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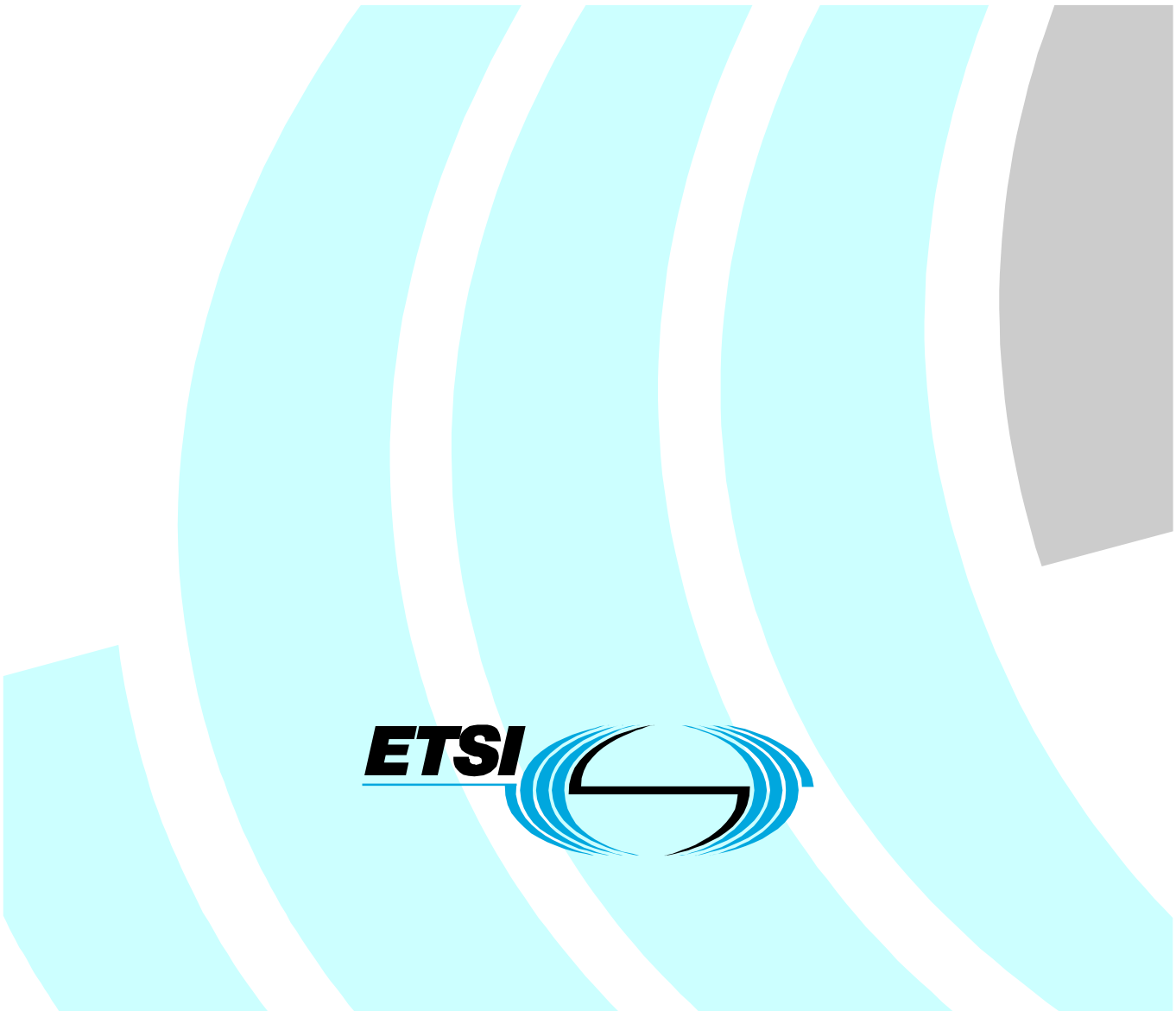
Technical Report

Electromagnetic compatibility and Radio spectrum Matters (ERM); Guide to the application of harmonized standards to multi-radio and combined radio and non-radio equipment; Part 1: ElectroMagnetic Compatibility



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Contents

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document is part 1 of a multi-part deliverable covering the guide to the application of harmonized standards to multi-radio and combined radio and non-radio equipment, as identified below:

Part 1: "ElectroMagnetic Compatibility";

Part 2: "Efficient use of the radio spectrum".

Introduction

The following text is taken from the Harmonized Standard Pro-forma and is included here to provide the reader with an overview of harmonized standards and their relationship with the R&TTE Directive [1].

Harmonized standards produced by ETSI for use under the R&TTE Directive [1] are 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.

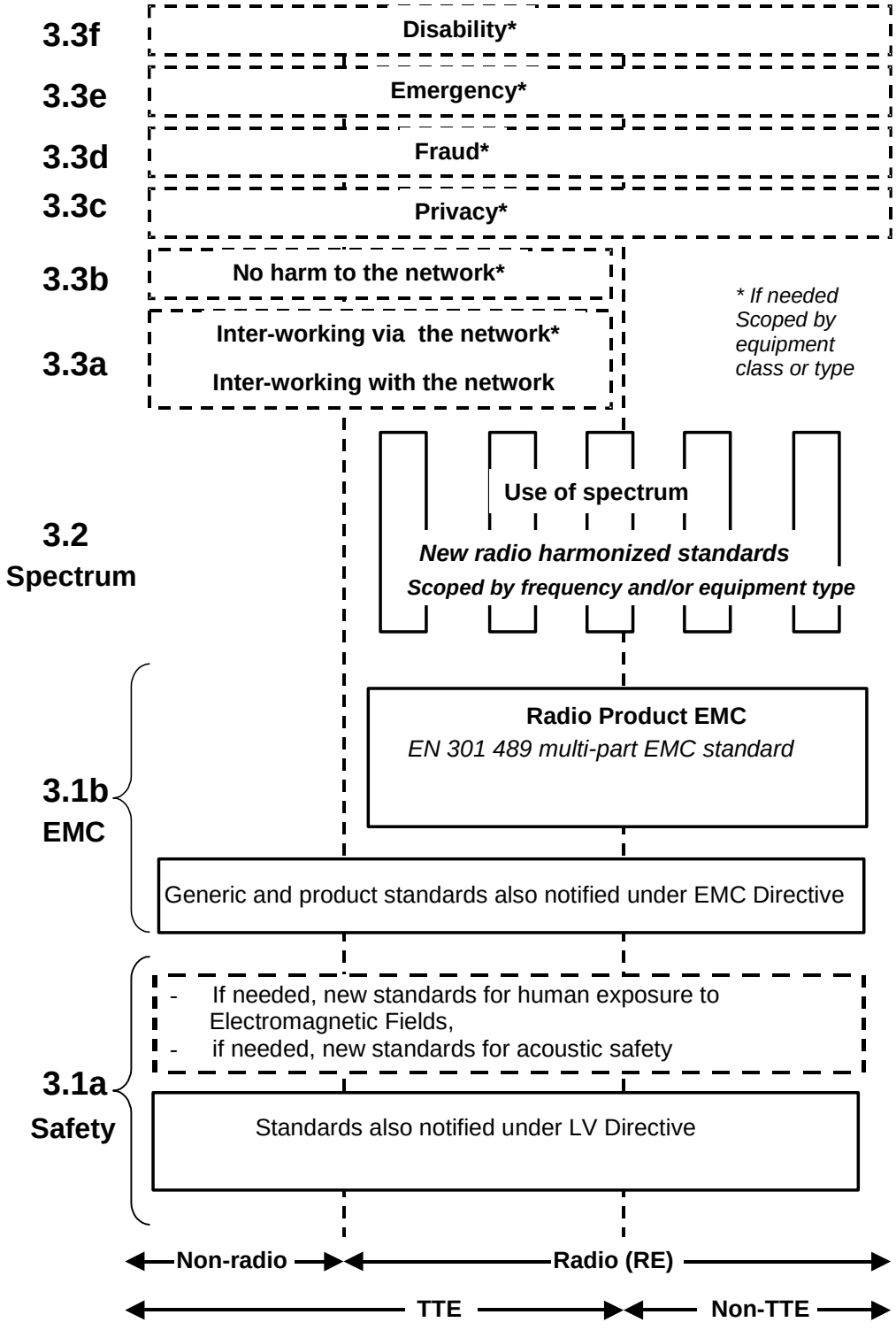

Figure 1: Modular structure for the various standards used under the R&TTE Directive [1]

The left hand edge of the figure 1 shows the different clauses of article 3 of the R&TTE Directive [1].

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of the present document 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 vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment. 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 3.1b the diagram shows EN 301 489, the multi-part product EMC standard for radio used under the EMC Directive [2].

For article 3.1a the diagram shows the existing safety standards currently used under the LV Directive [3] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

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. 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 under the R&TTE Directive [1] is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive [1] may be covered in a set of standards.

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 to be added:
  - under article 3.2 when new frequency bands are agreed; or
  - under article 3.3 should the Commission take the necessary decisions 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 provides guidance in assessing the technical difficulties with the application of harmonized EMC standards to combined products, which include a radio and/or a telecommunication function. Examples to be covered include products containing multiple radio technologies, radio in IT equipment, radio in domestic equipment, etc.

The present document is intended to cover these combined products, which are subject to the provisions of the R&TTE Directive [1] as a result of this combination.

The purpose of the present document is:

- to provide guidance with the testing of this type of equipment,
- to eliminate duplicate testing wherever possible,
- to recommend the selection of appropriate performance assessment and performance criteria for this type of equipment,
- to provide guidance for conformance evaluation and market surveillance.

Part 2 of the present document provides guidance on the application of harmonized radio product standards for combined products under article 3.2 (effective use of spectrum) of the R&TTE Directive [1].

The present document does not cover:

- single custom built products that are tailored to a specific customer quotation,
- product that operate independently if they are not contained within a single enclosure.

2 References

For the purposes of this Technical Report (TR) the following references apply:

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

[3] 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.

[4] EN 50083-2: "Cable networks for television signals, sound signals and interactive services - Part 2: Electromagnetic compatibility for equipment".

[5] EN 50130-4: "Alarm systems - Part 4: Electromagnetic compatibility - Product family standard: Immunity requirements for components of fire, intruder and social alarm systems".

[6] EN 55011: "Industrial, scientific and medical (ISM) radio-frequency equipment - Radio disturbance characteristics - Limits and methods of measurement".

[7] EN 55013: "Limits and methods of measurement of radio disturbance characteristics of broadcast receivers and associated equipment".

[8] EN 55014-1: "Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission - Product family standard".

[9] EN 55014-2: "Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard".

[10] EN 55015: "Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment".

[11] EN 55020: "Electromagnetic immunity of broadcast receivers and associated equipment".

[12] EN 55022: "Limits and methods of measurement of radio disturbance characteristics of information technology equipment".

[13] EN 55024: "Information technology equipment - Immunity characteristics - Limits and methods of measurement".

[14] EN 50065-1: "Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz - Part 1: General requirements, frequency bands and electromagnetic disturbances".

[15] EN 55103-1: "Electromagnetic compatibility - Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use - Part 1: Emission".

[16] EN 55103-2: "Electromagnetic compatibility - Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use - Part 2: Immunity".

[17] EN 61000-3-2: "Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)".

[18] EN 61000-3-3: "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".

[19] EN 61000-3-11: "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".

[20] EN 61000-6-2: "Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments".

[21] EN 61547: "Equipment for general lighting purposes - EMC immunity requirements".

[22] ETSI EN 301 489-1 "ElectroMagnetic compatibility and Radio spectrum Matters (ERM);ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements".

[23] Article S1, No S1.145 of the Radio Regulations: "Terms and definitions".

[24] ETSI EN 301 843-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for marine radio equipment and services; Part 1: Common technical requirements".

[25] IEEE standard 1394: "IEEE Standard for a High Performance Serial Bus".

3 Definitions and abbreviations

3.1 Definitions

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

combined equipment: any equipment made of two or more individual products or functions

NOTE: At least one of the individual products or functions falls within the scope of the R&TTE Directive [1]. The result of this combination provides additional control and/or functionality to the combined equipment.

communications link: any link used to convey information between two or more separate pieces of equipment

NOTE: The communications link may utilize any technology as the underlying transport mechanism.

component Part: part of the combined equipment that provides a (additional) function to the combined equipment but cannot operate individually

control: any signals, whether analogue or digital, designed to change the basic operation, or internal configuration of the receiving product, except where selections are made from predetermined, unchangeable options

exclusion band: radio frequency range over which EMC testing is not performed

function: functionality that cannot be identified as a separate product and is embedded into another product

information transfer: any signals, whether analogue or digital, designed to transfer information or to select from predetermined, unchangeable options, built into the receiving product

NOTE: This includes any handshaking or transfer aids.

manufacturer: manufacturer of the equipment, or his authorized representative, or an equipment supplier to the European market

multi-radio equipment: radio equipment containing two or more radio transmitters and/or receivers using different technologies that may operate simultaneously

performance criteria: criteria used to evaluate the performance of equipment during and after the application of the electromagnetic phenomena

port: particular interface, of the specified equipment (apparatus), with the electromagnetic environment

EXAMPLE: For example, any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see figure 2).

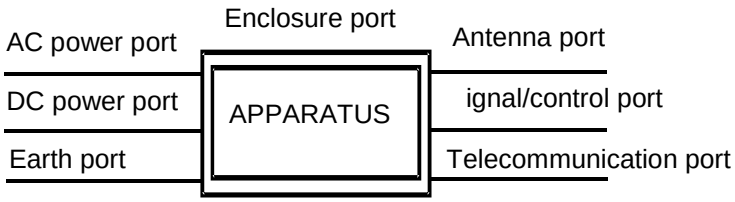

Figure 2: Examples of ports

NOTE: An interface, which uses optical fibre, is not a port for the purposes of testing because it does not interact with the electromagnetic environment within the frequency range, which is applicable for the present document. An optical fibre interface may still be used in the assessment of performance.

primary function: function of a combined equipment, declared by the manufacturer, as the key operation of the equipment

primary product: individual product within a combined equipment that provides the primary function

telecommunication port (Telecommunication/Network Port): ports for voice, data and signalling transfer which are intended to interconnect widely-dispersed systems via such means as direct connection to multi-user telecommunications networks (e.g. public switched telecommunications networks, integrated services digital networks, xDSL, etc.), local area networks (e.g. Ethernet, Token Ring, etc.), and similar networks

NOTE 1: Ports generally intended for interconnection of components of an ITE system under test (e.g. RS-232, parallel printer, Universal Serial Bus (USB), IEEE Standard 1394 [25] ("Fire Wire"), etc.) and used within its intended specifications, e.g. maximum length, are not considered to be telecommunications/network ports under this definition (see EN 55022 [12]).

NOTE 2: All cables are to remain connected to the ITE system during this conducted emission measurement as required for both the conducted and radiated compliance measurements.

3.2 Abbreviations

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

AC	Alternating Current
DC	Direct Current
EMC	ElectroMagnetic Compatibility
EU	European Union
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
ISM	Industrial, Scientific and Medical equipment
ITE	Information Technology Equipment
LAN	Local Area Network
PABX	Private Automatic Branch eXchange
PC	Personal Computer
PDA	Personal Digital Assistant
R&TTE	Radio and/or Telecommunications Terminal Equipment
RF	Radio Frequency
RLAN	Radio Local Area Network
USB	Universal Serial Bus
WAN	Wide Area Network

4 Products considered in the present document

4.1 Relationship between individual components of a combined product

In all of the various scenarios at least one of the **products** or **functions** falls within the scope of the R&TTE Directive [1].

Figures 3 to 9 illustrate the various product combinations considered in the present document.

4.1.1 Scenario 1

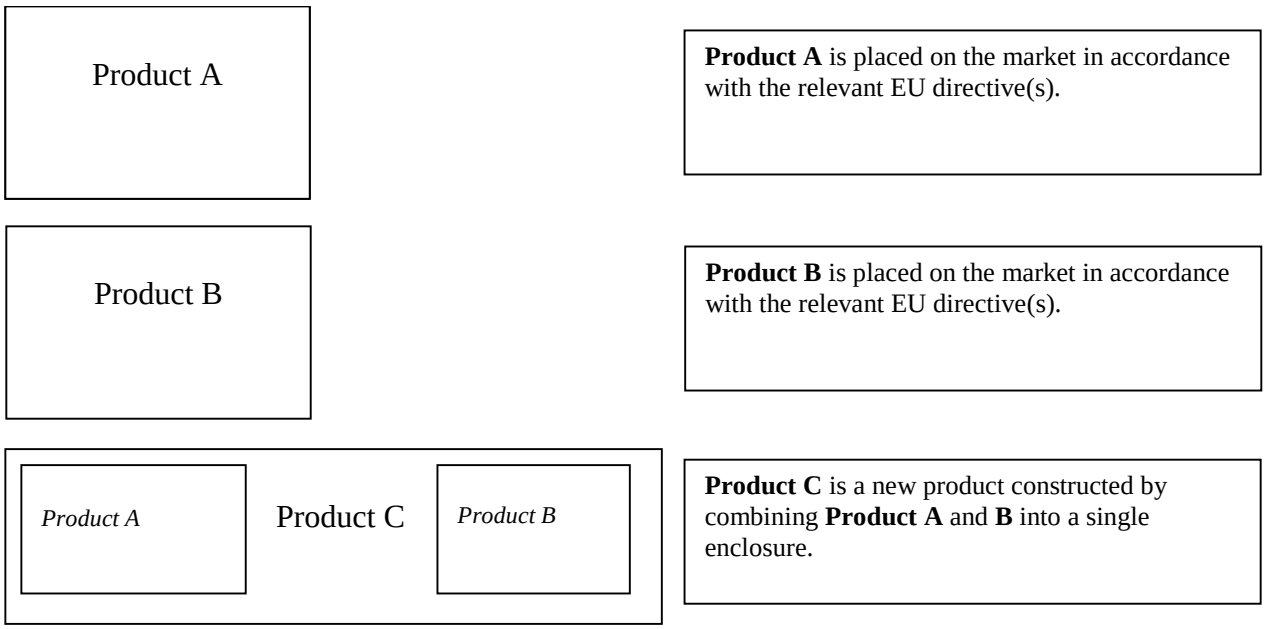

Figure 3

In this scenario all three of the above products are products in their own right with their own functionality and compliance to their respective EU directives, but may in some cases be reliant upon one of the other products for its power supply. In this scenario either **product A** and/or **product B** is a product that falls within the scope of the R&TTE Directive [1] therefore **product C** also falls under the scope of the R&TTE Directive [1].

4.1.2 Scenario 2

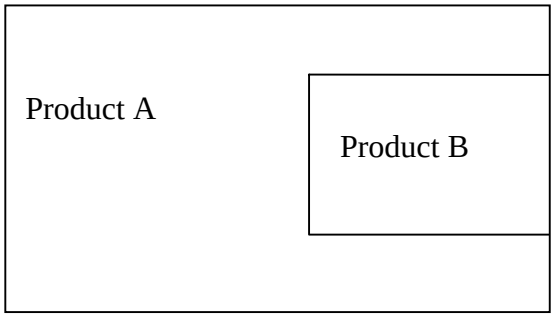

Figure 4

Product A is a product in its own right and is placed upon the EU market in accordance with the relevant directives. **Product B** is dependent upon **product A** and relies upon **product A** for control and possibly power. **Product B** is physically installed within **product A** according to the manufacturers instruction, e.g. plug and socket, hard wiring. There may be multiple types of **product B's** within a single **product A.**

4.1.3 Scenario 3

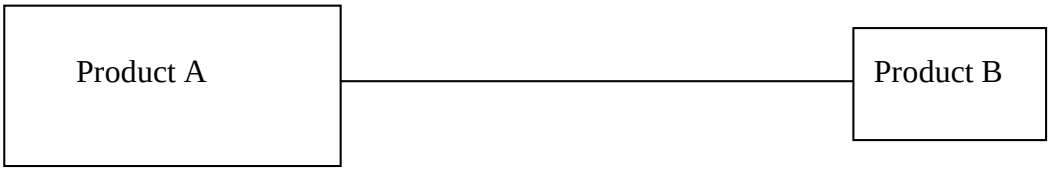

Figure 5

Product A is a product in its own right and is placed upon the EU market in accordance with the relevant directives. **Product B** is dependent upon **product A** and relies upon **product A** for control and possibly its power supply. **Product B** is physically connected by either cable or fibre to **product A**, and the two products may be some distance apart. There may be several **product B's** connected to a single **product A**.

4.1.4 Scenario 4

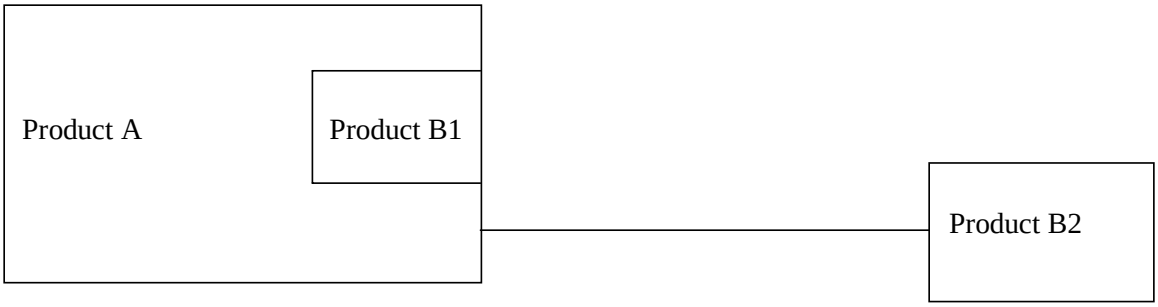

Figure 6

This scenario is a combination of the previous two scenarios. **Product B1** is physically installed within **product A** according to the manufacturers instruction, e.g. plug and socket, hard wiring, whilst **product B2** is physically connected by either cable or fibre to **product A** and may be some distance apart.

4.1.5 Scenario 5

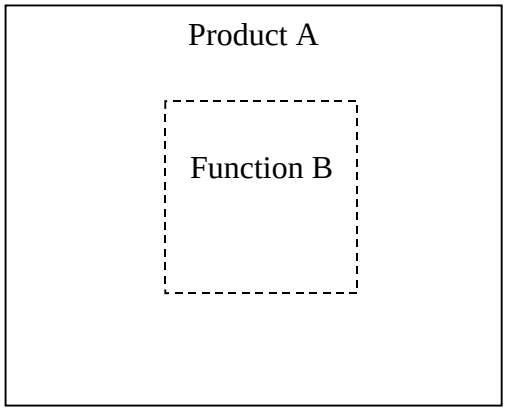

Figure 7

Product A was a product in its own right and was placed upon the EU market in accordance with the relevant directives. In this scenario an additional function, **function B,** is incorporated into **product A** during a design evolution and cannot be identified as a separate part of **product A**. However **product A** can be operated without using **function B**.

4.1.6 Scenario 6

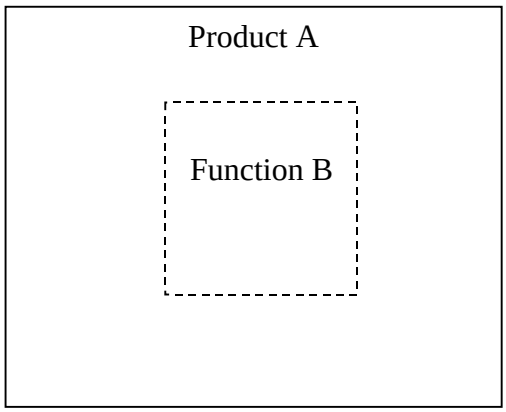

Figure 8

Function B is part of **product A** which was added during design. **Product A** cannot be operated without using **function B**.

4.1.7 Scenario 7

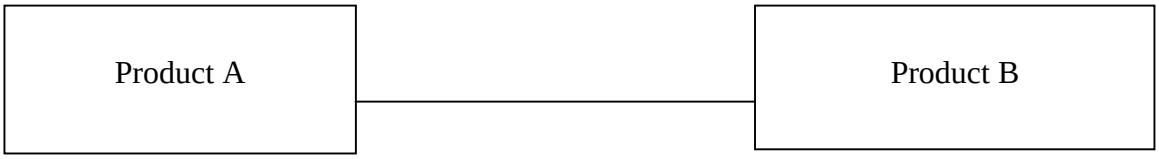

Figure 9

Products A and **B** are products in their own right. However **product A** relies upon **product B** for its operation. **Product B** may work with other products. The link between **product A** and **B** may be either a physical link (e.g. cable) or non-physical (e.g. radio).

5 Application of harmonized standards to combined equipment

5.1 Functional dependencies

The following table takes the above scenarios, from clause 4.1, and places them into a category dependant upon whether the individual products/functions can operate independently of each other. The final column in the table indicates where guidance upon application of harmonized standards can be found.

Multi radio products, as detailed in clause 6, can be in any of the scenarios described in clause 4.1.

Table 1: Functional dependencies

	Product A		Product/Function B		Category	Reference clause in present document for application of harmonized standards
	Works alone	**Does not work alone**	**Works alone**	**Does not work alone**		
Scenario 1	X		X		1	5.2
Scenario 2	X			X	2	5.3.1
Scenario 3	X			X	2	5.3.2
Scenario 4	X			X	2	5.3.1 and 5.3.2
Scenario 5	X			X	2	5.3.1
Scenario 6		X		X	3	5.4
Scenario 7		X	X		2	5.3.2
NOTE: Product B can mean more than one product.						

5.2 Category 1 - where all products can operate independently of each other

In this category it is assumed that the individual products will have been assessed and shown to be in compliance with the relevant directives.

The combined equipment should comply with article 3.1(b) of the R&TTE Directive [1].

Individual products used within the combined equipment have complete functionality in their own right. If used on their own then the relevant harmonized EMC standard for that product should be used to demonstrate conformity for that product.

Evaluation of combined equipment may be made by reviewing the existing assessments of the individual products. If an individual product is used according to its manufacturers instructions, and it has been previously assessed in a configuration which is representative of the combined equipment usage, it is not necessary to re-assess that product or the combined equipment. Additional assessment of the combined equipment should only be made where there is insufficient information to make an evaluation, or where the results of the evaluation are unclear.

5.2.1 Emissions

It is recognized that the individual products which make up the combined equipment may have been assessed to different harmonized EMC standards with differing emission limits. However, for combined equipment, the limits used to demonstrate compliance should be taken from the harmonized EMC standard for the primary product (declared by the manufacturer). Ports not covered in the harmonized EMC standard relevant to the primary product should be assessed against the details set out for these ports in the harmonized EMC standards for the other products contained within the combined equipment.

Where one or more of the products is a radio the exclusion band details should be taken from the harmonized radio product EMC standard and taken into account and applied during the EMC assessment of the combined equipment.

Where the emissions from the combined equipment are identified as spurious emissions, as defined in ITU-R radio regulation S1.145 [23], from any radio product incorporated into the combined equipment, these emissions should be regarded as radio spurious emissions subject to article 3.2 of the R&TTE Directive [1]. The assessment of these spurious emissions can be found in the harmonized radio standard for use under article 3.2 of the R&TTE Directive [1].

5.2.2 Immunity

It is recognized that the individual products which make up the combined equipment may have been assessed to different harmonized EMC standards with differing immunity test levels, phenomena and performance criteria. However, for combined equipment, the harmonized EMC standard for the primary product (declared by the manufacturer) should be used.

The following additional immunity tests should be applied to the combined equipment if not already included in the assessment of the primary product:

- conducted immunity on telecommunications, signal and control ports as defined in the harmonized EMC standards for the other products contained within the combined equipment;
- radiated immunity (Radio Frequency electromagnetic field) as defined in the harmonized EMC standards for the radio and/or telecommunication functions contained within the combined equipment.

Where one or more of the products is a radio the exclusion band details should be taken from the harmonized radio product EMC standard and be taken into account and applied during the EMC assessment of the combined equipment.

If additional immunity tests have been performed then the relevant performance criteria should be taken from the harmonized EMC product standard containing these tests.

Where the combined equipment relies on one or more communications links for its operation, then these links should be maintained during immunity testing in accordance with the relevant harmonized EMC product standard, and any degradation of performance should be in accordance with the manufacturers declaration.

For a combined equipment containing a radio, loss of link or degradation of performance should not be considered as a non-compliance if this is due to a narrow band receiver response as defined in the relevant radio EMC product harmonized standard. For combined equipment containing radio products the performance criteria should include that the transmitter is not unintentionally operated during testing. The actual performance criteria used should be recorded in any subsequent test report.

5.3 Category 2 - where one or more of the individual products cannot operate independently

Within this category of combined equipment, the product providing the control functions can be operated separately and therefore will have been assessed to the relevant harmonized EMC standard for that product.

The combined equipment shall comply with article 3.1(b) of the R&TTE Directive [1].

5.3.1 Products physically incorporated within another product

When a combined equipment is made up from the incorporation of one or more products into another product, then the assessment of the combined equipment should be on the same basis as that recommended in clauses 5.2.1 and 5.2.2.

5.3.2 Products connected to, but not physically incorporated within, another product

When a combined equipment is made up from one or more products connected to, but not physically incorporated into another product, then the EMC assessment may be carried out using one of the following options:

- where the testing of the combined equipment may be performed on a complete configuration which is representative of typical configuration, then the assessment should be on the same basis as that recommended in clauses 5.2.1 and 5.2.2;

- where the physical and/or cable distance between the various parts of the combined equipment is such that testing of the combination would not be representative of a typical configuration, then each part of the combined equipment may be evaluated individually to the relevant harmonized EMC standard. Details of typical configurations should be declared by the manufacturer.

Care should be taken during testing to provide adequate control of the individual parts in order to maintain representative operation.

5.4 Category 3 - where none of the component parts operate independently

This category of combined equipment is characterized by the fact that the various component parts cannot operate independently.

The combined equipment should comply with article 3.1(b) of the R&TTE Directive [1].

The primary function of the combined equipment should be declared by the manufacturer.

5.4.1 Emissions

The limits and tests used to demonstrate compliance of the combined equipment should be taken from the harmonized EMC standard relevant to the primary function (declared by the manufacturer). Ports not covered in the harmonized EMC standard relevant to the primary function should be assessed against the details set out for these ports in the harmonized EMC standards for the other products/functions contained within the combined equipment.

Where one or more of the functions is a radio the exclusion band details should be taken from the relevant harmonized radio product EMC standard and applied during the EMC assessment of the combined equipment.

Where the emissions from the combined equipment are identified as spurious emissions, as defined in ITU-R radio regulation S1.145 [23], from any radio product incorporated into the combined equipment, these emissions should be regarded as radio spurious emissions subject to article 3.2 of the R&TTE Directive [1]. The assessment of these spurious emissions can be found in the harmonized radio standard for use under article 3.2 of the R&TTE Directive [1].

5.4.2 Immunity

The test levels, performance criteria and test methods used to demonstrate compliance of the combined equipment should be taken from the harmonized EMC standard for the primary function (declared by the manufacturer).

The following additional immunity tests should be applied to combined equipment if not already included in the assessment of the primary function:

- radiated immunity (Radio Frequency electromagnetic field) as defined in the harmonized EMC standards for the radio and/or telecommunication functions contained within the combined equipment;

- conducted immunity on telecommunications signal and control ports as defined in the harmonized EMC standards for the radio and/or telecommunication functions contained within the combined equipment.

If additional immunity tests have been performed then the relevant performance criteria should be taken from the harmonized EMC product standard containing these tests.

Where one or more of the functions is a radio, the exclusion band details should be taken from the relevant harmonized radio product EMC standard and applied during the EMC assessment of the combined equipment.

Where the combined equipment relies on one or more communications links for its operation, then these links should be maintained during immunity testing in accordance with the relevant harmonized EMC standards, and any degradation of performance should be in accordance with the manufacturers declaration.

For a combined equipment containing a radio, loss of link or degradation of performance should not be considered as a non-compliance if this is due to a narrow band receiver response as defined in the relevant radio EMC product harmonized standard. For combined equipment containing radio product/function the performance criteria should include that the transmitter is not unintentionally operated during testing. The actual performance criteria used should be recorded in any subsequent test report.

6 Application of harmonized EMC standards to Multi-radio equipment

This clause details the additional considerations when dealing with multi-radio equipment. These should take precedence in case of conflict with those determined in clause 5.

For Multi-radio equipment, the applicable EMC phenomena and limits are those set out in the EN 301 489 series and for maritime equipment in the EN 301 843 series.

The test conditions, performance assessment and performance criteria as stated in EN 301 489-1 [22] or EN 301 843-1 [24] are used together with the specific product related parts of the EN 301 489 series or the EN 301 843 series for specific radio equipment.

6.1 Multi-radio equipment capable of independent transmission

If the individual radio products and their corresponding radio links operate independently in normal usage (as declared by the manufacturer), then separate testing should be used. In this case the individual radio products should be assessed to the appropriate harmonized EMC product standards.

6.2 Multi-radio equipment not capable of independent transmission

However, where operation of the individual radio products and their corresponding radio links is simultaneous in normal usage (as declared by the manufacturer), then separate testing should not be used. In this case testing should be performed on the complete combined equipment. An overall performance criteria is required for the combined equipment. This may be developed by examining the individual performance criteria of the various radio products involved. The performance criteria used should be declared by the manufacturer and recorded in the test report.

Where multiple operational frequencies are used, exclusion bands should be defined for each of the radio products and all of these should be used during testing.

Annex A:
Harmonized EMC standards

This annex provides an overview of the tests to be performed according to different harmonized EMC standards, which may be used in conjunction with this guide.

It should be noted that the following tables are correct at time of publication, but for the latest detailed listing readers are advised to check the CEC Official Journal which list the harmonized standards under both the EMC Directive [2] and the R&TTE Directive [1].

A.1 Phenomena/Equipments and standards Overview for Emissions

Table A1: Phenomena/Equipments and standards Overview for Emissions

Phenomena by Port		Equipment categories and applicable emission requirements									
		ITE	**Radio**	**Household appliances**	**ISM**	**CATV**	**Professional audio**	**Broadcast receivers**	**Public Network equipment**	**TTE**	**Lighting equipment**
Enclosure											
	Radiated Emissions	Yes EN 55022	Yes (ancillaries only) EN 301 489 series	No EN 55014-1 (replaced by power emission test up to 300 MHz)	Yes EN 55011	Yes EN 50083-2 (power emission test up to 25GHz)	Yes EN 55103-1	Yes EN 55013 (power emission test on some products)	Yes EN 300 386	Yes EN 55022	Yes EN 55015 (magnetic field in 9 kHz-30 MHz)
AC Mains											
	Conducted Emissions	Yes EN 55022	Yes EN 301 489 series	Yes EN 55014-1	Yes EN 55011	Yes EN 50083-2	Yes EN 55103-1	Yes EN 55013	Yes EN 300 386	Yes EN 55022	Yes EN 55015
	AC Mains Harmonics (<16 A)	Yes EN 61000-3-2	Yes EN 61000-3-2	Yes EN 61000-3-2	Yes EN 61000-3-2	Yes EN 61000-3-2	Yes EN 61000-3-2	Yes EN 61000-3-2	Yes EN 61000-3-2	Yes EN 61000-3-2	Yes EN 61000-3-2
	AC Mains Voltage Fluctuations (<16 A)	Yes EN 61000-3-3	Yes EN 61000-3-3	Yes EN 61000-3-3	Yes EN 61000-3-3	Yes EN 61000-3-3	Yes EN 61000-3-3	Yes EN 61000-3-3	Yes EN 61000-3-3	Yes EN 61000-3-3	Yes EN 61000-3-3
	AC Mains Voltage Fluctuations (<75 A)	Yes EN 61000-3-11	Yes EN 61000-3-11	Yes EN 61000-3-11	Yes EN 61000-3-11	Yes EN 61000-3-11	Yes EN 61000-3-11	Yes EN 61000-3-11	Yes EN 61000-3-11	Yes EN 61000-3-11	Yes EN 61000-3-11
DC port											
	Conducted Emissions	No	Yes EN 301 489 series	Yes (applicable to specific equipment) EN 55014-1	No	No	Yes EN 55103-1	No	Yes EN 300 386	No	Yes (applicable to DC supply) EN 55015
Signal and telecom ports											
	Conducted Emissions	Yes (telecom ports only) EN 55022	Yes (telecom ports only) EN 301 489 series	No	No	No (covered by the power emission test)	Yes EN 55103-1	Yes (antenna port only) EN 55013	Yes EN 300 386	Yes (telecom ports only) EN 55022	Yes (load and control ports) EN 55015

Phenomena by Port		Equipment categories and applicable emission requirements									
		Signalling on Low Voltage	**Alarm systems**								
Enclosure											
	Radiated Emissions	Yes (as alternative the power emission test can be applied) EN 50065-1	Yes EN 55022								
AC Mains											
	Conducted Emissions	Yes EN 50065-1	Yes EN 55022								
	AC Mains Harmonics (<16 A)	Yes EN 61000-3-2	Yes EN 61000-3-2								
	AC Mains Voltage Fluctuations (<16 A)	Yes EN 61000-3-3	Yes EN 61000-3-3								
	AC Mains Voltage Fluctuations (<75 A)	Yes EN 61000-3-11	Yes EN 61000-3-11								
DC port											
	Conducted Emissions	No	Yes EN 55022								
Signal and telecom ports											
	Conducted Emissions	No	No								

A.2 Phenomena/Equipments and standards Overview for Immunity

Table A2 Phenomena/Equipments and standards Overview for Immunity

Phenomena by Port		Equipment categories and applicable immunity requirements									
		ITE	**Radio**	**Household appliances**	**ISM (this table does not cover medical equipment)**	**CATV**	**Professional audio**	**Broadcast receivers**	**Public Network equipment**	**TTE**	**Lighting equipment**
Enclosure											
	Magnetic field at 50Hz	Yes (if applicable) EN 55024	No	Yes EN 55014-2	Yes EN 61000-6-2	No	Yes EN 55103-2	No	No	Yes (if applicable) EN 55024	Yes (if applicable) EN 61547
	EM field	Yes EN 55024	Yes EN 301 489 series	Yes (some products) EN 55014-2	Yes EN 61000-6-2	Yes EN 50083-2 (150 kHz - 1 GHz)	Yes EN 55103-2	Yes EN 55020	Yes EN 300 386	Yes EN 55024	Yes EN 61547
	ESD	Yes EN 55024	Yes EN 301 489 series	Yes EN 55014-2	Yes EN 61000-6-2	No	Yes EN 55103-2	Yes EN 55020	Yes EN 300 386	Yes EN 55024	Yes EN 61547
Signal-/Telecom ports											
	RF common mode	Yes EN 55024	Yes EN 301 489 series	Yes EN 55014-2	Yes EN 61000-6-2	Yes EN 50083-2	Yes EN 55103-2	Yes (on specific ports) EN 55020 (also in differential mode)	Yes EN 300 386	Yes EN 55024	Yes EN 61547
	Surge	Yes EN 55024	Yes (telecom) EN 301 489 series	No	No	Yes EN 50083-2	Yes EN 55103-2	No	Yes EN 300 386	Yes EN 55024	No
	Electrical Fast Transients	Yes EN 55024	Yes EN 301 489 series	Yes EN 55014-2	Yes EN 61000-6-2	No	Yes EN 55103-2	Yes EN 55020	Yes EN 300 386	Yes EN 55024	Yes EN 61547
DC Input											
	RF common mode	Yes EN 55024	Yes EN 301 489 series	Yes EN 55014-2	Yes EN 61000-6-2	No	Yes EN 55103-2	No	Yes EN 300 386	Yes EN 55024	Yes EN 61547
	Surge	Yes (if applicable) EN 55024	No	No	Yes EN 61000-6-2	No	Yes EN 55103-2	No	No	Yes EN 55024	No

Phenomena by Port		Equipment categories and applicable immunity requirements									
		ITE	**Radio**	**Household appliances**	**ISM (this table does not cover medical equipment)**	**CATV**	**Professional audio**	**Broadcast receivers**	**Public Network equipment**	**TTE**	**Lighting equipment**
DC Input											
	Electrical Fast Transient	Yes EN 55024	Yes EN 301 489 series	Yes EN 55014-2	Yes EN 61000-6-2	No	Yes EN 55103-2	No	Yes EN 300 386	Yes EN 55024	Yes EN 61547
AC Input											
	RF common mode	Yes EN 55024	Yes EN 301 489 series	Yes EN 55014-2	Yes EN 61000-6-2	Yes EN 50083-2	Yes EN 55103-2	Yes EN 55020	Yes EN 300 386	Yes EN 55024	Yes EN 61547
	Voltage Dips/short interruptions	Yes EN 55024	Yes EN 301 489 series	Yes EN 55014-2	Yes EN 61000-6-2	No	Yes EN 55103-2	No	Yes (for other than telecommunication centres) EN 300 386	Yes EN 55024	Yes EN 61547
	Surge	Yes EN 55024	Yes EN 301 489 series	No	Yes EN 61000-6-2	No	Yes EN 55103-2	No	Yes EN 300 386	Yes EN 55024	Yes EN 61547
	Electrical Fast Transient	Yes EN 55024	Yes EN 301 489 series	Yes EN 55014-2	Yes EN 61000-6-2	Yes EN 50083-2	Yes EN 55103-2	Yes EN 55020	Yes EN 300 386	Yes EN 55024	Yes EN 61547

Phenomena by Port		Equipment categories and applicable immunity requirements									
		Signalling on Low Voltage	**Alarm systems**								
Enclosure											
	Magnetic field at 50Hz	Yes (if applicable) EN 55024	No								
	EM field	Yes EN 55024	Yes EN 50130-4								
	ESD	Yes EN 55024	Yes EN 50130-4								
Signal-/Telecom ports											
	RF common mode	Yes EN 55024	Yes EN 50130-4								
	Surge	Yes EN 55024	Yes EN 50130-4								
	Electrical Fast Transients	Yes EN 55024	Yes EN 50130-4								
DC Input											
	RF common mode	Yes EN 55024	Yes EN 50130-4								
	Surge	Yes (if applicable) EN 55024	Yes EN 50130-4								
	Electrical Fast Transient	Yes EN 55024	Yes EN 50130-4								
AC Input											
	RF common mode	Yes EN 55024	Yes EN 50130-4								
	Voltage Dips/short interruptions	Yes EN 55024	Yes EN 50130-4								
	Surge	Yes EN 55024	Yes EN 50130-4								
	Yes EN 55103-2	Yes EN 55024	Yes EN 50130-4								

Annex B:
Examples of various type of combined equipment

B.1 Examples Scenario 1 Products

GPRS Base station: constructed by combing an existing GSM base station with and an existing IP enabled digital switch in a single enclosure.

B.2 Examples Scenario 2 Products

PC with plug in modem card: where modem card relies upon the PC for control and power supply.

PC with plug in Radio LAN card: where Radio LAN card relies upon the PC for control and power supply.

PDA with plug in WAN card: where WAN card relies upon the PDA for control and power supply.

B.3 Examples Scenario 3 Products

Cordless PABX: where cordless radio unit is external to the PABX but relies upon the PABX for control and power supply.

PDA connected to an external RLAN: where the RLAN module is external to the PDA but relies upon the PDA for control and power supply.

FM broadcast receiver and/or MP3 player connected externally to and controlled from a cell-phone keyboard and user interface software.

B.4 Examples Scenario 4 Products

PC with plug in modem and an external RLAN connected via a USB cable: where both the modem and RLAN rely upon the PC for control and power supply.

B.5 Examples Scenario 5 Products

Refrigerator controlled by RLAN with manual control option.

Printer with both cable connection and built in RLAN connectivity: thus allowing data to be sent either via the RLAN or the cable connection, but where the RLAN functionality cannot be removed.

B.6 Examples Scenario 6 Products

Radio controlled light dimmer: where the radio link is the only means of control and where the radio function embedded within the light dimming function.

Printer with RLAN connectivity only: where operation is only possible via the RLAN link and where the RLAN circuitry is embedded within the printer circuitry.

B.7 Examples Scenario 7 Products

Television receiver with universal remote control and no manual controls, where the universal remote control can control other appliances.

B.8 Examples of Multi-Radio Equipment

Tri-Band Cellular Telephone with Radio LAN interface for cordless headset.

Annex C: Bibliography

- ETSI EN 300 386: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements".

History

Document history		
V1.1.1	July 2002	Publication