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Elektromagnetna združljivost (EMC) in zadeve v zvezi z radijskim spektrom (ERM) - Standard elektromagnetne združljivosti (EMC) za fiksne radijske povezave in njihov pribor

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for fixed radio links and ancillary equipment

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Candidate Harmonized European Standard (Telecommunications series)

**Electromagnetic compatibility and
Radio spectrum Matters (ERM);
ElectroMagnetic Compatibility (EMC) standard
for fixed radio links and ancillary equipment**

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Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

Other ETSI standards cover radio communications equipment not listed in the scope.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [2] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is based upon the Generic Standards EN 50081-1 [6] and EN 50082-1 [7].

The present document, together with EN 300 198 [23], EN 300 197 [22], ETS 300 636 [32], ETS 300 431 [28], ETS 300 630 [29], ETS 300 633 [31], ETS 300 639 [34], EN 300 234 [24], ETS 300 407 [26], ETS 300 408 [27], ETS 300 632 [30], ETS 300 638 [33], EN 301 055 [20] and EN 301 021 [19] 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 [1] as amended).

For equipment which can be connected to the Alternating Current (AC) mains supply, the requirements of EN 61000-3-2 [8] and EN 61000-3-3 [9] apply where appropriate from the 1-1-2001.

Technical specifications relevant to the EMC Directive are given in annex A.

National transposition dates

Date of adoption of this EN:	24 September 1999
Date of latest announcement of this EN (doa):	31 December 1999
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 June 2000
Date of withdrawal of any conflicting National Standard (dow):	31 December 2002

1 Scope

The present document covers the assessment of Fixed Radio Links and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC). Technical specifications related to the antenna port of the radio equipment are found in the related product standards for the effective use of the radio spectrum. If the relevant product standard does not specify any spurious emission limits for the antenna port, then the default values as specified in subclause 8.4 of the present document apply.

The present document specifies the applicable EMC tests, the test methods, the limits and the minimum performance criteria for Analogue and Digital Fixed Radio Links operating as fixed point to point, and Point to Multipoint systems as defined in annex B, including the associated ancillary equipment.

The processing and protection switch, (de)modulator, transmitter, receiver, RF filters, branching networks, feeders are covered by the present document. The multiplexing and/or de-multiplexing elements are covered if they form part of the transmitter, receiver and/or transceiver.

The environmental classification used in the present document refers to the environment classification used in the Generic Standards EN 50081-1 [6], EN 50082-1 [7] or the telecommunications centre environment TR 101 651 [25].

The EMC requirements have been selected to ensure an adequate level of compatibility for apparatus at residential, commercial, light industrial or telecommunications centre environment. The levels do not cover extreme cases which may occur in any location but have a low probability of occurrence.

The present document may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena or a continuous phenomena is permanently present, e.g. a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference or the interfered part or both.

Compliance of radio equipment to the requirements of the present document does not signify compliance to any requirements related to the use of the equipment (i.e. licensing requirements).

Compliance to the present document does not signify compliance to any safety requirements. However, it is the responsibility of the assessor of the equipment that any observations regarding apparatus becoming dangerous or unsafe as a result of the application of the tests of the present document, should be recorded in the test report.

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, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] 89/336/EEC: "Council directive of 3 May 1989 on the approximation of the laws of the member states relating to electromagnetic compatibility".
- [2] 98/34/EC: "Directive of the European Parliament and of the Council of 20 July 1998 amending; Directive laying down a procedure for the provision of information in the field of technical standards and regulations".
- [3] CEPT Recommendation 74-01: "Spurious emissions".
- [4] CISPR 16-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus".

- [5] EN 55022 (1998): "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement".
- [6] EN 50081-1 (1992): "Electromagnetic compatibility - Generic emission standard - Part 1: Residential, commercial and light industry".
- [7] EN 50082-1 (1992): "Electromagnetic compatibility - Generic immunity standard - Part 1: Residential, commercial and light industry".
- [8] EN 61000-3-2 (1995): "Electromagnetic compatibility (EMC) - Part 3: Limits - Section 2: Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)".
- [9] EN 61000-3-3 (1995): "Electromagnetic compatibility (EMC) - Part 3: Limits - Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current up to and including 16 A".
- [10] EN 61000-4-2 (1998): "Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test".
- [11] EN 61000-4-3 (1998): "Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio frequency, electromagnetic field immunity test".
- [12] EN 61000-4-4 (1995): "Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test".
- [13] EN 61000-4-5 (1995): "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test".
- [14] EN 61000-4-6 (1996): "Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields".
- [15] EN 61000-4-11 (1994): "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measuring techniques - Voltage dips, short interruptions and voltage variations immunity tests".
- [16] IEC 60050-161: "International Electrotechnical Vocabulary, Chapter 161: Electromagnetic compatibility".
- [17] ITU-R Recommendation F.746-3: "Radio-frequency channel arrangements for radio-relay systems".
- [18] ITU-R Recommendation F.1191-1 (1997): "Bandwidths and unwanted emissions of digital radio-relay systems".
- [19] EN 301 021: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Time Division Multiple Access (TDMA); Point-to-multipoint DRRS in Frequency Division Duplex (FDD) bands in the range 3 GHz to 11 GHz".
- [20] EN 301 055: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Direct Sequence Code Division Multiple Access (DS-CDMA); Point-to-multipoint DRRS in frequency bands in the range 1 GHz to 3 GHz".
- [21] EN 301 126-1: "Fixed Radio Systems; Conformance testing; Part 1: Point-to-Point equipment - Definitions, general requirements and test procedures".
- [22] EN 300 197: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Parameters for DRRS for the transmission of digital signals and analogue video signals operating at 38 GHz".
- [23] EN 300 198: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Parameters for DRRS for the transmission of digital signals and analogue video signals operating at 23 GHz".
- [24] EN 300 234: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); High capacity DRRS carrying 1 x STM-1 signals and operating in frequency bands with about 30 MHz channel spacing and alternated arrangements".

- [25] TR 101 651: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Classification of the electromagnetic environment conditions for equipment in telecommunication networks".
- [26] ETS 300 407: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Parameters for DRRS for the transmission of digital signals and analogue video signals operating around 55 GHz".
- [27] ETS 300 408: "Transmission and Multiplexing (TM); Parameters for radio-relay systems for the transmission of digital signals and analogue video signals operating at around 58 GHz, which do not require co-ordinated frequency planning".
- [28] ETS 300 431: "Transmission and Multiplexing (TM); Digital fixed point-to-point radio link equipment operating in the frequency range 24,25 GHz to 29,50 GHz".
- [29] ETS 300 630: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Low capacity point-to-point DRRS operating in the 1,4 GHz frequency band".
- [30] ETS 300 632: "Transmission and Multiplexing (TM); Fixed radio link equipment for the transmission of analogue video signals operating in the frequency range 24,25 GHz to 29,50 GHz".
- [31] ETS 300 633: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Low and medium capacity point-to-point DRRS operating in the frequency range 2,1 GHz to 2,6 GHz".
- [32] ETS 300 636: "Transmission and Multiplexing (TM); Time Division Multiple Access (TDMA) point-to-multipoint digital radio systems in the frequency range 1 to 3 GHz".
- [33] ETS 300 638: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Fixed point-to-point radio link equipment for the transmission of digital signals and analogue video signal operating in the frequency bands 10 GHz and 14 GHz with 20 MHz alternate channel spacing".
- [34] ETS 300 639: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRRS); Sub-STM-1 DRRS operating in the 13 GHz, 15 GHz and 18 GHz frequency bands with about 28 MHz co-polar and 14 MHz cross-polar channel spacing".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

ancillary equipment: equipment used in connection with radio communications equipment is considered as ancillary equipment if:

- the equipment is intended for use in conjunction with a radio communications equipment to provide additional operational and/or control features, for example to extend control to another position or location; and
- the equipment cannot be used on a stand alone basis to provide user functions independently of a radio communications equipment; and
- the radio communications equipment 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's basic functions).

channel separation: according to ITU-R Recommendation F.1191-1 [18], the CHannel Separation (CHS) is taken as $XS/2$ for alternated frequency channel arrangements and XS for co-channel and interleaved frequency channel arrangements as defined by ITU-R Recommendation F.746-3 [17], XS is the radio-frequency separation between the centre frequencies of adjacent radio-frequency channels on the same polarization and in the same direction of transmission.

fixed equipment: equipment intended for installation in a fixed position.

port: a particular interface of the specified equipment (apparatus) with the electromagnetic environment. Any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see figure 1).

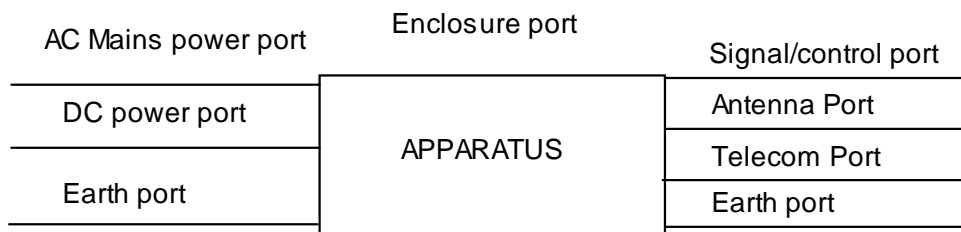


Figure 1: Examples of ports

necessary bandwidth: for digital radio-relay systems the necessary bandwidth is to be considered to have the same value as the occupied bandwidth as defined in (ITU-R Recommendation F.1191-1 [18], subclause 2.2). For application to multi-channel or multi-carrier transmitters/transponders, where several carriers may be transmitted simultaneously from a final output amplifier or an active antenna, the necessary bandwidth is taken to be the transmitter or transponder bandwidth.

occupied bandwidth: 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 $\beta/2$ of the total mean power of a given emission. For digital radio-relay systems the value of percentage $\beta/2$ should be taken as 0,5 % (ITU-R Recommendation F.1191-1 [18], subclause 2.1).

telecommunications port: ports which are intended to be connected to telecommunication networks (e.g. public switched telecommunication networks, integrated services digital networks), local area networks (e.g. Ethernet, Token Ring) and similar networks.

product standard: functional standard describing frequency management parameters of radio product.

radio communications equipment: telecommunication equipment which includes one or more radio transmitters and/or receivers and/or parts thereof for use in a fixed, mobile or portable application. It can be operated with ancillary equipment but if so, is not dependent on it for basic functionality.

spurious emission: emission on a frequency, or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products but exclude out-of-band emissions (CEPT Recommendation 74-01 [3]).

operating frequency range: range(s) of radio frequencies covered by the Equipment Under Test (EUT) without any change of units.

enclosure port: physical boundary of the equipment onto which an electromagnetic phenomenon may radiate or impinge. In the case of integral antenna equipment, this port is inseparable from the antenna port.

continuous phenomena (continuous disturbance): electromagnetic disturbance, the effects of which on a particular device or equipment cannot be resolved into a succession of distinct effects (IEC 60050-161 [16]).

transient phenomena: pertaining to or designating a phenomena or a quantity which varies between two consecutive steady states during a time interval short compared with the time-scale of interest (IEC 60050-161 [16]).

3.2 Abbreviations

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

AC	Alternating Current
BER	Bit Error Ratio
CCS	Central Controller station
CHS	Channel Separation
CRS	Central Radio Station
CW	Continuous Wave
DC	Direct Current
DRRS	Digital Radio relay Systems
EM	Electromagnetic
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
LISN	Line Impedance Stabilizing Network
RF	Radio Frequency
RS	Repeater Stations
TS	Terminal Stations

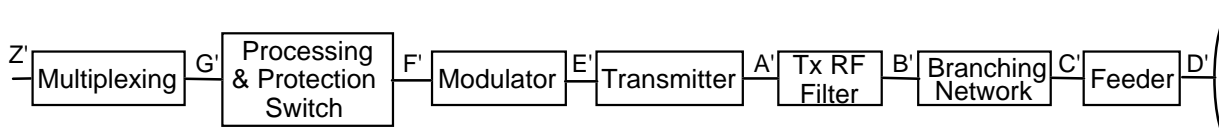
4 General test conditions

This clause defines the general test configuration and is relevant to clauses 8 and 9.

4.1 Test conditions and configurations

This subclause defines the test conditions and configurations for the emission and immunity tests as follows:

- a transmitter shall, as a minimum, comprise the element between E' and A' of figure 2. Additionally the transmitter may comprise any of the other elements from the transmitter chain shown in figure 2. If these additional elements are part of the transmitter or system they shall also meet the requirements of the present document;

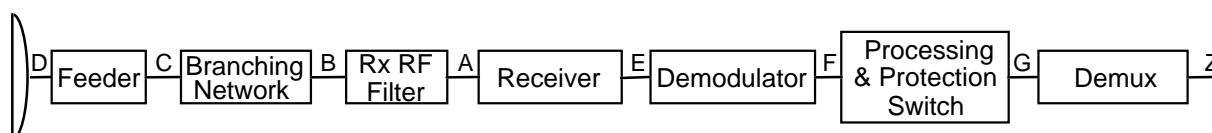


NOTE 1: For the purposes of defining the reference points, the branching network (B' to C') does not include a hybrid.

NOTE 2: Points B' and C' may coincide, dependent on the equipment configuration.

Figure 2: Elements of a transmitter

- a receiver shall, as a minimum, comprise the element between A and E of figure 3. Additionally the receiver may comprise any of the other elements from the receiver chain shown in figure 3. If these additional elements are part of the receiver or system they shall also meet the requirements of the present document;



NOTE 1: For the purposes of defining the reference points, the branching network (B to C) does not include a hybrid.

NOTE 2: Points B and C may coincide, dependent on the equipment configuration.

Figure 3: Elements of a receiver