ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

STANDARD ECMA-133

REFERENCE CONFIGURATIONS FOR CALLS THROUGH EXCHANGES OF PRIVATE TELECOMMUNICATION NETWORKS

April 1989

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BRIEF HISTORY

This ECMA Standard is based on, and complements, corresponding CCITT and CEPT Recommendations applicable to public telecommunication networks.

The specification given herein relates to a series of standards applicable to private telecommunication networks, especially to private switching networks. It is intended to ensure that such standards be prepared on, and reflect, the common understanding of their overall context.

This Standard fits into the framework of the standardization activities in the field of information technology and telecommunications as sponsored by the Commission of the European Communities for the establishment of a harmonized common market in Europe. It is contributed to CENELEC for further processing as a European pre-Norm (ENV), according to the Common Declaration of Cooperation in the Field of Telecommunications in Private Networks, agreed upon between CENELEC and ECMA.

A need has been identified to define reference points which allow the proper specification of functions of exchanges of private telecommunication networks. Reference configurations for ISDN-like calls have been chosen for that purpose.

Adopted as an ECMA Standard by the General Assembly on 25th April 1989.

Table of Contents

1.   SCOPE

This Standard specifies a Reference Configuration for calls through Private Tele-communication Network Exchanges (PTNXs). This reference configuration shall be the reference for other PTNX-related standards. The configuration is not intended to require any specific implementation of a PTNX, but only to provide guidance for the specification of PTNX capabilities. The reference configuration is sufficient to support ISDN-like call types. It can be extended to also support non-ISDN-like call types.

2.   FIELD OF APPLICATION

This Standard applies primarily to Private Telecommunication Networks (PTNs) consisting of interconnected PTNXs.

3.   CONFORMANCE

A PTNX-related standard is in conformance with this Standard if it uses those concepts, terms and notations specified in this Standard which are applicable. Additional concepts, terms and notations required by such a standard shall not be in contradiction to those of this Standard.

4.   REFERENCES

In this Standard all references to CCITT Recommendations are references to the Recommendations as agreed by the CCITT Plenary Assembly in Melbourne in November 1988 and published in the Blue Book.

CCITT Rec. I.324   ISDN Network Architecture

CCITT Rec. I.411   ISDN User-Network Interfaces - Reference Configurations

ISO 7498   Information Processing Systems - Open Systems
                    Interconnection - Basic Reference Model

ENV-xxxxxx   Terminology in Private Telecommunication Networks
                    (a preliminary title for the Standard being prepared by
                    CENELEC)

5.   DEFINITIONS

5.1   Private Telecommunication Network Exchange (PTNX)

A nodal entity which provides autonomous (i.e. independently of the public ISDN) and automatic switching and call handling functions used for the provision of telecommunication services which are based on the definitions of the public ISDN services.

Note 1 :

If applicable, a PTNX provides :
- *telecommunication services within its own area, and/or*
- *telecommunication services from the public ISDN, and/or*
- *telecommunication services from other public or private networks, and/or*
- *within the context of a private telecommunication network, telecommunication services from other PTNXs*

to users of the same and/or another PTNX.

A PTNX may be represented by an ISPBX, or by equipment which is physically part of the equipment of, for example, an ISDN local exchange.

5.2 Private Telecommunication Network (PTN)

A private network comprising one or more interconnected PTNXs. The PTN provides services to its extension users which are based on those provided by its PTNXs. A PTN may spread over more than one user premises. In this case, inter-PTNX connections between the PTNXs serving the individual premises are required. These interconnections are considered part of the PTN.

5.3 Reference Configuration

A conceptual configuration showing functional arrangements within a public ISDN, within a PTN, or between a public ISDN and a PTN. Reference configurations are based on association rules of functional groupings and reference points. A functional arrangement may but need not be equivalent to a physical arrangement of units of equipment.

5.4 Functional Grouping

A set of functions which may be needed in functional arrangements. A functional grouping may but need not be equivalent to a unit of equipment. Depending on the actual implementation, some of the functions of a functional grouping may or may not be present.

5.5 Reference Point

A conceptual point at the conjunction of two functional groupings. In a specific functional arrangement, a reference point may but need not correspond to a physical interface between units of equipment.

6. REFERENCE CONFIGURATION

Figure 1 shows an example reference configuration for ISDN-like calls through an exchange of a private telecommunication network. The relationship between this reference configuration and the CCITT reference configuration for public ISDN access is described in Appendix C. Examples of physical implementations of PTNXs and PTNs are described in Appendix B.

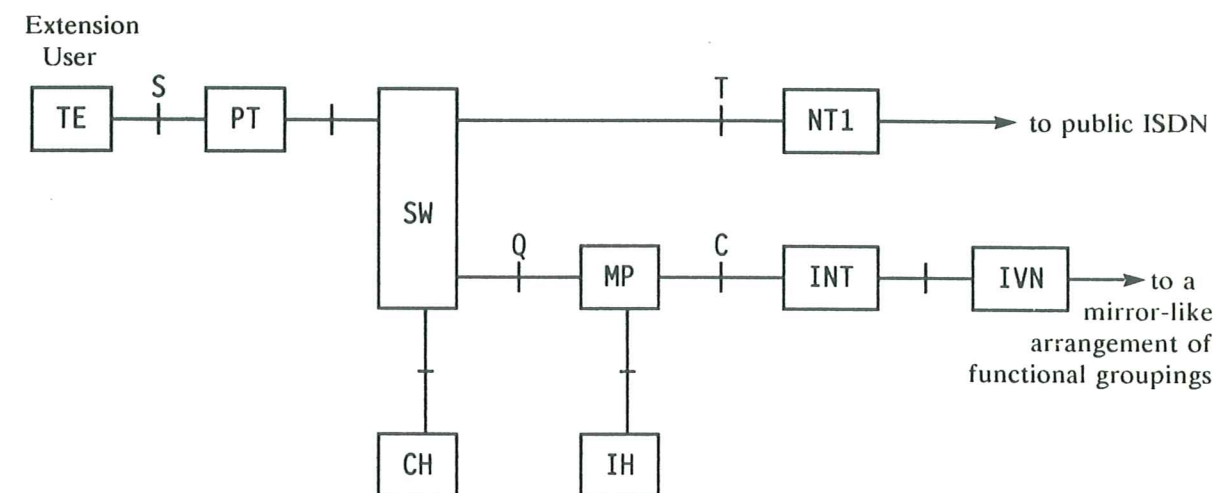Figure 1 shows functional groupings and reference points.

Figure 1 : Example Reference Configuration for ISDN-like PTNX Calls

6.1 Functional Groupings

6.1.1 Call Handling (CH) Functional Grouping

The CH functional grouping provides signalling and call handling functions. Signalling information is sent and received, via the SW functional grouping, to and from call handling functions within the TE functional grouping, peer CH functional groupings within other PTNXs, and call handling functions within public ISDNs.

6.1.2 Interconnection Handling (IH) Functional Grouping

The IH functional grouping provides signalling and connection handling functions for the control, where possible, of inter-PTNX connections provided by the IVN functional grouping. Signalling information is sent and received, via the MP functional grouping, to and from call handling functions within the IVN functional grouping.

The PTNX system management functions coordinate IH and CH functional groupings.

6.1.3 Intervening Network (IVN) Functional Grouping

The IVN functional grouping supports communication between PTNXs. Where inter-PTNX connections are controllable by PTNXs, the IVN functional grouping includes call handling functions.

Note 2 :

The IVN functional grouping may be provided by a real network, e.g. a public ISDN. Other functions which may exist as part of real networks which provide means of interconnecting PTNXs are not part of the IVN functional grouping.

6.1.4 Intervening Network Termination (INT) Functional Grouping

The INT functional grouping provides transmission functions and, if applicable, Layer 1 signalling functions between the MP and the IVN functional groupings. In the case where the real network is a public ISDN, the INT becomes an NT1 functional grouping.

6.1.5 Mapping (MP) Functional Grouping

The MP functional grouping provides the functions necessary for mapping of user and signalling information between the INT and the SW functional groupings. It also maps signalling information for inter-PTNX connection control between the INT and the IH functional groupings.

6.1.6 Network Termination 1 (NT1) Functional Grouping

The NT1 functional grouping is defined in CCITT Rec. I.411.

6.1.7 Private Network Termination (PT) Functional Grouping

The PT functional grouping provides transmission functions and, if applicable, Layer 1 signalling functions between the TE and the SW functional groupings.

6.1.8 Switching (SW) Functional Grouping

The SW functional grouping provides switching functions for user and signalling information. User information is switched between PT, MP and NT1 functional groupings. Signalling information is switched between CH and PT, between CH and MP, and between CH and NT1 functional groupings.

6.1.9 Terminal Equipment (TE) Functional Grouping

This is the TE functional grouping defined in CCITT Rec. I.411. The TE functional grouping may be either a TE1 functional grouping or a combination of a TE2 and a TA functional grouping.

6.2 Reference Points

Letters have been allocated to those reference points at which the need for interface and/or protocol standards has been identified.

6.2.1 C Reference Point

The C reference point defines the boundary between the MP and the INT functional groupings. In the case where the intervening network is a public ISDN, the C reference point coincides with the T reference point.

Note 3 : The significance of the C reference point is described in Appendix A.

6.2.2 Q Reference Point

The Q reference point defines the boundary between the SW and the MP functional groupings.

Note 4 : The significance of the Q reference point is described in Appendix A.

6.2.3 S Reference Point

The S reference point defines the boundary between the TE and the PT functional groupings, and is the access point to PTN capabilities.

6.2.4 T Reference Point

The T reference point defines the boundary between the SW and the NT1 functional groupings. It indicates the point of interworking between PTN and public ISDN capabilities.

7. PTNX CALL TYPES

The functional groupings shown in Figure 1 support the ISDN-like call types indicated below.

7.1 Extension - to - Extension Calls

An extension - to - extension call is based on a connection between two extension users which are served by the same SW functional grouping. PT and TE functional groupings are involved on behalf of each extension user.

7.2 Extension - to - Public ISDN Calls

An extension - to - public ISDN call is based on a connection between an extension user and an access to a public ISDN. The extension user and the public ISDN access are both served by the same SW functional grouping. PT and TE functional groupings are involved on behalf of the extension user, whereas the NT1 functional grouping is involved on behalf of the public ISDN.

7.3 Extension - to - Other PTNX Calls

An extension - to - other PTNX call is based on a connection between an extension user and a link to another PTNX in the same PTN. The extension user and the link to the other PTNX are both served by the same SW functional grouping. PT and TE functional groupings are involved on behalf of the extension user, whereas MP, IH, INT and IVN functional groupings are involved on behalf of the link to the other PTNX.

7.4 Other PTNX - to - Public ISDN Calls

An other PTNX - to - public ISDN call is based on a connection between a link to another PTNX in the same PTN and an access to a public ISDN. The link to the other PTNX and the access to the public ISDN are both served by the same SW functional grouping. MP, IH, INT and IVN functional groupings are involved on behalf of the link to the other PTNX, whereas the NT1 functional grouping is involved on behalf of the public ISDN.

7.5 Other PTNX - to - Other PTNX Calls

An other PTNX - to - other PTNX call is based on a connection between two links to other PTNXs. The links are served by the same SW functional grouping of the PTNX concerned (Transit PTNX). MP, IH, INT and IVN functional groupings are involved on behalf of each of the links.

7.6 Public ISDN - to - Public ISDN Calls

A public ISDN - to - public ISDN call is based on a connection between two public ISDN accesses. The accesses are served by the same SW functional grouping. The NT1 functional grouping is involved on behalf of each of the public ISDN accesses.

APPENDIX A (Informative)

The Significance of the C and Q Reference Points

The interconnection of PTNXs within the same PTN is achieved by using services of an intervening network, which is terminated at each end by the INT functional grouping. A number of different scenarios can be identified for the interconnection of PTNXs, depending on the nature of the intervening network and the bearer service which it provides, e.g. dedicated transmission system, permanent or demand bearer services of a public ISDN or other network. Consequently the nature of the interface at the C reference point can vary.

At the Q reference point, however, the nature of the intervening network and bearer service are not visible. Although physical interfaces are not normally expected to exist at the Q reference point, conceptual inter-PTNX protocols which are independent of the interconnection scenario can be specified for the Q reference point. These protocols are visible and indirectly testable at the C reference point.

The MP functional grouping provides mapping between a scenario-independent conceptual interface at Q and a scenario-dependent real interface at C, for example :

- mapping of conceptual B and D channels at Q onto real channels or time-slots at C;

- conversion between scenario-independent signalling protocols at Q and scenario-dependent signalling protocols at C.

APPENDIX B (Informative)

Physical Implementations of PTNXs

As a minimum, a PTNX provides SW and CH functional groupings. Depending on the call types to be supported and on the physical implementation, a PTNX may contain other functional groupings. For example, if a PTNX is to support extension users, the PT functional grouping may be realized wholly within the PTNX, partly within the PTNX and partly by external equipment, or completely by external equipment.

A PTN comprises one or more PTNXs, including the interconnecting links (INT and IVN functional groupings) if any. It is bounded by the S reference point at the extension and by the T reference point at the public ISDN access.

Figure B-1 shows an example of a PTN consisting of two PTNXs.
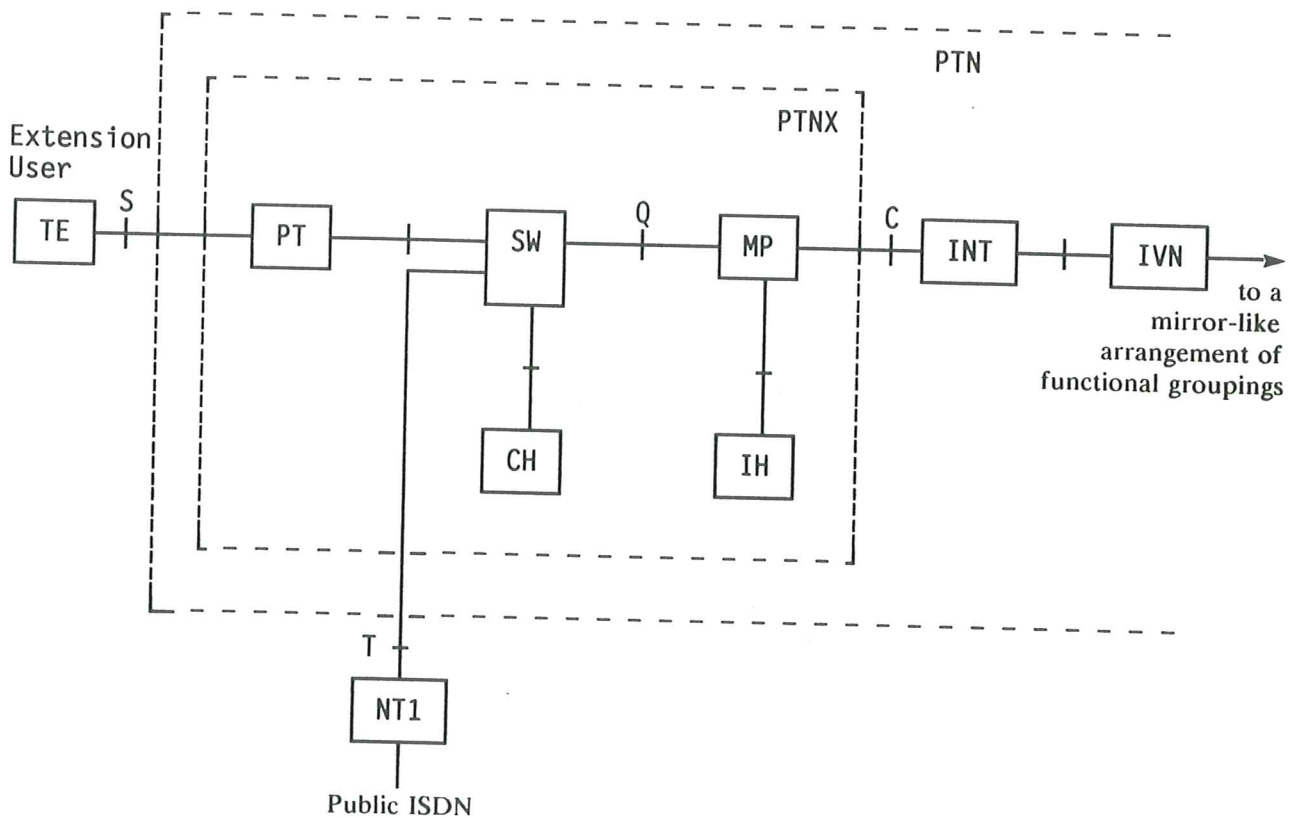

Figure B-1 : Example for a Physical Implementation of a PTN

APPENDIX C (Informative)

Relationship with the Reference Configuration for Public ISDN Access

The reference configuration defined in this Standard shows the TE and NT1 functional groupings and the S and T reference points of CCITT Rec. I.411, which is the reference configuration for public ISDN access.

Where a PTN is used for public ISDN access, i.e. for a call between a TE and a public ISDN, the PTN provides the functionality of the NT2 functional grouping defined in Rec. I.411 in addition to other functionalities.

Where the TE is on the same node as the interface to the public ISDN, NT2 functionality is provided by functional groupings of that node.

Where the TE is on a different node from the interface to the public ISDN, NT2 functionality is provided by a combination of the functional groupings of the nodes involved in the call and the IVN and INT functional groupings of the interconnecting links.

APPENDIX D

List of Acronyms and Abbreviations

C	C Reference Point
CH	Call Handling (functional grouping)
ENV	European pre-Norm
IH	Interconnection Handling (functional grouping)
INT	Intervening Network Termination (functional grouping)
ISDN	Integrated Services Digital Network
ISPBX	Integrated Services Private automatic Branch Exchange
IVN	Intervening Network (functional grouping)
MP	Mapping (functional grouping)
NT1	Network Termination 1 (functional grouping)
NT2	Network Termination 2 (functional grouping)
PT	Private Network Termination (functional grouping)
PTN	Private Telecommunication Network
PTNX	Private Telecommunication Network Exchange
Q	Q Reference Point
S	S Reference Point
SW	Switching (functional grouping)
T	T Reference Point
TA	Terminal Adaptor (functional grouping)
TE	Terminal Equipment (functional grouping)
TE1	Terminal Equipment Type 1
TE2	Terminal Equipment Type 2