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**Network Aspects (NA);
General Configuration and basic functions
for the interconnection of Private Telecommunications
Networks with the public ISDN**

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Foreword

ETSI Technical Reports (ETRs) are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim-European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, relating to the use or application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or I-ETS.

This ETR has been produced by the Network Aspects (NA) Technical Committee of the European Telecommunications Standards Institute (ETSI) and discusses the possible configurations of interworking between Private Telecommunications Networks (PTNs) and the public Integrated Services Digital Network (ISDN) from an abstract modelling point of view.

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1 Scope

This ETSI Technical Report (ETR) is intended to give a view on the possible configurations which might occur in different interworking cases between Private Telecommunications Networks (PTN) and public Integrated Services Digital Networks (ISDNs) from an abstract modelling point of view.

2 Definitions and abbreviations

2.1 Definitions

In this subclause only the definitions necessary for the understanding of this ETR are given. Terms of the public ISDN are defined in the CCITT Recommendation I-series.

Public network: a network which provides services to the general public.

Private Telecommunications Network (PTN): a network which provides services to a determined set of users.

Private Telecommunications Network Exchange (PTNX): a nodal entity which provides autonomous (i.e. independently of the public ISDN), 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: 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 telecommunications network, telecommunication services from other PTNXs to users of the same and/or another PTNX.

A PTNX may be represented by an Integrated Services Private automatic Branch Exchange (ISPBX), or by equipment which is physically part of the equipment of, for example, an ISDN local exchange.

Integrated Services Private Automatic Branch Exchange (ISPBX): a PTNX which is located on the premises of the private network provider.

Integrated Services Centrex (ISCTX): an implementation of a PTNX that is not located on the premises of a private network operator. It may be co-located with, or physically part of, a public ISDN local exchange.

Inter-PTNX: a connection between two interconnected PTNXs.

2.2 Abbreviations

For the purposes of this ETR the following abbreviations apply.

ISCTX	Integrated Services Centrex
ISDN	Integrated Services Digital Network
ISPBX	Integrated Services Private automatic Branch Exchange
PABX	Private Automatic Branch Exchange
PTN	Private Telecommunications Network
PTNX	Private Telecommunications Network Exchange

3 General configurations for the interworking of a terminal on the public ISDN communicating with a terminal on a PTN

3.1 PTN is an unknown network

If a terminal on the public ISDN communicates with a terminal on a PTN, which is not known (e.g. non-ISDN Private Automatic Branch Exchange (PABX)), the overall ISDN-connection ends at the T reference point (see figure 1).

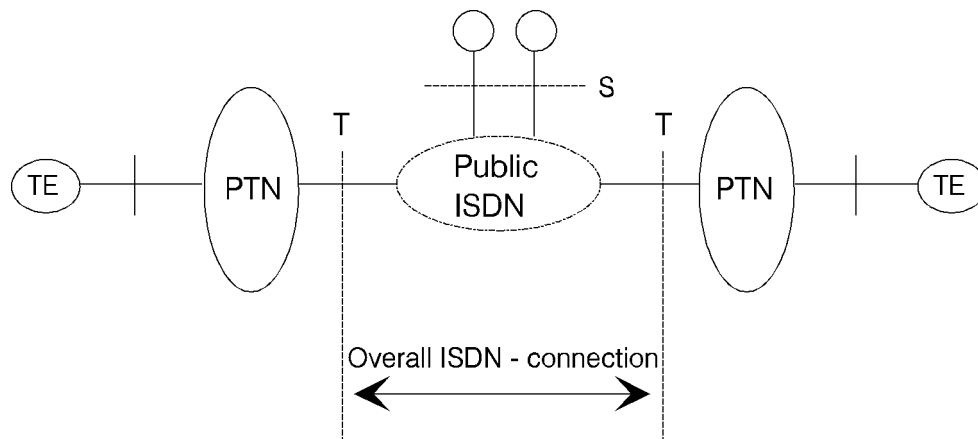


Figure 1: Interworking between the public ISDN and a PTN

3.2 PTN is a private ISDN

In this subclause, the PTN is considered as a private ISDN.

3.2.1 PTN realised separately from the ISDN

Figure 2 shows the interworking between a private and the public ISDN.

Functions of the ISDN:

- giving terminals on the public ISDN access to terminals on the PTN.

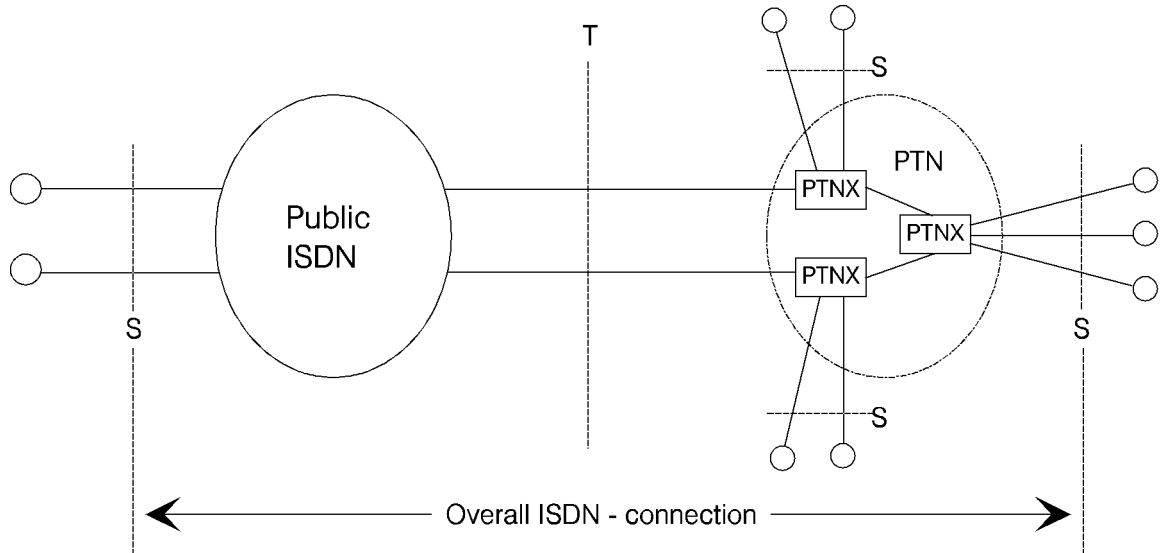


Figure 2: Interworking between public and private ISDN with separated functionality

3.2.2 PTN using resources from the ISDN for trunking

The private ISDN uses resources from the public ISDN for trunking, the switching of the PTN is performed separately from the public ISDN (see figure 3).

Functions of the ISDN:

- giving terminals on the public ISDN access to terminals on the PTN;
- trunking for the PTN.

As a result of the fact that the public ISDN takes no part in the establishment of inter-PTNX calls, the following characteristics apply to the trunking function:

- multi-stage call and connection establishment (see NOTE);
- the protocol for inter-PTNX call establishment is different to the protocol for public ISDN calls;
- the public ISDN is transparent to all inter-PTNX call establishment or service provision signalling;
- no functional entities can be allocated to the public ISDN.

In the case of ISCTX the switching is located in the public ISDN, but the functionality belongs to the PTN.

- NOTE: Inter-PTNX connection establishment may require up to three stages:
- 1) the establishment of the signalling connection between PTNXs for call control;
 - 2) the establishment of the inter-PTNX signalling (QSIG) relation between PTNXs;
 - 3) the establishment of the inter-PTNX connection:
 - between the originating PTNX and the public ISDN;
 - across the public ISDN;
 - between the public ISDN and the terminating PTNX.

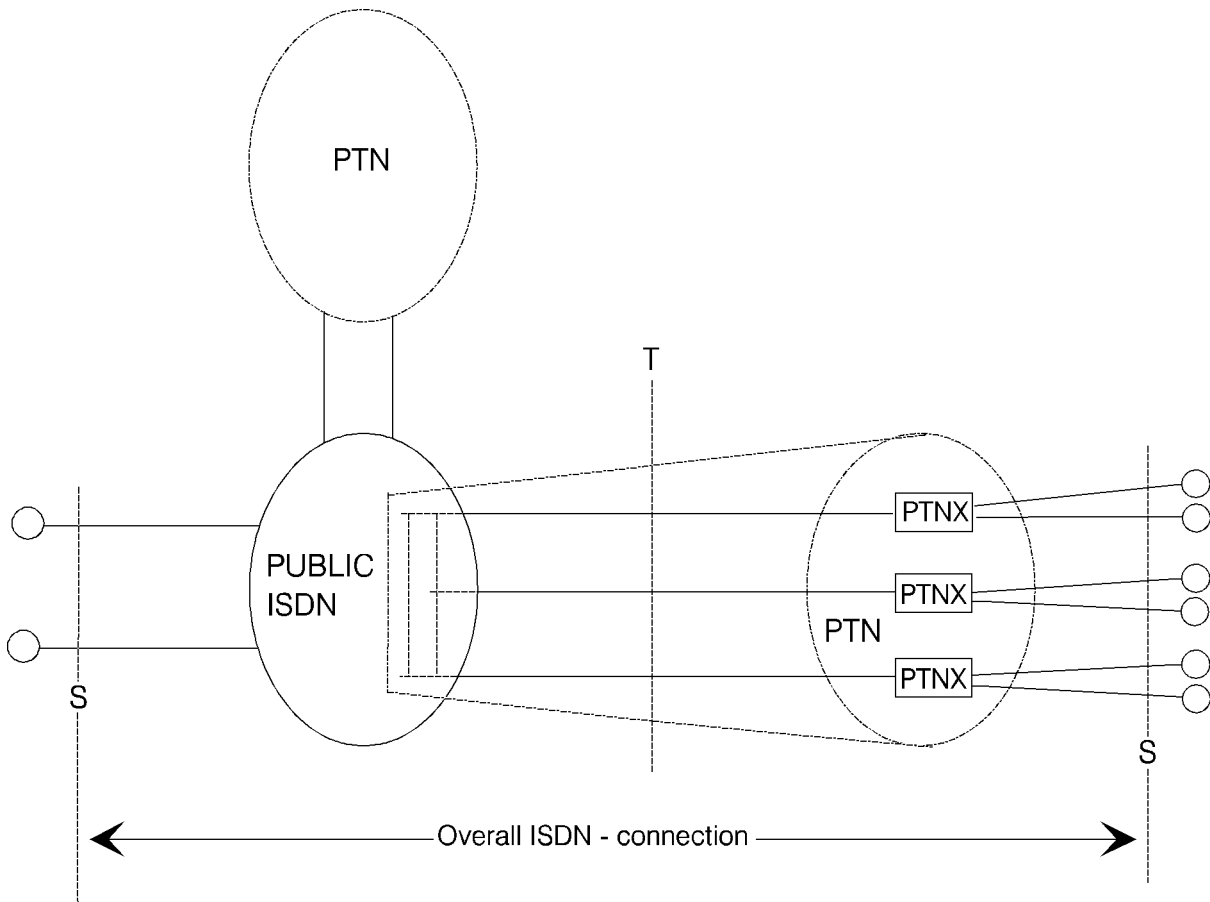


Figure 3: Interworking between public and private ISDN with common trunking functions

3.2.3 PTN using resources of the public ISDN for trunking and switching

The interworking configuration in the case of the PTN using resources of the public ISDN for trunking and switching is shown in figure 4.

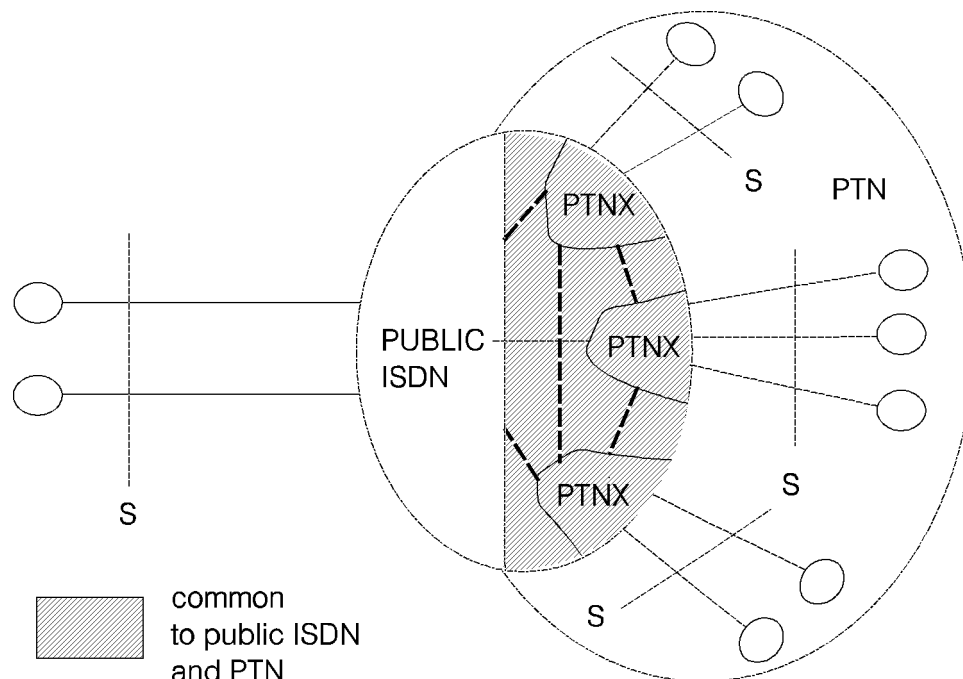


Figure 4: Interworking between public and private ISDN with common trunking and switching functions

Because the public ISDN interacts with the PTN during the establishment of inter-PTNX calls, the following characteristics apply:

- the inter-PTNX call and inter-PTNX connection establishment takes place in a single step;
- the protocol for inter-PTNX and public ISDN call establishment can be common;
- the public ISDN can route calls and establish bearer connections by interpreting the signalling information from the PTN. (Thus the access from/to each PTNX to/from the public ISDN can be considered as a single resource);
- functional entities for PTN call handling may be allocated to the public ISDN.

Functions of the ISDN:

- giving terminals on the public ISDN access to terminals on the PTN;
- trunking for the PTN;
- switching functionality for the PTN;
- additional specialised functionality for calls and services to support the PTN;
- interpreting private network numbers.

The reference point for this interworking case is for further study.

3.2.4 Possible configuration with a real private network

In reality the modelling cases given in subclauses 3.1.2.1 to 3.1.2.3 might occur in combination (see figure 5).

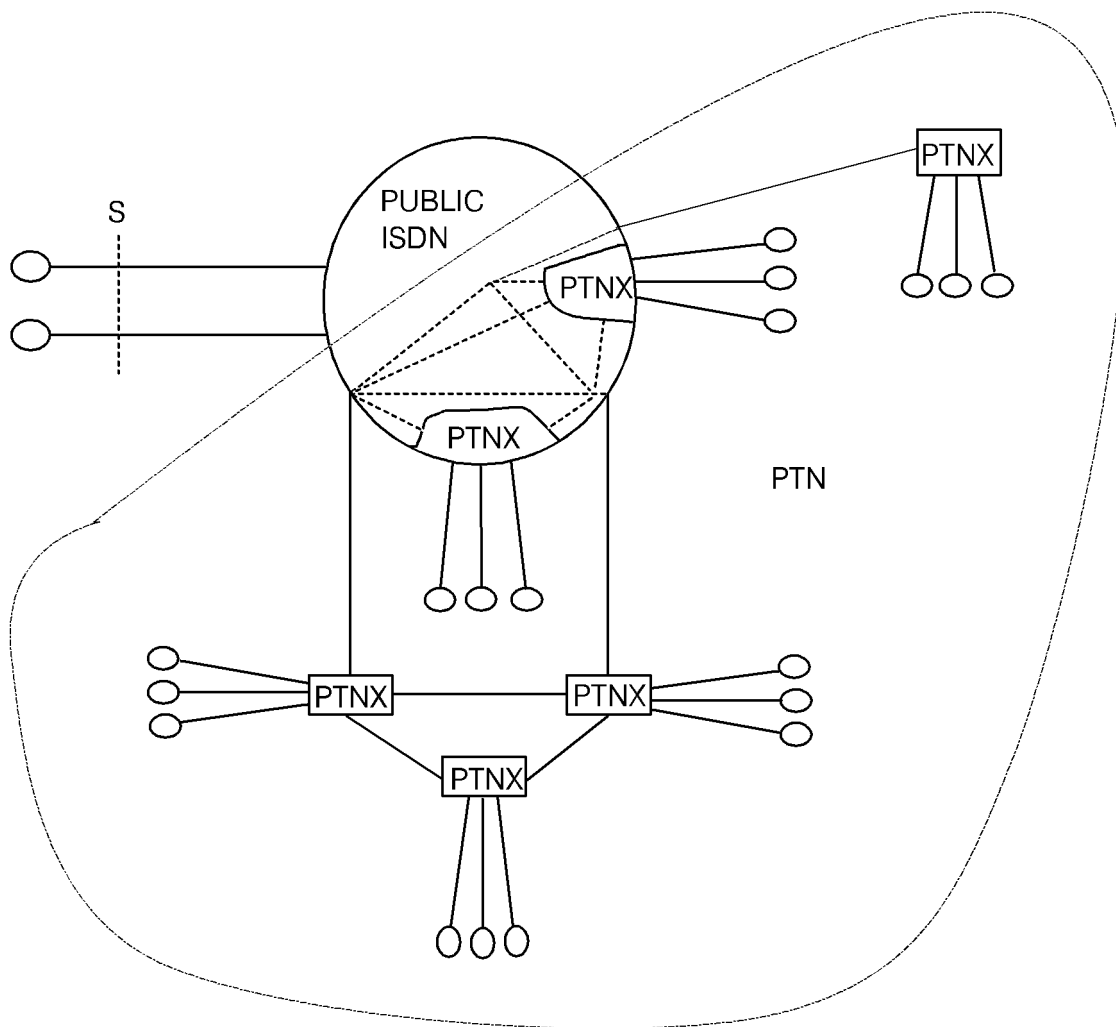


Figure 5: Example for interworking between public ISDN and a real private network

3.2.5 PTN accessing the public ISDN packet switching capabilities

NOTE: ETSI Sub-Technical Committee NA2 will produce a Technical Report in relation to this subject.

4 Basic functions

The following basic functions of a public ISDN are identified as relevant in PTN to ISDN interconnection:

- 1) access to/from the public network;
- 2) trunking;
- 3) switching;
- 4) access to/from non-ISDN networks, using public ISDN interworking capabilities;
- 5) provision of specialised additional network resources of the public ISDN to support PTNs.

The following capabilities of the public ISDN are required for PTN to ISDN interconnection:

- ISDN end-to-end signalling;
- bearer services as requested by the originating PTNX;
- charging capabilities;
- user control of connection establishment;
- basic connection handling.

History

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