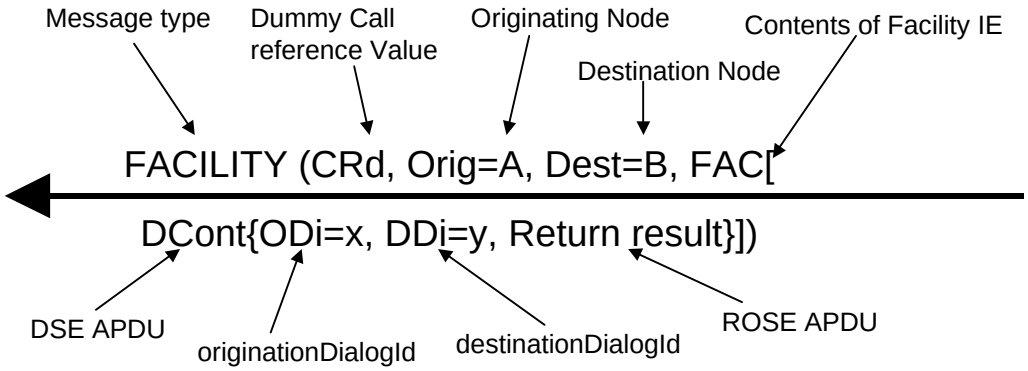


**Figure C.10 — Notation for Connectionless Call independent message sequence examples**

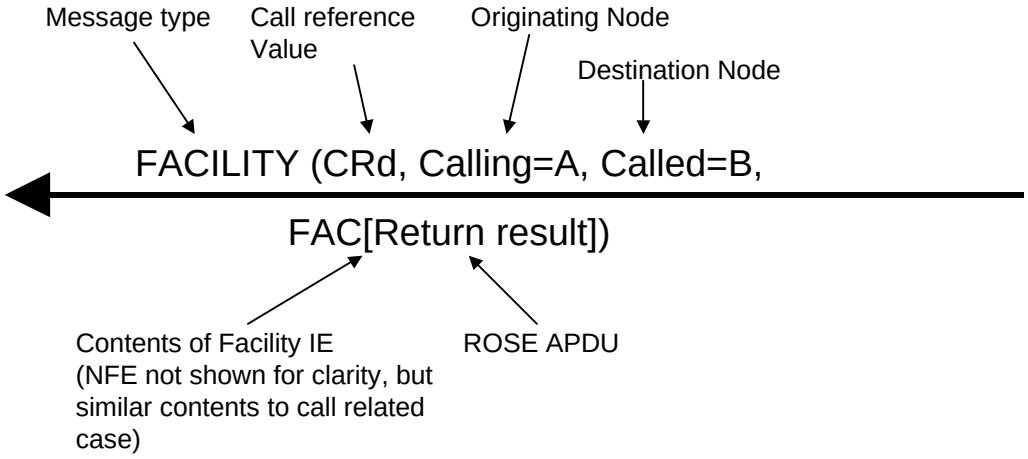


**Figure C.11 — Notation for Connection oriented Call independent message sequence examples**

The abbreviations DCont, DBeg and DEnd refer to the DialogContinuePDU, DialogBeginPDU and DialogEndPDU respectively, defined in clause 8.


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### C.3.1 Connectionless Transport

Figure C.12 shows service requests which are passed between two PINXs

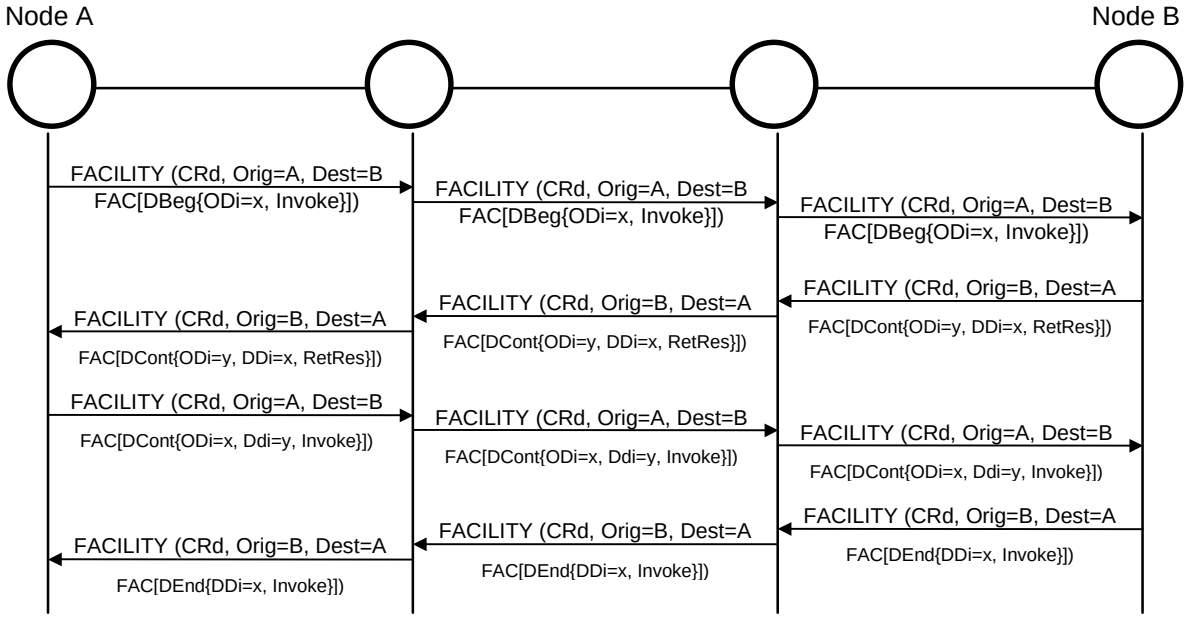


**Figure C.12 — Connectionless end to end service**

### C.3.2 Connection oriented Transport

Figure C.13 shows the establishment, active and clearing phases of a Call independent signalling connection between two PINXs

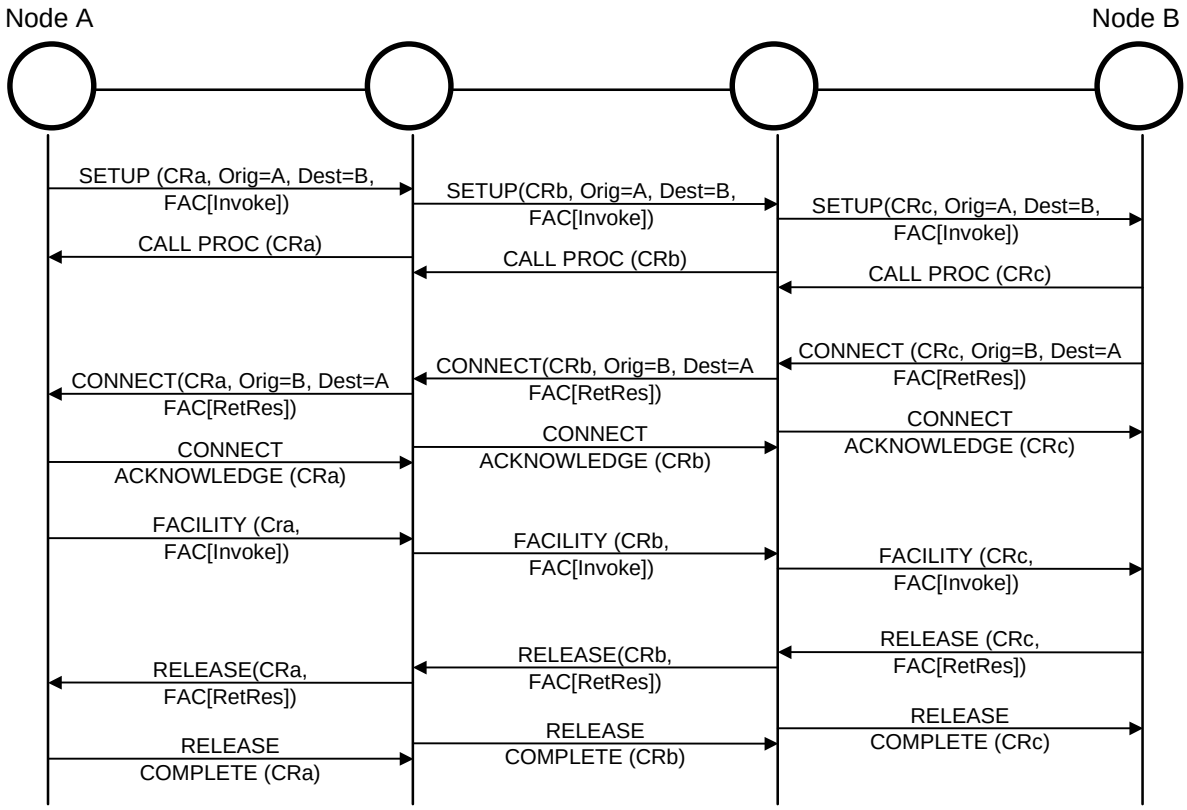


**Figure C.13 — Connection oriented signalling connection**

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# Annex D

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## Remote operations protocol and application association control

This annex was deleted. Information about ROSE APDU transport via PSS1 Generic Functional Protocol can be found in section 8.2 of this International Standard.


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# Annex E

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## Formal ROSE Definitions

The formal rose definitions can be found in ITU-T Rec. X.880.

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# Annex F

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# Examples of the use of Manufacturer specific information

## F.1 Manufacturer Specific Object Identifiers in Operation Values

As defined in 9.1, manufacturers who wish to provide manufacturer specific supplementary services in a standardised manner should use unique operation values, constructed using manufacturer specific object identifiers.

Manufacturer specific object identifiers may be constructed in the following way. Manufacturers requiring an assigned identification may apply to a "Sponsoring and Issuing organisation" according to ISO/IEC 6523-1/2 and be assigned an organisation identifier. The manufacturer should then use that organisation identifier in an object identifier (as the root of the manufacturer specific service operation value) according to the structure defined by the issuing organisation.

One example of a regional Sponsoring and issuing organisation is ECMA, which has been assigned an International Code Designator (ICD). ECMA will assign values to ECMA member companies in its object identifier root. The use of ECMA issued organisation identifiers in object identifiers is as shown in table F.1. PINXs conforming to this International Standard can make use of an organisation identifier issued by any "sponsoring and issuing organisation" (e.g. ECMA or a National Standards Body).

**Table F.1 — Structure of ECMA Object Identifier**

| | |
|---|---|
| level 1: | iso( 1) |
| level 2: | identified-organization( 3) |
| level 3: | icd-ecma( 0012) |
| level 4: | a) standard( 0)<br>b) technical-report( 1)<br>c) member-company( 2)<br>d) private-ISDN-signalling-domain( 9) |
| level 5: | for c) of level 4:<br>organisation identifier<br>assigned by ECMA |
| level 6: | this level and others below it<br>are used to suit the purpose of<br>the organisation assigned the<br>value at Level 5. |

Thus, according to table F.1, the ECMA object identifier for a company with the assigned organisation code '1999' (all organisation codes issued by ECMA have 4 digits of which the first is always '1'), may be structured as shown in table F.2. The contents of level 6 is manufacturer specific and may identify a company specific operation value or may not exist at all. In this example, level 6 provides a manufacturer specific operation value.


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**Table F.2 — ECMA Object identifier for hypothetical manufacturer specific service operation**

| |
|---|
| Object identifier for hypothetical manufacturer specific service operation value:<br><br>HypotheticalManufacturerSpecificSupplementaryService ::=<br>{ iso( 1) identified-organization( 3) icd-ecma( 0012)<br>member-company( 2) hypothetical-manufacturer( 1999)<br>hypothetical-manufacturer-service( 1) }<br><br>In pure numeric notation, this would be:<br><br>{ 1 3 0012 2 1999 1 }<br><br>(This shall be encoded as described in ITU-T recommendation X.690) |

This object identifier value would then be used in the definition of the manufacturer specific operation (internally to that manufacturer). An example of a manufacturer specific operation definition is shown in table F.3.

## F.2 Manufacturer specific extensions to standardised supplementary services

An example of the use of the element of type Extension (defined in 9.2) in a standardised supplementary services definition is given in table F.4 for a hypothetical ISO standard number '2222222'. In the operation definitions for standardised supplementary services, the following constructs are used:

– where the standardised parameter (argument of invoke APDU, result of return result APDU) is a single value (e.g. INTEGER), the Standard can instead specify a SEQUENCE containing a CHOICE of an element of type Extension or a SEQUENCE of elements of type Extension. Thus, the parameter would then become:

```
Parameter1 ::= CHOICE
               {
               integerName          INTEGER,
               sequenceName         SEQUENCE
                   {
                   integerNameInSeq INTEGER,
                   ext                      CHOICE
                       {
                       single       [1] IMPLICIT Extension{{ExampleExtensionSet}},
                       multiple     [2] IMPLICIT SEQUENCE OF
Extension{{ExampleExtensionSet}}
                       }
                   }
               }
      ExampleExtensionSet           EXTENSION    ::= {...}
```

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– where the parameter is a SEQUENCE type, this would be replaced by a SEQUENCE containing a CHOICE of an element of type Extension or a SEQUENCE of elements of type Extension. Thus, the parameter would then become:

```
Parameter2 ::= SEQUENCE
        {
        listName  List-of-Standard-parameter-types,
        ext       CHOICE        {
                        single   [1] IMPLICIT Extension{{ExampleExtensionSet}},
                        multiple[2] IMPLICIT SEQUENCE OF
Extension{{ExampleExtensionSet}}
                }       OPTIONAL
        }
    ExampleExtensionSet         EXTENSION    ::= {...}
```

– where there is no defined parameter, a parameter should be added as shown below:

```
Parameter ::= CHOICE
        {
        null       NULL,
        extension [1] IMPLICIT Extension{{ExampleExtensionSet}},
        extensionSeq      [2] IMPLICIT SEQUENCE OF Extension{{ExampleExtensionSet}}
        }
ExampleExtensionSet             EXTENSION    ::= {...}
```

NOTE - The use of implicit tagging within the CHOICE construct containing elements of type Extension should be used consistent with the context specific tags used in the remainder of the SEQUENCE in which it is contained.

In this way, manufacturer specific additions to standardised supplementary services may be included in a generic and backwards compatible manner. The manufacturer object identifier (shown in table F.3 below) should be encoded in the same manner as described in 9.1.

The use of a SEQUENCE of elements of type Extension allows the coexistence of a number of different extensions to the standardised supplementary service. It also allows for future versions of the standardised service to be backwards compatible with, and to coexist with, manufacturer-specific additions to the original supplementary service.


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**Table F.3 — Example of manufacturer specific operation**

```
Hypothetical-service-operation-asn1-97
{ iso( 1) identified-organization( 3) icd-ecma( 12) member-company( 2) hypothetical-manufacturer( 1999)
 hypothetical-service-offering-asn1-97 ( 9999)}


DEFINITIONS        ::=
BEGIN

IMPORTS         OPERATION FROM Remote-Operations-Information-Objects
                     {joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)};

MSI-HypotheticalService-Operations OPERATION  ::= { hypotheticalService }

hypotheticalService            OPERATION    ::= {
               ARGUMENT                HypotheticalArgument
               RESULT                  HypotheticalResult
               ALWAYS RESPONDS  FALSE
               CODE                    global: { iso( 1) identified-organization( 3) icd-ecma( 12)
                                       member-company( 2) hypothetical-manufacturer( 1999)
                                       hypothetical-manufacturer-service( 1) }
               }

HypotheticalArgument        ::=  INTEGER
                                 {    hypotheticalParameter1( 0),
                                      hypotheticalParameter2( 1)
                                 }

HypotheticalResult          ::=  INTEGER
                                 {    hypotheticalResult1( 0),
                                      hypotheticalResult2( 1)
                                 }

END             -- of hypothetical-manufacturer-service-operation
```

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**Table F.4 — Example definition of standardised operation with elements of type extension**

```
Hypothetical-service-operation-asn1-97
{ iso standard hypothetical-standard( 2222222) first-and-only-module-asn1-97 ( 0) }


DEFINITIONS        ::=
BEGIN


IMPORTS        OPERATION FROM Remote-Operations-Information-Objects
{joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)};

                EXTENSION, Extension{} FROM Manufacturer-specific-service-extension-class-asn1-97
                { iso standard pss1-generic-procedures( 11582) msi-class-asn1-97 ( 11)};

MSI-HypotheticalService-Operations OPERATION  ::= { hypotheticalService }

hypotheticalService      OPERATION ::= {
                         ARGUMENT     CHOICE
                         {    normalArgument      NormalIntegerArgument,
                              sequenceName        SEQUENCE
                              {    normalArgument      NormalIntegerArgument,
                                   extension           CHOICE
                                   {    single    [2] IMPLICIT Extension{{ExampleExtensionSet}},
                                        multiple  [3] IMPLICIT SEQUENCE OF
                                                      Extension{{ExampleExtensionSet}}
                                   } OPTIONAL
                              }
                         }
                         RESULT     SEQUENCE
                         {    list           ListOfNormalResultSequenceElements,
                              extension           CHOICE
                                   {    single    [2] IMPLICIT Extension{{ExampleExtensionSet}},
                                        multiple  [3] IMPLICIT SEQUENCE OF
                                                      Extension{{ExampleExtensionSet}}
                                   } OPTIONAL
                         }
                         ALWAYS RESPONDS        FALSE
                         CODE        global: { iso standard hypothetical-standard( 2222222)
                                   hypothetical-operation( 10) }
                    }

NormalIntegerArgument ::=  INTEGER
                    {    hypotheticalParameter1( 0),
                         hypotheticalParameter2( 1)
                    }

ListOfNormalResultSequenceElements  ::=  SEQUENCE
                    {    normalResultSequenceElement1 [0] IMPLICIT INTEGER,
                         normalResultSequenceElement2 [1] IMPLICIT INTEGER }

ExampleExtentionSet    EXTENSION ::= {...}

END             -- of hypothetical-service-operation-asn1-97
```


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**Table F.5 — Example definition of manufacturer specific extension (sheet 1 of 2)**

```
Hypothetical-service-operation-asn1-97
{ iso standard hypothetical-standard( 2222222) first-and-only-module-asn1-97 ( 0) }

DEFINITIONS        ::=
BEGIN

IMPORTS        OPERATION FROM Remote-Operations-Information-Objects
{joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)};

                EXTENSION, Extension{} FROM Manufacturer-specific-service-extension-class-asn1-97
                { iso standard pss1-generic-procedures( 11582) msi-class-asn1-97 ( 11)};

MSI-HypotheticalService-Operations OPERATION  ::= { hypotheticalService }

hypotheticalService     OPERATION ::= {
                        ARGUMENT    CHOICE
                        {   normalArgument      NormalIntegerArgument,
                            sequenceName        SEQUENCE
                            {   normalArgument      NormalIntegerArgument,
                                extension           CHOICE
                                {   single    [2] IMPLICIT Extension{{ExampleExtensionSet}},
                                    multiple  [3] IMPLICIT SEQUENCE OF
                                                  Extension{{ExampleExtensionSet}}
                                } OPTIONAL
                            }
                        }

                        RESULT      SEQUENCE
                        {   list            ListOfNormalResultSequenceElements,
                            extension           CHOICE
                                {   single    [2] IMPLICIT Extension{{ExampleExtensionSet}},
                                    multiple  [3] IMPLICIT SEQUENCE OF
                                                  Extension{{ExampleExtensionSet}}
                                } OPTIONAL
                        }

                        ALWAYS RESPONDS   FALSE

                        CODE        global: { iso standard hypothetical-standard( 2222222)
                                    hypothetical-operation( 10) }
                    }

NormalIntegerArgument ::=  INTEGER
                    {   hypotheticalParameter1( 0),
                        hypotheticalParameter2( 1)
                    }

ListOfNormalResultSequenceElements  ::=  SEQUENCE
                    {   normalResultSequenceElement1 [0] IMPLICIT INTEGER,
                        normalResultSequenceElement2 [1] IMPLICIT INTEGER }

msiExtension1       EXTENSION ::= {
                    ARGUMENT    SEQUENCE {
                                element1    INTEGER,
                                element2    OCTET STRING}
                    IDENTIFIER  { iso identified-organization icd-ecma member-company
                                  hypothetical-manufacturer hypothetical-extension-number1 (1)}
                    }
```

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**Table F.5 — Example definition of manufacturer specific extension (sheet 2 of 2)**

```
msiExtension2       EXTENSION ::= {
                    ARGUMENT    INTEGER
                    IDENTIFIER  { iso identified-organization icd-ecma member-company
                                  hypothetical-manufacturer hypothetical-extension-number2 (2)}
                    }
ExampleExtensionSet EXTENSION ::= { msiExtension1 | msiExtension2 }

END                 -- of hypothetical-service-operation-asn1-97
```

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# Annex G

(informative)

## Problem code definitions

**Table G.1 — Problem Code Definitions**

| | |
|---|---|
| **General Problem:** | |
| — unrecognisedPDU | signifies that the type of the APDU as evidenced by its Type identifier, is not defined in clause 11. |
| — mistypedPDU | signifies that the structure of the APDU does not conform to that defined in clause 11. |
| — badlyStructuredPDU | signifies that the structure of the APDU does not conform to the Standard notation and encoding rules, defined in ITU-T Recommendations X.680 and X.690. |
| **Invoke problem:** | |
| — duplicatedInvocation | signifies that the Invoked-identifier parameter violates the assignment rules of ITU-T Recommendation X.880. |
| — unrecognisedOperation | signifies that the type of the operation is not one of those supported. |
| — mistypedArgument | signifies that the type of the operation argument supplied is not expected. |
| — resourceLimitation | the performing PINX is not able to perform the invoked operation due to resource limitation. |
| — initiatorReleasing | the association initiator is not willing to perform the invoked operation because it is about to attempt to release the application association. |
| — unrecognisedLinkedId | signifies that there is no operation in progress with an Invoke identifier equal to the specified Linked identifier. |
| — linkedResponseUnexpected | signifies that the invoked operation referred to by the Linked identifier is not a parent operation. |
| — unexpectedChildOperation | signifies that the invoked child operation is not one that the invoked parent operation referred to by the Linked identifier allows. |
| **Return result problem:** | |
| — unrecognisedInvocation | signifies that no operation with the specified invoke identifier is in progress. |
| — resultResponseUnexpected | signifies that the invoked operation does not report a result. |
| — mistypedResult | signifies that the type of the Result parameter supplied is not expected. |
| **Return error problem:** | |
| — unrecognisedInvocation | signifies that no operation with the specified invoke identifier is in progress. |
| — errorResponseUnexpected | signifies that the invoked operation does not report failure. |
| — unrecognisedError | signifies that the reported error is not one expected. |
| — unexpectedError | signifies that the reported error is not one that the invoked operation may report. |
| — mistypedParameter | signifies that the type of the error parameter supplied is not one that is expected. |

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## Annex H

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## Bibliography

ITU-T Rec. X.208:1988, Specification of Abstract Syntax Notation One (ASN.1) (Blue Book)

ITU-T Rec. X.209:1988, Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1) (Blue Book)

ITU-T Rec. X.219:1988, Remote Operations: Model, notation and service definition (Blue Book)

ITU-T Rec. X.229 :1988, Remote Operations: Protocol specification



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# Annex I

(informative)

## Object identifiers defined in ISO/IEC 11582

This annex lists the object identifier values assigned in this International Standard and data types, values, classes and macros that are exported from any modules identified by those values. All the object identifiers in this International Standard are defined using the ISO object identifier tree. This means that each object identifier value is assigned in the tree:

gfObjectIdTree ::= iso( 1) standard( 0) pss1-generic-procedures( 11582)

Table I.1 lists the module number values and the data types, values, classes and macros which are exported from these modules.

**Table I.1 — ASN.1 Module Object identifiers used in ISO/IEC 11582**

| Object Identifier | Reference | Notes |
|---|---|---|
| { gfObjectIdTree msi-definition( 0) } | Table K.1, on page 100 | Exports: Extension, EXTENSION |
| { gfObjectIdTree association-control-apdus( 1) } | Table K.7, on page 105 | Exports: AcseAPDU |
| { gfObjectIdTree network-facility-extension( 2) } | Table K.3, on page 101 | Exports: NetworkFacilityExtension |
| { gfObjectIdTree interpretation-apdu( 3) } | Table K.4, on page 102 | Exports: InterpretationApdu |
| { gfObjectIdTree dialogue-service-pdus( 4) } | Table K.5, on page 103 | Exports: DseAPDU |
| { gfObjectIdTree remote-operations-apdus( 5) } | Table K.6, on page 104 | Exports: RoseAPDU |
| { gfObjectIdTree pss1-generic-parameters( 6) } | Table K.11, on page 111 | Exports: PSS1InformationElement |
| { gfObjectIdTree notification-data-structure( 7) } | Table K.8, on page 106 | Exports: NotificationDataStructure |
| { gfObjectIdTree network-protocol-profile-definition( 8) } | Table K.2, on page 101 | Exports: NetworkProtocolProfile |
| { gfObjectIdTree addressing-data-elements( 9) } | Table K.9, on page 107 | Exports: PresentedAddressScreened, PresentedAddressUnscreened, PresentedNumberScreened, PresentedNumberUnscreened, Address, PartyNumber, PartySubaddress, ScreeningIndicator, PresentationAllowedIndicator |
| { gfObjectIdTree notification-macro( 10) } | Table K.10, on page 110 | Exports: NOTIFICATION, pss1IeNotification |
| { gfObjectIdTree msi-class-asn1-97 ( 11) } | Table 14, on page 44 | Exports : everything |
| { gfObjectIdTree association-control-apdus-asn1-97( 12) } | Table 35, on page 58 | Exports : everything |
| { gfObjectIdTree network-facility-extension-asn1-97 ( 13) } | Table 31, on page 52 | Exports : everything |
| { gfObjectIdTree interpretation-apdu-asn1-97( 14) } | Table 32, on page 52 | Exports : everything |
| { gfObjectIdTree dialogue-service-pdus-asn1-97( 15) } | Table 33, on page 53 | Exports : everything |
| { gfObjectIdTree pss1-service-apdus-asn1-97( 16) } | Table 34, on page 55 | Exports : everything |
| { gfObjectIdTree pss1-generic-parameters-asn1-97( 17) } | Table B.3, on page 74 | Exports : everything |
| { gfObjectIdTree notification-data-structure-asn1-97( 18) } | Table 37, on page 60 | Exports : everything |

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| | | |
|---|---|---|
| { gfObjectIdTree network-protocol-profile-definition-asn1-97( 19) } | Table 29, on page 51 | Exports : everything |
| { gfObjectIdTree addressing-data-elements-asn1-97( 20) } | Table B.1, on page 70 | Exports : everything |
| { gfObjectIdTree notification-class-asn1-97( 21) } | Table B.2, on page 73 | Exports : everything |


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# Annex J

(informative)

## "Recipe" for migration of X.208 / X.209 based QSIG ASN.1 modules to X.680 / X.690 ASN.1

This annex gives a short introduction of how existing ITU-T Rec. X.208 / X.209 based Supplementary Service and Additional Network Feature ASN.1 modules have to be changed to gain conformance with ITU-T Rec. X.680 / X.690.

### J.1 Module Header

All ISO/IEC 11582 and PSS1 SS/ANF modules which are migrated to ITU-T Rec. X.680 / X.690 ASN.1 have get a new module number and name to all unambiguous references for IMPORT statements. Table J.1 shows an example.

**Table J.1 — Module Header**

| X.208 / X.209 ASN.1 code | X.680 / X.690 ASN.1 code |
|---|---|
| Example-Service-Name-Operations<br>{ iso ( 1) standard ( 0) pss1-name (xxx)<br>example-service-name-operations( 0) } | Example-Service-Name-Operations-**asn1-97**<br>{ iso ( 1) standard ( 0) pss1-name (xxx)<br>example-service-name-operations-**asn1-97**( **1**) } |
| DEFINITIONS ::=<br><br>-- This might alternatively be defined as<br>-- DEFINITIONS EXPLICIT TAGS ::=<br><br>BEGIN | DEFINITIONS ::=<br><br>-- If defined as DEFINITIONS EXPLICIT TAGS ::=<br>-- this shall not be changed.<br><br>BEGIN |

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## J.2 IMPORTS and EXPORTS

Table J.2 shows how the IMPORTS and EXPORTS sections of a ASN.1 module have to be changed to gain conformance with ITU-T Rec. X.680 / X.690.

When importing from another PSS1 module (e.g. from ISO/IEC 11582 or any PSS1 SS/ANF) only the migrated version of the affected module shall be used, i.e. the IMPORT statement for that module has to be changed to the new module reference which is described in section J.1.

Table J.2 only shows some general examples for those modules from which structures are imported most of the time. If definitions from other PSS1 modules are needed it is necessary to look up the new reference in the related Standard. If the module, from which a definition shall be imported, is not migrated to X.680 / X.690 ASN.1 then it first has to be migrated.

For modules which are not defined within the PSS1 standards set it is necessary to use references to X.680 / X.680 conformant modules. Import statements to e.g. the General-Error-List (ITU-T Recommendation Q.950) shall be changed.

**Table J.2 — IMPORTS and EXPORTS Statements**

| X.208 / X.209 ASN.1 code | X.680 / X.690 ASN.1 code |
|---|---|
| IMPORTS<br><br>OPERATION, ERROR FROM<br>Remote-Operation-Notation<br>{ joint-iso-ccitt( 2)<br>remote-operations( 4) notation( 0) } | IMPORTS<br><br>OPERATION, ERROR FROM<br>Remote-Operations-Information-Objects<br>{joint-iso-itu-t remote-operations(4)<br>informationObjects(5) version1(0)} |
| Extension FROM<br>Manufacturer-specific-service-<br>extension-definition<br>{ iso standard<br>pss1-generic-procedures (11582)<br>msi-definition ( 0)} | EXTENSION, Extension{} FROM<br>Manufacturer-specific-service-<br>extension-class-asn1-97<br>{ iso standard<br>pss1-generic-procedures (11582)<br>msi-class-asn1-97 (11) }<br><br>-- please note that there must not be a blank character<br>-- between the word Extension and the following {}. |
| PartyNumber FROM<br>Addressing-Data-Elements<br>{ iso standard<br>pss1-generic-procedures (11582)<br>addressing-data-elements ( 9)} | PartyNumber FROM<br>Addressing-Data-Elements-asn1-97<br>{ iso standard<br>pss1-generic-procedures (11582)<br>addressing-data-elements-asn1-97 ( 20)} |
| Name FROM<br>Name-Operations<br>{ iso standard<br>pss1-name (13868)<br>name-operations ( 0)} | Name FROM<br>Name-Operations-asn1-97<br>{ iso standard<br>pss1-name (13868)<br>name-operations-asn1-97 ( 1)} |


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| | |
|---|---|
| NOTIFICATION FROM<br>Notification-Data-Structure<br>{iso(1)<br>standard(0)pss1-generic-procedures(11582)<br>notification-data-structure(7)}; | NOTIFICATION FROM<br>Notification-Data-Structure-asn1-97<br>{iso(1)<br>standard(0)pss1-generic-procedures(11582)<br>notification-data-structure-asn1-97(18)}; |
| EXPORTS Example1, Example2; | -- EXPORTS everything (Statement not needed) |

## J.3 Usage of Operations

In the examples given in Table J.3 please note the change from capital to small letter in the name of operations.

**Table J.3 — OPERATION**

| X.208 / X.209 ASN.1 code | X.680 / X.690 ASN.1 code |
|---|---|
| | -- this statement is new and should be included in new<br>-- modules following the header<br>ExampleModule-Operations OPERATION ::= {<br>example1 \| example2 \| example3} |
| Example1 ::= OPERATION<br>ARGUMENT ExampleArg<br>RESULT ExampleRes<br>ERRORS { error1,<br>unspecified}<br><br>example1 Example1 ::= localValue 2001 | example1 OPERATION ::= {<br>ARGUMENT ExampleArg<br>RESULT ExampleRes<br>ERRORS { error1 \|<br>unspecified}<br>CODE local: 2001} |
| Example2 ::= OPERATION<br>ARGUMENT ExampleArg<br><br>example2 Example2 ::= localValue 2002 | example2 OPERATION ::= {<br>ARGUMENT ExampleArg<br>RETURN RESULT FALSE<br>ALWAYS RESPONDS FALSE<br>CODE local: 2002} |
| Example3 ::= OPERATION<br>ARGUMENT ExampleArg<br>ERRORS { error1,<br>unspecified}<br><br>example1 Example1 ::= localValue 2003 | example3 OPERATION ::= {<br>ARGUMENT ExampleArg<br>RETURN RESULT FALSE<br>ERRORS { error1 \|<br>unspecified}<br>ALWAYS RESPONDS FALSE<br>CODE local: 2003} |

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## J.4 Definition of ERRORS

**Table J.4 — ERROR**

| X.208 / X.209 ASN.1 code | X.680 / X.690 ASN.1 code |
|---|---|
| error1 ERROR ::= localValue 3001 | error1 ERROR ::= {<br>CODE local: 3001} |
| Unspecified ERROR PARAMETER ExampleExt1<br><br>unspecified Unspecified ::= localValue 3003 | unspecified ERROR ::= {<br>PARAMETER ExampleExt1<br>CODE local: 3003} |
| Unspecified2 ERROR PARAMETER Extension<br><br>unspecified2 Unspecified2 ::= localValue 3003 | unspecified2 ERROR ::= {<br>PARAMETER<br>Extension{{ExampleExtSet}}<br>CODE local: 3003} |

## J.5 Usage of Extensions

**Table J.5 — Extensions**

| X.208 / X.209 ASN.1 code | X.680 / X.690 ASN.1 code |
|---|---|
| ExampleArg ::= SEQUENCE {<br>something INTEGER,<br>extension ExampleExt1}<br><br>ExampleExt1 ::= CHOICE {<br>single [1] IMPLICIT<br>Extension,<br>multiple [2] IMPLICIT<br>SEQUENCE OF<br>Extension} | ExampleArg ::= SEQUENCE {<br>something INTEGER,<br>extension ExampleExt1}<br><br>ExampleExt1 ::= CHOICE {<br>single [1] IMPLICIT<br><br>Extension{{ExampleExtSet}},<br>multiple [2] IMPLICIT<br>SEQUENCE OF<br><br>Extension{{ExampleExtSet}}<br>}<br><br>ExampleExtSet EXTENSION ::= {...} |


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## J.6 Usage of Notification

**Table J.6 — Notifications**

| X.208 / X.209 ASN.1 code | X.680 / X.690 ASN.1 code |
|---|---|
| | -- this statement is new and should be included<br>-- in new modules following the header<br><br>ExampleNotificationSet NOTIFICATION ::= {<br>exampleNotification1 } |
| ExampleNotification1 ::= NOTIFICATION<br>ARGUMENT NULL<br><br>exampleNotification1 ExampleNotification1 ::=<br>localValue 4001 | exampleNotification1 NOTIFICATION ::= {<br>ARGUMENT NULL<br>CODE local: 4001<br>} |

## J.7 Element Names

In many cases in already existing modules elements of data structures like SEQUENCE or CHOICE were defined by just indicating the type-name of the element. This is not longer allowed in X.680 / X.690 ASN.1.

**Table J.7 — Element Names**

| X.208 / X.209 ASN.1 code | X.680 / X.690 ASN.1 code |
|---|---|
| ExampleRes ::= SEQUENCE {<br>INTEGER,<br>ExampleExt2}}<br><br>ExampleExt2 ::= CHOICE {<br>[0] NULL<br>[1] IMPLICIT Extension,<br>[2] IMPLICIT<br>SEQUENCE OF Extension} | ExampleRes ::= SEQUENCE {<br>something INTEGER,<br>extension ExampleExt2}<br><br>ExampleExt2 ::= CHOICE {<br>null [0] NULL,<br>single [1] IMPLICIT<br><br>Extension{{ExampleExtSet}},<br>multiple [2] IMPLICIT<br>SEQUENCE OF<br><br>Extension{{ExampleExtSet}}<br>} |

## J.8 END Statement

The END statement shall indicate the new module name as a comment.

**Table J.8 — END Statement**

| X.208 / X.209 ASN.1 code | X.680 / X.690 ASN.1 code |
|---|---|
| END | END -- of Example-Service-Name-Operations-asn1-97 |

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# Annex K

(informative)

## 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 11582, i.e. based on ITU-T Recommendations X.208 / X.209, which are expected to be withdrawn. Starting with the fourth edition the ASN.1 modules within ISO/IEC 11582 comply with ITU-T Recommendations X.680 / X.690. Please note that regardless of which of the modules is used as a base of a QSIG implementation, the encoded hex-string will stay identical.

The formal rose definitions for the modules listed in this annex can be found in ITU-T Rec. X.219.

NOTE - The modules as defined in annex F are not listed in here, as the changes applied to them due to the migration to ITU-T Recommendations X.680 / X.690 can also be applied to the previously defined modules without changing their functionality when used with ITU-T Recommendations X.208 / X.209.

**Table K.1 — Manufacturer specific extension mechanism -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209**

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


  BEGIN


  DEFINITIONS                   ::=
  BEGIN
  EXPORTS                       Extension, EXTENSION;
  EXTENSION MACRO                   ::=
          TYPE NOTATION         ::= Argument
          VALUE NOTATION        ::= Value (VALUE(OBJECT IDENTIFIER))
          Argument              ::= "Argument" NamedType
          NamedType             ::= identifier type|type
  END  -- of EXTENSION macro


  Extension       ::=     SEQUENCE
                          {   manufacturer              EXTENSION,
                              ANY DEFINED BY            manufacturer
                          }


  END     -- of Manufacturer-specific-service-extension-definition
```



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**Table K.2 — Network Protocol Profile -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209**

```
Network-Protocol-Profile-definition

    { iso( 1) standard( 0) pss1-generic-procedures( 11582)
                    network-protocol-profile-definition( 8) }

    DEFINITIONS                 ::=
    BEGIN
    EXPORTS             NetworkProtocolProfile;

    NetworkProtocolProfile      ::=     [18] IMPLICIT INTEGER
                                            {   acse( 19),
                                                dse( 32) } (0..254)

    END -- of Network Protocol Profile definition
```

**Table K.3 — Network Facility Extension -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209**

```
Network-Facility-Extension
    { iso( 1) standard( 0) pss1-generic-procedures( 11582) network-facility-extension( 2) }

DEFINITIONS   ::=

BEGIN

EXPORTS             NetworkFacilityExtension;

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

NetworkFacilityExtension    ::=     [10] IMPLICIT SEQUENCE
                {   sourceEntity                [0] IMPLICIT EntityType,
                    sourceEntityAddress         [1] AddressInformation      OPTIONAL,
                    destinationEntity           [2] IMPLICIT EntityType,
                    destinationEntityAddress    [3] AddressInformation      OPTIONAL
                }

EntityType  ::=     ENUMERATED
                        {   endPINX( 0),
                            anyTypeOfPINX( 1)
                        }

AddressInformation ::=      PartyNumber

END     -- of Network Facility Extension
```

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**Table K.4 — Interpretation APDU -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209**

```
Interpretation-Apdu
{ iso( 1) standard( 0) pss1-generic-procedures( 11582) interpretation-apdu( 3) }

DEFINITIONS             ::=
BEGIN
EXPORTS                 InterpretationApdu;

InterpretationApdu  ::=     [11] IMPLICIT ENUMERATED
            {   discardAnyUnrecognisedInvokePdu( 0),
                clearCallIfAnyInvokePduNotRecognised( 1),
                -- this value also applies to Call independent signalling connections
                -- see clause 8.1.2
                rejectAnyUnrecognisedInvokePdu( 2)
                -- this coding is implied by the absence of an
                -- interpretation APDU.
            }

END     -- of Interpretation-Apdu
```


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**Table K.5 — Dialog Servcice PDUs -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209**

```
Dialog-Service-Pdus
    {iso( 1) standard( 0) pss1-generic-procedures( 11582) dialog-service-pdus( 4) }

DEFINITIONS             ::=
BEGIN
EXPORTS                 DseAPDU;
IMPORTS
    RoseAPDU        FROM        Remote-Operations-Apdus
        { iso( 1) standard( 0) pss1-generic-procedures( 11582) remote-operations-apdus( 5) }
    AcseAPDU        FROM        Association-Control-Apdus
        { iso( 1) standard( 0) pss1-generic-procedures( 11582) association-control-apdus( 1) }
    Extension       FROM        Manufacturer-specific-service-extension-definition
        { iso( 1) standard( 0) pss1-generic-procedures( 11582) msi-definition( 0) };

DseAPDU  ::=        CHOICE
                    {   begin       [12] IMPLICIT DialogBeginPDU,
                        end         [14] IMPLICIT DialogEndPDU,
                        continue    [15] IMPLICIT DialogContinuePDU,
                        abort       [17] IMPLICIT DialogAbortPDU        }

DialogBeginPDU    ::=   SEQUENCE
                        {   OriginationDialogId,
                            RemoteOperationsPortion     OPTIONAL }

DialogEndPDU      ::=   SEQUENCE
                        {   DestinationDialogId,
                            RemoteOperationsPortion     OPTIONAL    }

DialogContinuePDU     ::=   SEQUENCE
                        {   OriginationDialogId,
                            DestinationDialogId,
                            RemoteOperationsPortion     OPTIONAL    }

DialogAbortPDU    ::=   SEQUENCE
                        {   DestinationDialogId,
                            CHOICE
                            {   P-AbortCause,
                                UserAbortInformation    }           }

OriginationDialogId     ::=   [0]  IMPLICIT OCTET STRING SIZE(0..8)

DestinationDialogId     ::=   [1]  IMPLICIT OCTET STRING SIZE(0..8)

P-AbortCause        ::=   [2]  IMPLICIT INTEGER
                            {   unrecognisedDseApdu( 0),
                                unrecognisedDialogId( 1),
                                badlyFormattedDseApdu( 2),
                                incorrectDseApdu( 3),
                                resourceLimitation( 4)          }  (0..255)

UserAbortInformation    ::=   [3] IMPLICIT Extension

RemoteOperationsPortion   ::=   [4]  IMPLICIT SEQUENCE OF CHOICE
                                    {   [17]    RoseAPDU,
                                        [19]    AcseAPDU        }

END    -- of Dialog-Service-Pdus
```

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**Table K.6 — ROSE APDUs -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209 (sheet 1 of 2)**

```
Remote-Operations-Apdus
    { iso( 1) standard( 0) pss1-generic-procedures( 11582) remote-operations-apdus( 5)  }

DEFINITIONS                 ::=
BEGIN

EXPORTS                 RoseAPDU;
IMPORTS                 OPERATION, ERROR FROM Remote-Operations-Notation
                { joint-iso-ccitt( 2) remote-operations( 4) notation( 0) };

RoseAPDU        ::= CHOICE
                    {   invoke          [1] IMPLICIT    InvokePDU,
                        retResult       [2] IMPLICIT    ReturnResultPDU,
                        retError        [3] IMPLICIT    ReturnErrorPDU,
                        reject          [4] IMPLICIT    RejectPDU           }

InvokePDU       ::= SEQUENCE
                    {   invokeID            InvokeIDType,
                        linkedID            [0] IMPLICIT InvokeIDType OPTIONAL,
                        operationValue      OPERATION,
                        argument            ANY DEFINED BY
                                            operationValue OPTIONAL     }

ReturnResultPDU ::= SEQUENCE
                    {   invokeID        InvokeIDType,
                        SEQUENCE
                        {   operationValue      OPERATION,
                            result              ANY DEFINED BY
                                                operationValue }    OPTIONAL }

ReturnErrorPDU  ::= SEQUENCE
                    {   invokeID            InvokeIDType,
                        errorValue          ERROR,
                        parameter           ANY DEFINED BY
                                            errorValue  OPTIONAL    }

RejectPDU       ::= SEQUENCE
                    {   invokeID    CHOICE
                                    {   InvokeIDType,
                                        NULL            },
                        problem     CHOICE
                                    {   [0] IMPLICIT GeneralProblem,
                                        [1] IMPLICIT InvokeProblem,
                                        [2] IMPLICIT ReturnResultProblem,
                                        [3] IMPLICIT ReturnErrorProblem }       }

InvokeIDType    ::=     INTEGER(-32768..32767)

GeneralProblem  ::=     INTEGER
                        {   unrecognisedAPDU( 0),
                            mistypedAPDU( 1),
                            badlyStructuredAPDU( 2)             } (0..255)

InvokeProblem   ::=     INTEGER
                        {   duplicateInvocation( 0),
                            unrecognisedOperation( 1),
                            mistypedArgument( 2),
                            resourceLimitation( 3),
                            initiatorReleasing( 4),
                            unrecognisedLinkedIdentifier( 5),
                            linkedResponseUnexpected( 6),
                            unexpectedChildOperation( 7)        } (0..255)
```



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**Table K.6 — ROSE APDUs -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209 (sheet 2 of 2)**

```
ReturnResultProblem    ::=    INTEGER
                              {    unrecognisedInvocation( 0),
                                   resultResponseUnexpected( 1),
                                   mistypedResult( 2)              } (0..255)
ReturnErrorProblem     ::=    INTEGER
                              {    unrecognisedInvocation( 0),
                                   errorResponseUnexpected( 1),
                                   unrecognisedError( 2),
                                   unexpectedError( 3),
                                   mistypedParameter( 4)           } (0..255)
END    -- of Remote-Operations-Apdus
```

**Table K.7 — ACSE APDUs -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209**

```
Association-Control-Apdus
    {iso( 1) standard( 0) pss1-generic-procedures( 11582) association-control-apdus( 1) }
DEFINITIONS                ::=
BEGIN
EXPORTS       AcseAPDU;
IMPORTS       ACSE-apdu      FROM       ACSE-1
    { joint-iso-ccitt association-control( 2) abstract-syntax( 1) apdus( 0) version( 1) };
AcseAPDU      ::=  ACSE-apdu
END --of Association-Control-Apdus
```

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**Table K.8 — ASN.1 encoded Notification Data Structure -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209**

```
Notification-Data-Structure
    { iso( 1) standard( 0) pss1-generic-procedures( 11582) notification-data-structure( 7) }

DEFINITIONS   ::=
BEGIN

EXPORTS       NotificationDataStructure;

NotificationDataStructure     ::=  SEQUENCE
                                   {    notificationTypeID          NOTIFICATION,
                                        notificationArgument        ANY DEFINED BY
                                                                    notificationTypeID   }

-- ANY is filled by the single ASN.1 type following
-- the keyword ARGUMENT in the type definition of a particular
-- notification

END -- of Notification-Data-Structure
```


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**Table K.9 — Addressing information definitions -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209 (sheet 1 of 3)**

```
Addressing-Data-Elements
    {iso( 1) standard( 0) pss1-generic-procedures( 11582) addressing-data-elements( 9)}

DEFINITIONS EXPLICIT TAGS ::=
BEGIN

EXPORTS     PresentedAddressScreened,
            PresentedAddressUnscreened,
            PresentedNumberScreened,
            PresentedNumberUnscreened,
            Address, PartyNumber, PartySubaddress,
            ScreeningIndicator, PresentationAllowedIndicator;

PresentedAddressScreened    ::=     CHOICE {
            presentationAllowedAddress          [0] IMPLICIT AddressScreened,
            presentationRestricted              [1] IMPLICIT NULL,
            numberNotAvailableDueToInterworking [2] IMPLICIT NULL,
            presentationRestrictedAddress       [3] IMPLICIT AddressScreened}

PresentedAddressUnscreened  ::=     CHOICE {
            presentationAllowedAddress          [0] IMPLICIT Address,
            presentationRestricted              [1] IMPLICIT NULL,
            numberNotAvailableDueToInterworking [2] IMPLICIT NULL,
            presentationRestrictedAddress       [3] IMPLICIT Address}

PresentedNumberScreened     ::=     CHOICE {
            presentationAllowedAddress          [0] IMPLICIT NumberScreened,
            presentationRestricted              [1] IMPLICIT NULL,
            numberNotAvailableDueToInterworking [2] IMPLICIT NULL,
            presentationRestrictedAddress       [3] IMPLICIT NumberScreened}

PresentedNumberUnscreened   ::=     CHOICE {
            presentationAllowedAddress          [0] PartyNumber,
            presentationRestricted              [1] IMPLICIT NULL,
            numberNotAvailableDueToInterworking [2] IMPLICIT NULL,
            presentationRestrictedAddress       [3] PartyNumber}

AddressScreened     ::=     SEQUENCE {
                                PartyNumber,
                                ScreeningIndicator,
                                PartySubaddress OPTIONAL}

NumberScreened          ::=     SEQUENCE {
                PartyNumber,
                ScreeningIndicator}

Address                 ::=     SEQUENCE {
                PartyNumber,
                PartySubaddress OPTIONAL}
```

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**Table K.9 — Addressing information definitions -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209 (sheet 2 of 3)**

```
PartyNumber                 ::=     CHOICE {
                    unknownPartyNumber          [0] IMPLICIT NumberDigits,
                    -- the numbering plan is the default numbering
                    -- plan of the network. It is recommanded that
                    -- this value is used.
                    publicPartyNumber           [1] IMPLICIT PublicPartyNumber,
                    -- the numbering plan is according to
                    -- Recommendation E.163 and E.164.
                    dataPartyNumber             [3] IMPLICIT NumberDigits,
                    -- not used, value reserved.
                    telexPartyNumber            [4] IMPLICIT NumberDigits,
                    -- not used, value reserved.
                    privatePartyNumber          [5] IMPLICIT PrivatePartyNumber,
                    nationalStandardPartyNumber [8] IMPLICIT NumberDigits}
                    -- not used, value reserved.

PublicPartyNumber           ::=     SEQUENCE {
                    publicTypeOfNumber          PublicTypeOfNumber,
                    publicNumberDigits          NumberDigits}

PrivatePartyNumber          ::=     SEQUENCE {
                    privateTypeOfNumber         PrivateTypeOfNumber,
                    privateNumberDigits         NumberDigits}

NumberDigits                ::=     NumericString (SIZE(1..20))

PublicTypeOfNumber          ::=     ENUMERATED {
                    unknown (0),
                    -- if used number digits carry prefix indicating type
                    -- of number according to national recommendations.
                    internationalNumber (1),
                    nationalNumber (2),
                    networkSpecificNumber (3),
                    -- not used, value reserved
                    subscriberNumber (4),
                    abbreviatedNumber (6)}
                    -- valid only for called party number at the outgoing
                    -- access, network substitutes appropriate number.

PrivateTypeOfNumber         ::=     ENUMERATED {
                    unknown (0),
                    level2RegionalNumber (1),
                    level1RegionalNumber (2),
                    pISNSpecificNumber (3),
                    localNumber (4),
                    abbreviatedNumber (6)}

PartySubaddress             ::=     CHOICE {
                    UserSpecifiedSubaddress,
                    -- not recommended.
                    NSAPSubaddress}
                    -- according to Recommendation X.213.

UserSpecifiedSubaddress     ::=     SEQUENCE {
                    SubaddressInformation,
                    oddCountIndicator BOOLEAN OPTIONAL}
                    -- used when the coding of subaddress is BCD

NSAPSubaddress              ::=     OCTET STRING (SIZE(1..20))
                    -- specified according to X.213. Some networks may
                    -- limit the subaddress value to some other length
                    -- e.g. 4 octets
```



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**Table K.9 — Addressing information definitions -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209 (sheet 3 of 3)**

```
SubaddressInformation          ::=      OCTET STRING (SIZE(1..20))
                        -- coded according to user requirements. Some networks
                        -- may limit the subaddress value to some other length
                        -- e.g. 4 octets

ScreeningIndicator             ::=      ENUMERATED {
                        userProvidedNotScreened (0),
                        -- number was provided by a remote user terminal
                        -- equipment, and has been screened by a network that
                        -- is not the local public or the local private
                        -- network.
                        userProvidedVerifiedAndPassed (1),
                        -- number was provided by a remote user terminal
                        -- equipment (or by a remote private network), and has
                        -- been screened by the local public or the local
                        -- private network.
                        userProvidedVerifiedAndFailed (2),
                        -- not used, value reserved.
                        networkProvided (3)}
                        -- number was provided by local public or local
                        -- private network.

PresentationAllowedIndicator   ::=      BOOLEAN

END -- of Addressing-Data-Elements
```

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**Table K.10 — NOTIFICATION macro definition -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209**

```
Notification-macro
    { iso( 1) standard( 0) pss1-generic-procedures( 11582) notification-macro( 10) }
DEFINITIONS                 ::=
BEGIN
EXPORTS             NOTIFICATION, pss1IeNotification;
IMPORTS             PSS1InformationElement    FROM  PSS1-generic-parameters-definition
        { iso( 1) standard( 0) pss1-generic-procedures( 11582) pss1-generic-parameters( 6)};


NOTIFICATION MACRO      ::=
BEGIN
TYPE NOTATION           ::=  Argument
VALUE NOTATION          ::=  value ( VALUE CHOICE
                                {   localValue          INTEGER,
                                    globalValue     OBJECT IDENTIFIER   } )
Argument                ::=  "ARGUMENT" NamedType
NamedType               ::=  identifier type | type


END -- of NOTIFICATION MACRO


-- this notification is used to convey information elements used as notifications
-- across a PISN
pss1IeNotification      NOTIFICATION
                        ARGUMENT        PSS1InformationElement
                        ::= localValue2001


END -- of Notification-macro
```



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**Table K.11 — PSS1 information element -**

**ASN.1 definition conforming to ITU-T Recs. X.208 / X.209**

```
PSS1-generic-parameters-definition
    { iso( 1) standard( 0) pss1-generic-procedures( 11582) pss1-generic-parameters( 6)}


DEFINITIONS             ::=
BEGIN


EXPORTS             PSS1InformationElement;


PSS1InformationElement    ::=  [APPLICATION 0]   IMPLICIT    OCTET STRING


END  -- of PSS1 Generic parameters definition
```

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# Annex L

(informative)

# Technical changes since third edition of ECMA-165

This annex lists the technical changes made to this Standard since its third edition. Additional editorial changes have been applied, but are not detailed in this annex.

## L.1 General changes

General changes have been applied due to migration from ITU-T Recs. X.208 / X.209 ASN.1 notation to ITU-T Recs. X.680 / X.690 ASN.1 notation. All ASN.1 modules in this Standard have been changed. Annex K shows the original ASN.1 modules from the third edition, i.e. conforming to ITU-T Recs. X.208 / X.209.

All differences with ISO/IEC 11582 (1995) have been deleted in this edition of ECMA-165. Especially all information about Transit Counter was deleted from this Standard, as ECMA-225 reflects all Transit Counter issues relevant for the Generic Functional Protocol.

## L.2 Further technical changes to specific sections

### L.2.1 Changes in clause 7.3.1.9 Transport of APDUs associated with a call independent signalling connection

Text in third edition:

Sub-clause 7.1.1 shall apply, with the exception that the term ‘call’ shall be interpreted as ‘Call independent signalling connection’.

Text in fourth edition:

When requested by GFT-Control, the Facility information element may be sent in a call establishment or a call clearing message (see clause 10) of the connection oriented, call independent signalling connection or in a FACILITY message during Active state of the connection oriented, call independent signalling connection.

### L.2.2 Changes in clause 7.3.1.10 Protocol error handling

Text in third edition:

...

- if a SETUP ACKNOWLEDGE, ALERTING, DISCONNECT or PROGRESS message (defined in ECMA-143) is received in any state (except the Null state, where invalid call reference error procedures apply) it shall be treated as an unexpected or unrecognised message in accordance with 9.2.4 of ECMA-143.

Text in fourth edition:

...

- if a SETUP ACKNOWLEDGE, ALERTING, INFORMATION, DISCONNECT or PROGRESS message (defined in ECMA-143) is received in any state (except the Null state, where invalid call reference error procedures apply) it shall be treated as an unexpected or unrecognised message in accordance with 9.2.4 of ECMA-143.

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