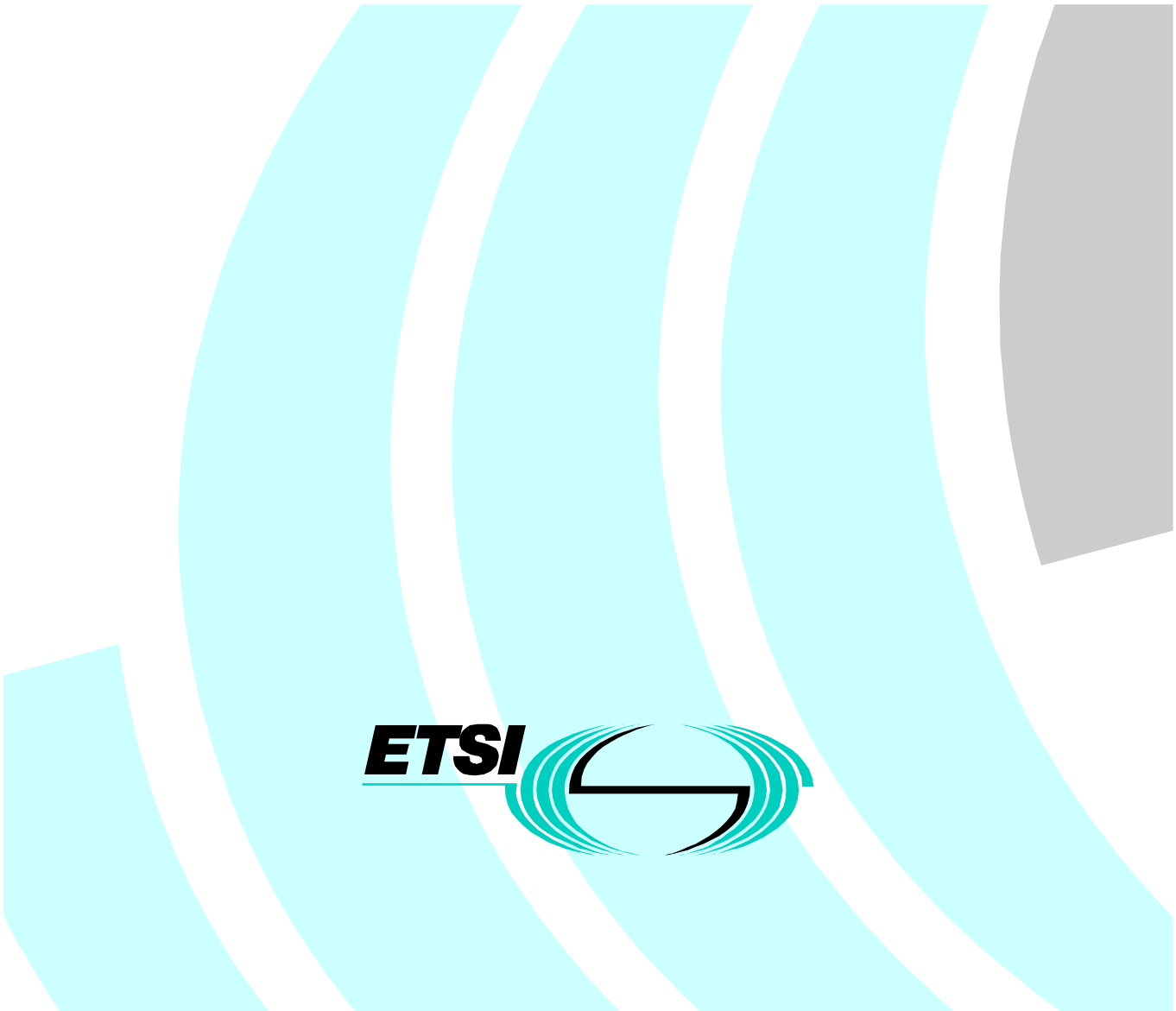
ETSI EN 300 761-2 V1.1.1 (2001-06)

Candidate Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Automatic Vehicle Identification (AVI) for railways operating in the 2,45 GHz frequency range; Part 2: Harmonized standard covering essential requirements under article 3.2 of the R&TTE Directive



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Contents

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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).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [5] 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 Directive 1999/5/EC [1] 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 ("the R&TTE Directive") [1].

The present document is part 2 of a multi-part deliverable covering the Short Range Devices (SRD); Automatic Vehicle Identification (AVI) for railways operating in the 2,45 GHz frequency range, as identified below:

Part 1: "Technical characteristics and methods of measurement";

Part 2: "Harmonized standard covering essential requirements under article 3.2 of the R&TTE Directive".

National transposition dates	
Date of adoption of this EN:	15 June 2001
Date of latest announcement of this EN (doa):	30 September 2001
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2002
Date of withdrawal of any conflicting National Standard (dow):	31 March 2003

Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive [1]. Each standard is a module in the structure. The modular structure is shown in figure 1.

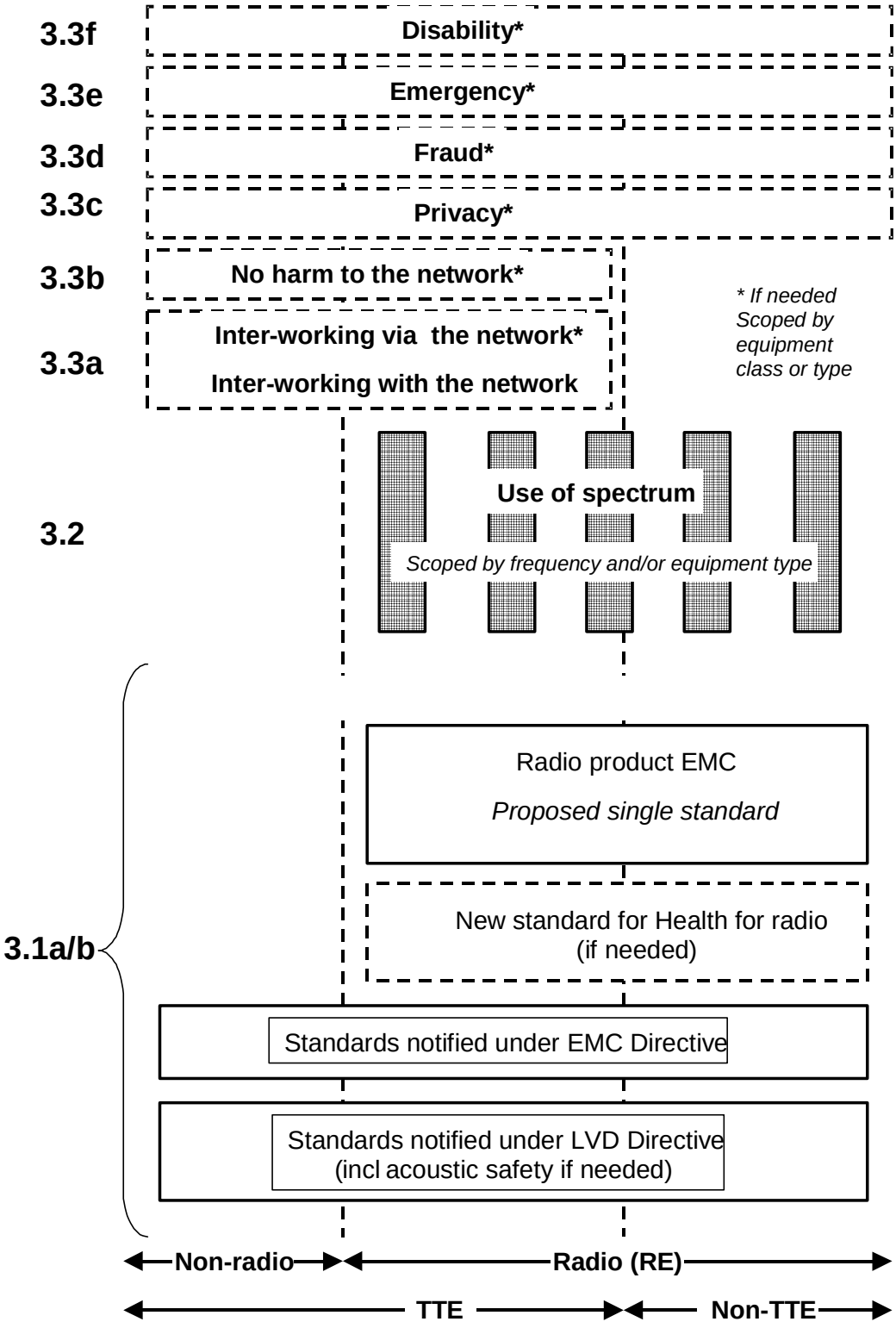

Figure 1: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure shows the different clauses of article 3 of the Directive.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.3 various horizontal boxes are shown. Their dotted lines indicate that essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The bottom of the figure shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. The General Standard will always apply to it, and a radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement is adopted by the Commission and if the equipment in question lies within the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the Directive may be covered in just the General Standard or in a set of standards that includes the General Standard.

The modularity principle has been taken because:

- it minimizes the number of standards needed. Because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment;

- it provides scope for standards under articles 3.2 and 3.3 to be added when new frequency bands are agreed or when the Commission takes decisions under article 3 without requiring alteration of standards that are already published;

- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

1 Scope

The present document applies to a dedicated 2,45 GHz Short Range Device (SRD) microwave link intended for a European wide data communication system for Railway applications, Automatic Vehicle Identification (AVI) which fulfil the Union Internationale des Chemins de fer (UIC) specifications and are interoperable with the current UIC system except for the interrogator (Track Units (TU)) bandwidth.

The present document contains the technical characteristics for radio equipment and is referencing by CEPT/ERC Recommendation T/R 70-03 [4].

The Interrogator bandwidth is limited to 8 MHz shared within five channels:

- with a Radio Frequency (RF) output connection and specified antenna or with an integral antenna;
- for data transmission only;
- operating on radio frequencies in the 2,446 GHz to 2,454 GHz Industrial, Scientific and Medical (ISM) band, with power levels up to 500 mW e.i.r.p.

The present document is a product standard covering various Railway applications where the data transmission of the system will be active only during the presence of the train.

The present document covers fixed installed interrogators (TUs) and transponders (mobile stations). For certain measurements the transponders are measured together with the whole interrogating system.

The in-track base station (interrogator) transmit and receive modulations are a combination of Amplitude Shift Keying (ASK) and Frequency Shift Keying (FSK) respectively.

The present document supports the necessary transmitter and receiver data rates between 192 kbit/s and 384 kbit/s according to the type of transaction.

It covers the minimum characteristics considered necessary in order to make the best use of the available frequencies. It does not necessarily include all the characteristics which may be required by a user, nor does it necessarily represent the optimum performance achievable.

The present document includes specifications for methods of measurement for equipment fitted with antenna sockets and/or integral antenna.

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the manufacturer. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

The present document is intended to cover the provisions of article 3.2 of Directive 1999/5/EC [1] (R&TTE Directive), which states that "… radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference.".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive [1] may apply to equipment within the scope of the present document.

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 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).

[2] ETSI EN 300 761-1 (V 1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Automatic Vehicle Identification (AVI) for railways operating in the 2,45 GHz frequency range; Part 1: Technical characteristics and methods of measurement".

[3] ETSI ETR 028: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".

[4] CEPT/ERC Recommendation T/R 70-03: "Relating to the use of Short Range Devices (SRD)".

[5] 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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [1], and EN 300 761-1 [2], apply.

3.2 Symbols

For the purposes of the present document, the symbols defined in EN 300 761-1 [2], apply.

3.3 Abbreviations

For the purposes of the present document, the abbreviations defined in EN 300 761-1 [2], apply.

4 Technical requirements specifications

4.1 Transmitter requirements

4.1.1 Equivalent isotropically radiated power

The equivalent isotropically radiated power, as defined in EN 300 761-1 [2], clause 7.1.1, shall not exceed the limits in EN 300 761-1 [2], clause 7.1.3.

This requirement applies to transmitters with an integral or dedicated antenna.

4.1.2 Frequency error

The frequency error, as defined in EN 300 761-1 [2], clause 7.2.1, shall not exceed the limits in EN 300 761-1 [2], clause 7.2.3.

4.1.3 Transmitter spectrum mask

The transmitter spectrum mask, as defined in EN 300 761-1 [2], clause 7.3.1, shall not exceed the limits in EN 300 761-1 [2], clause 7.3.3, table 2.

4.1.4 Spurious emissions

The spurious emissions, as defined in EN 300 761-1 [2], clause 7.6.1, shall not exceed the limits in EN 300 761-1 [2], clause 7.6.6, table 5.

This requirement applies to all transmitters.

4.1.5 Duty cycle

The duty cycle, as defined in EN 300 761-1 [2], clause 7.7.1, shall not exceed the limits in EN 300 761-1 [2], clause 7.7.3, table 6.

This requirement applies to all transmitters.

4.2 Receiver requirements

4.2.1 Co-channel rejection

The co-channel rejection, as defined in EN 300 761-1 [2], clause 8.3.3.1, shall not exceed the limits in EN 300 761-1 [2], clause 8.3.3.3.

4.2.2 Adjacent band selectivity

The adjacent band selectivity, as defined in EN 300 761-1 [2], clause 8.3.4.1, shall not exceed the limits in EN 300 761-1 [2], clause 8.3.4.3.

4.2.3 Spurious response rejection and desensitization

The blocking or desensitization, as defined in EN 300 761-1 [2], clauses 8.3.1 and 8.3.5.1, shall not exceed the limits in EN 300 761-1 [2], clauses 8.2.3 and 8.3.5.3, table 7.

4.2.4 Intermodulation response rejection

The intermodulation response rejection, as defined in EN 300 761-1 [2], clauses 8.3.1 and 8.3.6.1, shall not exceed the limits in EN 300 761-1 [2], clause 8.2.3 and 8.3.6.3.

4.2.5 Spurious radiations

The spurious radiations, as defined in EN 300 761-1 [2], clauses 8.4.1, shall not exceed the limits in EN 300 761-1 [2], clause 8.4.5.

This requirement applies to all receivers.

4.2.6 Transponder spurious radiation

The transponder spurious radiation, as defined in EN 300 761-1 [2], clause 9.4.1, shall not exceed the limits in EN 300 761-1 [2], clause 9.4.3 table 11.

5 Testing for compliance with technical requirements

5.1 Essential radio test suites

5.1.1 Environmental conditions for testing

5.1.1.1 Normal and extreme test-conditions

Type tests shall be made under normal test conditions, and also, where stated, under extreme test conditions.

The test conditions and procedures shall be as specified in EN 300 761-1 [2], clauses 5.3 to 5.4.1.1.

5.1.1.2 Test power source

The test power source shall meet the requirements of EN 300 761-1 [2], clause 5.2.

5.1.2 Choice of samples for test suites

Measurement shall be performed, according to the present document, on samples of equipment defined in EN 300 761-1 [2], clauses 4.2.1 to 4.2.3.2.

5.1.3 Transmitter test suites

5.1.3.1 Equivalent isotropically radiated power (e.i.r.p)

Either:

- the test specified in EN 300 761-1 [2], clause 7.1.2, shall be carried out; or
- this test suite applies to transmitters with an integral or dedicated antenna.

5.1.3.2 Frequency error

The test specified in EN 300 761-1 [2], clause 7.2.2, shall be carried out.

This test suite applies to all transmitters.

5.1.3.3 Transmitter spectrum mask

The test specified in EN 300 761-1 [2], clause 7.3.2, shall be carried out.

5.1.3.4 Spurious emissions

Either:

- the tests specified in EN 300 761-1 [2], clause 7.6.3 and EN 300 761-1 [2], clause 7.6.4, shall be carried out; or
- the test specified in EN 300 761-1 [2], clause 7.6.5, shall be carried out.

5.1.4 Receiver test suites

5.1.4.1 Spurious radiations

Either:

- the tests specified in EN 300 761-1 [2], clause 8.4.2 and EN 300 761-1 [2], clause 8.4.3, shall be carried out; or
- the test specified in EN 300 761-1 [2], clause 8.4.4, shall be carried out.

5.1.4.2 Transponder spurious radiation

The test specified in EN 300 761-1 [2], clause 9.4.2, shall be carried out.

5.2 Other test specifications

The requirements in clause 4.2 have been set on the assumption that the test specifications in table 1 will be used to verify the performance of equipment.

Table 1: Receiver test specifications

Clause	Performance requirement	Clause on EN 300 761-1 [2] containing the test method
4.2.1	Co-channel rejection	8.3.3.2
4.2.2	Adjacent channel selectivity	8.3.4.2
4.2.3	Spurious response rejection and desensitization	8.3.5.2
4.2.4	Intermodulation response rejection	8.3.6.2
4.2.5	Spurious radiations	8.4.2 and 8.4.3; or 8.4.4

6 Interpretation of measurement results

The interpretation of the results recorded in the test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit shall be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be separately included in the test report;
- the value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 2.

Table 2: Measurement uncertainty

RF frequency	$\pm 1 \times 10^{-7}$
RF power, conducted	±4 dB
Adjacent channel power	±3 dB
Conducted emission of transmitter, valid up to 12,75 GHz	±4 dB
Conducted emission of receivers	±3 dB
Radiated emission of transmitter, valid up to 12,75 GHz	±6 dB
Radiated emission of receiver, valid up to 12,75 GHz	±6 dB

For the test methods, according to the present document the uncertainty figures shall be calculated according to the methods described in the ETR 028 [3] and shall correspond to an expansion factor (coverage factor) k = 1,96 or k = 2 (which provide confidence levels of respectively 95 % and 95,45 % in case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Table 2 is based on such expansion factors.

The particular expansion factor used for the evaluation of the measurement uncertainty shall be stated.

History

Document history				
V1.1.1	July 2000	Public Enquiry	PE 20001124:	2000-07-26 to 2000-11-24
V1.1.1	April 2001	Vote	V 20010615:	2001-04-16 to 2001-06-15
V1.1.1	June 2001	Publication		