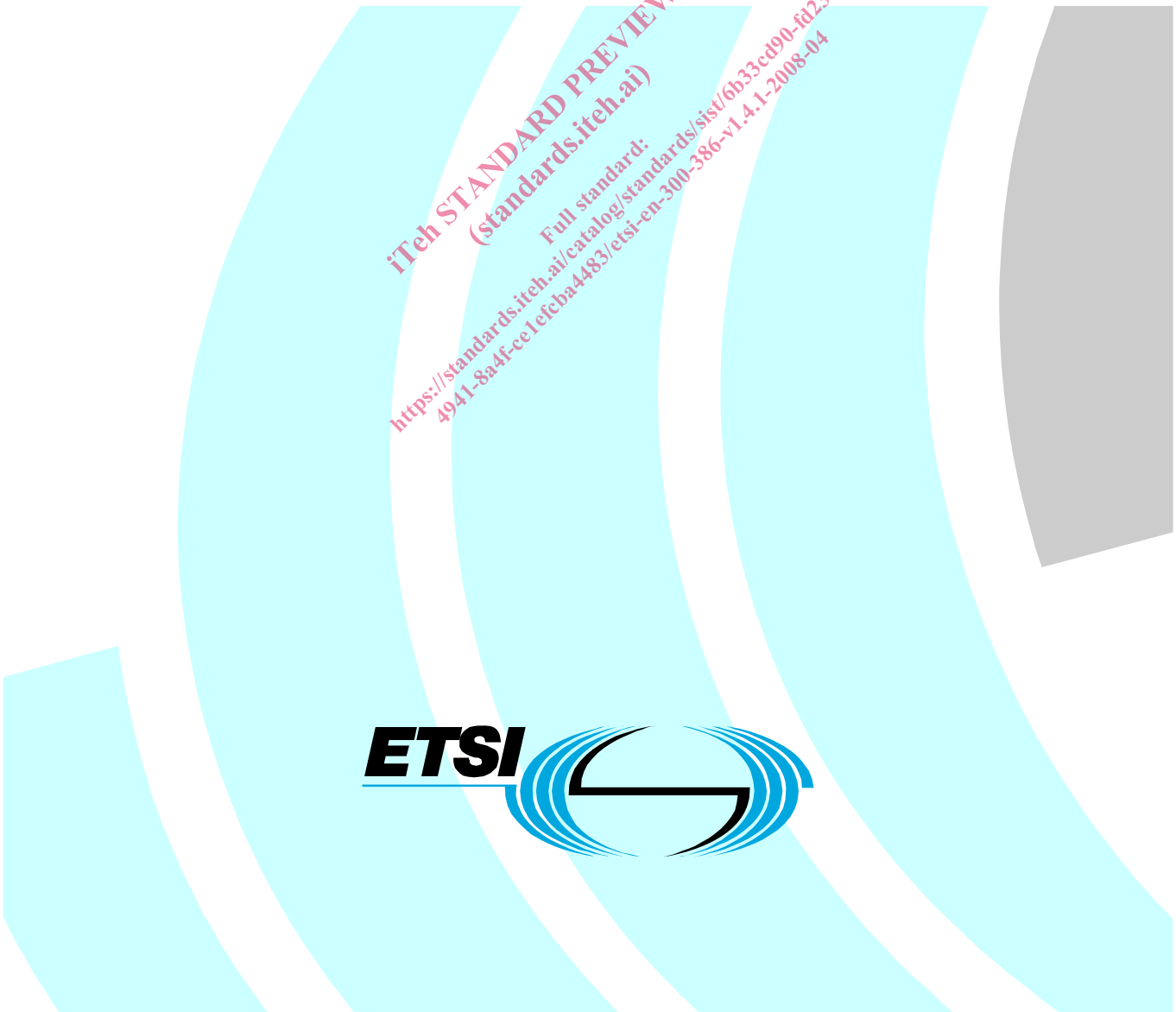
Final draft ETSI EN 300 386 V1.4.1 (2008-02)

Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements



Reference
REN/ERM-EMC-249

Keywords
EMC, network, testing

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, please send your comment to one of the following services:
http://portal.etsi.org/chaircor/ETSI_support.asp

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [51] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (89/336/EEC [49] as amended and 2004/108/EC [52]).

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	36 months after doa

1 Scope

The present document covers the EMC requirements for non-radio equipment intended to be used within a public telecommunications network, which provides telecommunications between Network Termination Points (NTPs) (i.e. excluding terminal equipment beyond the NTPs). Examples of such equipment are:

- Switching equipment. Such equipment includes:
  - local telephone exchanges;
  - remote switching concentrators;
  - international switches;
  - telex switches;
  - network packet switches;
  - base station controllers, radio network controllers;
  - network servers and gateways.
- Non-radio transmission equipment and ancillary equipment. Such equipment includes:
  - multiplexers;
  - line equipment and repeaters, e.g. equipment for:
    - Synchronous Digital Hierarchy (SDH);
    - Plesiochronous Digital Hierarchy (PDH);
    - Asynchronous Transfer Mode (ATM);

  such as:
    - Digital Cross Connect systems;
    - network terminations;
    - transmission equipment used in the access network like XDSL.
- Power supply equipment. Such equipment includes:
  - central power plant;
  - end of suite power supplies;
  - uninterruptible power supplies;
  - stabilized AC power supplies; and
  - other dedicated telecommunication network power supplies;

  but excludes equipment which is uniquely associated with or integrated in other equipment.

- Supervisory equipment**.** Such equipment includes:
  - network management equipment;
  - operator access maintenance equipment;
  - traffic measurement systems;
  - line test units;
  - functional test units.

The function of *supervision* may either be performed by independent equipment or form part of other telecommunication network equipment. If the function of supervision forms part of a telecommunication network equipment, the performance may be evaluated simultaneously with other functions (such as switching and transmission) during EMC testing.

The environmental classification locations used in the present document refers to TR 101 651 [50].

The requirements of the present document have been selected to ensure an adequate level of immunity for the apparatus covered by the scope of the present document. The levels do not, however, cover extreme cases which may occur at any location but with a low probability of occurrence. In special cases, situations may arise where the levels of disturbance may exceed the immunity test levels specified in the present document. In these instances, special mitigation measures may have to be employed.

General purpose equipment, which is used as a part of a telecommunication network, may be covered by the scope of other standards. For such equipment, if those other standards fully cover the requirements of the present document, no further assessment is necessary. Equipment for cabled distribution systems intended only for television and sound signals as defined in EN 50083-2 [3] and optical amplifiers as defined in ITU-T Recommendations G.661 [33] and G.662 [34] are outside the scope of the present document.

Equipment may provide different functions, i.e. switching equipment may also provide transmission functions and transmission equipment may provide storage capabilities etc. All available functions of the EUT shall be tested.

2 References

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

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] CENELEC EN 55016-1-2 ((Amendment - 2006): "Specification for radio disturbance and immunity measuring apparatus and methods -- Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances".

[2] Void.

[3] CENELEC EN 50083-2 (2006): "Cable networks for television signals, sound signals and interactive services -- Part 2: Electromagnetic compatibility for equipment".

[4] CENELEC EN 55022 (2006): "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement".

[5] CENELEC EN 61000-3-2 (2006): "Electromagnetic compatibility (EMC) -- Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)".

[6] CENELEC EN 61000-3-3 (1995): "Electromagnetic compatibility (EMC) -- Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16 A per phase and not subject to conditional connection".

[7] CENELEC EN 61000-3-11 (2000): "Electromagnetic compatibility (EMC) -- Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current <= 75 A and subject to conditional connection".

[8] CENELEC EN 61000-3-12 (2005): "Electromagnetic compatibility (EMC) -- Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and <= 75 A per phase".

[9] CENELEC EN 61000-4-2 (2001): "Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test".

[10] CENELEC EN 61000-4-3 (2006): "Electromagnetic compatibility (EMC) -- Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test".

[11] CENELEC EN 61000-4-4 (2004): "Electromagnetic compatibility (EMC) -- Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test".

[12] CENELEC EN 61000-4-5 (2006): "Electromagnetic compatibility (EMC) -- Part 4-5: Testing and measurement techniques - Surge immunity test".

[13] CENELEC EN 61000-4-6 (2006): "Electromagnetic compatibility (EMC) -- Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields".

[14] CENELEC EN 61000-4-11 (2004): "Electromagnetic compatibility (EMC) -- Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests".

[15] ETSI ETS 300 132-1 (1996): "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated by alternating current (ac) derived from direct current (dc) sources".

[16] ETSI EN 300 132-2 (V2.1.2): "Environmental Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)".

[17] IEC 60050-161: "International Electrotechnical Vocabulary. Chapter 161: Electromagnetic compatibility".

[18] IEC 60050-714: "International Electrotechnical Vocabulary - Chapter 714: Switching and signalling in telecommunications".

[19] ETSI EN 300 127 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated emission testing of physically large telecommunication systems".

[20] ITU-T Recommendation O.41 (1994): "Psophometer for use on telephone-type circuits".

[21] ITU-T Recommendation G.996.1 (2001): "Test procedures for digital subscriber line (DSL) transceivers".

[22] ETSI TS 101 135 (V1.5.3): "Transmission and Multiplexing (TM); High bit-rate Digital Subscriber Line (HDSL) transmission systems on metallic local lines; HDSL core specification and applications for combined ISDN-BA and 2 048 kbit/s transmission".

[23] ETSI TS 101 524-1 (V1.1.1): "Transmission and Multiplexing (TM); Access transmission system on metallic access cables; Symmetrical single pair high bit rate Digital Subscriber Line (SDSL); Part 1: Functional requirements".

[24] ETSI TS 101 270-1 (V1.4.1): "Transmission and Multiplexing (TM); Access transmission systems on metallic access cables; Very high speed Digital Subscriber Line (VDSL); Part 1: Functional requirements".

[25] ITU-T Recommendation G.992.1 (2003): "Asymmetrical digital subscriber line (ADSL) transceivers".

[26] ITU-T Recommendation G.992.3 (2006): " Asymmetrical digital subscriber line transceivers 2 (ADSL2)".

[27] ITU-T Recommendation G.992.5 (2006): "Asymmetrical Digital Subscriber Line (ADSL) transceivers - Extended bandwidth ADSL2 (ADSL2plus)".

2.2 Informative references

[28] ETSI EN 300 011-1 (V1.2.2): "Integrated Services Digital Network (ISDN); Primary rate User Network Interface (UNI); Part 1: Layer 1 specification".

[29] ETSI ETS 300 012-1 (2000): "Integrated Services Digital Network (ISDN); Basic User-Network Interface (UNI); Part 1: Layer 1 specification".

[30] ETSI EN 300 166 (V1.2.1): "Transmission and Multiplexing (TM); Physical and electrical characteristics of hierarchical digital interfaces for equipment using the 2 048 kbit/s - based plesiochronous or synchronous digital hierarchies".

[31] ETSI ETS 300 232 (1993): "Transmission and Multiplexing (TM); Optical interfaces for equipments and systems relating to the Synchronous Digital Hierarchy [ITU-T Recommendation G.957 (1993), modified]".

[32] ISO/IEC 8802-3 (2000): "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".

[33] ITU-T Recommendation G.661 (2006): "Definition and test methods for the relevant generic parameters of optical amplifier devices and subsystems".

[34] ITU-T Recommendation G.662 (2005): "Generic characteristics of optical amplifier devices and subsystems".

[35] ITU-T Recommendation G.712 (2001): "Transmission performance characteristics of pulse code modulation channels".

[36] ITU-T Recommendation G.812 (2004): "Timing requirements of slave clocks suitable for use as node clocks in synchronization networks".

[37] ITU-T Recommendation G.813 (2003): "Timing characteristics of SDH equipment slave clocks (SEC)".

[38] Void.

[39] ITU-T Recommendation G.961 (1993): "Digital transmission system on metallic local lines for ISDN basic rate access".

[40] ITU-T Recommendation O.150 (1996): "General requirements for instrumentation for performance measurements on digital transmission equipment".

[41] ITU-T Recommendation Q.552 (2001): "Transmission characteristics at 2-wire analogue interfaces of digital exchanges".

[42] ITU-T Recommendation V.10 (1993): "Electrical characteristics for unbalanced double-current interchange circuits operating at data signalling rates nominally up to 100 kbit/s".

[43] ITU-T Recommendation V.11 (1996): "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".

[44] ITU-T Recommendation V.24 (2000): "List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE)".

[45] ITU-T Recommendation V.28 (1993): "Electrical characteristics for unbalanced double-current interchange circuits".

[46] ITU-T Recommendation V.36 (1988): "Modems for synchronous data transmission using 60-108 kHz group band circuits".

[47] ITU-T Recommendation X.24 (1988): "List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) on public data networks".

[48] ITU-T Recommendation X.25 (1996): "Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit".

[49] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

[50] ETSI TR 101 651 (1999): "Electromagnetic compatibility and radio spectrum matters (ERM); Classification of the electromagnetic environment conditions for equipment in telecommunication networks".

[51] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations (EMC Directive).

[52] Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC (EMC Directive).

[53] ITU-T Recommendation G.783 (2006): "Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks".

[54] ITU-T Recommendation G.798 (2004): "Characteristics of optical transport network hierarchy equipment functional blocks".

[55] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

[56] IEEE 1284 (2000): "IEEE Standard Signalling Method for a Bidirectional Parallel Peripheral Interface for Personal Computers".

[57] IEEE 1394.1 (2004): "IEEE Standard for High Performance Serial Bus Bridges".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in IEC 60050-161 [17] and the following apply:

NOTE: The definitions taken from IEC 60050-161 [17] have reference in parentheses.

AC secondary interface: output port of an AC power supply

AC secondary voltage: output of the AC power supply at the AC secondary interface

NOTE: The AC secondary voltage may be either:

- a stabilized AC supply derived from a DC primary supply (e.g. where the power supply is an inverter); or
- derived from the AC primary supply (e.g. a stabilized power supply used where the quality of the primary supply is not sufficient to feed telecommunication equipment).

burst (161-02-07): sequence of a limited number of distinct pulses or an oscillation of limited duration

connection: temporary association of transmission channels or telecommunication circuits, switching or other functional units set up to provide for the transfer of information between two or more points in a telecommunication network (IEC 60050-714 [18])

continuous disturbance (161-02-11): electromagnetic disturbance the effects of which on a particular device or equipment cannot be resolved into a succession of distinct effects

DC secondary interface: output port of a DC power supply

DC secondary voltage: output of the DC power supply at the DC secondary interface

NOTE: The DC secondary voltage may be derived from the AC primary supply with or without a buffer battery.

duration (of a voltage change) (161-08-03): interval of time for the voltage to increase or decrease from the initial value to the final value

duration (of a pulse): interval of time between the instants at which the instantaneous value of a pulse reaches 50 % of the pulse magnitude for the first and last time

enclosure port: physical boundary of the Equipment Under Test (EUT) through which electromagnetic fields may emanate or on which they may impinge

environment, environmental conditions: electromagnetic conditions external to the equipment, to which it is subjected at a certain time

NOTE: The environmental conditions comprise a combination of single environmental parameters and their severity.

environmental parameters: present one or more properties of the electromagnetic environment

immunity (to a disturbance) (161-01-20): ability of a device, equipment or system to perform without degradation in the presence of an electromagnetic disturbance

impulsive disturbance (161-02-09): electromagnetic disturbance which, when incident on a particular device or equipment, manifests itself as a succession of distinct pulses or transients

interface "A": terminals at which a power supply is connected to the telecommunications equipment

multimedia network equipment: multimedia network equipment containing broadcast and telecommunication functions

nominal voltage: nominal value of voltage that designates the type of supply

normal service: service mode where telecommunications equipment operates within its specification

performance criterion: limits of acceptable behaviour of the equipment during and after the application of the electromagnetic phenomenon

NOTE: Performance criteria A apply for continuous phenomena; performance criteria B and C apply for transient phenomena; and performance criteria R apply for resistibility phenomena.

port: particular interface of the EUT with the external electromagnetic environment

power supply: power source (within the scope of the present document) to which telecommunications equipment is intended to be connected

primary supply: public mains or a locally generated AC or DC supply

public telecommunications network: telecommunication network operated by an entity required to publish its interface specifications under art. 4 of directive 1999/05/EC [55]

pulse (161-02-02): abrupt variation of short duration of a physical quantity followed by a rapid return to the initial value

Radio Frequencies (RF): frequency range above 150 kHz

rise time (of a pulse) (161-02-05): interval of time between the instants at which the instantaneous value of a pulse first reaches a specified lower value and then a specified upper value

NOTE: Unless otherwise specified, the lower and upper values are fixed at 10 % and 90 % of the pulse magnitude.

secondary supply: supply to the telecommunications equipment (e.g. racks or system blocks), derived from the primary supply

surge (voltage) (161-08-11): transient voltage wave propagating along a line or a circuit and characterized by a rapid increase followed by a slower decrease of the voltage

system block: functional group of equipment depending for its operation and performance upon the secondary power supply

telecommunication network ports: telecommunications/network port point of connection for voice, data and signalling transfers intended to interconnect widely dispersed systems via such means as direct connection to multi-user telecommunications networks (e.g. public switched telecommunications networks (PSTN) integrated services digital networks (ISDN), x-type digital subscriber lines (xDSL), etc.), local area networks (e.g. Ethernet, Token Ring, etc.) and similar networks

NOTE 1: A port generally intended for interconnection of components of an ITE system under test (e.g. RS-232, IEEE 1284 [56] (parallel printer), Universal Serial Bus (USB), IEEE 1394 [57] ("Fire Wire"), etc.) and used in accordance with its functional specifications (e.g. for the maximum length of cable connected to it), is not considered to be a telecommunications/network port under this definition.

NOTE 2: See EN 55022 [4].

tertiary supply: supply to the telecommunications equipment derived from the secondary supply

transient (adjective or noun) (161-02-01): pertaining to or designating a phenomenon or a quantity which varies between two consecutive steady states during a time interval which is short compared with the timescale of interest