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Telecommunication network equipment;
Harmonised Standard for
ElectroMagnetic Compatibility (EMC) requirements

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Foreword

This final draft Harmonised European Standard (EN) 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 EN Approval Procedure.

The present document has been prepared:

- under the Commission's standardisation request C(2016) 7641 final of 30.11.2016 [i.43] ('M/552'), to provide one voluntary means of conforming to the essential requirements of Directive 2014/30/EU on the harmonisation of the laws of the Member States relating to electromagnetic compatibility [i.31];
- under the Commission's standardisation request C(2015) 5376 final of 4.8.2015 [i.7] ('M/536'), to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.6].

Once the present document is cited in the Official Journal of the European Union under the Directives, compliance with the normative clauses of the present document given in tables A.1 and A.2 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of the relevant Directives and associated EFTA regulations.

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):	18 months after doa

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

1 Scope

The present document specifies the EMC requirements for telecommunication equipment intended to be used within a telecommunications network, which provides telecommunications between Network Termination Points (NTPs) (i.e. excluding terminal equipment beyond the NTPs). Radio functionality (e.g. Bluetooth®, Wi-Fi®, GPS) incorporated in telecommunication network equipment is also within the scope of the present document. Examples of such equipment are:

1) 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.
2) 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.
3) 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.
4) Supervisory equipment. Such equipment includes:
   - network management equipment;
   - operator access maintenance equipment;
   - traffic measurement systems;
   - line test units;

- functional test units.

NOTE 1: 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.

5) Telecommunication network equipment incorporating radio equipment.

6) Data centre equipment which is intended to be used within telecommunication network infrastructure:

- Storage.
- Processor.
- Server.

The requirements applicable to radio interfaces of Telecommunication network equipment within the scope of the present document (e.g. Bluetooth®, Wi-Fi®, GPS) are defined in clause 7 and annex D.

The environmental classification locations used in the present document refer to ETSI TR 101 651 [i.22].

The emission requirements of the present document refer to EN 55032 [31] that have been selected to ensure an adequate level of protection to radio services.

The immunity 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. Equipment which also fall within the scope of EN 50083-2 [3] may require additional testing on the relevant RF ports. See clause 9.2 and annex C.

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 are to be tested.

NOTE 2: The relationship between the present document and essential requirements of annex I.1 of Directive 2014/30/EU [i.31] and/or article 3.1(b) of Directive 2014/53/EU [i.6] is given in annex A.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

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

The following referenced documents are necessary for the application of the present document.

[1] EN 55016-1-2 (2014 + Amendment 1: 2018): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Coupling devices for conducted disturbance measurements", (produced by CENELEC).

[2] EN 55016-2-3 (2017 + Amendment 1: 2019): "Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements", (produced by CENELEC).

[3] EN 50083-2 (2012 + Amendment 1: 2015): "Cable networks for television signals, sound signals and interactive services - Part 2: Electromagnetic compatibility for equipment", (produced by CENELEC).

[4] Void.

[5] Void.

[6] Void.

[7] Void.

[8] Void.

[9] EN 61000-4-2 (2009): "Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test", (produced by CENELEC).

[10] EN 61000-4-3 (2020): "Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test", (produced by CENELEC).

[11] EN 61000-4-4 (2012): "Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test", (produced by CENELEC).

[12] EN 61000-4-5 (2014 + Amendment 1: 2017): "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test", (produced by CENELEC).

[13] EN 61000-4-6 (2014): "Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields", (produced by CENELEC).

[14] EN 61000-4-11 (2020): "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase", (produced by CENELEC).

[15] ETSI EN 300 132-1 (V2.1.1) (03-2019): "Environmental Engineering (EE); Power supply interface at the input to Information and Communication Technology (ICT) equipment; Part 1: Alternating Current (AC)".

[16] ETSI EN 300 132-2 (V2.6.1) (04-2019): "Environmental Engineering (EE); Power supply interface at the input of Information and Communication Technology (ICT) equipment; Part 2: -48 V Direct Current (DC)".

[17] IEC 60050-161 (1990): "International Electrotechnical Vocabulary. Chapter 161: Electromagnetic compatibility".

[18] IEC 60050-714 (1992): "International Electrotechnical Vocabulary - Chapter 714: Switching and signalling in telecommunications".

[19] ETSI EN 301 489-1 (V2.2.3) (11-2019): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility".

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

[21] ETSI EN 301 489-17 (V3.2.4) (09-2020): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility".

[22] Void.

[23] ETSI EN 301 489-19 (V2.1.1) (04-2019): "ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation, and timing data; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU".

[24] EN 61000-4-34 (2007 + Amendment A1: 2009): "Electromagnetic compatibility (EMC) - Part 4-34: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase", (produced by CENELEC).

[25] Void.

[26] Void.

[27] Void.

[28] ETSI EN 300 132-3 (V2.2.1) (05-2021): "Environmental Engineering (EE); Power supply interface at the input of Information and Communication Technology (ICT) equipment; Part 3: Up to 400 V Direct Current (DC)".

[29] Recommendation ITU-T G.812 (2004 + Erratum 1: 2005): "Timing requirements of slave clocks suitable for use as node clocks in synchronization networks".

[30] Recommendation ITU-T G.813 (2003 + Corrigendum 1: 2006 + Corrigendum 2: 2011): "Timing characteristics of SDH equipment slave clocks (SEC)".

[31] EN 55032 (2015 + Amendment A11: 2020 + Amendment A1: 2020): "Electromagnetic compatibility of multimedia equipment - Emission requirements", (produced by CENELEC).

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

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

[i.2] ETSI EN 300 012-1 (V1.2.2): "Integrated Services Digital Network (ISDN); Basic User-Network Interface (UNI); Part 1: Layer 1 specification".

[i.3] 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".

[i.4] ETSI ETS 300 232 (1993 + Amendment 1: 1996): "Transmission and Multiplexing (TM); Optical interfaces for equipments and systems relating to the Synchronous Digital Hierarchy [ITU-T Recommendation G.957 (1993), modified]".

[i.5] ISO/IEC/IEEE 8802-3 (2014): "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".

[i.6] Directive 2014/53/EU of the European Parliament and of the council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

[i.7] Commission Implementing Decision C(2015) 5376 final of 4.8.2015, ('M/536'), on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

[i.8] Recommendation ITU-T G.712 (2001): "Transmission performance characteristics of pulse code modulation channels".

[i.9] Void.

[i.10] Void.

[i.11] ITU Radio Regulations (Article 1, Section VI).

[i.12] Recommendation ITU-T G.961 (1993 + Erratum 1: 2000): "Digital transmission system on metallic local lines for ISDN basic rate access".

[i.13] Recommendation ITU-T O.150 (1996 + Corrigendum 1: 2002): "General requirements for instrumentation for performance measurements on digital transmission equipment".

[i.14] Recommendation ITU-T Q.552 (2001): "Transmission characteristics at 2-wire analogue interfaces of digital exchanges".

[i.15] Recommendation ITU-T V.10 (1993): "Electrical characteristics for unbalanced double-current interchange circuits operating at data signalling rates nominally up to 100 kbit/s".

[i.16] Recommendation ITU-T V.11 (1996): "Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s".

[i.17] Recommendation ITU-T V.24 (2000): "List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE)".

[i.18] Recommendation ITU-T V.28 (1993): "Electrical characteristics for unbalanced double-current interchange circuits".

[i.19] Recommendation ITU-T V.36 (1988): "Modems for synchronous data transmission using 60-108 kHz group band circuits".

[i.20] Recommendation ITU-T X.24 (1988): "List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) on public data networks".

[i.21] Recommendation ITU-T X.25 (1996 + Corrigendum 1: 1998): "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".

[i.22] ETSI TR 101 651 (V2.1.1): "Classification of the electromagnetic environment conditions for equipment in telecommunication networks".

[i.23] EN 61000-6-1 (2019): "Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments", (produced by CENELEC).

[i.24] Void.

[i.25] Recommendation ITU-T G.783 (2006 + Erratum 1: 2006 + Amendment 1: 2008 + Amendment 2: 2010): "Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks".

[i.26] Recommendation ITU-T G.798 (2017 + Corrigendum 1: 2018 + Amendment 1: 2018): "Characteristics of optical transport network hierarchy equipment functional blocks".

[i.27] Void.

[i.28] IEEE 1284™ (2000): "IEEE Standard Signalling Method for a Bidirectional Parallel Peripheral Interface for Personal Computers".

[i.29] IEEE 1394™ (2008): "IEEE Standard for High Performance Serial Bus Bridges".

[i.30] Void.

[i.31] Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast).

[i.32] Recommendation ITU-T G.996.1 (2001 + Amendment 1: 2003): "Test procedures for digital subscriber line (DSL) transceivers".

[i.33] 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".

[i.34] ETSI TS 101 524-1 (V1.1.1): "Transmission and Multiplexing (TM); Access transmission system on metallic access cables; Symmetrical single pair high bitrate Digital Subscriber Line (SDSL); Part 1: Functional requirements".

[i.35] 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".

[i.36] Recommendation ITU-T G.992.1 (1999 + Annex H: 2000 + Corrigendum 1: 2001 + Corrigendum 2: 2002 + Amendment 1: 2003 + Corrigendum of Amendment 1: 2003): "Asymmetric digital subscriber line (ADSL) transceivers".

[i.37] Recommendation ITU-T G.992.3 (2009 + Corrigendum 1: 2009 + Amendment 1: 2010 + Amendment 2: 2010 + Amendment 3: 2010 + Corrigendum 2: 2011 + Amendment 4: 2011 + Amendment 5: 2012 + Corrigendum 3: 2013): "Asymmetric digital subscriber line transceivers 2 (ADSL2)".

[i.38] Recommendation ITU-T G.992.5 (2009 + Corrigendum 1: 2010): "Asymmetric digital subscriber line 2 transceivers (ADSL2) - Extended bandwidth ADSL2 (ADSL2plus)".

[i.39] Recommendation ITU-T G.993.1 (2004): "Very high speed digital subscriber line transceivers (VDSL)".

[i.40] Recommendation ITU-T G.993.2 (2015): "Very high speed digital subscriber line transceivers 2 (VDSL2)".

[i.41] Recommendation ITU-T G.991.1 (1998): "High bit rate digital subscriber line (HDSL) transceivers".

[i.42] Recommendation ITU-T G.991.2 (2013 + Amendment 1: 2004 + Amendment 2: 2005 + Amendment 2 Erratum 1: 2005 + Amendment 3: 2005): "Single-pair high-speed digital subscriber line (SHDSL) transceivers".

[i.43] Commission implementing Decision C(2016) 7641 final of 30.11.2016, ('M/552'), on a standardisation request to the European Committee for Standardisation, to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards harmonised standards in support of Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.

[i.44] EN 50083 series: "Cable networks for television signals, sound signals and interactive services", (produced by CENELEC).

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms 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).

antenna port: port for connection of an antenna used for intentional transmission and/or reception of radiated RF energy

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

channel width: bandwidth between the two frequencies f_{low} and f_{high} defined as the operating channel within ITU-R

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

critical stored data: data that is essential for an EUT to operate

data centre: structure, or group of structures, dedicated to the centralized accommodation, interconnection and operation of information technology and network telecommunications equipment providing data storage, processing and transport services together with all the facilities and infrastructures for power distribution and environmental control together with the necessary levels of resilience and security required to provide the desired service availability

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 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

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

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