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Electrical safety - Classification of interfaces for equipment to be connected to telecommunication networks

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Foreword

This joint CENELEC Report / ETSI Guide (EG) has been produced under the joint responsibility of the European Committee for Electrotechnical Standardization (CENELEC) TC74 WG1 and the European Telecommunications Standards Institute (ETSI).

This document is a guide to the determination of the interface requirements for equipment in terms of safety. It lists a number of interfaces and indicates the safety category of each listed interface. This document does not contain sufficient detail for conformance testing purposes, except when used in conjunction with product standards such as EN 60950.

This document replaces ETSI Technical Report (ETR) 012 (1992).

The information herein aligns with changes made to EN 60950 since time of publication of ETR 012.

Introduction

The equipment safety standard EN 60950 specifies the requirements for categories of CIRCUITS as SELV CIRCUITS, TNV CIRCUITS and HAZARDOUS VOLTAGE circuits (among others). For stand-alone equipment it is a relatively simple matter to determine the different categories of circuits. However, equipment having data port interfaces is intended to be connected to other equipment, locally or via a network. In this case, the safety categories of the interfaces which will be connected together have to be compatible with each other. Furthermore, the category of the interface of the remote equipment may be unknown. This is the case in systems where telecommunication equipment and data processing equipment are connected together via different types of interfaces and networks.

To overcome this situation, it is necessary to classify the interfaces of equipment in such configurations according to the application, and to select the safety category for the interfaces of the equipment and for the type of the network. Similarly, the interfaces have to be classified for protection against damage of the equipment and of the network. Aspects of protection are dealt with in certain ETSI documents and the ITU-T K series of Recommendations.

The present document only covers equipment appropriately interconnected. Furthermore, it does not address damage caused by one equipment to other equipment with which it is connected. Exceptionally, interfaces may be designed for higher or lower levels of protection for special applications. In such cases one has to ensure that only interfaces having compatible safety categories and protection levels are connected together. These are based on the available specifications of the equipment manufacturers and network providers, and on information regarding the installation category of the mains interface.

The present document is intended to be used by: Equipment Designers, Network Operators (NOs), Network Regulators/Authorities, Standards Writers and Network Installers. The present document is applicable to various interfaces of equipment. Networks are not "equipment" within the meaning of EN 60950 and so are not covered by this document. However, it is necessary to consider the characteristics, installation and presentation of TELECOMMUNICATIONS NETWORKS when determining what equipment interface requirements apply (e.g. SELV CIRCUIT, TNV-1 CIRCUIT, TNV-2 CIRCUIT, TNV-3 CIRCUIT etc. See EN 60950, annex V, abbreviated in this document as annex D).

If there is a conflict between the present document and a more detailed specification, the latter prevails.

1 Scope

The present document applies to equipment interfaces. These interfaces within the equipment may be connected to TELECOMMUNICATIONS NETWORKS, or they may form part of the TELECOMMUNICATIONS NETWORK infrastructure, or they may provide localized transfer of data. The present document provides guidance on the classification of interfaces in accordance with the circuit types defined in EN 60950 and EN 41003 following an analysis of the telecommunication network's characteristics.

If a standard other than EN 60950 is used for designing the equipment and its interface (e.g. EN 41003 in conjunction with other product safety standards), then the corresponding requirements of these other standards are to be preferred.

The present document applies regardless of ownership or responsibility for installation and maintenance of the equipment or network.

Examples of equipment covered by the present document include, but are not limited to:

facsimile machines, key telephone systems, network billing equipment, PABXs, network supervisory equipment, telephone answering machines, network switching equipment, network transmission equipment, network terminating equipment, modems, telephone sets, and network power feeding equipment.

NOTE: Terminal Equipment is often connected to customer premises cabling when used in a business environment and there are ENs covering such cabling.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

EN 60950 (1992), including A1 (1993), A2 (1993), A3 (1995), A4 (1997) and A11 (1997): "Safety of information technology equipment".

EN 60065 (1998): "Audio, video and similar electronic apparatus - Safety requirements".

EN 41003: "Particular safety requirements for equipment to be connected to telecommunications networks".

HD 384 series: "Electrical installation of buildings". (IEC 60364 series, modified)

HD 625.1 S1: "Insulation co-ordination for equipment within low voltage systems; Part 1: Principles, requirements and tests". (IEC 60664-1)

prEN 50174-1: "Information technology - Cabling installation; Part 1: Specification and quality assurance planning".

prEN 50174-2: "Information technology - Cabling installation; Part 2: Installation planning and practices inside buildings".

prEN 50174-3: "Information technology - Cabling installation; Part 3: Installation planning and practices external to buildings".

ETS 300 253: "Equipment Engineering (EE); Earthing and bonding of telecommunication equipment in telecommunication centres".

ETS 300 001: "Attachments to Public Switched Telephone Network (PSTN); General technical requirements for equipment connected to an analogue subscriber interface in the PSTN; Chapter 1: General".

ETS 300 012: "Integrated Services Digital Network (ISDN); Basic user-network interface Layer 1 specification and test principles".

ETS 300 132-2: "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)"

ETS 300 247: "Business Telecommunications (BT); Open Network Provision (ONP) technical requirements; 2 048 kbit/s digital unstructured leased line (D2048U) Connection characteristics"

ETS 300 418: "Business TeleCommunications (BTC); 2 048 kbit/s digital unstructured and structured leased lines (D2048U and D2048S); Network interface presentation".

TBR 3: "Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access".

IEC 61312-1: "Protection against lightning electromagnetic impulse; Part 1: General principles".

CA/1209/DV (1998): "Guide on the Safety of Multimedia Equipment" (Draft IEC Guide 112).

ISO/IEC 8802-3: "Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications".

ITU-T Recommendation K.20: "Resistibility of telecommunication switching equipment to overvoltages and overcurrents".

ITU-T Recommendation K.21: "Resistibility of subscribers' terminals to overvoltages and overcurrents".

ITU-T Recommendation K.27: "Bonding configurations and earthing inside a telecommunication building".

ITU-T Recommendation K.31: "Bonding configurations and earthing of telecommunication installations inside a subscriber's building".

ITU-T Recommendation G.703: "Physical/electrical characteristics of hierarchical digital interfaces".

ITU-T Recommendation V.28: "Electrical characteristics for unbalanced doubled-current interchange circuits".

3 Definitions and abbreviations

3.1 Definitions

NOTE 1: In common with EN 60950, defined terms are shown throughout in SMALL CAPITALS.

For the purposes of the present document, the following definitions apply in addition to the following definitions of EN 60950:

TELECOMMUNICATIONS NETWORK, SELV CIRCUIT, SECONDARY CIRCUIT, PRIMARY CIRCUIT, TNV CIRCUIT (including TNV-1 CIRCUIT, TNV-2 CIRCUIT, TNV-3 CIRCUIT), HAZARDOUS VOLTAGE.

ANTENNA INTERFACE: A port for connection of a radio frequency antenna to equipment.

COAXIAL CABLE INTERFACE: A port for connection of a coaxial cable (providing for asymmetrical transmission) to equipment.

NOTE 2: In the present document, indoor and outdoor coaxial cables are considered separately.

SYMMETRICAL CABLE INTERFACE: A port for connection of a cable providing for symmetrical transmission (e.g. twisted pair) to equipment.

NOTE 3: For the purposes of the present document, the use of both indoor and outdoor twisted pair cables is considered separately.

NETWORK TERMINATION POINT: The physical point at the boundary of a network intended to accept the connection of a terminal equipment or to be interconnected to another network.

TERMINAL CONNECTION POINT: The physical point of the terminal equipment intended to be connected to a network.

A.C. MAINS SUPPLY: The external A.C. power distribution system supplying power to the equipment. Sources of power include public or private utilities and, unless otherwise specified in EN 60950, equivalent sources such as motor-driven generators and uninterruptible power supplies.

NOTE 4: The above definition has been derived from the draft 3rd edition of IEC 60950/EN 60950.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

A.C.	Alternating Current
D.C.	Direct Current
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LPZ	Lightning Protection Zone
NO	Network Operator
NCP	Network Connection Point
NT	Network Termination
NTP	Network Termination Point
NTU	Network Terminating Unit
PABX	Private Automatic Branch Exchange
PNO	Public Network Operator
PSTN	Public Switched Telephone Network
SDH	Synchronous Digital Hierarchy
TA	Terminal Adapter
TCP	Terminal Connection Point
TE	Terminal Equipment

4 Reference configuration

Figure 1 illustrates a hypothetical configuration of "network clouds" giving examples of the types of equipments covered by the present document. Certain of these equipments will only have one or two interface types, others may have many. Certain of the "network clouds" will be elements within the PSTN (where the possibility of more than one network operator exists) and others may be private networks. The equipment connected to this "network cloud" and part of the "network cloud" itself can be any type covered by the scope of the present document.

The present document provides a framework for safety requirements and protection levels by reference to the particular examples given in figures 1, 2, 3 and 4. Configurations not covered should be treated using the same principles.

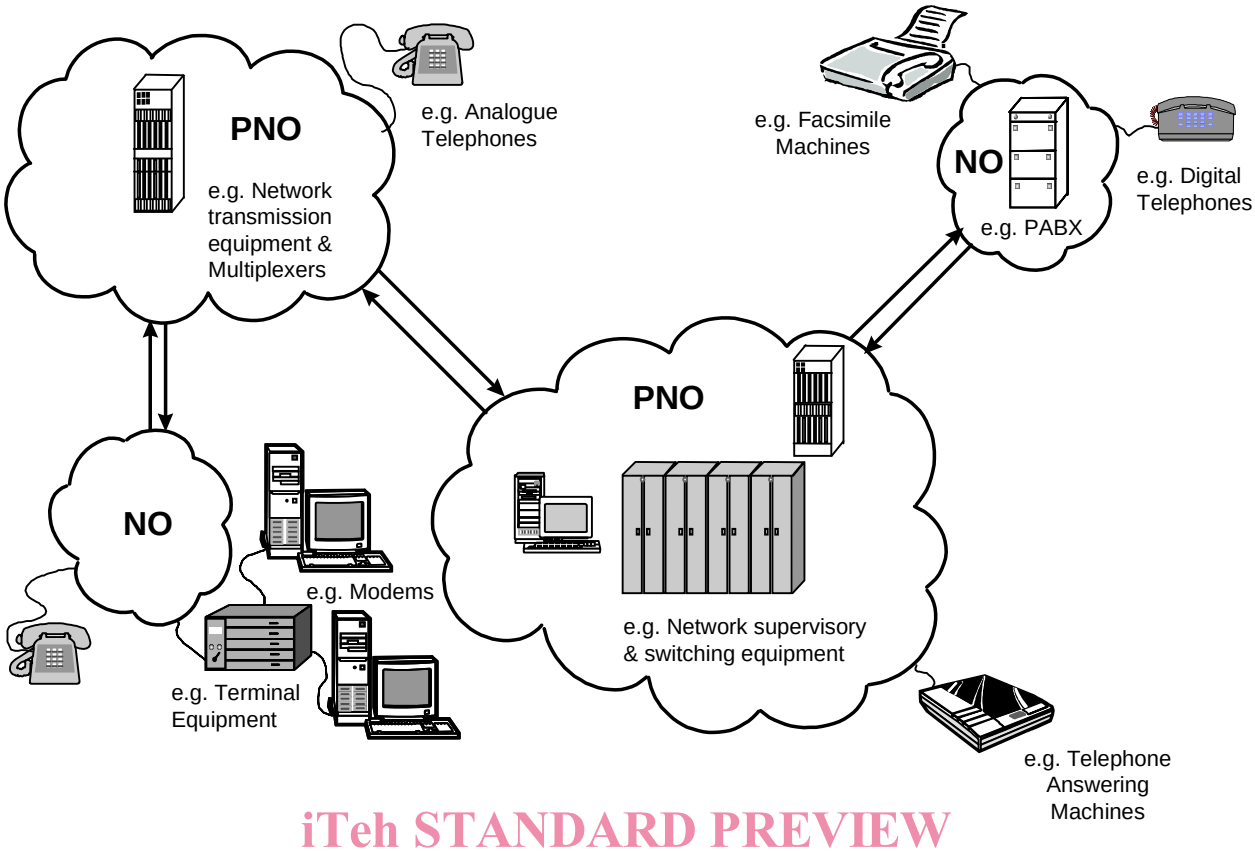

Figure 1: Reference configuration

Where, in a practical situation, an equipment has two or more interfaces of different types, it is normally necessary to provide safety separation within the equipment between those interfaces in accordance with EN 60950.

Figures 2, 3 and 4 illustrate possible network configurations. Included are some of the network elements involved in such networks and an indication of the various commercial organizations, both Public Network Operators (PNOs) and Network Operators (NOs) generally (who could be public or private) that are involved in providing network infrastructures to service the end customer.

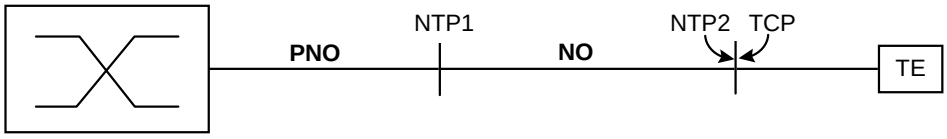

Figure 2: Example network configuration

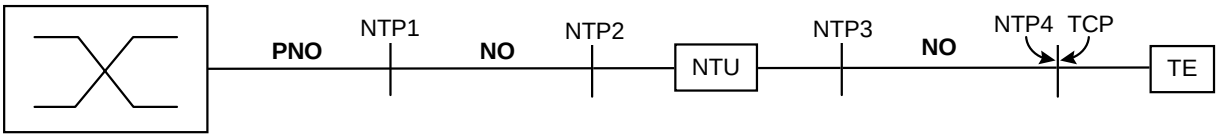

Figure 3: Example network configuration

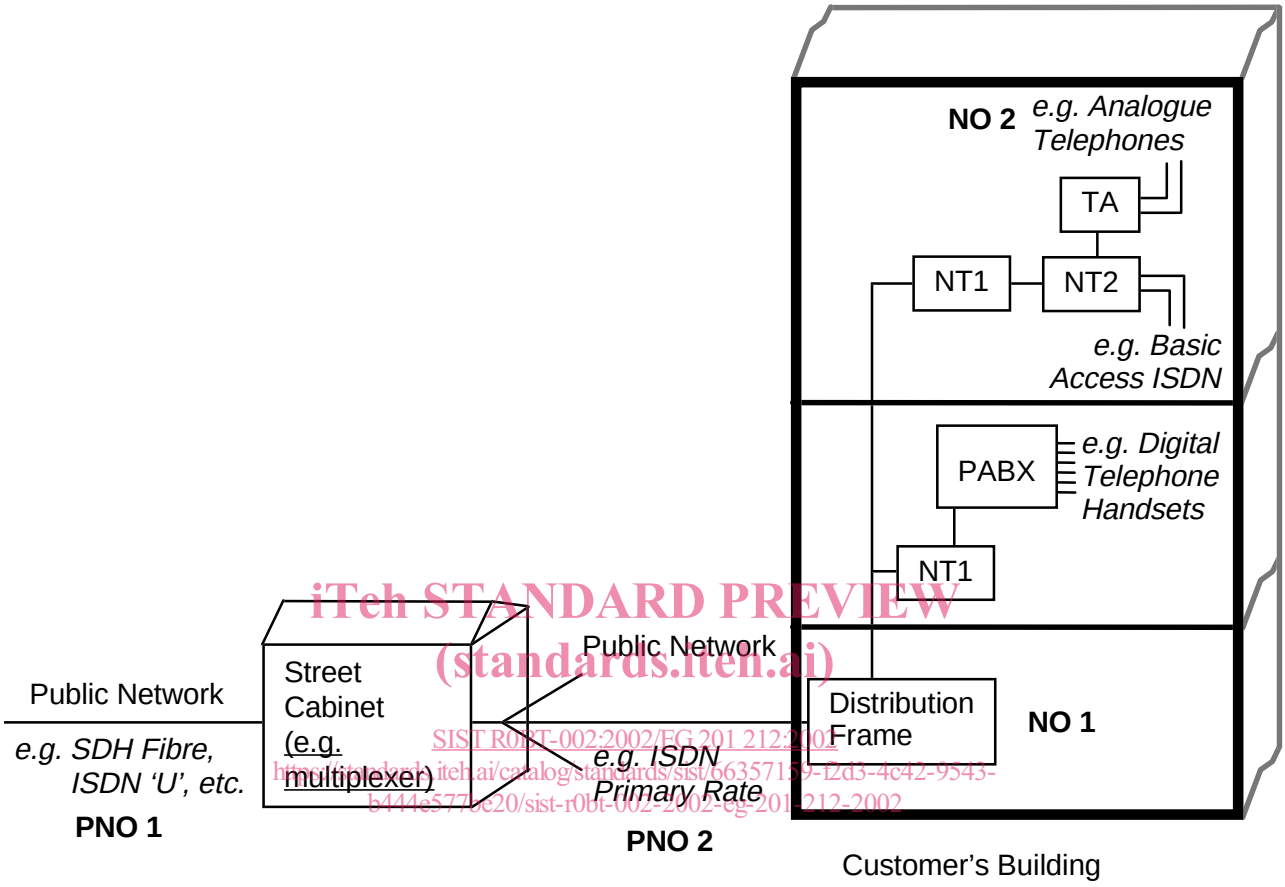

Figure 4: Example network configuration

5 Safety categories of interfaces provided for connection to a Telecommunications Network

NOTE: Both PRIMARY CIRCUITS and SECONDARY CIRCUITS can be subject to transient overvoltages. Refer to EN 60950.

5.1 SELV circuits

The requirements for SELV CIRCUITS are as specified in EN 60950.

5.2 TNV circuits

The requirements for TNV CIRCUITS are as specified in EN 60950. TNV CIRCUITS are further sub-divided into TNV-1 CIRCUITS, TNV-2 CIRCUITS and TNV-3 CIRCUITS, depending on their nominal operating voltage and on the likelihood of their being subject to overvoltages.