

ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

STANDARD ECMA-135

SCENARIOS FOR INTERCONNECTIONS
BETWEEN EXCHANGES
OF PRIVATE TELECOMMUNICATION
NETWORKS

April 1989

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European Computer Manufacturers Association
114 Rue du Rhône - 1204 Geneva (Switzerland)

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BRIEF HISTORY

This ECMA Standard 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.

Besides access to the public ISDN, the nodes of private telecommunication networks allow for calls between each other which either do not use the public ISDN at all, i.e. non-ISDNs intervene between these nodes and provide some interconnection facility, or which do use the public ISDN just to provide an interconnection facility. In any case the services offered to the extension user are those offered by the private telecommunication network and not those of the intervening network. The latter provides bearer services to the private telecommunication network over which its telecommunication services are executed.

Several scenarios are conceivable to provide such interconnections between private telecommunication network nodes.

This Standard specifies a method of identifying such scenarios and provides an overview of those scenarios.

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

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1. SCOPE

Whereas Standard ECMA-133, "Reference Configurations for Calls through Exchanges of Private Telecommunication Networks", specifies that, in general, bearer services of an intervening network are used to link Private Telecommunication Network Exchanges (PTNXs) at reference point C, this Standard classifies the different means by which PTNXs are able to use and control bearer services provided by intervening networks.

2. FIELD OF APPLICATION

This Standard applies to PTNXs consisting of

- interconnected Integrated Services Private automatic Branch Exchanges (ISPBXs), and/or
- ISPBXs interconnected with ISDN Services which are comparable to those offered by an ISPBX (ISCTXs).

This Standard could also apply to interconnected ISCTXs.

This Standard further applies to the intervening networks which provide bearer services for the interconnection of PTNXs.

The Standard shall be used:

- for the evaluation of the technical, operational and economic aspects of the identified scenarios;

and resulting from this evaluation:

- as the basis for further standardization of PTNX functions and intervening network services which adequately fulfill the demands under the said aspects, for certain scenarios.

Any scenario selected for further standardization shall be capable of supporting user information transfer and the transfer of inter-PTNX signalling information as specified at the Q reference point.

This Standard may also be used as a guide by private network implementors for the selection of inter-PTNX connection capabilities.

3. CONFORMANCE

A standard specifying the technical characteristics or specifying the evaluation, comparison, etc. of the identified scenarios is in conformance with this Standard, if it uses the applicable concepts, terms and notations specified in this Standard. Additional concepts, terms and notations required by such other standards shall not conflict with those of this Standard.

4. REFERENCES

- | | |
|----------|--|
| ECMA-133 | Reference Configurations for Calls through Exchanges of Private Telecommunication Networks |
|----------|--|

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

6. CRITERIA FOR THE IDENTIFICATION OF SCENARIOS

The first criterion for the specification of scenarios shall be the time aspect of provision, which may be on a longer term or on an on-demand basis.

The second criterion for the specification of scenarios shall be the level to which the intervening network intervenes in the transfer of the inter-PTNX signalling information.

The time criterion allows a categorization of intervening media into:

- dedicated systems (fixed connections) which are permanently provided, due to ownership or to a long-term contract;
- permanent public network connections which are provided on a long-term basis, e.g. subject of a contract; and

- on-demand public network connections which are provided, on an on-demand basis, due to a real-time request which uses call control procedures across the interface between the PTN and the intervening network.

Note 2

For the purpose of this Standard, a reserved connection which can be controlled by the PTNX on an on-demand basis is also considered as an on-demand connection.

The second criterion allows a categorization of intervening media into systems which, for inter-PTNX signalling, intervene:

- at the level of a physical medium,
- at the level of a physical layer bitstream,
- at the level of an ISDN signalling connection, or
- at the level of a packet or frame mode connection.

7. IDENTIFICATION OF SCENARIOS

For each scenario two PTNXs with their mapping functional groupings (MP) and the Q and C reference points are shown, together with the intervening network and, where relevant, with the intervening network termination functional grouping (INT).

Note 3

The functional groupings and reference points are defined in Standard ECMA-133.

Each scenario describes a generic combination of a method of providing a user information connection and a method of providing an inter-PTNX signalling connection. Other combinations of these methods may also be applicable, and the classification given here is not intended to exclude them.

Also shown is the relationship between (virtual) B- and D-channels at the Q reference point and, if applicable, (real) B- and D-channels at the C reference point.

Note 4

For all scenarios using a public ISDN the D-channel of an access to the intervening public ISDN, and any B-channel not being used for inter-PTNX connection, may also be used to access services of the public ISDN for purposes other than inter-PTNX connection.

Where applicable, the presentation of a third PTNX explicitly indicates that the scenario can support multiple Q reference points across a single intervening network access.

The following generic combinations have been identified as scenarios:

i) **Dedicated Systems**

These are pre-established and do not allow multiple physical destinations.

ii) **Permanent Intervening Network Connections**

Any number of pre-established channels or logical connections; groups of channels or connections may lead to different destinations.

iii) **On-demand Intervening Network Connections**

Any number of on-demand established channels or logical connections; groups of channels or connections may lead to different destinations.

7.1 Type 1 Scenarios : Dedicated Systems

The dedicated systems encompass dedicated physical links and dedicated transmission systems. For the purpose of this Standard, no distinction is made as to whether or not the capacity of these systems is fully exploited.

7.1.1 Scenario 1.1 - Dedicated Physical Link

In this scenario a dedicated physical link, e.g. copper wires or optical fibres, interconnects two PTNXs, see Figure 1.

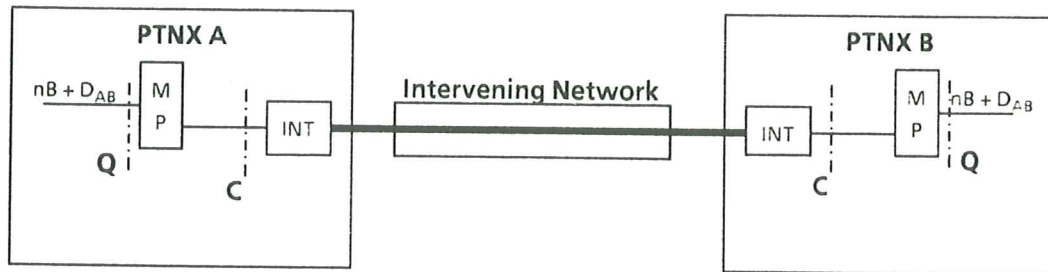


Figure 1 - Dedicated Physical Link

The intervention level is at physical medium.
Any INT functions shall be provided by the PTNXs.

Note 5

PTNXs could be interconnected by using S interfaces according to Standards ECMA-103 or ECMA-104. However, the functional ranges of these interfaces allow for short distances only, e.g. for back-to-back operation of PTNXs (typically ISPBXs only) which are co-sited on the same premises. Therefore, the use of S interfaces is considered outside the scope of this scenario.

7.1.2 Scenario 1.2 - Dedicated Transmission System

In this scenario a dedicated transmission system, e.g. PCM 30, interconnects two PTNXs, see Figure 2.

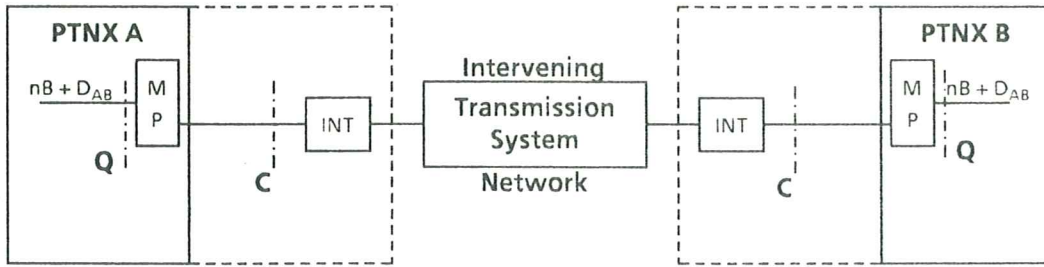


Figure 2 - Dedicated Transmission System

Note 6

The INT functions may optionally be part of the PTNXs.

The intervention level is at physical layer bitstream.

7.2 Type 2 Scenarios : Permanent Public Network Connections

Besides the provision of an adequate permanent user information transfer bearer channel, the public network connections encompass the following provisions for inter-PTNX signalling: permanent circuit switched (e.g. over a B-channel), permanent ISDN signalling, and permanent virtual call.

Type 2 scenarios allow an access to be used for more than one Q reference point, each one leading to a different PTNX. The number of channels to each PTNX is, however, fixed by contract.

7.2.1 Scenario 2.1 - Permanent Circuit Switched

The B- and D-channels at the Q reference point are mapped onto B-channels (or equivalent for non-ISDNs, e.g. PSTNs) of the intervening network access. These are permanently circuit switched to other PTNXs, see Figure 3.

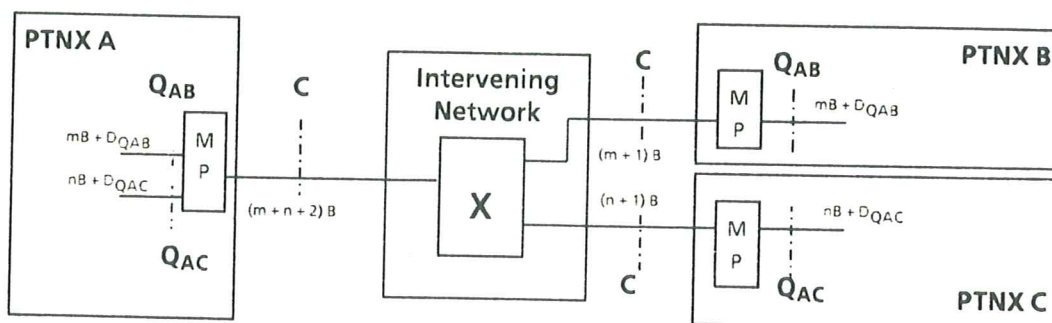


Figure 3 - Permanent Circuit Switched

Note 7

The intervening network shown is non-ISDN. In the case of an ISDN, the C reference points are equivalent to T reference points.

Note 8

The INT functional grouping is not shown. In the case of an intervening public ISDN, it is identical with an NTI functional grouping.

Note 9

Q_{AB} indicates a Q reference point which is associated with the interconnection between PTNXs A and B.

The intervention level is at the physical layer.

7.2.2 Scenario 2.2 - Permanent ISDN Signalling Connection

The B-channels at the Q reference point are mapped onto B-channels of the intervening network access. These are permanently circuit switched to other PTNXs. The D-channel at the Q reference point, D_Q , is mapped onto a permanent signalling connection within the D-channel at the C reference point (which is equivalent to the T reference point). See Figure 4.

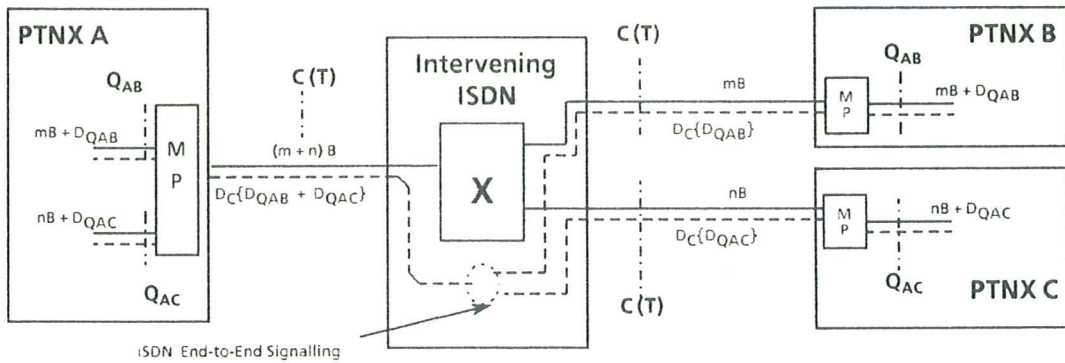


Figure 4 - Permanent ISDN Signalling Connection

Note 10

$D_C\{Q_{AB}\}$ indicates that the D-channel for reference point Q_{AB} is embedded in the D-channel for the C reference point.

7.2.3 Scenario 2.3 - Permanent Virtual Call

The B-channels at the Q reference point are mapped onto B-channels of the intervening network access. These are permanently circuit switched to other PTNXs. The D-channel at the Q reference point is mapped onto a permanent (frame or packet mode) virtual call within a B-channel or the D-channel at the C reference point (which is equivalent to the T reference point). See Figure 5.

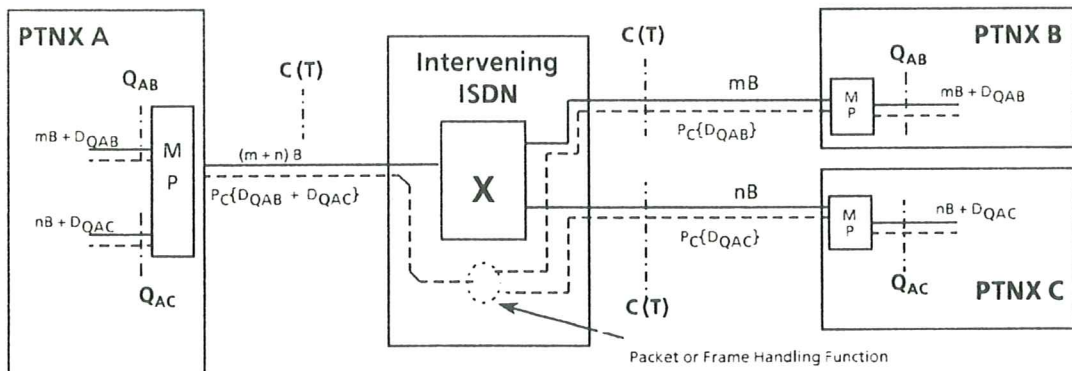


Figure 5 - Permanent Virtual Call

Note 11

$P_C\{Q_{AB}\}$ indicates that the D-channel for reference point Q_{AB} is embedded in a permanent virtual call which can be conveyed on a B- or on a D-channel at the C reference point.

Note 12

Also non-ISDN based methods are conceivable, but are considered outside the scope of this Standard.

The intervention level for inter-PTNX signalling information is at the level of a frame or packet mode connection.

7.3 Type 3 Scenarios : On-demand Public Network Connections

The PTNXs are able to establish inter-PTNX connections by use of on-demand services of the intervening network. The connection established may be used by the PTNXs in the following ways:

- for a single PTN call;
- for several PTN calls;
- for one or more signalling-only connections, i.e. with no PTN call associated to that signalling connection.

Type 3 scenarios encompass the following provisions for inter-PTNX signalling: circuit switched (e.g. over a B-channel), ISDN signalling, and (packet or frame mode) virtual calls. The numbers of B-channels for each PTNX interconnection are determined on the basis of actual traffic volume.

Type 3 scenarios allow an access to be used for more than one Q reference point, each one leading to a different peer PTNX.

7.3.1 Scenario 3.1 - On-demand Circuit Switched

The B- and D-channels at the Q reference point are mapped onto B-channels (or equivalent in the case of non-ISDNs, e.g. PSTN) of the intervening network which lead to the peer PTNX(s). See Figure 6.

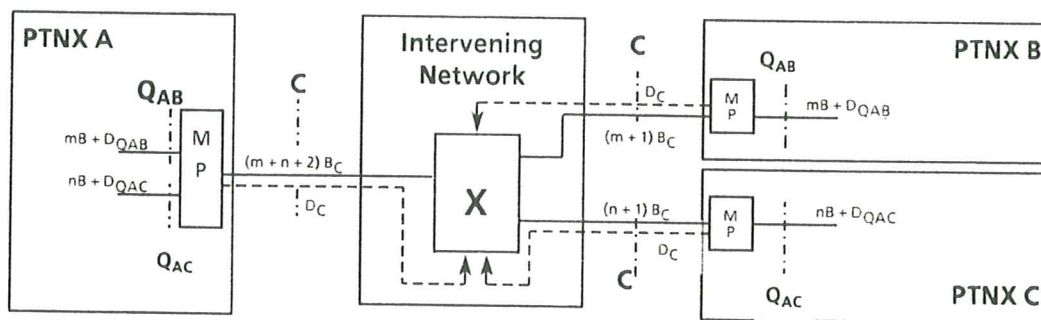


Figure 6 - On-demand Circuit Switched

Note 13

In the case of an ISDN, the C reference points are equivalent to T reference points.

7.3.2 Scenario 3.2 - On-demand ISDN Signalling Connection

The B-channels at the Q reference point are mapped onto B-channels of the intervening network. These lead to the peer PTNX and can be established and dis-established on-demand. The associated inter-PTNX signalling information

at the Q reference point is carried by signalling capability of the D-channel at the T reference point. See Figure 7.

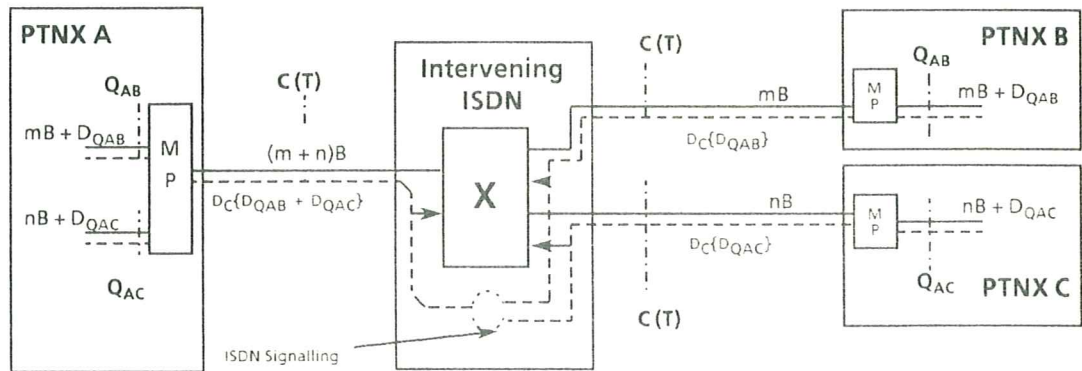


Figure 7 - On-demand ISDN Signalling

Note 14

$D_C\{\dots\}$ indicates that the enclosed signalling connection is embedded in the D-channel at the C reference point.

7.3.3 Scenario 3.3 - On-demand Virtual Call

The B-channels at the Q reference point are mapped onto B-channels of the intervening network. These lead to the peer PTNX and can be established and dis-established on-demand. The associated inter-PTNX signalling information at the Q reference point is carried by a frame or packet mode virtual call. See Figure 8.

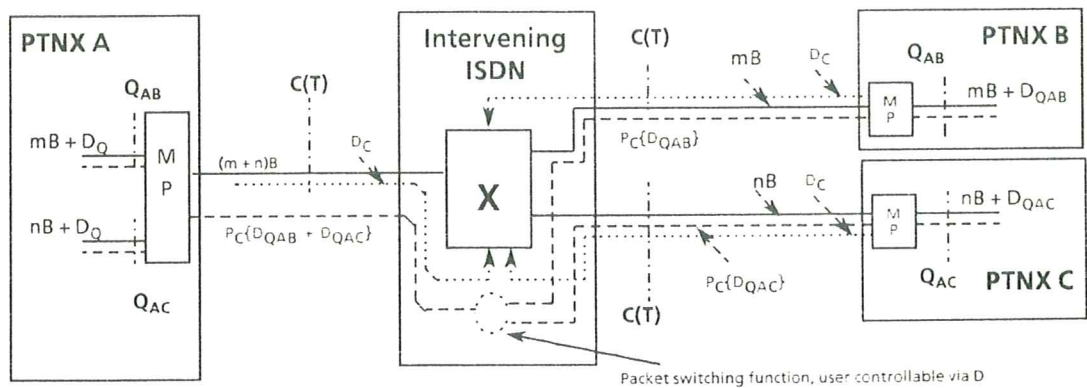


Figure 8 - On-demand Virtual Call

Note 15

$P_C\{\dots\}$ indicates that the inter-PTNX signalling connections are conveyed by a packet or frame mode bearer service. These bearer services can be provided on a B- or on a D-channel.

7.4 Characteristics of the Scenarios

Some general characteristics of the scenarios described in 7.1 to 7.3 above are summarized in Table 1.

Scenario	Type and Characteristics	Name	Multiple Q Reference Points	Access to N Control Plane	Conveyance of inter-PTNX signalling information	Access also usable for calls other than inter-PTNX	
1	Dedicated Systems Pre-established, no multiple physical destinations						
		1.1	Dedicated Physical Link	No	Not defined	No	
		1.2	Dedicated Transmission System	No	Dedicated Time Slot	No	
2	Permanent Public Network Connections Any number of pre-established channels or logical connections; groups of channels or connections may lead to different destinations						
		2.1	Permanent circuit switched	Yes, fixed by contract	No	Any B Channel (or equivalent)	Yes
		2.2	Permanent ISDN signalling connection	Yes, fixed by contract	No	D Channel, pre-established ISDN Signalling Capability	Yes
		2.3	Permanent Virtual Call	Yes, fixed by contract	No	Any Channel (B or D), permanent virtual connection	Yes
3	On-Demand Public Network Connections Any number of on-demand established channels or logical connections; groups of channels or connections may lead to different destinations						
		3.1	On-Demand circuit switched	Yes, Flexible	Yes	Any B channel (or equivalent) circuit switched connection	Yes
		3.2	On-Demand ISDN signalling connection	Yes, Flexible	Yes	D Channel, ISDN Signalling Capability	Yes
		3.3	On-Demand virtual call	Yes, Flexible	Yes	Any Channel (B or D), virtual call	Yes

Table 1 - General Characteristics of Scenarios

APPENDIX A

List of Acronyms and Abbreviations

C	C Reference Point
ENV	European pre-Norm
INT	Intervening Network Termination (functional grouping)
ISDN	Integrated Services Digital Network
ISPBX	Integrated Services Private automatic Branch Exchange
MP	Mapping (functional grouping)
NT1	Network Termination 1 (functional grouping)
PTN	Private Telecommunication Network
PTNX	Private Telecommunication Network Exchange
Q	Q Reference Point
S	S Reference Point
T	T Reference Point
TE	Terminal Equipment (functional grouping)

