

Recommendation **ITU-T K.136 (11/2022)**

SERIES K: Protection against interference

Electromagnetic compatibility requirements for radio telecommunication equipment

Recommendation ITU-T K.136

Electromagnetic compatibility requirements for radio telecommunication equipment

Summary

Recommendation ITU-T K.136 specifies the electromagnetic compatibility (EMC) requirements and the test method for radio telecommunication equipment and associated ancillary equipment.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T K.136	2018-11-13	5	11.1002/1000/13715
2.0	ITU-T K.136	2022-11-29	5	11.1002/1000/15180

Keywords

Electromagnetic compatibility, EMC, radio, radio frequency, RF.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents/software copyrights, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the appropriate ITU-T databases available via the ITU-T website at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2023

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Table of Contents

	Page
1 Scope	1
2 References.....	1
3 Definitions	4
3.1 Terms defined elsewhere	4
3.2 Terms defined in this Recommendation.....	6
4 Abbreviations and acronyms	8
5 Conventions	9
6 Test methods and limits.....	9
6.1 Emission requirements	9
6.2 Immunity requirements	10
7 General operational conditions and test configuration	11
7.1 General conditions.....	11
7.2 General configurations	11
7.3 RF exclusion band	12
7.4 Narrowband responses of receivers or receivers which are part of transceivers	13
7.5 Normal test modulation	14
7.6 Operational conditions.....	14
7.7 Test configuration.....	14
7.8 Test conditions for equipment with a special port.....	15
8 Performance assessment	15
8.1 General	15
8.2 Equipment which can provide a continuous communication link.....	16
8.3 Equipment which cannot provide a continuous communication link	16
8.4 Ancillary equipment	16
8.5 Equipment classification	16
9 Performance criteria.....	17
9.1 Performance criterion A	17
9.2 Performance criterion B	17
9.3 Performance criterion C	17
9.4 Specific performance criteria	17
10 Test report.....	19
Annex A – Emission requirements	20
Annex B – Immunity requirements.....	22
Annex C – Test on PoE port	32
C.1 Introduction	32
C.2 Operational condition	32

	Page
C.3 Test configuration.....	32
C.4 Test methods.....	33
C.5 Performance criteria	37
Bibliography.....	39

Recommendation ITU-T K.136

Electromagnetic compatibility requirements for radio telecommunication equipment

1 Scope

This Recommendation specifies the general requirements of electromagnetic compatibility (EMC) and test methods for radio telecommunication and associated ancillary equipment. Radio equipment includes, e.g., mobile access network equipment such as base stations, fixed radio links equipment such as microwave relay, fixed-satellite service, radio navigation-satellite services, short-range devices, mobile broadband access devices, mobile-satellite service, and wireless access point devices. Specific product Recommendations, e.g., [b-ITU-T K.114] and [b-ITU-T K.116], take precedence over this Recommendation. EMC test methods for wireline ports can be found in [ITU-T K.137].

The working frequencies of radio equipment could be from 9 kHz to 400 GHz.

This Recommendation describes the common testing operational conditions and performance criteria.

The environmental classification locations used in this Recommendation refer to [ITU-T K.34].

This Recommendation defines the specific immunity testing levels and performance criteria to be applied to radio network telecommunication equipment in the following environments:

- telecommunication centres; see clauses 6.1.1 and 6.1.2 of [ITU-T K.34];
- outdoor locations (e.g., streets, parking roofs, towers, poles): see clause 6.2 of [ITU-T K.34];
- customer premises (residential, commercial or light industrial environment): see clause 6.3 of [ITU-T K.34].

The immunity requirements of this Recommendation have been selected to ensure an adequate level of immunity. Extreme cases of disturbances with low probability of occurrence are not considered. In special cases, situations may arise where the levels of disturbance may exceed the immunity test levels defined in this Recommendation. In these conditions, special mitigation measures or protection may have to be implemented.

The emission requirements of this Recommendation refer to the classification provided in [CISPR 32].

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- | | |
|---------------|--|
| [ITU-T G.812] | Recommendation ITU-T G.812 (2004), <i>Timing requirements of slave clocks suitable for use as node clocks in synchronization networks</i> . |
| [ITU-T G.813] | Recommendation ITU-T G.813 (2003 + Corrigendum 1: 2005 + Corrigendum 2: 2016), <i>Timing characteristics of SDH equipment slave clocks (SEC)</i> . |

[ITU-T K.34]	Recommendation ITU-T K.34 (2020), <i>Classification of electromagnetic environmental conditions for telecommunication equipment – Basic EMC Recommendation.</i>
[ITU-T K.38]	Recommendation ITU-T K.38 (1996), <i>Radiated emission test procedure for physically large systems.</i>
[ITU-T K.76]	Recommendation ITU-T K.76 (2022), <i>Electromagnetic compatibility requirements for DC power ports of telecommunication network equipment in frequencies below 150 kHz.</i>
[ITU-T K.137]	Recommendation ITU-T K.137 (2022), <i>Electromagnetic compatibility requirements and measurement methods for wireline telecommunication network equipment.</i>
[ITU-R SM.329-12]	Recommendation ITU-R SM.329 (2012), <i>Unwanted emissions in the spurious domain.</i>
[IEC 61000-3-2]	IEC 61000-3-2:2018, A1:2020, <i>Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).</i>
[IEC 61000-3-3]	IEC 61000-3-3:2013, A1:2017, A2:2021, <i>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.</i>
[IEC 61000-3-11]	IEC 61000-3-11:2017, <i>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.</i>
[IEC 61000-3-12]	IEC 61000-3-12:2011, ISH1:2012, <i>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.</i>
[IEC 61000-4-2]	IEC 61000-4-2:2008, <i>Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test.</i>
[IEC 61000-4-3]	IEC 61000-4-3:2020 <i>Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test.</i>
[IEC 61000-4-4]	IEC 61000-4-4:2012, <i>Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test.</i>
[IEC 61000-4-5]	IEC 61000-4-5:2014, A1:2017, <i>Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test.</i>
[IEC 61000-4-6]	IEC 61000-4-6:2013, <i>Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields.</i>

- [IEC 61000-4-11] IEC 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.*
- [IEC 61000-4-29] IEC 61000-4-29:2000, *Electromagnetic compatibility (EMC) – Part 4-29: Testing and measurement techniques – Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests.*
- [IEC 61000-4-34] IEC 61000-4-34:2005, A1:2009 and COR1:2009, *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.*
- [IEC 61000-6-1] IEC 61000-6-1:2016, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments.*
- [IEC 61000-6-2] IEC 61000-6-2:2016, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments.*
- [IEC 61000-6-3] IEC 61000-6-3:2020, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards emission standard for equipment in residential environments.*
- [IEC 61000-6-4] IEC 61000-6-4:2018, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments.*
- [IEC 61000-6-8] IEC 61000-6-8:2020, *Electromagnetic compatibility (EMC) – Part 6-8: Generic standards - Emission standard for professional equipment in commercial and light-industrial locations.*
- [IEC CISPR 16-1-1] IEC CISPR 16-1-1:2019, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus.*
- [IEC CISPR 16-1-2] IEC CISPR 16-1-2:2014, A1:2017, *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.*
- [IEC CISPR 16-1-4] IEC CISPR 16-1-4:2019, A1:2020, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-4: Radio disturbance and immunity measuring apparatus – Antennas and test sites for radiated disturbance measurements.*
- [IEC CISPR 16-2-1] IEC CISPR 16-2-1:2014 and COR1, AMD1:2017, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-1: Methods of measurement of disturbances and immunity – Conducted disturbance measurements.*
- [IEC CISPR 16-2-3] IEC CISPR 16-2-3:2016, A1:2019, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 2-3: Methods of measurement of disturbances and immunity – Radiated disturbance measurements.*
- [IEC CISPR 16-4-2] IEC CISPR 16-4-2:2011, A1:2014, A2:2018, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modelling – Measurement instrumentation uncertainty.*

[IEC CISPR 32]	IEC CISPR 32:2015, A1:2019, <i>Electromagnetic compatibility of multimedia equipment – Emission requirements</i> .
[IEC CISPR 35]	IEC CISPR 35:2016, <i>Electromagnetic compatibility of multimedia equipment – Immunity requirements</i> .
[ISO/IEC 17025]	ISO/IEC 17025:2017, <i>General requirements for the competence of testing and calibration laboratories</i> .

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 AC mains power port [IEC CISPR 35]: Port used to connect to the AC mains supply network.

3.1.2 analogue/digital data port [IEC CISPR 35]: Signal/control port, antenna port, wired network port, or optical fibre port with metallic shielding and/or metallic strain relief member(s).

3.1.3 antenna port [b-ETSI EN 301 489-1]: Port, for connection of an antenna used for intentional transmission and/or reception of radiated RF energy.

3.1.4 arrangement [IEC CISPR 35]: Physical layout and orientation of all the parts of the EUT, AE and any associated cabling, located within the test area.

3.1.5 associated equipment [IEC CISPR 35]: Equipment needed to exercise and/or monitor the operation of the EUT.

3.1.6 audio equipment [IEC CISPR 35]: Equipment which has a primary function of either (or a combination of) generation, input, storage, play, retrieval, transmission, reception, amplification, processing, switching or control of audio signals.

3.1.7 base station equipment [b-ETSI EN 301 489-1]: Radio and/or ancillary equipment intended for operation at a fixed location and powered directly or indirectly (e.g., via an AC/DC converter or power supply) by the AC mains network, or an extended local DC mains network.

3.1.8 common mode impedance [IEC CISPR 35]: Asymmetrical mode impedance between a cable attached to a port and the Reference Ground Plane (RGP).

3.1.9 configuration [IEC CISPR 35]: Operational conditions of the EUT and AE, consisting of the set of hardware elements selected to comprise the EUT and AE, the mode of operation used to exercise the EUT and arrangement of the EUT and AE.

3.1.10 converted common mode current [IEC CISPR 35]: Asymmetrical mode current converted from differential mode current by the unbalance of an attached cable and/or network.

3.1.11 DC network power port [IEC CISPR 35]: Port, not powered by a dedicated AC/DC power converter and not supporting communication, that connects to a DC supply network.

NOTE 1 – Equipment with a DC power port which is powered by a dedicated AC/DC power converter is defined as AC mains powered equipment.

NOTE 2 – DC power ports supporting communication are considered to be wired network ports, for example Ethernet ports which include power over Ethernet (PoE).

3.1.12 enclosure port [IEC CISPR 35]: Physical boundary of the EUT through which electromagnetic fields may radiate or may enter.

3.1.13 equipment Under Test [IEC CISPR 35]: Equipment being evaluated for compliance with the requirements of this document.

3.1.14 formal measurement [IEC CISPR 35]: Measurement used to determine compliance.

NOTE – This is often the final measurement performed. It may be carried out following a pre-scan measurement. It is the measurement recorded in the test report.

3.1.15 function [IEC CISPR 35]: Operation carried out by an equipment.

NOTE – Functions are related to basic technologies incorporated in the equipment such as: displaying, recording, processing, controlling, reproducing, transmitting, or receiving single medium or multimedia content. Where relevant the content may be data, audio, or video, either individually or in combination.

3.1.16 highest internal frequency [IEC CISPR 35]: Highest fundamental frequency generated or used within the EUT, or highest frequency at which it operates.

3.1.17 information technology equipment [IEC CISPR 35]: Equipment having a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control of data and/or telecommunication messages and which may be equipped with one or more ports typically for information transfer.

3.1.18 integral antenna [IEC CISPR 35]: Antenna designed for permanent connection to the equipment and considered part of the enclosure port.

NOTE – An integral antenna may be fitted internally or externally.

3.1.19 mobile equipment [b-ETSI EN 301 489-1]: Receiver, transmitter or transmitter/receiver (transceiver) intended for installation and use in a vehicle and powered by the main battery of the vehicle.

3.1.20 mode of operation [IEC CISPR 35]: Set of operational states of all functions of an EUT during a test or measurement.

3.1.21 multi-radio equipment [b-ETSI EN 301 489-1]: Radio equipment containing two or more radio transmitters and/or receivers using different technologies that may operate simultaneously.

3.1.22 multi-standard-radio [b-ETSI EN 301 489-1]: Radio equipment with ability of its receiver and transmitter to process two or more carriers in common active RF components simultaneously in a declared RF bandwidth, where at least one carrier is of a different radio access technology than the other carrier(s).

3.1.23 occupied bandwidth [b-ITU Radio Regs]: The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage $b/2$ of the total mean power of a given emission. Unless otherwise specified in an ITU-R Recommendation for the appropriate class of emission, the value of $b/2$ should be taken as 0.5%.

3.1.24 port [IEC CISPR 35]: Physical interface through which electromagnetic energy enters or leaves the EUT.

NOTE – See Figure 1.

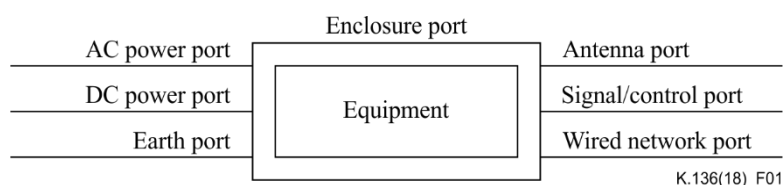


Figure 1 – Examples of ports

3.1.25 portable equipment [b-ETSI EN 301 489-1]: Radio and/or ancillary equipment intended for portable (e.g., handheld) operation, powered by its own integral battery.

3.1.26 primary function [IEC CISPR 35]: Any function of an equipment considered essential for the user or for the majority of users.

3.1.27 primary protection [IEC CISPR 35]: Means by which the majority of surge stress is prevented from propagating beyond a designated location (preferably the building entrance point).

3.1.28 primary protector [IEC CISPR 35]: Surge protection device used for the primary protection of analogue/digital ports that may connect to cables that leave the building structure.

3.1.29 signal/control port [IEC CISPR 35]: Port intended for the interconnection of components of an EUT, or between an EUT and AE and used in accordance with relevant functional specifications (for example for the maximum length of cable connected to it).

3.1.30 wired network port [IEC CISPR 35]: Port for the connection of voice, data and signalling transfers intended to interconnect widely dispersed systems by direct connection to a single-user or multi-user communication network.

NOTE 1 – Examples of these include CATV, PSTN, ISDN, xDSL, LAN and similar networks.

NOTE 2 – These ports may support screened or unscreened.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 ancillary equipment: This is an electrical or electronic equipment, that is intended to be used with a receiver or transmitter and that can be in the same enclosure (see Figure 2) or in a separate enclosure (see Figure 3) of the radio transceiver.

NOTE 1 – It is considered as an ancillary equipment if:

- the equipment is intended for use with a receiver or transmitter to provide additional operational and/or control features to the radio equipment (e.g., to extend control to another position or location); and
- the equipment cannot be used to provide user functions independently of a receiver or transmitter; and
- the receiver or transmitter, to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e., it is not a sub-unit of the main equipment essential to the main equipment basic functions).

NOTE 2 – This is a modified version of the definition given [b-ETSI EN 301 489-1].

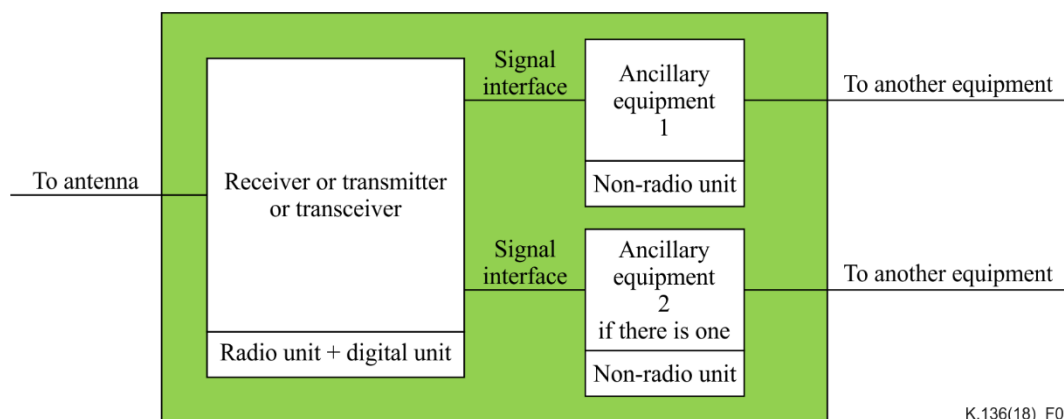


Figure 2 – Ancillary equipment

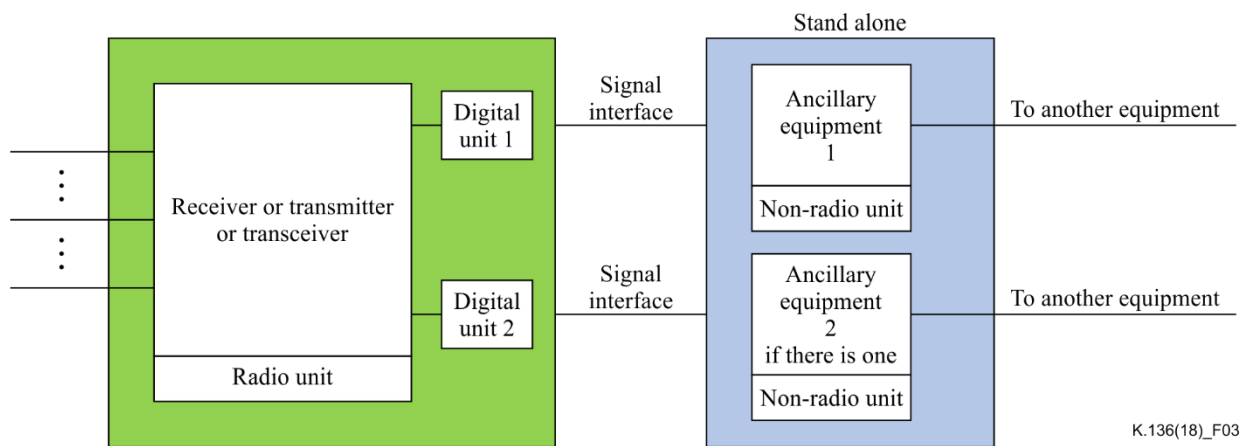


Figure 3 – Standalone ancillary equipment

3.2.2 combined Radio equipment: Equipment consisting of two or more products where at least one of which is radio communication equipment and at least one of which is non-radio equipment.

NOTE – This is a modified version of the definition given in [b-ETSI EN 301 489-1].

3.2.3 customer premises environment: Physical location in the residential, commercial, public and light-industrial locations where telecommunication equipment is installed or used. In this environment the electromagnetic disturbance protection and earthing and bonding conditions might be an uncontrolled facility in the lobby of a building.

The electromagnetic environmental conditions for customer premises environments are described in clause 6.1 of [ITU-T K.34].

3.2.4 DC power port: Port used to connect to the DC supply network.

3.2.5 outdoor locations: An environment where equipment is exposed to the atmosphere and hosts telecommunication equipment. Examples of this environment include street sides, roofs or external sides of buildings, towers and poles.

The electromagnetic environmental conditions for outdoor environments are described in clause 7.1 of [ITU-T K.34].

NOTE – This is a modified version of the definition given in [b-ITU-T K.114].

3.2.6 radio equipment: An electrical or electronic product, which primary function is to intentionally transmits and/or receives radio waves for the purpose of radio communication.

NOTE – This is a modified version of the definition given in [b-ETSI EN 301 489-1].

3.2.7 radio module: Piece of radio equipment that can be added to a product to allow radio communication.

3.2.8 repeater: Device with two radio frequency (RF) ports, both of which are intended to be connected to antennas, capable of receiving, amplifying and transmitting simultaneously in one direction a signal in a base station system (BSS) transmit band and in the other direction a signal in the corresponding BSS receive band.

3.2.9 telecommunication centre: Physical location hosting telecommunication equipment which is managed and operated exclusively by the telecom operator and other business entities. This definition includes the data centres. This environment is dedicated to telecommunication network equipment and is better controlled in terms of electromagnetic disturbance protection and earthing and bonding. The electromagnetic environmental conditions for telecommunication centres are described in clause 6.1 of [ITU-T K.34].

NOTE – This is a modified version of the definition given in [b-ITU-T K.114].

3.2.10 throughput: Number of payload bits successfully received per second for a reference measurement channel in a specified reference condition.

3.2.11 residential location: Location which exists as an area of land designated for the construction of domestic dwellings, and is characterized by the fact that equipment is directly connected to a low-voltage public mains network or connected to a dedicated DC source which is intended to interface between the equipment and the low-voltage mains network.

Examples of residential locations are houses, apartments, and farm buildings used for habitation.

3.2.12 commercial, public and light-industrial location: Location which exists as areas of the city centre, offices, public transport systems (road/train/underground), and modern business centres containing a concentration of office automation equipment (PCs, fax machines, photocopiers, telephones, etc.), and characterized by the fact that equipment is directly connected to a low-voltage public mains network or connected to a dedicated DC source which is intended to interface between the equipment and the low-voltage mains network.

Examples of commercial, public or light-industrial locations are:

- retail outlets, for example shops, supermarkets;
- business premises, for example offices, banks, hotels, data centres;
- areas of public entertainment, for example cinemas, public bars, dance halls;
- places of worship, for example temples, churches, mosques, synagogues;
- petrol stations, car parks, amusement and sports centres;
- general public locations, for example parks, amusement facilities, public offices;
- hospitals, educational institutions, for example schools, universities, colleges;
- public traffic areas, railway stations, and public areas of an airport;
- light-industrial locations, for example workshops, laboratories, service centres.

3.2.13 professional installation: Installation and maintenance of equipment by professional(s) with sufficient knowledge to employ electromagnetic compatibility (EMC) mitigation measures according to the installation instructions.

3.2.14 professional equipment: Equipment for use in trades, professions, or industries which is not intended for sale to the general public.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AAS	Adaptive Antenna System
AC	Alternating Current
AM	Amplitude Modulation
AMN	Artificial Mains Network
BER	Bit Error Ratio
BLER	Block Error Ratio
BSS	Base Station System
BTS	Base Station
CDN	Coupling Decoupling Network
CRT	Cathode Ray Tube
DC	Direct Current

e.i.r.p.	Equivalent Isotropically Radiated Power
e.r.p.	Effective Radiated Power
EMC	Electromagnetic Compatibility
EUT	Equipment Under Test
FER	Frame Erasure Ratio
ISN	Impedance Stabilisation Network
MSR	Multi-Standard Radio
PD	Powered Device
PoE	Power over Ethernet
PSE	Power Sourcing Equipment
QoS	Quality of Service
RF	Radio Frequency
UPS	Uninterruptible Power Supply

5 Conventions

None.

6 Test methods and limits

Emission and immunity requirements are defined in the following clauses.

6.1 Emission requirements

The general requirements for test methods and limits apply, according to [IEC CISPR 32]. Table A.1 applies to equipment intended for use in telecommunication centres, and Table A.2 applies to equipment intended for use in customer premises and outdoor plants.

Radiated emission measurements should be performed at higher frequency bands; Table 1 shows the necessary highest frequency up to which radiated emission tests should be performed.

Table 1 – Required highest frequency for radiated emission test

Highest internal frequency(F_x)	Measured up to highest frequency
$F_x \leq 108 \text{ MHz}$	1 GHz
$108 \text{ MHz} < F_x \leq 500 \text{ MHz}$	2 GHz
$500 \text{ MHz} < F_x \leq 1 \text{ GHz}$	5 GHz
$F_x > 1 \text{ GHz}$	$5 \times F_x$ up to a maximum of 40 GHz
NOTE – F_x : highest fundamental frequency generated or used within the equipment under test (EUT) or highest frequency at which it operates.	

Conducted emission measurements at power input and/or output ports shall be performed using the artificial mains network (AMN) defined in [IEC CISPR 16-1-2] and test methods defined in [IEC CISPR 32]. The test method for alternating current (AC) mains port defined in [IEC CISPR 32] applies to the direct current (DC) power port.

Conducted emission measurements on wired-network ports shall be performed using the impedance stabilization network (ISN) defined in [IEC CISPR 16-1-2] and test methods defined in [IEC CISPR 32].