PALAS – Powerline as an Alternative Local AccesS
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Deliverable D4:
European PLC Regulatory Landscape

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Table of contents:

1 Scope and Objective

The objective of this document is to provide entrants to the PLC industry a framework and landscape by which to understand the various interactive issues relating to regulatory and standards issues affecting the design, development, deployment and exploitation of PLC equipment, systems and services. This document focuses on these issues from the perspective of the European Community, although it attempts to orientate the reader to help understand how standards and regulations developed at a European level are adopted, ratified and applied at the individual National level.

1.1 PLC Standards development process

This study of the European regulatory and standards landscape has been carried out at a time when standards are in the process of being developed and when discussions and negotiations are taking place to amplify, clarify and simplify regulations and standards which affect the deployment of PLC technologies on a commercial scale. This work must therefore be viewed as a dynamic exercise. While the bulk of the work contained in this document outlines the regulatory and standards structure employed throughout the European Community, it is only possible to provide a snapshot of the current state of deliberations relating to incomplete resolutions which may form the basis of future regulations and standards. To overcome this difficulty, the document points the reader to various sources of information where the latest position relative to regulatory and standards issues might be obtained. The those wishing to involve themselves in the process of influencing the establishment of regulation and standards, it is intended that the document would enable to the reader to identify and become familiar with the workings of the numerous consultative bodies which work to establish this vital framework aimed at developing, enabling and protecting our European Community.

1.2 National, Regional and Global Perspectives

Despite the fact that this document takes a European perspective, it is absolutely necessary for the reader to understand that the global economy is stimulating a global perspective on regulatory and standards issues. In this regard, there are numerous bodies outside the European community, which either function at a global level, or, in the case of economic regions such as the USA, exercise influence which has to be taken into consideration when assessing the overall regulatory and standards position.

Inversely, since nationalism remains the dominant force within a territory, those wishing to deploy PLC technology within a particular territory must look to the regulatory and standards bodies within that territory in order to fully comply with requirement pertaining to that territory. Within the European Community there is an ongoing process of the harmonisation of European standards and the

harmonisation of acceptable levels of protection aimed at guaranteeing the free movement of apparatus. [1]. In this regard, there is an ongoing process of change toward Euro-centric rather than National-centric standards and regulations.

This transitional process inevitably gives rise to conflicting interpretations of certain standards established at a European level when adopted and implemented at a National level. These variations or potential variations are currently giving rise to much discussion and concern particularly in the area of the interpretation of European Directives relating to Electro Magnetic Compatibility (EMC). Notably these variations can be identified in the different approaches adopted by Regulators in Germany and Regulators in the United Kingdom for example, where, if formally adopted would appear to offend the general concept of enabling the free movement of apparatus throughout the European Community. Monitoring the progress of the development, implementation and enforcement of these regulations at a National level and understanding influences which have given rise to these variations will provide for a clearer understanding of the regulatory landscape as well as an opportunity to understand the justification or otherwise of those variations to be adopted and justified within those territories.

Ref:
[1] Guide to the implementation of Community Harmonisation Directives

2 Orientation and background relating to the emergence of PLC standards for low and high frequency communications over existing power distribution networks. [1a]

The last ten years has seen major developments by electricity companies throughout the world to investigate and implement communications services using the 11kV, low voltage power distribution network. The driving force behind this commercial enterprise arises from the competition to introduce new services to the broad range of customers, industrial, commercial and residential. A further and growing concern is the limited bandwidth available on all types of communications services throughout the world.

The first power line carrier services, concentrated on transmission and reception in the low frequency band. In Europe, the European Committee for Electro-technical standardisation, CENELEC produced a standard EN50065, covering the communications requirements for transmitting and receiving signals in the frequency range 3Khz to 148.5Khz,over the low voltage distribution network for both to the building and in building communication.

The services provided in this frequency range included remote meter reading of all types of utility meter, basic load and energy management. This type of service required only low data rates, which could be efficiently provided at these low frequencies.

As the demand for more services into buildings grows, competition between the major cable companies intensifies. Due to the shortage of bandwidth and limited power due to EMC limits, companies are exploiting other parts of the frequency spectrum in the range 1Mhz to 30Mhz.This allows companies to enter into the broadband services such as the internet and video on demand associated with high speed data services.

To introduce such services places demand on the technical requirements for conditioning the low voltage distribution network. The increase in bandwidth from a few kilohertz for low data rates to several megahertz for these new services will require considerable ingenuity .In particular, the increase in the noise levels and the commensurate increase in power required at these frequencies places severe constraints with respect to the EMC limits on the power line.

Ref:

[1a] Paper entitled ‘High Frequency Communications using the Low Voltage Power Distribution Network’ by Dr John Newbury Head of Faculty of Technology at Open University, UK, and serving on various bodies including: CENELEC S/C205A WG10, IEEE, CIGRE and Joint Working Group of ETSI PLT & CENELEC

2.1 Low and High Frequency Communication

The low frequency standard of the European Committee, CENELEC, for low voltage communications over the distribution line, EN50065, was reviewed in 1999. [[2]]. The key characteristics of this standard that underpin the high frequency specification are as follows:

- 230V @50Hz throughout Europe
- Frequency range 3KHz to 148.5KHz

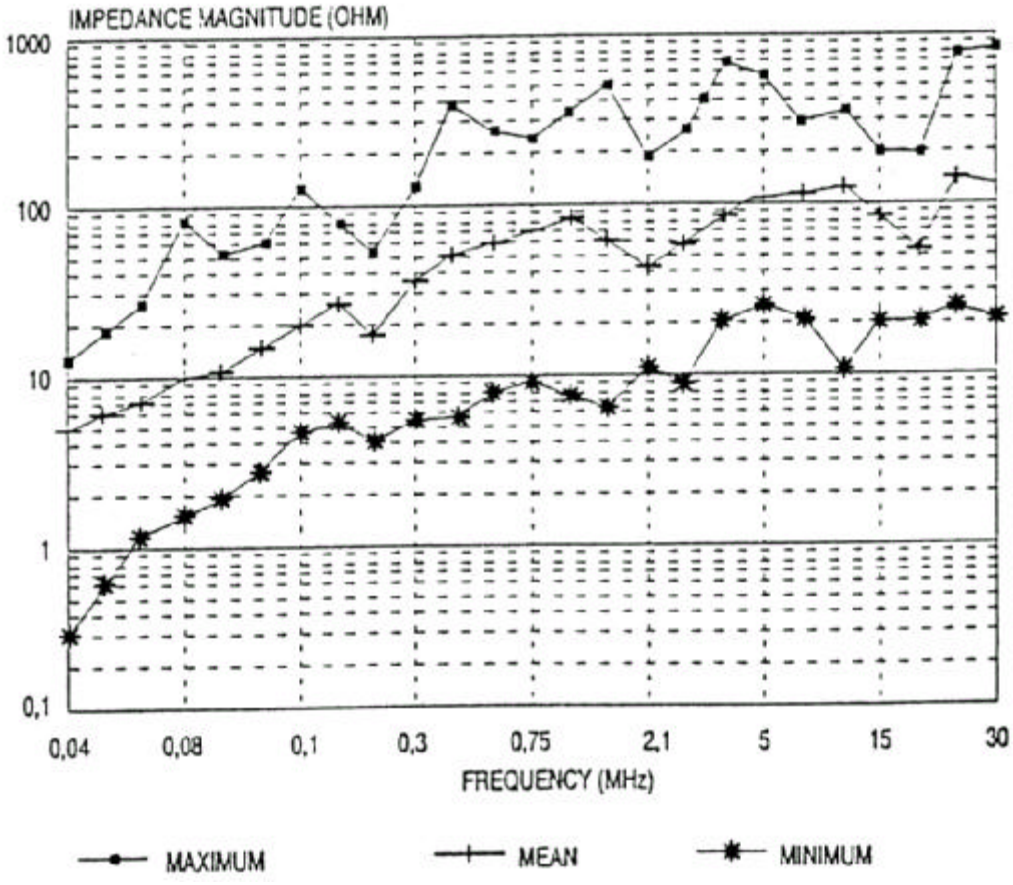
- Utility Band 3KHz to 95KHz
- Consumer Band 95KHz to 140KHz
- Maximum power 116dB
- Immunity to disturbances
- Three types of filter: input, impedance and segmentation

The importance of the maximum power for transmission, which leads to the immunity levels for disturbance of adjacent communication systems coupled with the acceptance that filters may be a key requirement for stability of communications into buildings.

These key requirements arise from the behaviour of the power distribution network. In particular, the variation of the impedance due to impedance mismatches at joints or points where equipment is connected to the mains network leads to reflections. This due to:

- Variable impedance of the power line
- The low voltage mains does not have a characteristic impedance
- Loads being switched on and off randomly introducing a change in impedance
- Channel noise varies with frequency, load, time of day and geographical location

Ref:
[2] Communications Media for Buildings and Associated Data Rates: 12th Annual Symposium AMRA. 1999.



The variation of impedance with frequency range is shown in Figure 1.

Figure 1 - The communication signals at low frequency are propagated along the low voltage power line through conducted emission with very little energy radiated from the line causing interference to other communication services. As the frequency is increased from the low frequency band of 3KHz to 148.5KHz through to the high frequency range of 1MHz to 30MHz and higher the propagation characteristics of the signal change .The signal changes from being dominantly conducted transmission along the power line cable to having an additional propagation path through radiated emission .It is this latter emission mechanism from the cable that gives rise to interference with a range of other communication services and provides the limiting factor in this type of communication service using the low voltage power distribution network.

2.2 Power Quality of Low Voltage Distribution Line

The changes in the impedance of the line due to switching and connecting and disconnecting equipment to the line introduces harmonics onto the line altering the power quality along the distribution line. These harmonics are assessed in terms of the Electromagnetic Compatibility (EMC) of the circuit. In considering the implications and effects on line, experiments have shown that the harmonics have a greater effect on the electricity supply than the equipment connected to the line.

The harmonics and in particular the odd ones are in phase with the currents which leads to larger amplitude currents. These lead to high currents on the neutral line of three phase systems. This again leads to over heating of components of the distribution circuit and potential damage to the transformer. This particular problem has dominated over the last few years due to the switched mode power supplies contained in televisions and personal computers. In the international arena of standards the International Electro-technical commission (IEC) standard IEC 61000-3-2, Disturbances in supply systems caused by household equipment.

2.3 Communication Networks

The communication network between the utility and buildings can at present be divided into two categories:

- Computer Interconnection, for accessing the Internet, computers and associated equipment
- Control networks for operating lights ,switches and different electrical appliance

The computer type network lends itself to the high data rate and frequency, whereas the control network uses the low frequency power line system EN50065.

In the home networks, with considerable equipment connected to the mains wiring circuits switching off and on randomly leads to key characteristics of:

- The medium has an average impedance of 2 to 3 ohms (the impedance values are averaged across measurements taken in different European countries, predominantly in France, Germany and Italy).
- 90% of the impedance values are in the range 0.5ohms and 10ohms.
- the nominal impedance is 5ohms.
- resonance effects between the capactive load and transformer inductance.
- the physical location of the power line will introduce reflections along the line and subsequent alteration of the impedance of the line.

The variation of the impedance of the line with frequency is shown in figure 2.

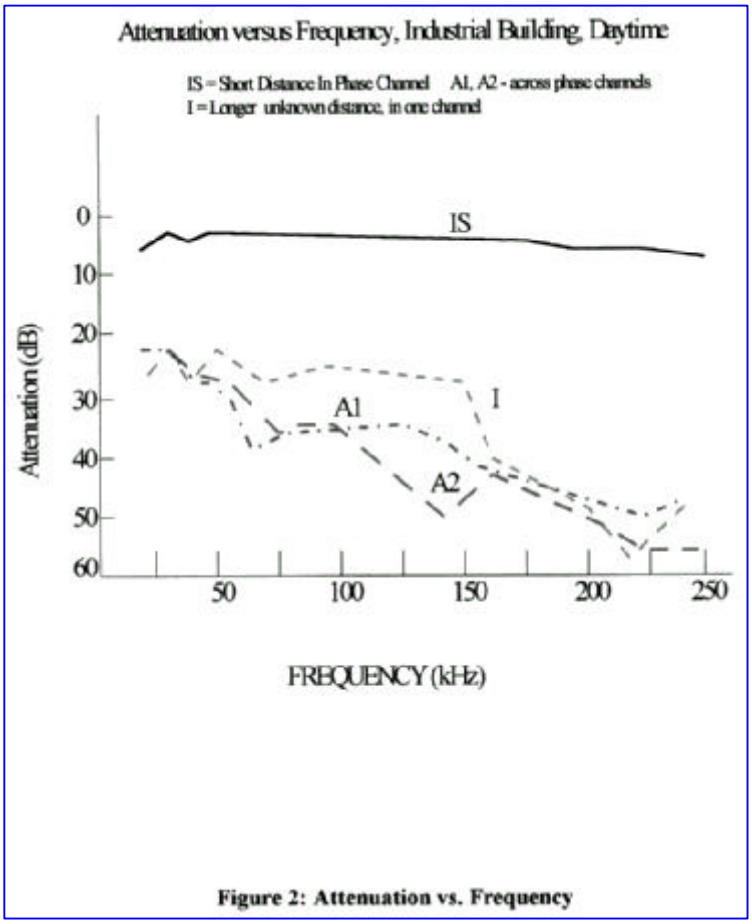


Figure 2: Attenuation vs. Frequency

It should be noted that other competing technology media are also challenging power line communication for home communications. These include cable modems, asymmetrical digital subscriber line (ADSL) satellite broadcasts and wireless network services.

For low voltage power transmission standard modulation systems are used including spread frequency shift keying (SFSK) and spread amplitude shift keying (SASK). For high frequency transmission, Orthogonal Frequency-division Multiplexing (OFDM) is used, and operates by transmitting data over multiple sub-carriers .It also offers the potential for reducing multiple reflections of the signal.

2.4 High Frequency Transmission

Data transmission at high frequencies is not allocated a frequency band similar to that of the low frequency band. There has been considerable discussion of trying to adopt the fixed frequency ranges in the 1MHz to 30 MHz part of the spectrum.

The main reason for this is due to the thousands of other organisations operating in this frequency band .If these so called “chimneys” were located, many other

companies would request the same. Therefore it is important to follow the CISPR22 rules for EMC and then operate at frequencies where the noise level is very low.

The characteristics of this part of the frequency band include:

- Operational frequency range: 1MHz to 10MHz (the frequency range has still to be determined by other regulatory bodies within Europe. Currently the view is that the spectral range will be of the order 1MHz to 30MHz, but it is still under considerable debate.
- Date rate: 10Mbits/sec (with respect to the modem, there are a number of proprietary designs within companies, but none for commercial use. The modulation system is based on an OFDM principal.
- Signal propagation principally through radiated emission.
- Interference will be caused by other adjacent systems.
- High attenuation.
- Increased noise floor
- High S/N ration required

2.5 Noise Characteristics

The main causes of noise over the low voltage distribution net work
Operating in the 1 to 10MHz range includes:

- Impulse and burst noise (the impulsive and burst noise originate from devices such as oven hobs, dimmer switches and such equipment. This will be in addition to the normal Johnson thermal noise and associated sky wave noise.
- Switches.
- Electronic starters for gas heating systems.

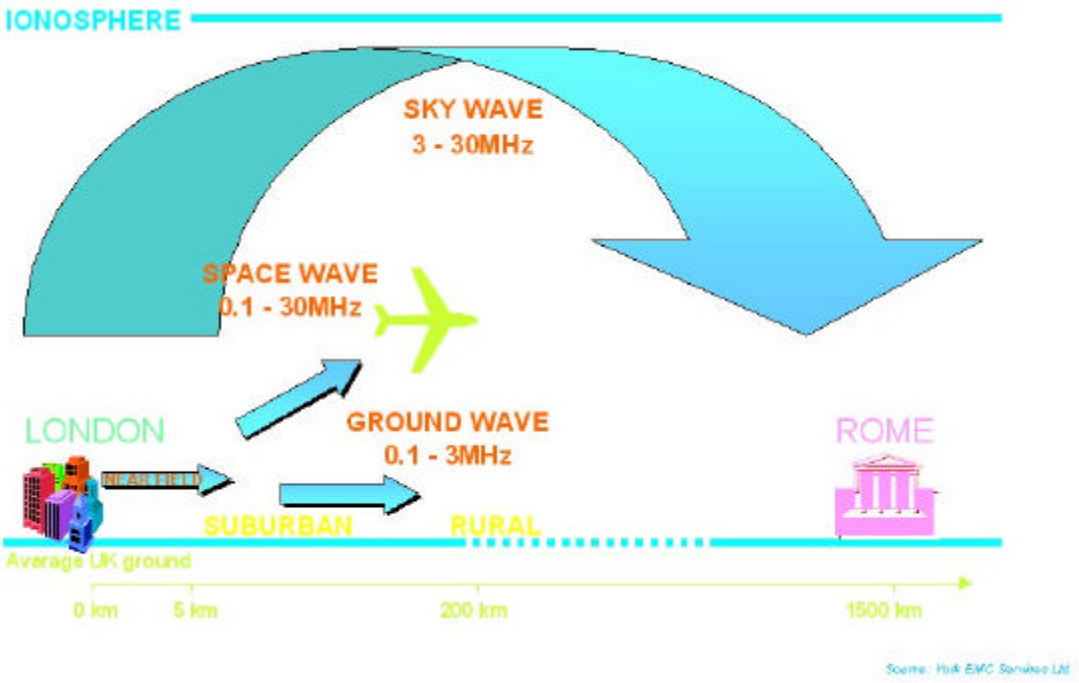
The noise in the night time does decrease to a point but this will also depend on the solar cycle.

The transmission of power line systems in the high frequency range will give rise to potential interference to a variety of well-established services. These include:

- Broadcasting
- Amateur Radio
- Mobile communications
- Distress frequencies
- Space Research and radio astronomy
- Military communications

2.6 Ground and Atmospheric Propagation

Figure 3 [3]



Compared with low frequency transmission and reception, at high frequencies the power line gives rise to ground wave and sky wave propagation. If these systems are accumulated together in high densities they offer the greatest interference to other communication services. Figure 3.

The density of sources if high will give rise to considerable interference. This is likely in urban city areas, whereas, in rural areas there are fewer sources of interference.

It is important to those receiving sites that operate equipment for military, shipping, and navigational services that the amount of interference in the area is calculated.

Ground wave interference causes the greatest problems at those sites with special requirements. Although such sites can have special conditions associated with them, there is always the potential problem of the sky wave causing interference.

In addition, ships at sea and low flying aircraft may be susceptible to such sources of disturbance. A considerable number of different cases may be considered.

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Ref:

[3] Cumulative Radiated Emissions from Metallic Broadband Data Distribution Systems, by York EMC Services Ltd, for Radiocommunications Agency, UK.

Consequently it is important to calculate the interference for a single, then a number of sources, even allowing for inverse square law of attenuation. Generally each source that contributes to the noise is treated as an isotropic source. However practically the sources may well be connected to the 11KV substation. This type of substation has up 200 homes, but not all homes are transmitting at any one time. Therefore it can be considered that the sub-station is a single contributing source.

The contribution of these sources of potential noise and interference to other communication systems is the type of terrain the source is transmitting over. If the terrain is over water, propagation will not be attenuated. However over rough terrain considerable losses could be encountered.

The contribution from sky wave propagation is very different from ground wave propagation. For the maximum contribution to increase the radio noise floor the noise frequency must be below the critical angle and frequency. It should be remembered that the conditions of the ionosphere change throughout the day according to season and sunspot cycle. At any time there is a critical frequency below which the signal is reflected back to earth and will contribute to raising the noise floor. Above the critical frequency the sky wave will travel into space and will not have any effect on the noise level. From experiments carried out by the radio communications agency [3a] (RCA) power line transmission in the high frequency band contributes more to the noise floor at a comparative bit-rate than any other potential source such ADSL or VDSL. Arguably the higher bit-rates planned for VDSL would tend to contribute an overall higher noise-floor, although this in not yet scientifically proven and will require more comparative studies.

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Ref:

[3a] Cumulative Radiated Emissions from Metallic Broadband Data Distribution Systems, by York EMC Services Ltd, for Radiocommunications Agency, UK.

3 PLC Regulations and Standards

3.1 Standards Bodies and Legislation

Standards are developed through a process of consensus involving the participants in various standards organisation focusing on particular aspects of the PLC industry. The membership and constitution of the different standards bodies varies significantly based on whether the Body emanates from an industry-based regulatory body, or a governmental-based regulatory body, or a combination nation of the two.

There are also standing arrangements between most of the standardisation bodies relative to the incorporation of, or ratification of, aspects of standards developed by different standardisation bodies. This interactivity and ratification of standards produced by different bodies adds time and a good deal of complexity to the process although presents a practical way in which standards might be proposed, developed, interpreted, amended and ratified at a regional and global level, ensuring that the standards produced form the basis of a truly global, interoperable PLC system.

Over the past few years there has been a dramatic decrease in State intervention due to the widespread privatisation and industry self-regulation. In this way standards are evolved into those adopted by the industry for self-regulation and those adopted and ratified by national and regional governments for the purposes of drafting enforceable legislation.

3.1.1 PLC Standards Issues

In relation to PLC the issues currently under review fall therefore into two categories:

1. Legislative regulatory issues.
2. Industry self-regulation issues.

3.1.2 Legislative PLC Regulatory Issues

Legislative Regulatory Issues are seen to be:

- Telecommunicatons services.
- Physical layer aspects, in co-operation with CENELEC.

3.1.3 Industry Self-Regulation Standardisation Issues

The following areas were determined as issues to be considered by ETSI at the outset of the ETSI PLT project. In practise the working headings of these issues have been changed and amplified as the working groups have progressed with the work in hand. The current list of issues being addressed by ETSI, the PLCforum and CENELEC can be seen later in this report under 'Snapshot of current stage of PLC development'.

- Interfaces to other networks.
- Functional reference configurations.
- Protocol stacks.
- Medium access mechanism.
- Management of the PLC system.
- Encryption and privacy issues.
- Testing and conformity.

3.1.4 Assignment of Current PLC Regulatory Deliberation

Specific areas of regulatory work have been agreed and assigned between ETSI, CENELEC, CEPT and the PLCforum. [4] The agreed distribution of work is as follows:

Issue	Assigned to
SPECTRUM MANAGMENT	CEPT ERC (through ETSI TC ERM)
EMC	Joint Working Group CENELEC/ETSI involving experts from ETSI TC ERM, CENELEC SC205A, TC 209, TC 210, TC 215.
SYSTEM ASPECTS	CENELEC SC205A: Lower Layers (physical layer) ETSI EP PLT: (higher layers)

Definition of Bodies in table:

CEPT ERC = SE35 of the European Conference of Postal and Telecommunications Administrations

ETSI TC ERM = ETSI Technical Committee Electromagnetic Compatibility (EMC) and Radio Spectrum Matters

SC205A WG10 of CENELEC = European Committee for Electrotechnical Standardisation.

Ref

[4] ETSI Annual Report 1999

4 Existing standards for PLC EMC and frequency management.

The development of high frequency PLC standards are being evolved from existing standards which were developed with low frequency communications in mind. These foundation standards and existing work are described below:

- CISPR 22
- CENELEC Standard EN50065.

4.1 CISPR 22

CISPR 22: 1997 Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement. [5]

CISPR 22 (EN55022- Information Technology Equipment) is the emission requirements for products covered under EN50081-1 as well as those classified as Information Technology Equipment (ITE) and Electronic Data Processing (EDP). This is electronic equipment which generally has a clock signal of 9KHz or greater. The requirements are broken into radiated and conducted using Class A and Class B.

Information Technology Equipment (ITE) definition:

Any equipment:

a) which has a primary function of either 9or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control of data and of telecommunication messages and which may be equipped with one or more terminal ports typically operated for information transfer.
b) With a rated supply voltage not exceeding 600V.

It includes, for example, data processing equipment, office machines, electronic business equipment and telecommunication equipment.

Any equipment (or part of the ITE equipment) which a primary function of radio transmission and/or reception according tot he ITU Radio Regulations are excluded from the scope of CISPR 22.

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Ref:
[5] www.atlasce.com/cispr_22.htm

CISPR 22 EMISSION LIMITS FOR CLASS 'A' DEVICES

Radiated Emissions (30 meters)		
Frequency (MHz)	uV/m	dB(uV/m)
30 – 230	31.6	0
230 – 1000	70.8	37
Conducted Emissions		
Frequency (MHz)	uV QP (AV)	dB(uV) QP (AV)
0.15 – 0.5	8912.5 (1995)	79 (66)
0.5 –30	4467 (1000)	(60)

CISPR 22 EMISSION LIMITS FOR CLASS 'B' DEVICES

Radiated Emissions (10 meters)		
Frequency (MHz)	uV/m	dB(uV/m)
30 – 230	31.6	30
230 – 1000	70.8	37
Conducted Emissions		
Frequency (MHz)	uV QP (AV)	dB(uV) QP (AV)
0.15 – 0.5	1995-631 (631-199.5)	66-56 (56-46) (limit varies linearly
0.5 – 5	631 (199.5)	56 (46)
5 – 30	1000 (316)	60 (50)

NOTE: uV QP (AV) = micro-volts (uV) and QP means quasi Peak and is an average value (AV).

4.2 CENELEC EN50065

Signalling on low-voltage electrical installations in the frequency range 3kHz to 148.5kHz – Part 1: General requirements, frequency bands and electromagnetic disturbances. CENELEC defines a frequency range for utilities of 3 – 95kHz and 95 – 148.5kHz for private consumers. [5a]

Ref:
[5a] CENELEC www.cenelec.org

The key characteristics of this standard that underpin the high frequency specification are as follows:

- 230V @50Hz throughout Europe
- Frequency range 3KHz to 148.5KHz
- Utility Band 3KHz to 95KHz
- Consumer Band 95KHz to 140KHz
- Maximum power 116dB
- Immunity to disturbances
- Three types of filter: input, impedance and segmentation

The importance of the maximum power for transmission, which leads to the immunity levels for disturbance of adjacent communication systems coupled with the acceptance that filters may be a key requirement for stability of communications into buildings.

These key requirements arise from the behaviour of the power distribution network. In particular, the variation of the impedance due to impedance mismatches at joints or points where equipment is connected to the mains network leads to reflections. This due to:

- Variable impedance of the power line
- The low voltage mains does not have a characteristic impedance
- Loads being switched on and off randomly introducing a change in impedance
- Channel noise varies with frequency, load, time of day and geographical location

5 Significant PLC EMC regulations and drafts.

In Europe, EMC issues are addressed within the EMC Directive. This and associated documents are attached as Annex I, II & III. The EMC Directive is briefly described below.

5.1 EMC Directive

EU guidelines on the application of council directive 89/336/eec of 3rd May 1989 on the approximation of laws of the Member States relating to Electromagnetic compatibility) [6]

The EU's EMC Directive - 89/336/EEC (amended by Directives 91/263/EEC, 92/31/EEC, 93/68/EEC, 93/97/EEC) have been prepared by the General Directorate III Industry of the Commission in collaboration with the group of government experts of Member States, representatives of European industry, European Standardisation Bodies (CENELEC) and bodies entrusted with the technical tasks related to third party intervention in the conformity assessment procedures.

The EMC Directive is a new-approach directive laying down apparatus protection requirements and leaving it to standards, primarily European harmonised standards, to define technical requirements to achieve the level of protection required. The EMC Directive is a total harmonisation Directive, that is its provisions replaced the national ones concerned when they came into force.

The Directive came into force on 1st January 1996. Below is a summary of some main features:

- Application of the relevant standards is compulsory for all EU countries and all other countries that intend to put their products on the EU market.
- The EMC Directive concerns emission from as well as immunity of electrical and electronic devices, and it applies basically to product standards.
- All the products must be tested and certified according to specific rules.

Ref:
[6] EMC Directive 89/336/EEC

5.2 R&TTE Directive

Directive 1999/5/EC [7] of the European Parliament and of the Council of 9th March 1999, on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

The R&TTE Directive was published in the Official Journal of the European Communities on 7th April 1999. It covers all radio equipment and all equipment intended to be connected to public telecommunications networks. It establishes a regulatory framework for the placing on the market, free movement and putting into service. It relies on Harmonised Standards developed by recognised European standards bodies. Harmonised Standards define technical characteristics which can be used to meet the essential requirements of the Directive which are:

- Protection of health and safety of the user and any other person, based on the protection requirements of the Low Voltage Directive 73/23/EEC (article 3.1a of the Directive).
- The essential requirements of the Electromagnetic Compatibility Directive (article 3.1b).
- Effective use of the radio spectrum/orbital resource so as to avoid harmful interference (article 3.2)

5.3 MPT1570 (DRAFT) UK

The drafting of legislation within the framework of EMC Directive is a complex process and it would be impracticable to examine this process in each Member State. Of significance is the apparently different interpretation presently being developed in the United Kingdom under MPT1570 (Draft) [8] and NB30 in Germany. Details of these approaches are reproduced below:

The Radiocommunications Agency in the UK has established the maximum permissible levels of electromagnetic radiation from telecommunications systems utilising material substances operating in the frequency range 9kHz to 30MHz. The MPT 1570 Standard sets out the procedure to be adopted for the measurement of that radiation.

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Ref:
[7] R&TTE Directive
[8] MPT 1570 Draft, UK

PART A: EMR from telecommunications systems operating over material substances in the frequency range: 9kHz to 150 kHz.

PART B: EMR from telecommunications systems operating over material substances in the frequency range: 150kHz to 1.6MHz.

PART C: EMR from telecommunications systems operating over material substances in the frequency range 1.6 to 30MHz.

PART D: EMR from telecommunications systems operating over material substances in the frequency range 30MHz to 300MHz.

NOTE: In respect of PARTS C & D, limits and measurement methods are under consideration.

This MPT standard is the standard referred to in the Wireless Telegraphy (Control of Interference from Telecommunications Systems Utilising Material Substances) Regulations 2000.

Draft Limits proposed for use in the United Kingdom

Frequency Range MHz	**Magnetic Field Limit (equivalent electric field) dB µV/m (Peak)**	**Measurement Distance**	**Measurement Bandwidth**
0.09 - 0.15	73.5 -20 log f (kHz) Note 1	1 metre	200 Hz
0.150 - 1.6	40 - 7.7 log f (MHz) Note 1	1 metre	9 kHz
1.6 to 30 MHz.	20 - 7.7 log f (MHz) Note 2	3 metres	9 kHz
30 MHz to 300 MHz	LIMITS AND MEASUREMENT METHODS ARE CURRENTLY UNDER CONSIDERATION		
Note 1: Limits from MPT 1570: April 2000 (for public consultation within UK) Note 2: Limits from MPT 1570: December 1999 (still under consideration)			

[1]This corresponds to an effective radiated power of 20 dB pW.
[2]This corresponds to an effective radiated power of 33 dB pW

5.4 NB30 in Germany

This standard [9] provides procedures for the in-situ measurement of unwanted disturbance emissions caused by telecommunication networks that make use of the radio frequency spectrum to convey a range of services over non-radio paths.

These include WANs, LANs and CATV as well as the recently developed overlay technologies that utilise power distribution or telephone networks.

Radio communication services which may be affected by unwanted disturbance emissions include, but are not restricted to; off-air frequency standards, radio clocks, short range devices, aeronautical radio navigation, emergency safety of life, broadcasting, military and marine HF communications, land mobile, fixed links, cordless telephones and amateur radio.

Protection from unwanted disturbance emissions radiated by telecommunication networks is specifically called for in ITU-R RR S15.12 and provided for in Article 6, 1 (a) of Council Directive 89/336/EEC.

The radio frequency spectrum covered by this standard is 9 kHz to 3 GHz.

Limits applicable in the Federal Republic of Germany

Frequency Range MHz	**Limit of (Peak) disturbance field strength dB (µV/m)**	**Measurement Distance**	**Measurement Bandwidth**
0.009 - 1	40-20*log (f/MHz)	3 m	?
1 - 30	40-8.8*log (f/MHz)	3 m	9 kHz
30 - 1000	27[1]	3 m	120 kHz
1000 - 3000	40[2]	3 m	1 MHz
Limits according to Official Communication No.1/1999, Official Journal BMWI			

CISPR measuring bandwidth change at 150 kHz?

Ref:
[9] NB30 draft, Germany

6 International Regulatory and Standards Landscape

Figure 4 represents aspects of the International Regulatory and Standards Landscape from the perspective of the European PLC industry. The inter-relationship between different regulatory bodies is only approximately represented in the graphic. For details of how different regulatory bodies co-operate with each other please see details outlined in the description of regulatory and standards bodies in the following chapter.

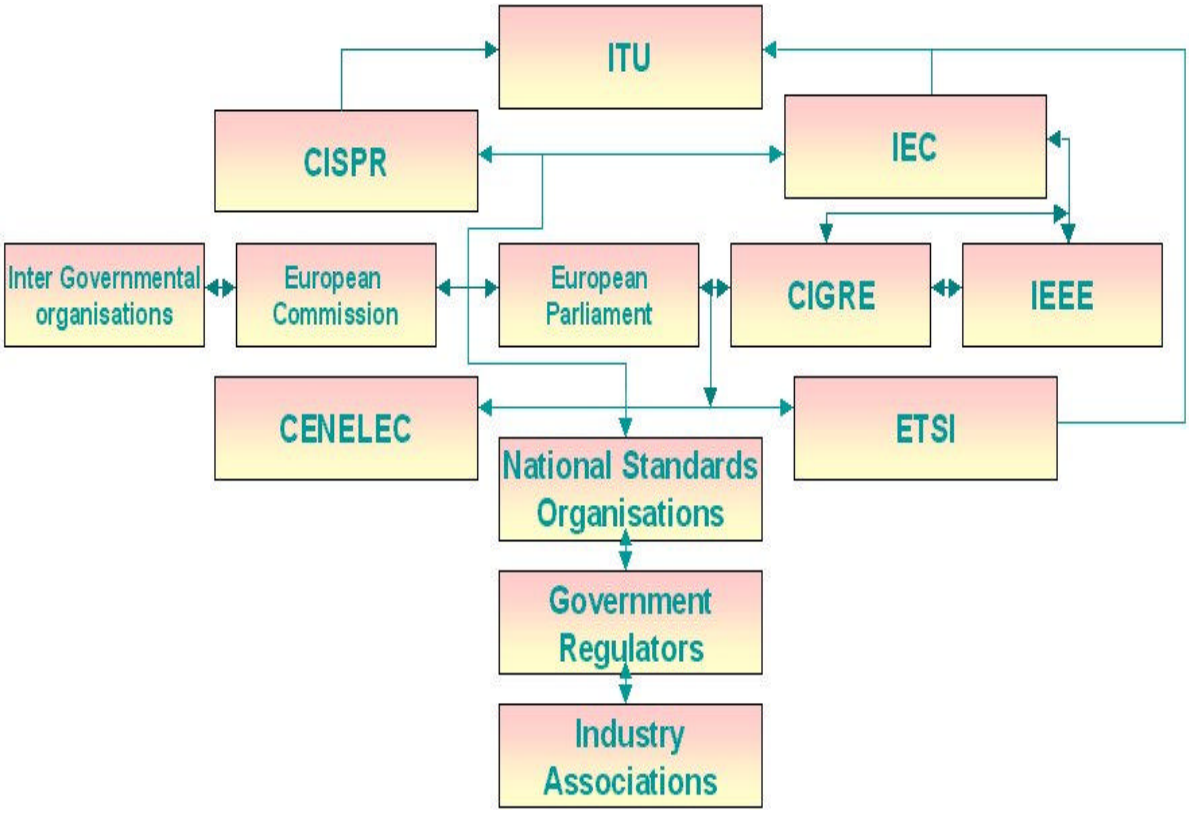

Figure 4: International Regulatory and Standards Landscape

7 Detailed Description of each of the Regulatory and Standards Bodies

This section outlines the objectives, work and channels of co-operation with other Regulatory and Standards Bodies from the perspective of the PLC industry within the European Community. At first glance there appears to be considerable overlap between the different organisations. In practise however, through custom and practise and numerous agreements, the efforts of the international regulatory bodies are working toward a harmonised process to develop standards which may be used as a basis of drafting legislation and for the adoption of a basis of self regulation by the industries involved.

It must be remembered, however, that the globalisation of the telecommunications business increasingly demands the globalisation of standards and in the process of achieving global consensus, a complex process of co-operation, ratification, clarification and harmonisation is constantly in train. At practical level participants in the PLC industry are governed by regulations that are enforced at a local level by national regulators drawing their authority from nationally enacted legislation. The participant is also required to conform to industry standards developed by the recognised International Standards Bodies.

7.1 Industry Associations

7.1.1 PLC*forum*

The PLC*forum* [10] was established on the 23-24 March 2000 in Interlaken, Switzerland as the follow-up organisation of two previously acting committees, the International Powerline Communications Forum (IPCF) and the German Powerline Telecommunications Forum (PTF). This association was formed with the aim of uniting and representing the interests of players engaged in Power Line Communications (PLC) from all over the world.

The PLC*forum* member companies are:

- Joining forces to promote PLC Technology and to lead targeted discussions among all who are interested.
- Developing concepts for dedicated promotion of PLC and conducting preparation & research in terms of regulation, standardisation and marketing at an international level
- Preparing the basis for business models of PLC technology and the services that can be offered.

Ref:
[10] www.plcforum.org

In order to realise the above aims effectively, the operational work is conducted within the working groups. Due to the current market situation Regulatory, Technology, Marketing and In-house Working Groups have been established. In the Regulatory working groups the main areas of work are:

- Frequency allocation
- Licensing procedure
- Telecommunications law
- Energy law
- Definition of regulatory framework
- Effect of regulatory framework
- Participation in PLC projects of regulatory organisations
- Liaison with other organisations

7.1.2 Electricity Association

A key activity of the EA [11] is representing its members, seeking to ensure their views are effectively communicated to opinion formers and decision-makers. The EA has considerable experience in presenting the views of the industry to Ministers, MEPs, civil servants and EU officials on issues affecting the industry.

The Electricity Association is recognised by UK government and both Houses of Parliament as an authoritative source of information and its opinion and is frequently called upon to provide comment and detailed submissions on energy related issues. Its lobbying efforts on EU legislation are complemented by its membership of Eurelectric, the European committee of electricity supply undertakings, whose primary role is to represent the collective voice of the EU electricity industries at the Brussels institutions. The EA is a UK representative on this Body.

7.1.3 EuroAMRA

The Euroamra [12] is the new face of the AMR associations in Europe. E-commerce and the internet are stimulating Utility interest and the tide of deregulation and competition is creating unprecedented opportunities for innovation. EuroAMRA's stated mission is to support this new wave of value creation through the sharing and experience, ideas and best practice. It will promote the benefits of electronic communications and commerce; eliminate barriers to market development and help the whole industry maximise success in working applications. E-amra.com will be a web-focused organisation, delivering news and information, directories, guides and reports, plus a varied programme of high quality conferences, workshops and site visits throughout Europe. Local focus groups will also be set-up to address regional and national priorities.

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Ref:
[11] www.electricity.org.uk
[12] www.e-amra.com

7.1.4 HomePlug Alliance (www.homeplug.com)

HomePlug [13] is an industry Alliance comprised of industry leaders at each level of the value chain - from Technology to Services & Content. The Alliance members bring necessary capabilities and a financial commitment to the successful launch of the technology.

- Service & Content: new services, content to pull demand for network devices. Requirements for network to support services, usage models, provisioning, customer care.
- Retail: Channels for sales & support of networked devices. Installation and support services. Consumer education.
- Hardware: Connected devices to enable new classes of services via the internet or other networks – PC, CE, Networking.
- Software: Software services and applications to simplify set-up and use of the network.
- Silicon: Cost effective silicon with a variety of feature sets to support a broad variety of products.
- Technology: Enabling technology that meets requirements for performance, cost and is scalable to future generations.

HomePlug's vision is to deliver Internet and multimedia from every home power outlet and to enable the home through worldwide home powerline networking standards.

The Alliance's mission is to enable and promote rapid availability, adoption and implementation of cost effective, interoperable and standards-based home powerline networks and products.

Ref:
[13] www.homeplug.com

7.2 European Union Members National Government Regulators

For reference purposes and orientation, we have, where information is available, provided a detailed description of each entity.

7.2.1 Austria

- **Osterreichische Gesellschatft fur telekommunikationsregulierung, Austria**

- **Bundesministerium fur Wissenschaft und Verkehr (bm.wv), Austria**

- **Telecom-Control, Austria [14]**

The deregulation of telecoms markets is an issue that will continue to occupy all of Europe in the coming years. Regulatory authorities have been established throughout the European Union, not least because of the general European legal environment and the requirements and other activities of the EU. The purpose of these regulatory authorities is to ensure free and fair competition in the national telecommunication markets.

For this reason, Telekom-Control GmbH, a non-profit organisation, and the Telekom-Control Commission, an independent panel authority with regulatory powers, were established at the end of 1997.

In the context of telecommunications market deregulation, the topics covered can be divided into several important areas: Regulation of market access (Licensing), the opening up of networks, prevention of the abuse of power in the market, securing universal services, the economically logical use of limited resources, the administration of number ranges and consumer protection measures.

The highest telecommunications authority in Austria is the Federal Minister of Transport, Innovation and Technology. Under the present division of tasks, telecommunications affairs are handled by Section IV, which is in charge of the Telecommunications Offices in Graz, Innsbruck, Linz and Vienna, as well as the Approvals Office. The Federal Minister passes ordinances in accordance with the Telecommunications Act; examples include the Numbering Ordinance, Fees Ordinance and Interconnection Ordinance. One of the Ministry's essential tasks is to impose and handle the regulations necessary for implementing international treaties, especially those concerning the use of the frequency spectrum.

Ref:
[14] www.tkc.at

The Telecommunications Offices are in charge of enforcing the administrative penalty clauses under the Telecommunications Act, among other duties. The Approvals Office is responsible for deciding on type-approval applications for terminal equipment and radio communications systems.

7.2.2 Belgium

- **Belgium Institution of Postal Services and Telecommunications (BIPT) [15]**

The Belgian Institute of Postal and Telecommunications Services (IBPT) is the regulating entity of the postal and telecommunications sector in Belgium, and was created by the law of 21 March 1991. Set up in 1993, its importance has primarily grown as a result of the gradual opening to competition, particularly in the telecommunications sector. The Institute is responsible for strategic (it is competent to give opinions regarding post and telecommunications sector policies), regulatory (drafting of Belgian regulations and transposition into Belgian law of European directives), operational (management of licenses, approvals and frequencies), conciliation (between operators) and monitoring missions.

The IBPT's Frequency Management Department is in charge of managing the Belgian radio electric spectrum. This mission includes the daily application and co-ordination of frequencies for the Belgian spectrum and the long-term policy on frequency plans and frequency readjustments. The department works to ensure the correct application of the various international agreements signed by Belgium concerning the use of the electromagnetic spectrum. Most frequency allocation dossiers are treated in the framework of the Vienna Agreement (1993).

7.2.3 Denmark

- **Ministry of Research, Denmark**

- **Telestyrelsen – National Telecom Agency, Denmark [16]**

The National Telecom Agency is in charge of administrative and regulatory functions based on the legislation governing telecommunications. The Agency is engaged in the preparation of new legislation on telecommunications and draft amendments to existing legislation. Another area of the Agency's activities is the extensive international telecommunications co-operation including EU co-operation to find new rules and regulations.

Ref:
[15] www.bipt.be
[16] www.tst.dk

It is the aim of the Agency to be able to carry out its tasks in such a manner that its reputation naturally becomes that of centre of government expertise on telecommunications. The National Telecom Agency exercises powers as defined under the Act on the National Telecom Agency (Act No. 395 of 10 June 1997) The National Telecom Agency is a Government Agency under the Ministry of Research and Information Technology.

7.2.4 Finland

- **Ministry of Transport and Communications, Finland**

- **Telecommunications Administration Centre (TAC), Finland [17]**

The Telecommunications Administration Centre (TAC) is an agency under the Ministry of Transport and Communications Finland. It was established in 1988. When the competition in telecommunications began there was a need to separate business operations and administrative functions in the field. The Telecommunications Administration Centre was established to fill this need. The development in telecommunications was taken into consideration in the Telecommunications Act that entered into force in 1987 and in the Radio Act in 1988. The same year the new Act on Telecommunications Administration became effective enabling the establishment of the TAC.

7.2.5 France

- **Ministry of postal services, telecommunications and space, France**

- **Agence Nationale des Frequences, France**

- **The French Telecommunicatons Regulatory Authority (ART), France [18]**

To implement European directives, the French law of 26 July 1996 opened up the telecommunications sector to full competition from 1 January 1998. This law thus provides for telecommunications activities to be carried out freely. Regulation involves the application, by the competent authority, of all legal, economic and technical arrangements that will allow for telecommunications activities to be exercised effectively. In France, the law has entrusted this mission to the minister responsible for telecommunications and an independent institution: the French Telecommunications Regulatory Authority (ART), set up on 5 January 1997.

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Ref:
[17] www.thk.fi
[18] www.art-telecom.fr

7.2.6 Germany

- **Bundesministerium fur Wirtschaft (BMWi), Germany**

- **Regulatory Authority for Telecommunications and Posts (RegTP) [19]**

The Regulatory Authority for Telecommunications and Posts was set up by the Telecommunications Act, in force since August 1996. It is a higher federal authority within the scope of business of the Federal Ministry of Economics and Technology and has its headquarters in Bonn. The Regulatory Authority superseded the Federal Ministry of Posts and Telecommunications and its subordinate Federal Office.

The Regulatory Authority which took up its work on 1st January 1998 is tasked with promoting the development of postal and telecommunications markets through liberalisation and deregulation. It is equipped with effective procedure and instruments with which to enforce the regulatory aims. These include information and investigative rights as well as a set of sanctions.

- The Regulatory Authority's determinations are made by its Ruling Chambers.
- The companies directly concerned take part in the Ruling Chamber proceedings.
- Representatives of business circles affected may be summoned to attend proceedings.
- The determinations are underpinned by the Telecommunications Act and the Postal Act, and are subject to judicial review.
- The determinations cannot be quashed by the supervisory authority (the Economics and Technology Ministry) in the event of legal action. In derogation of the provisions of the Restraints of Competition Act, there is no scope for ministerial decisions.
- There are no appeal proceedings.
- Actions against determinations may be brought directly before the administrative courts, but do not automatically have suspensory effect.

The major statutes forming the legal basis for the Regulatory Authority's official acts are

- the Telecommunications Act ("TKG"),
- the side-law to the Telecommunications Act,
- the Electromagnetic Compatibility Act ("EMVG"),
- the Amateur Radio Act ("AFuG"),
- the Digital Signature Act ("SigG"), and
- the Postal Act.

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Ref:
[19] www.regtp.de

The RegTP is actively involved in various EMC standardisation bodies. 37 experts from the RegTP represent Germany's interests in over 40 national and some 200 international working groups at, for example, the International Telecommunication Union (ITU), the European Telecommunications Standards Institute (ETSI), the European Conference of Postal and Telecommunications Administrations (CEPT), the International Standards Organisation/International Electrotechnical Commission (ISO/IEC), the German Standards Institute/German Electrotechnical Committee (DIN/DKE), and the European Commission.

7.2.7 Greece

- **National Telecommunications and Post Commission, Greece [20]**

7.2.8 Irish Republic

- **Office of the Director of Telecommunications Regulation [21]**
- **Department of Transport, Energy and Communications, Irish Republic**

7.2.9 Italy

- **Ministry of Communications, Italy**

- **Italian Competition Authority, Italy**

- **Italian Communications Authority [22]**

The establishment of the Communications Regulatory Authority. Law n°249 of 31 July 1997 situated the Authority in this context of institutional relations, instructing it to conduct its activities "in full autonomy and with independence of judgement and assessment".

Independence is the first of the reasons at the basis of the Authority's establishment, and constitutes the element characterising the model constructed by law. Independence with respect to both political and economic leverage must therefore represent the Authority's most outstanding feature, because it constitutes the primary condition for its legitimacy and the efficacy of its action.

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Ref:
[20] www.eet.gr
[22] www.agcom.it

Compared with the underlying approach prevailing in other European countries, however, the peculiarity of Law n°249 of 1997 resides not only in the broad range of legal instruments whereby the Authority may exercise its decision-making powers and take action. Equally important, and perhaps all the more characteristic, is the model pursued by means of the choice made, attributing to the Communications Regulatory Authority a series of functions which exercise an equally extensive impact upon the area of telecommunications as well as that of audiovisuals.

The role of regulatory bodies during the transition phase. Linked to this homogeneous and ramified movement is the creation in many countries of independent authorities, to whom the executive branch of government assigns tasks of market regulation and warranty for operators and consumers with a view to a social use of flexible forms of knowledge with a wide range of choices. Their widespread establishment may be understood as the way countries decide to act in an effort to guide and channel the technological transformation underway (which in operational terms brings together sectors with highly different legal traditions and thereby makes them mutually dependent: TV, press, IT, telecommunications), and define a new perimeter of responsibility in that transformation process.

7.2.10 Luxembourg

- **Ministry of Communications, Luxembourg**

- **Institut Luxembourgeois des Telecommunications [23]**

The ILT began its activities in June 1997. ILT's mission consists in taking care that the sector of telecommunications of the Grand Duchy of Luxembourg is opened with competition, that competition is real and equitable there and that all the consumers have access to the services of telecommunications under reasonable conditions. ILT operates under the supervision of the Minister of Transport.

7.2.11 Netherlands

- **Onafhankelijke Post en Telecommunicatie Autoriteit (OPTA) [24]**

The mission of the Directorate-General for Telecommunications and Post (DGTP) is to ensure high quality, socially responsible facilities for telecommunications, telematics and post in a competitive environment. OPTA works closely with other regulatory authorities in members states of the EU and in the form of meetings of the Independent Regulators Group (IRG). In addition, on a more incidental basis, it has contact with the ITU and with the Organisation for Economic Co-operation and Development.

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Ref:
[23] www.etat.lu/ILT
[24] www.opta.nl

7.2.12 Portugal

- **Institute for Communicatons Portugal (ICP) [25]**

ICP is the regulatory body of the Portuguese communications sector, reporting to the Minister of Social Equipment. ICP started its activity in 1989 as a public institute with administrative and financial autonomy, with the purpose of:

- providing support to the government in the co-ordination, tutelage, and planning of the communications sector,
- representing the sector,
- managing the radioelectrical spectrum.

Guided by an integrated view of the development of communications in Portugal, ICP is responsible for fulfilling three major tasks:

- Government Advisement, in the fields of communications policy measures, preparations of legislation and technical opinions, representation of the Portuguese State at international organisations and international co-operation;
- Market Regulation, in the fields of sector organisations, granting and supervising licences and authorisations, price agreements, frequency consignment, quality control, conciliation procedures, and consumer protection;
- Technical Assignment, in the fields of radioelectric spectrum management, approvals and homologations of communications equipment and materials.

7.2.13 Spain

- **Secretary of Telecommunications, Spain**

- **Comision del Mercado de las Telecomunicaciones (CMT), Spain [26]**

The CMT was created in June 1996 with the object to safeguard, in the benefit of the citizens the conditions of effective competition in the market of the telecommunications, audio-visual, telematics and interactive services.

7.2.14 Sweden

- **National Post and Telecom Agency (PTS) [27]**

Post-och telestyrelsen, PTS, the Swedish National Post and Telecom Agency, is the governmental authority for issues relating to telecoms, IT, radio and postal services. PTS was founded on 1st July 1992 . PTS issues regulations and ensures that existing legislation is followed and is responsible for allocating frequencies within Sweden, as well as co-ordinating its operations with other countries.

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[25] www.icp.pt
[26] www.cmt.es
[27] www.pts.se

7.2.15 United Kingdom

- **Department of Trade & Industry [28]**

The aim of the Department of Trade & Industry is to increase competitiveness and scientific excellence in order to generate higher levels of sustainable growth and productivity in a modern economy.

Its stated objectives are:
1. To promote enterprise, innovation and increased productivity.
2. To make the most of the UK's science, engineering and technology.
3. To create strong and competitive markets.
4. To develop a fair and effective legal and regulatory framework.

- **Radiocommunications Agency (RA) [29]**

The Radiocommunications Agency (RA) was established as an Executive Agency of the Department of Trade and Industry on 2 April 1990. It is responsible for the allocation, maintenance and supervision of most non-military radio spectrum in the UK and for representing the UK in international meetings on radio.

Agency Structure**:** The Agency is arranged in four executives, each headed by a Director dealing with Spectrum Policy, Spectrum Services, Customer Services and Corporate Services and Facilities.

Outside Bodies: Three external bodies have links with the Agency.

1. Radio Spectrum International (RSI) is the Agency's public-private partnership with CMG plc, a leading European IT company. RSI is a private sector joint venture that supplies the Agency with advanced information systems and also exploits the Agency's intellectual property and know-how by providing consultancy services on a commercial basis to spectrum managers throughout the world.

2. The Spectrum Management Advisory Group is an independent body under the chairmanship of Dr John Forrest and with members selected from a wide range of backgrounds that provides independent strategic advice on spectrum matters to Ministers and the Agency.

3. The Agency Steering Board under the chairmanship of Alastair Macdonald CB, Director General Industry at the DTI, and with external members having relevant industrial or commercial experience, advises the Secretary of State on the Agency's Corporate Plan and the extent to which the Agency carries out its functions effectively and efficiently. The Steering Board also has a role in considering complaints that cannot be resolved by the Chief Executive to the satisfaction of the complainant.

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Ref:
[28] www.dti.gov.uk
[29] www.radio.gov.uk

The European Community (EC) Directive on Electromagnetic Compatibility has been implemented in the UK by the Electromagnetic Compatibility Regulations 1992. The Regulations apply to all electronic and electrical apparatus, both commercial and domestic, including radio and television receivers, and covers emissions and immunity.

- **Office of Telecommunications (OFTEL) [30]**

OFTEL is the regulator – or "watchdog" – for the UK telecoms industry. Broadcast transmission is also part of OFTEL's remit. OFTEL's aim is for customers to get the best possible deal in terms of quality, choice and value for money. OFTEL is a government department but independent of ministerial control and is headed by the Director General of Telecommunications, who is appointed by the Secretary of State for Trade and Industry.

OFTEL was set up under the Telecommunications Act 1984. Under this Act the Director General has a number of functions and duties (these are summarised in 2 and 3). The main way OFTEL regulates is through monitoring and enforcing the conditions in all telecommunications licences in the UK. OFTEL also initiates modifications to these licence conditions.

The Director General has extensive powers under the Telecommunications Act, particularly when enforcing or modifying licence conditions. If a condition is breached, he can require the licence holder to comply by making an order. This is enforceable by third parties or the Director General through civil action. He can also make determinations – for example to set out the terms for interconnection between networks where the two operators cannot agree between themselves. This is fundamental to promoting competition because it enables customers of one network operator to contact customers of the other – and vice versa.

Another area for which OFTEL has responsibilities is telecommunications apparatus. This includes granting Site Specific Approvals to some equipment for use in specified locations and issuing general Approvals to permit certain classes of equipment to be approved and connected without the need for third-party testing. As part of this OFTEL maintains a register of apparatus approved under section 22 of the Telecommunications Act.

Ref:
[30] www.oftel.gov.uk

7.3 European Union Members National Standards Bodies (NSBs)

7.3.1 Austria

- **Osterreichisches Normungsinstitut (ON), Wien [31]**

For decades standardisation has primarily been considered a "national" matter. Even though, at present, standards are being prepared primarily on a European and International level, there is still a demand in certain areas for national standards. The platform for the preparation of Austrian Standards (ÖNORMEN) is the Austrian Standards Institute (ON). Some 6.600 experts from the economic and industrial sector, consumer organisations, administration and science participate in the preparation of Austrian Standards in around 200 Technical Committees (FNAs) of ON, with about 850 Subcommittees and Working Groups. They equally take care of the fact that Austria's interests are represented and safeguarded in European and international standardising bodies.

Today European standards represent keystones as regards the realisation of the European single market. They are valid in all of the 19 member states of the European Committee for Standardisation CEN (EU- and EFTA-states as well as the Czech Republic). Prior to this achievements 19 different standards, but also divergent technical regulations impeded foreign trade and service transactions; today, however, these European standards today facilitate and even make these transactions possible as such. Thus, European standards offer a means to join forces in a united Europe since standards serve to overcome technical barriers to trade.

7.3.2 Belgium

- **Institut belge de normalisation (BIN/IBN), Bruxelles [32]**

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Ref:
[31] www.on-norm.at
[32] www.bin.be, www.ibn.be

7.3.3 Denmark

- **DANSK STANDARD (DS), Charlottenlund [33]**

7.3.4 Finland

- **Finnish Standards Association (SFS), Helsinki [34]**

Standardisation is carried out at international, regional, national and company levels. The Finnish Standards Association SFS is an independent, non-profit making organisation co-operating with trade federations and industry, research institutes, labour market organisations, consumer organisations, and governmental and local authorities. Members of SFS include professional, commercial and industrial organizations, and the state of Finland represented by the ministries.

The Finnish Standards Association SFS and its standards-writing bodies, the Finnish Electrotechnical Standards Association and Telecommunications Administration Centre are members of the European standards organisations CEN, CENELEC and ETSI. The membership implies obligation to implement all European standards as SFS standards within six months, when the organisation concerned has approved the European standard.

7.3.5 France

Association francaise de normalisation (AFNOR), Paris [35]

AFNOR is a state-approved organisation placed under the supervision of the Ministry for Industry. Its stated missions are to pilot and co-ordinate the preparation of standards, to represent and defend French interests within all standardisation bodies, to approve standards, to promote and facilitate the use of standards and to develop NF certification and products, services and systems certification.

Ref:
[33] www.ds.dk
[34] www.sfs.fi
[35] www.afnor.fr

7.3.6 Germany

- **Deutsches Institut fur Normung (DIN), Berlin [36]**

Standardisation work in Germany is organised by the DIN. Standardisation work is carried out in 4,600 working committees with 28,500 external experts. Finished standards are checked at least every five years for their topicality. The work of DIN is based on consent and transparency and is committed to the public interest.

7.3.7 Greece

Hellenic Organisation for Standardisation (ELOT), Athens [37]
According to law 372/76, ELOT is the unique organisation at national level for the approval, issuing and distribution of Hellenic Standards. The procedures, established by ELOT for the elaboration of Hellenic Standards, aim to the achievement of consensus of all interested parties. Thus, standards are formulated by representative Technical Committees of Standardisation and are submitted to a public enquiry procedure in order to achieve the maximum of common acceptance. The Secretariat of a Technical Committee in many cases has been assigned to competent bodies. Hellenic Standards are also revised at regular intervals in order to meet the requirements of the latest developments in science and technology and they also are harmonised with the relevant international and European standards in order to be in line with developed countries.

According to law 372/76, the implementation of Hellenic Standards, is voluntary, as it happens in most countries. Some of them become mandatory by national or EEC legislation. According to law 372/76, ELOT is the national member and participates in the following international standardisation organisations International Organisation for Standardisation (ISO) and International Electrotechnical Commission (IEC).

The standards organisations of the member countries of EEC and EFTA, among them ELOT, are the members of the European Standards Organisations. These organisations are: The European Committee for Standardisation (CEN) and the European Committee for Electrotechnical Standardisation (CENELEC). ELOT participates in the work of the European Committee for Iron and Steel Standardisation (ECISS).

In the field of telecommunications standardisation, a memorandum of understanding has been signed by ELOT and the Hellenic Telecommunication Organisation in order to participate in the work of the European Telecommunications Standards Institute (ETSI) and to elaborate the appropriate Hellenic Standards.

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Ref:
[36] www.din.de
[37] www.elot.gr

7.3.8 Irish Republic

- **National Standards Authority of Ireland (NSAI), Dublin [38]**

NSAI operates under the National Standards Authority of Ireland Act 1996, on behalf of the Minister for Enterprise, Trade and Employment, for the publication of national standards; the provision of a comprehensive product and management system certification service; and the establishment of confidence in trade measurements. The governing board of NSAI is appointed by the Minister, and represents a cross-section of industrial and government interests.

NSAI activities are focused in four distinct areas:

- Standards Development
- Certification Services
- Irish Agreement Board
- Legal Metrology Service

7.3.9 Italy

- **Ente Nazionale Italiano di Unificazione (UNI), Milano [39]**

The Italian National Agency of Unification, UNI, was founded in 1921 in Milan.

7.3.10 Luxembourg

- **Service de l'Energie de l'Etat (SEE), Luxembourg [40]**

Formed in 1967 in the Grand Duchy of Luxembourg, SEE (Service de l'Energie de l'Etat) is:

- a Civil Service Department, independent of industry and trade associations; Luxembourg's National Standardisation Committee within the European and International Organisations,
- a Third party Certification Body;
- a test house for Electromagnetic Compatibility (EMC) and Product Safety;
- a Calibration laboratory;
- Luxembourg's Approval Board for Telecommunication Equipment;
- Notified Body (N° 0499) under several EC Directives;

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Ref:
[38] www.nsai.ie
[39] www.uni.com
[40] www.etat.lu/SEE

7.3.11 Netherlands

- **Nederlands Normalisatie-instituut (NNI), Delft [41]**

Electrotechnology, telecommunications and informatics. Rapid developments in information and communication technology (ICT) were a separate chapter in the standardisation activities of the Netherlands Electrotechnical Committee (NEC, which is the Netherlands national committee of the IEC and works closely with NNI). The facilities offered by the Internet and mobile communications are having an increasing effect on Dutch society, and their economic importance is growing. In the case of standardisation for IT applications the bulk of the work lies chiefly at the European level. The NNI currently provides the chairman and secretariat of the European technical committee on Road Transport and Traffic Telematics. Eight years after the implementation of the European EMC (Electromagnetic Compatibility) Directive, a panel has now been established to determine whether EMC standards are relevant and/or need to be replaced. The Netherlands is participating in this programme because of its considerable knowledge of EMC.

7.3.12 Portugal

- **Instituto Portugues da Qualidade (IPQ), Caparica [42]**

The IPQ assures the Portuguese representation at the international level in the area of quality. The IPQ is responsible for accreditation of entities, for national normalisation, and assuring liaisons and applying definite procedures in line with European and international organisations of normalisation.

7.3.13 Spain

- **Asociacion Espanola de Normalizacion y Certificacion (AENOR), Madrid [43]**

AENOR was created in 1986 and is the Spanish member of ISO, IEC, CEN, CENELEC.

Ref:
[41] www.nen.nl
[42] www.ipq.pt
[43] www.aenor.es

7.3.14 Sweden

SIS – Standardiseringen I Sverige (SIS), Stockholm [44]
SIS was founded in 1922 as the central body for standardisation in Sweden. Its stated mission is to contribute to the development of Swedish industry and society by promoting mutual understanding and voluntary agreement between different parties in business and industry, governmental authorities, consumers and other organisations with regard to standardisation, quality development and environmental awareness.

7.3.15 United Kingdom

- **British Standards Institution (BSI), London [45]**

Formed in the early 1900's, BSI is the world's oldest national standards body. BSI publishes about 1,700 standards a year, has 19,000 "live" standards and 40,000 products. All European Union standards are automatically adopted as British Standards. The trend is towards international standardisation, particularly through ISO.

What BSI does:

- Facilitates writing the standards that industry and business use to increase efficiency and safety and to trade internationally.
- Oversees the implementation of management systems that are recognised the world over as an essential key to running a profitable business.
- Inspects commodities and tests products to ensure that they are what they claim to be and what they claim to do efficiently and safely.
- Provides a range of related support services and learning opportunities.

Types of standards – British and worldwide:

- All British Standards use the product idenitifier "BS".
- All British adoptions of European Standards are identified with "BS EN".
- All International Standards are identified with "ISO".
- All International Standards adopted as British Standards are identified with "BS ISO".

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Ref:
[44] www.sis.se
[45] www.bsi-global.com

7.3.16 Independent Regulators Group

Contacts made in 1997 between the heads of national telecommunications regulators of the countries of the EU, the European Free Trade Association (EFTA) and the European Economic Area(EEA), have resulted in international consultations under the name 'Independent Regulators Group' (IRG) [45a]. In 1999, intense contact took place between the various members of the IRG. Within the IRG, the national regulatory authorities exchange information and experiences they have gained from their daily practice. The object of this is to enhance the harmonisation of policy – and therefore the uniformity of decisions, by the different regulatory authorities. This could contribute towards the effectiveness of the regulation and the internal European market. The heads of the IRG meet at least twice a year in order to discuss common matters that must be handled at European level.

Within the IRG, special attention is also devoted to the following subjects, with which several NRA's are occupied:

- ONP review
- Cost-allocation models
- Cross-border interconnection
- Significant market power
- Possibility to exchange confidential information within the IRG

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[45a] www.opta.nl

7.4 International Standards Organisations

7.4.1 How international standardisation began

International standardisation began [46] in the electrotechnical field: the International Electrotechnical Commission (IEC) was created in 1906. Pioneering work in other fields was carried out by the International Federation of the National Standardising Associations (ISA), which was set up in 1926. The emphasis within ISA was laid heavily on mechanical engineering.

ISA's activities ceased in 1942, owing to the Second World War. Following a meeting in London in 1946, delegates from 25 countries decided to create a new international organisation "the object of which would be to facilitate the international co-ordination and unification of industrial standards". The new organisation, ISO, began to function officially on 23 February 1947. The first ISO standard was published in 1951 with the title "Standard reference temperature for industrial length measurement.

7.4.2 ISO

ISO (The International Organisation for Standardisation) [47] is a worldwide federation of national standards bodies from some 130 countries, one from each country. It is a non-governmental organisation established in 1947. The mission of ISO is to promote the development of standardisation and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing co-operation in the spheres of intellectual, scientific, technological and economic activity. ISO's work results in international agreements, which are published as International standards.

ISO is made up of its members which are divided into three categories:

1. A 'member body' of ISO is the national body "most representative of standardisation in its country". Thus, only one body in each country may be admitted to membership of ISO.

A member body takes the responsibility for:

- Informing potentially interested parties in their country of relevant international standardisation opportunities and initiatives.
- Ensuring that a concerted view of the country's interests is presented during international negotiations leading to standards agreements.
- Providing their country's share of financial support for the central operations of ISO, through payment of membership dues.

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Ref:

[46] Friendship among equals – Recollections from ISO's first fifty years.
[47] www.iso.ch

Member bodies are entitled to participate and exercise full voting rights on any technical committee and policy committee of ISO.

2. A 'correspondent member' is usually an organisation in a country which does not yet have a fully developed national standards activity. Correspondent members do not take an active part in the technical and policy development work, but are entitled to be kept fully informed about the work of interest to them.

3. ISO has also established a third category, 'subscriber membership', for countries with very small economies. Subscriber members pay reduced membership fees that nevertheless allows them to maintain contact with international standardisation.

Who does the work?

The technical work of ISO is highly decentralised, carried out in a hierarchy of some 2850 technical committees, subcommittees and working groups. In these committees, qualified representatives of industry, research institutes, government authorities, consumer bodies and international organisations from all over the world come together as equal partners in the resolution of global standardisation problems. Some 30,000 experts participate in meetings each year.

The major responsibility for administrating a standards committee is accepted by one of the national standards bodies that make up the ISO membership – AFNOR, ANSI, BSI, CSBTS, DIN, SIS, etc. The member body holding the secretariat of a standards committee normally appoints one or two persons to do the technical and administrative work. A committee chairman assists committee members in reaching consensus. Generally, a consensus will mean that a particular solution to the problem at hand is the best possible one for international application at that time.

The Central Secretariat in Geneva acts to ensure the flow of documentation in all directions, to clarify technical points with secretariats and chairmen, and to ensure that the agreements approved by the technical committees are edited, printed, submitted as draft International Standards to ISO member bodies for voting, and published. Meetings of technical committees and subcommittees are convened by the Central Secretariat, which co-ordinates all such meetings with the committee secretariats before setting the date and place. Although the greater part of the ISO technical work is done by correspondence, there are, on average, a dozen ISO meetings taking place somewhere in the world every working day of the year.

Each member body interested in a subject has the right to be represented on a committee. International organisations, governmental and non-governmental, in liaison with ISO also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardisation.

What fields are covered?

The scope of ISO is not limited to any particular branch; it covers all technical fields except electrical and electronic engineering, which the responsibility of IEC. The work in the field of information technology is carried out by a joint ISO/IEC technical committee (JTC1).

How are ISO standards developed?

ISO standards are developed according to the following principles:

- Consensus. The views of all interests are taken into account: manufacturers, vendors and users, consumer groups, testing laboratories, governments, engineering professions and research organisation.
- Industry-wide. Global solutions to satisfy industries and customers worldwide.
- Voluntary. International standardisation is market-driven and therefore based on voluntary involvement of all interests in the market-place.

There are three main phases in the ISO standards development process.

1. The need for a standards is usually expressed by an industry sector, which communicates this need to a national member body. The latter proposes the new work item to ISO as a whole. Once the need for an International Standard has been recognised and formally agreed, the first phase involves definition of the technical scope of the future standard. This phase is usually carried out in working groups which comprise technical experts from countries interested in the subject matter.

2. Once agreement has been reached on which technical aspects are to be covered in the standards, a second phase is entered during which countries negotiate the detailed specifications within the standard. This is the consensus-building phase.

3. The final phase comprises the formal approval of the resulting draft International Standard (the acceptance criteria stipulate approval by two-thirds of the ISO members that have participated actively in the standards development process, and approval by 75% of all members that vote), following which the agreed text is published as an ISO International Standards.

Most standards require periodic revision. Several factors combine to render a standard out of date: technological evolution, new methods and materials new quality and safety requirements. To take account of these factors, ISO has established the general rule that all ISO standards should be reviewed at intervals of not more than five years. On occasion, it is necessary to revise a standard earlier.

Partners

International Partners

ISO collaborates with its international standardisation partner, the IEC, whose scope of activities complements ISO's. In turn, ISO and the IEC co-operate on a joint basis with the ITU (International Telecommunication Union). Like ISO, the IEC is a non-governmental body, while the ITU is part of the United Nations Organisation on standardisation in the fields of information technology and telecommunications.

ISO is building a strategic partnership with the World Trade Organisation (WTO) with the common goal of promoting a free and fair global trading system. The political agreements reached within the framework of the WTO require underpinning by technical agreement. ISO is being recognised as providing a special technical support role in relationship to the new and expanded WTO programmes.

Regional Partners

Many of ISO's members also belong to regional standardisation organisations. This makes it easier for ISO to build bridges with regional standardisation activities throughout the world. ISO has recognised regional standards organisations representing Africa, the Arab countries, the areas covered by the Commonwealth of Independent States, Europe, Latin America, the Pacific area and the South-East Asia nations. These recognitions are based on a commitment by the regional bodies to adopt ISO standards – wherever possible without change – as the national standards of their members and to initiate the development of divergent standards only if no appropriate ISO standards are available for direct adoption.

In addition, ISO liaises with some 500 international and regional organisations interested in specific aspects of its standardisation work.

7.5 European Standardisation bodies

The following bodies: CENELEC, CEN and ETSI are the three European standardisation bodies preparing European standards in specific sectors of activity. Most standards are prepared at the request of industry. The Commission can also request these bodies to prepare standards in the context of the implementation of Community legislation. This is known as standardisation work “mandated” by the Commission in support of the legislation. If these standards are prepared in the framework of the “New Approach” directives, they are known as “harmonised standards”.

The products manufactured in accordance with these standards benefit from a presumption of conformity with the essential requirements of a given directive. Although they are precisely defined, the functions of CENELEC, CEN and ETSI inevitably overlap in a number of fields, such as the machinery sector or the sector of information and communications technology (ICT), which is situated at the crossroads between information technology, electronic components and telecommunications networks.

CEN and ISO (International Standardisation Organisation) have signed an agreement on technical co-operation called the Vienna Agreement. ETSI and ITU (International Telecommunications Union) are constantly in contact.

CENELEC and the IEC (International Electrotechnical Commission) operate at two different levels but their actions have a strong mutual impact since they are the most important standardisation bodies in the electrotechnical field. Collaboration has always been felt necessary. Co-operation between CENELEC and the IEC is described in what is known as the “Dresden Agreement” since it was approved and signed by both partners in the German city in September 1996.

This agreement (which relates to common planning of new work and parallel CENELEC/IEC voting) intends:

- To expedite the publication and common adoption of International Standards.
- To ensure rational use of available resources and therefore technical consideration of the content of the standards should preferably take place at international level.
- To accelerate the standards preparation process in response to market demands.

7.5.1 CENELEC

CENELEC is the European Committee for Electrotechnical Standardisation. [48] It was set up in 1973 as a non-profit-making organisation under Belgian Law. It has been officially recognised as the European Standards Organisation in its field by the European Commission in Directive 83/189/EEC.

It's members have been working together in the interests of European harmonisation since the late 1950's, developing alongside the European Economic Community. CENELEC works with 35,000 technical experts from 19 European countries to publish standards for the European market.

Technical Structure of CENELEC

All interested parties are consulted during the CENELEC standards drafting, through involvement in technical meetings at national and European level (to establish the content of the draft) and through enquiries conducted by the members.

The General Assembly (AG) is the highest-level body. It makes all the policy decisions and is composed of delegations from each of the 19 National Committees (NCs).

An Administrative Board (CA) of eight officers, led by the President, supervises the work carried out according to the AG's resolutions.

The Technical Board (BT) co-ordinates the work of the technical bodies, which include Technical Committees (TCs), Sub-Committees (SCs), special Task Forces (BTTFs) and Working Groups (BTWGs). It is the BT, made up of one permanent delegate from each NC, which decides on ratification, on the basis of national voting, of draft standards prepared by the technical bodies.

The BT also approves work programmes and monitors the progress of standardisation work. The different CENELEC *technical* bodies are the following:

The Technical Committees (TCs) are established by the Technical Board with precise titles and scopes to prepare the standards. Technical Committees take into account any ISO/IEC work coming within their scope, together with such data as may be supplied by members and by other relevant international organisations, and work on related subjects in any other Technical Committees. Each Technical Committee establishes and secures Technical Board approval for its programme of work with precise title, scope and scheduled target dates for the critical stages of each project. These dates are reviewed at least once a year.

[48] www.cenelec,org

Subcommittees (SCs) may be established by a Technical Committee (after Technical Board approval on justification, programme of work, title and scope) having responsibility for a large programme of work in which :
- different expertise is needed for different parts of the work, and
- the range of separate activities needs co-ordination over long periods of time.
The parent TC retains full responsibility for the work of its SCs.

The BTTFs (Technical Board Task Forces) are technical bodies set up by the Technical Board, with a view to undertake a specific short term task within a target date and are composed of a Convenor and national delegations. A BTTF reports to the Technical Board, its parent body.

The BTWGs (Technical Board Working Groups) are technical bodies set up by the Technical Board to undertake a specific short term task within a target date. They are disbanded by its parent body once its task is completed. They are composed of a Convenor and of individual members appointed by the Technical Board and/or the National Committees to serve in a personal capacity.

Reporting Secretariats exist to provide information to the Technical Board on any ISO/IEC work which could be of concern to CENELEC. When the Technical Board wishes to examine a technical problem or to investigate a situation in an area not already covered by a technical Committee, the Central Secretariat may initially call upon a Reporting Secretariat to provide what information is available. A Reporting Secretariat is undertaken by a CENELEC member, usually the member holding the Secretariat of the concerned IEC/TEC or SC.

CENELEC Conformity Assessment Forum (CCAF) replaces the former sectoral committee ELSECOM. CCAF provides a forum for discussion of policies and strategies related to conformity assessment in the electrotechnical area, between representatives of the different conformity assessment schemes, representatives of their advisory structure, national interests represented by the interested CENELEC National Committees and advisors from European regulatory, economic and social partners.

Mutual Recognition Arrangement (MRA) is an agreement between parties involved in conformity assessment, that is based on the acceptance by the different parties of each other's results from the implementation of one or more elements of the conformity assessment scheme.

CENELEC Central Secretariat

CENELEC Central Secretariat is manned by 31 people and is a conglomerate of services designed to answer the needs for European standardisation and to serve the purpose of drafting, organising approval on and publishing European Standards. CENELEC being a service organisation, the Central Secretariat has been logically organised on the basis of a service model established by the Harvard Business School.

Collaborating in harmony, the different services weave themselves into one another in order to produce the very fabric of CENELEC that supports European standardisation.

Drafting

There are several ways to start making harmonised standards:

- An initial document comes from the International Electrotechnical Commission (80%) of cases).
- A document of European origin arises in one of CENELEC's own technical bodies.
- A first draft of a European document comes from one of CENELEC's co-operating partners.
- A fourth source is the National committees themselves. Under the Vilamoura Procedure, the NCs have agreed to notify CENELEC when they are planning any new work. CENELEC can, if it wants, take on this work.

Enquiry

When a suitable draft is available, it is submitted to the NCs for CENELEC enquiry, a procedure that lasts 6-months. Then the comments received are studied by the technical body working on the draft and incorporated into the document, where justified, before a final draft is sent out for vote. The vote usually takes 3-months.

Voting

Regarding voting, the members have weighted votes corresponding to the size of the country they represent. For instance, the larger countries like Germany, France, Italy and the UK have 10 votes each while the smaller ones have one or two weighted votes. There are two requirements for ratification of the standard. The vote must yield:

1. A majority of NCs in favour of the document.
2. At least 71% of the weighted votes cast are positive.

Numbering

The shortest unambiguous reference to European Standards is to use its number. The number of a European Standard consists of the capital letters 'EN' followed by a space and number in arabic numerals without any space, e.g:

EN50225:1996 (the year of availability of this EN is indicated by a colon)
EN 50157-2-1:1996 (the part number is separated by a hyphen)

The first two numerals indicate the origin of the standard. For example:
40000 to 44999 cover domains of common CEN/CENELEC activities in the IT field.
45000 to 49999 cover domains of common CEN/CENELEC activities outside the field of IT.
50000 to 59999 cover CENELEC activities.
60000 to 69999 refer to the CENELEC implementation of IEC documents with or without changes.

The IEC and ISO have allocated themselves blocks of publication numbers: from 1 to 59999 for the ISO and from 60000 to 79999 for the IEC.

CENELEC and the IEC operate at two different levels but it is self-evident that their actions have a strong mutual impact since they are the most important standardisation bodies in the electrotechnical field.

Collaboration has always been felt necessary. Co-operation between CENELEC and the IEC is described in what is known as “the Dresden Agreement” since it was approved and signed by both parties in the German city in September 1996. This agreement (which relates to common planning of new work and parallel CENELEC/IEC voting) intends to:

- Expedite the publication and common adoption of International Standards.
- Ensure rational use of available resources. Full technical consideration of the content of the standard should preferably take place at international level.
- Accelerate the standards preparation process in response to market demands.

The EN 55000 series are European standards based on CISPR publications. They have been published as harmonised standards under the EMC directive in the Official Journal of the European Communities.

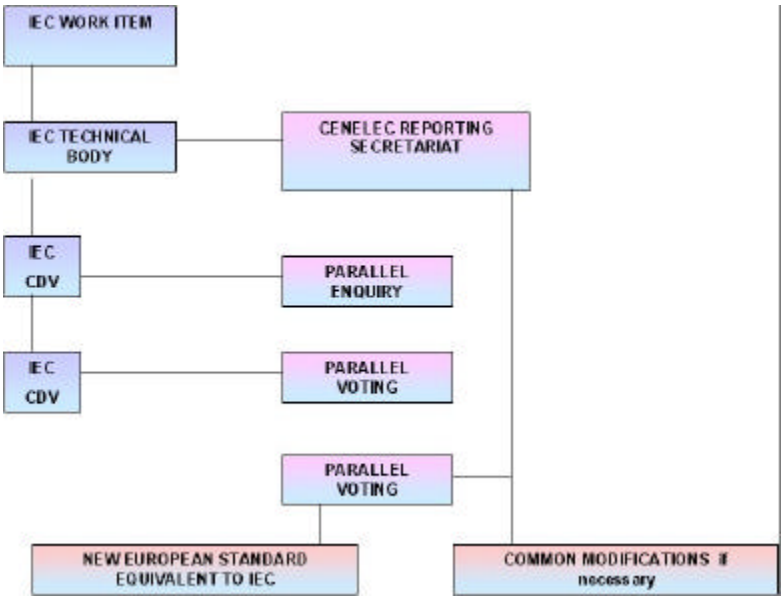
Common planning of new work

In their capacity as IEC members, CENELEC members are directly involved in the planning of new work in the IEC. Therefore, the following covers the cases where the need for new work arises within CENELEC.

From the CENELEC side, new work items may arise from CENELEC AG decisions, or, from CENELEC BT meetings on the basis of proposals by the membership, the affiliates and or the CENELEC co-operating partners.

- Work starts at CENELEC level in parallel with the IEC consultation. The IEC is to advise, as quickly as possible (at the latest within 6-months), whether the work can be incorporated in the current work programme with a target date as indicated by CENELEC.
- If the proposal is accepted by IEC the work ins then “promoted” to IEC level and CENELEC is kept informed by the IEC month by month of the state of progress of the work and of any difficulties which may be encountered. Should it becomes evident that the work in the IEC is not proceeding in such a manner as to meet the target dates, the question will be reconsidered by the CENELEC Technical Board.
- If the proposal is rejected by IEC or if the IEC’s timescale exceeds CENELEC’s planning requirements, the work is continued at CENELEC level only.

Figure 5 - Parallel CENELEC/IEC voting on draft International standards



Abbreviations:
CDV = Committee Draft with Vote
DIS = Draft International Standards

All CDV and FDIS (Final Draft International Standard) circulated for vote in IEC are automatically submitted for enquiry and vote respectively as prEN (Draft European Standard) within CENELEC. There are however a few exceptions. Voting forms (2-months) are sent simultaneously to the National Committees by the CENELEC Central Secretariat and by the IEC Central Office.

- Since European standards must mandatory be adopted as national standards (which is not the case for IEC standards), a National Committee may cast a negative note in CENELEC (with technical justification and copy to the IEC) and a positive vote in the IEC. CENELEC Technical Board then decides what action to take (e.g. a proposal for Common Modifications).
- If both results are positive, CENELEC Technical Board will ratify the new standards (normally by correspondence) while the IEC will publish it as an IEC standard.
- If the votes are negative in the IEC, the draft is referred back to the relevant technical body and CENELEC Technical Board decides what action is to be taken. For example, the implementation of the FDIS as European standard, or the start of independent European work, or the submission of a new proposal to the IEC.

EU Members of CENELEC

- Austria: Osterreichisches Elektrotechnishces Komitee (OEK) and Osterreichischen Verband fur Elektrotechnik (OVE) (www.ove.at)
- Belgium: Comite electrotechnique Belge (CEB) and Belgisch Elektrotechnisch Comite (BEC) (www.bec.ceb.be)
- Denmark: Dansk Standard (DS) Electrotechnical Sector (www.ds.dk)
- Finland: Finnish Electrotechnical Standards Association (SESKO) (www.sesko.fi)
- France: Union Technique de l'Electricite (UTE) (www.ute-fr.com)
- Germany: Deutsche Elektrotechnische Kommission im DIN and VDE (DKE) (www.dke.de)
- Greece: Hellenic Organisation for Standardisation (ELOT) (www.elot.gr)
- Ireland: Electro-Technical Council of Ireland (ETCI) (www.etci.ie)
- Italy: Comitato Elettrotecnico Italiano (CEI) (www.ceiuni.it)
- Luxembourg: Service de l'Energie de l'Etat (SEE) (www.etat.lu/SEE)
- Netherlands: Nederlands Normalisatie-instituut (NEN) (www.nen.nl)
- Portugal: Instituto Portugues da Qualidade (IPQ) (www.ipq.pt)
- Spain: Asociacion Espanola de Normalizacion y Certificacion (AENOR) (www.aenor.es)
- Sweden: Svenska Elektnska Kommissionen (SEK) (www.sekom.se)
- United Kingdom: British Electrotechnical Committee (BEC) at BSI (www.bsi-global.com)

7.5.2 ETSI

ETSI (the European Telecommunications Standards Institute) [49] was established in 1988 under French law in response to the need for an organisation to set telecommunications standards for the whole of Europe as a result of the creation of the single European Market in 1987. The scope of ETSI's activities include the fields of telecommunications and areas common to telecommunications, information technology and broadcasting.

ETSI is a non-profit making organisation whose mission is to produce the telecommunications standards that will be used for decades to come throughout Europe and beyond. Based in Sophia Antipolis, ETSI unites 773 members from 52 countries inside and outside Europe, and represents administrations, network operators, manufacturers, service providers, research bodies and users.

Membership

Any European organisation proving an interest in promoting European telecommunications standards has the right to represent that interest in ETSI thereby directly influencing the standards making process. There are five membership categories:

- Administrations, administrative Bodies and National Standards Organisations.
- Network Operators.
- Manufacturers.
- Users.
- Service Providers, Research Bodies, Consultancy Companies/partnerships and others.

A member can be a full member, associate member or observer falling within the geographical area of CEPT (Europe including East European countries).

Innovative approach

ETSI's approach to standards making is innovative and dynamic. ETSI members fix the standards work programme in function of market needs. Accordingly, ETSI produces voluntary standards, some of these may go on to be adopted by the EC as the technical base for Directives or Regulations, but the fact that the voluntary standards are requested by those who subsequently implement them means that the standards remain practical rather than abstract.

ETSI promotes the world-wide standardisation process whenever possible. Its Work Programme is based on and co-ordinated with the activities of international standardisation bodies mainly ITU-T and the ITU-R.

Ref:
[49] www.etsi.org

Organisation

ETSI consists of a General Assembly, a Board, a Technical Organisation and a Secretariat.

The General Assembly (GA) is the highest authority of ETSI and normally meets twice per year and is constituted by all ETSI members.

The Board is a body that acts on behalf of the GA by exercising powers that have been delegated to it by the GA. It consists of 24 members, 1 chairman, 2 vice-chairman elected by the GA.

The task of the Technical Organisation is to prepare standards and other deliverables. It encompasses ETSI Projects (EPs), Technical Committees (TCs) and ETSI Partnership Projects (EPP). A Technical Body may establish Working Groups to which parts of the TB's work programme may be delegated. More than 3500 experts are working for ETSI in over 200 groups.

- EPs are established on the basis of a market sector requirement to achieve a well defined result within a specific time frame with a set of well defined resources and focussed work items.
- TCs are organised around a set of work items addressing a specific technology area that my contribute to more than one Technical Body to provide continuity.
- EPPs are established on the basis of a market sector requirement when there is a need to co-operate with one or more external bodies and where such co-operation cannot be accommodated by an EP or TC.

The Central Secretariat of ETSI comprises about 110 staff members, divided into five departments. In order to promote and accelerate standardisation, additional experts work on a full time basis at the ETSI Headquarters. There are about 25 Specialist Task Forces (STFs) with around 60 experts. Over 5000 ETSI deliverables have been published.

ETSI Deliverables

A work item results in one deliverable (sometimes more than one), which can be a standard or a specification, a guide or a report:

- ETSI TS (ETSI Technical Specification and ETSI TR (ETSI Technical Report), adopted by the responsible Technical Body.
- ETSI ES (ETSI Standard) and ETSI EG (ETSI Guide), adopted after EDSI membership weighted voting.
- ETSI EN (European Standard – telecommunications series), adopted after ETSI membership national weighted voting.
- ETSI SR (ETSI Special Report), an information document used for various purposes, including giving public availability to information not produced within the Technical Body.

These deliverables fulfil the need for:

- High quality specifications delivered early to the market (ETSI TS)
- High quality standards supported by the whole ETSI global membership (ETSI ES)
- European harmonisation (ETSI EN)

Standards making process

Process Overview

The objective of the ETSI Standards Making Process (SMP) is to convert market needs for standardisation in the ICT area into ETSI deliverables (specification, standards, norms, guides, reports) used in the market place. The whole ETSI organisation is involved in either operation of the SMP or in direct or indirect support of it. The main technical activities are performed in the Technical Bodies of the Technical Organisation. The main direct support to those activities are provided by the Standards Making Support (SMS) department of the ETSI Secretariat.

The operation of the SMP in the Technical Organisation is governed by the ETSI Directives, in particular the Technical Working Procedures, and the ETSI Drafting Rules. The processes, tasks and procedures of the ETSI Secretariat are governed by the Secretariat's Quality Management System documentation, notably that of the SMS department.

Inception

The times when initiatives to standardisation were taken only when products and services were already available are long gone. This is particularly the case for telecommunications where standardisation precedes or goes hand in hand with the design and development processes. The input to this is "what's going on in the marketplace", with "marketplace" having a broad interpretation, including development in the research and academic circles. The output is a new standardisation area, given to an existing or a new Technical Body. The formal output is the Terms of Reference (ToR) and/or a Project Requirements Definition (PRD) document, approved by the ETSI Board, or, in the case of an ETSI Partnership Project with an external organisation, approved by the ETSI General Assembly.

Broadly, the process itself consists of:

- Identifying needs for standardisation in the subject areas defined by the ETSI Statutes and Rules of Procedure.
- Defining the suitable organisation for such standardisation within ETSI.

There are various participants in this process:

- Experts in the Technical Bodies and the Special committees
- ETSI Members
- SMS Technical Officers

Conception

The creation of a new standardisation area is manifested by the establishment of the new Technical Body or the amendment of the Terms of Reference of the Project Requirements Definition of an existing. The input is identified standardisation needs in the area. These work items may either be entirely new, leading to new deliverables, or a new version of an existing deliverable. The output is a work item, adopted by the ETSI Membership.

A proposal for a work item may come from inside or outside the Technical Body. The Technical Body may approve the work item, if at least four ETSI Members volunteer to support the work. The adoption is formally done by the ETSI Membership (the existence of new work items is made known via the ETSI Website and Members who disagree with the item may within 30-days oppose its adoption in to the ETSI Work Programme.

Drafting

A Technical Body is free to organise its work in any way it wishes, within the rules of the Technical Working Procedures, including creating Working Groups to which the tasks of drafting parts of the Technical Body's work programme are given. The drafting usually takes place in a small team (Rapporteur Group) lead by a Rapporteur. The work is largely done by "correspondence", i.e. by exchange of documents via the ETSI DocBox server and LISTSERV email exploder facilities. When the draft by the Rapporteur Group is considered ready, the draft deliverable is handed over to the Working Group (when it exists) for approval. The formal approval for further processing, or, in the case of ETSI Technical Specifications or ETSI Technical Reports, approval and adoption can only be done by the Technical Body, either at a meeting or by correspondence. Some drafting activities for a Technical Body are performed by Specialist Task Forces (STF) located at the ETSI Secretariat. The adaptation of specifications from external bodies (Publicly Available Specifications (PAS)) to the ETSI deliverables structure follows the same rules, but will normally be performed by the PAS provider, as defined in the Guidelines for adoption of Publicly Available Specifications.

Adoption

While the drafting process is, in principle, the same for all ETSI deliverables, the process elements of the adoption process depend on the type of deliverable being processed:

- ETSI Technical Specifications and ETSI Technical Reports – approval and adoption take place at the same time (one combined decision). Publication is then the only element in the adoption process. The Publication process element consist of final editing of the Word for Windows version of the adopted TS or TR, archiving, and publication PDF format. The published deliverable will then be made available for distribution via the ETSI Web server and constitute a part of the ETSI Documentation Services (EDS).

- ETSI Standard (ETSI ES) and ETSI Guide (ETSI EG) – following Technical Body approval and editing by SMS Technical Officer and the Editing and Document Management team (SMS/EDM), the draft is made available to the Full and Associate ETSI Members for voting in accordance with the Membership Approval Procedure (MAP) defined in the ETSI Rules of Procedure and Technical Working Procedures. Voting with MAP is done via a Web browser interface (Member voting application). The voting period is 60-days (in compliance with world Trade Organisation timing requirement). The deliverable is adopted if at least 71% of the weighted members votes cast are in favour of the draft. After adoption the deliverable is finally edited, archived and published in PDF format.
- European Standards – EN (telecommunications series) – after approval by the Technical Body, European Standards produced by ETSI EN (telecommunications series) are entered into one of the two approval procedures stipulated by the ETSI Rules of Procedure:
  1. One-step Approval Procedure (OAP)
  2. Two-step Approval Procedure (TAP)

  EN – One-step Approval Procedure is used when the draft is by the Technical Body considered mature, or is a new version of an ETSI EN. After editing, the draft is made available to the ETSI National Standards Organisations (NSOs) for a process where each NSO establishes the national position for the vote, i.e. performs national consultation in the territory of the NSO concerned. Although a vote is formally cast by the Head of National Delegation to ETSI (who in the majority of cases is not a representative of the NSO, byt may be (in the case where the NSO is a member of ETSI), the procedure including the voting is often referred to as “NSO Voting”. The period for “NSO voting” is 120-days. The deliverables are made available to the NSOs via file transfer via Internet and CD-ROM. The NSO sends the national position for the vote to ETSI via a web based electronic voting application. The deliverable will be adopted if at least 71% of the weighted national votes cast are in favour of the draft.

  EN – Two-step Approval Procedure. This procedure which is normally obligatory for Harmonised Standards involves the NSOs at two stages with resolution actions taken by the Technical Body responsible for the draft. The first NSO involvement, “NSO Public Enquiry” has a duration of 120-days. The second “NSO Voting” is 60-days. The comments, if any, received from the Public Enquiry are used by the Technical Body to decide on whether changes should be made to the draft before it is sent to the NSOs for their consultation and establishment of national position for the vote.

Combined processes

In order to make the results of the work of the Technical Body available to the market at an early stage, some of the above processes may be combined in such a way that two deliverables with identical content are processes/published in parallel, e.g. if the intention is to publish the draft as an ETSI EN (telecommunications series), but only after application of the Two-step Approval Procedure, the editing of the ETSI EN (sub-process Editing prior to Public Enquiry) also covers the Publication of an ETSI TS with identical contents. Parallel ETSI ES and ETSI TS processing is also possible but the time gain is less pronounced.

Promotion

The promotion activities address three main objectives:
1. Standardisation areas
2. Work items
3. Active members

In three main time frames:
1. Prior to start of standardisation work (inception and conception)
2. During standardisation work (drafting and adoption)
3. After publication

Management

The operations of ETSI and its bodies are governed by the ETSI Directives (containing ETSI Statutes, ETSI Rules of Procedure, ETSI Board Working Procedures, Powers and Functions of the Board, Terms of Reference of the Operational Co-ordination Group and ETSI Technical Working Procedures). The processes, tasks and procedures of the ETSI Secretariat is governed by the Secretariat's Quality Management System.

ETSI and the ITU

ETSI is a "Consultative Member" of the ITU and is entitled to attend the ITU Plenipotentiary Meetings. At present there is now a Co-operation Agreement in force allowing ETSI Members/TB representatives to attend ITU Study Groups but there are ongoing discussions concerning this. ETSI may put formal contributions to the ITU, but these have to first be approved by the ETSI General Assembly. The present, ad-hoc method of putting contributions to ITU Study Groups is to go via an ETSI member who is also a national representative in that Study Group.

EU Members National Standards Organisations who are ETSI Members:

- **Austria** – Osterreichisches Normungsinstitut (ON)
- **Belgium** – BIN/IBN
- **Denmark** – National Telecom Agency (TST)
- **Finland** – Telecommunications Administration Centre (THK)
- **France** – Association francaise de Normalisation (AFNOR)
- **Germany** – Deutsche Elektrotechnishe Kommission in DIN und VDE (DIN & VDE)
- **Greece** – Hellenic Standardisation Organisation (ELOT)
- **Irish Republic** – National Standards Authority of Ireland (NSAI)
- **Italy** – CEI/CONCIT (CEIUNI) & CONCIT/ISCTI (AGCOM)
- **Luxembourg** – Service de L'Energie de L'Etat (SEE)
- **Netherlands** – Netherlands Electrotechnical Committee (NEC/NEN)
- **Portugal** – Instituto Portugues da Qualidade (IPQ)
- **Spain** - AENOR
- **Sweden** – Information Technology Standardisation (ITS)
- **UK** – British Standards Institution (BSI)

7.5.3 CEPT

The European Conference of Postal and Telecommunications Administrations - CEPT was established in 1959 by 19 countries which expanded to 26 during its first ten years. [50] Original members were the incumbent monopoly-holding postal and telecommunications administrations. CEPT's activities included co-operation on commercial, operational, regulatory and technical standardisation issues.

In 1988 CEPT decided to create ETSI, The European Telecommunications Standards Institute, into which all its telecommunication standardisation activities were transferred.

In 1992 the postal and telecommunications operators created their own organisations, PostEurope and ETNO respectively. In conjunctions with the European policy of separating postal and telecommunications operations from policy-making and regulatory functions, CEPT thus became a body of policy-makers and regulators. At the same time, Central and Eastern European Countries became eligible for membership in CEPT. CEPT with its 43 members now covers almost the entire geographical area of Europe.

The role and purpose of CEPT was redefined at its plenary assembly, on 5-6 September 1995 in Weimar as follows:

CEPT offers its members the chance of:

- establishing a European forum for discussions on sovereign and regulatory issues in the field of post and telecommunications issues;
- providing mutual assistance among members with regard to the settlement of sovereign/regulatory issues;
- exerting an influence on the goals and priorities in the field of European Post and Telecommunications through common positions;
- shaping, in the field of European posts and telecoms, those areas coming under its responsibilities;
- carrying out its activities at a pan- European level;
- strengthening and fostering more intensively co-operation with Eastern and Central European countries;
- promoting and facilitating relations between European regulators (e.g. through personal contacts);

Ref:
[50] www.cept.org

- influencing, through common positions, developments within ITU and UPU in accordance with European goals;
- responding to new circumstances in a non-bureaucratic and cost-effective way and carrying out its activities in the time allocated;
- settling common problems at committee level, through close collaboration between its committees;
- giving its activities more binding force, if required, than in the past;
- creating a single Europe on posts and telecommunications sectors.

The new CEPT, which deals exclusively with sovereign/regulatory matters, has established three committees, one on postal matters, the CERP (Comité européen des régulateurs postaux) and two on telecommunications issues: the ERC (European Radiocommuication Committee) and the ECTRA (European Committee for Regulatory Telecommunications Affairs). The field of responsibility for each committee is decided by CEPT's Plenary Assembly, while each committee establishes its own rules of procedure and elects its chairman

The committees handles harmonisation activities within their respective fields of responsibility, and adopt recommendations and decisions. Such recommendations and decisions normally prepared by their working groups and project teams.

On 6 May 1991, the European Radiocommunications Committee established a permanent office in Copenhagen, the European Radiocommunications Office - ERO with the purpose to support the activities of the committee and to conduct studies for it and for the European Commission.

On 1 September 1994, ECTRA also established a permanent office in Copenhagen: the European Telecommunications Office - ETO, for the same purpose.

7.5.3.1 ERO

The functions of the ERO [51] (European Radiocommunications Office) include a role in the long-term planning of the radio spectrum, liaison with national frequency management authorities, co-ordination of research studies and consultation with interested parties on specific topics or parts of the frequency spectrum. In addition the ERO assists the European Radiocommunications Committee (ERC) in carry out its numerous activities.

Ref:
[51] www.ero.dk

7.5.3.2 ERC

The ERC (European Radiocommunications Committee) [52] is one of three committees that form the European Conference of Postal and Telecommunicatons Administrations (CEPT), the regional regulatory telecommunication organisation for Europe. The ERC is concerned with the development of policy on radiocommunications issues, which includes the co-ordination of frequency, administrative and technical matters relating to the regulation of radio in Europe. The ERC is also responsible for preparing the European proposals and positions for conferences of the ITU.

Within their respective areas of responsibility the permanent working groups prepare, and in some cases approve, harmonisation measures in the form of European Common Proposals (ECPs) for ITU Conferences and CEPT ERC Decisions, Recommendations and Reports. These documents are generally given a wide visibility with interested parties (operators, service providers, manufacturers, users and standards bodies, etc) in order to provide an open and transparent approval procedure.

7.5.3.3 ECTRA

ECTRA (European Committee for Telecommunications Regulatory Affairs) was created in 1990, a few years before the establishment of the new CEPT. CEPT Members are also members of ECTRA and the representatives of the European commission and EFTA are counsellors of ECTRA.

ECTRA's role is:

- To consider and develop common telecommunications regulatory policies in the European context, taking into account European and international legislation and regulations. This should be done in close co-operation with ERC and the European Commission and the EFTA.
- To prepare European common positions or use in the framework of international bodies.
- To exchange views on issues of common concern to regulatory authorities in the CEPT member countries, paying particular attention to the needs of the new members of the CEPT.
- To establish and maintain regular contact with representatives of relevant bodies or entities within and outside CEPT (including, operators, service providers, user groups, manufacturers, standardisation bodies and testing and certification entities) concerning questions of common interest.

Ref:
[52] www.erc.dk

ECTRA has established, in co-operation with ERC, a joint working group which is preparing European common position on ITU issues. ECTRA meets three times a year for a two-day meeting. ECTRA's "output" documents are decisions, recommendations, European common proposals, reports and minutes of meetings. In all meetings in which decisions are made, members endeavour to reach a consensus, if this is not possible, proposals are approved by a simple majority of the votes cast.

7.5.3.4 ETO

CEPT ECTRA established ETO (European Telecommunications Office) [53] in 1994 in order to provide expertise for ECTRA members and to contribute to the European Union's telecommunications policy on licensing and numbering.

Ref:
[53] www.eto.dk

7.6 CIGRE:

CIGRE (International Council on Large Electric Systems) [54] is a permanent non-governmental and non profit-making International Association based in France. It was founded in 1921 and aims to:

- Facilitate and develop the exchange of engineering knowledge and information, between engineering personnel and technical specialists in all countries as regards generation and high voltage transmission of electricity.
- Add value to the knowledge and information exchanged by synthesising state-of-the-art and world practices.
- Make mangers, decision-makers and regulators aware of the synthesis of CIGRE's work in the area of electric power.

More specifically, issues related to the planning and operation of power systems, as well as the design, construction, maintenance and disposal of HV equipment and plants are at the core of CIGRE's mission. Problems related to protection of electrical systems to telecontrol and telecommunication equipment are also part of CIGRE's area of concern.

Work
Technical work is being carried out within 15 Study Committees. The task of these Committees is to initiate and co-ordinate studies contributing to technical advance in their particular area. Moreover, they must take part in the organisation of Plenary Sessions and select the Preferential Subjects to be discussed during these sessions. Membership of these Study Committees (which include 24 members each) consists of well-known experts, who are nominated by the Governing Bodies of CIGRE for a period of 6-years. Their term of office may be renewed for 2-year periods if need be. Working Groups which include other experts are formed whose task is to investigate further a particular topic.

Organisation
Governing bodies consist of:

- The Administrative Council – 52 members with decision-making power
- The Executive Committee – 13 members, an advisory body making recommendations to the Council.
- The Technical committee comprising the Chairmen of the 15 Study Committees. This body is responsible for the technical direction and work of the Association.

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Ref:
[54] www.cigre.org

CIGRE is represented through a National Committee in 52 countries. These National committees play an important role locally as intermediary between members and the Central Office for all administrative processes related to the running of the organisation.

7.7 IEEE

The IEEE (The Institute of Electrical and Electronics Engineers) [55] helps advance global prosperity by promoting the engineering process of creating, developing, integrating, sharing and applying knowledge about electrical information technologies and sciences for the benefit of humanity and the profession.

IEEE's stated vision and missions statements are:

Vision: to advance global prosperity by fostering technological innovation, enabling members' careers and promoting community world-wide.

Mission: The IEEE promotes the engineering process of creating, developing, integrating, sharing and applying knowledge about electro and information technologies and sciences for the benefit of humanity and the profession.

It is a non-profit, technical professional association of more than 350,000 individual members in 150 countries. Through its members, the IEEE is a leading authority in technical areas ranging from computer engineering, biomedical technology and telecommunications, to electric power, aerospace and consumer electronics. Through its technical publishing, conferences and consensus-based standards activities, the IEEE:

- Produces 30% of the world's published literature in electrical engineering, computers and control technology.
- Holds annually more than 300 major conferences.
- Has more than 800 active standards and 700 under development.

IEEE-SA Standards Board is responsible on an Institute-wide basis for:

a) encouraging and co-ordinating the development of IEEE standards.
b) Reviewing all proposed IEEE standards to determine whether the proposed standards conform to the requirements established by the IEEE-SA Standards Board and whether consensus has been achieved for approval of the proposed standards.

The approval and publication of an IEEE standard implies that the document represents a consensus of the parties who have participated in its development and review. Since every attempt is made to involve all interests in the activity, it can be presumed that the document represents a consensus of interests concerned with the scope of the standard. Consensus is established when, in the judgement of the IEEE-SA Standards Board, substantial agreement has been reached by directly and materially affected interest categories.

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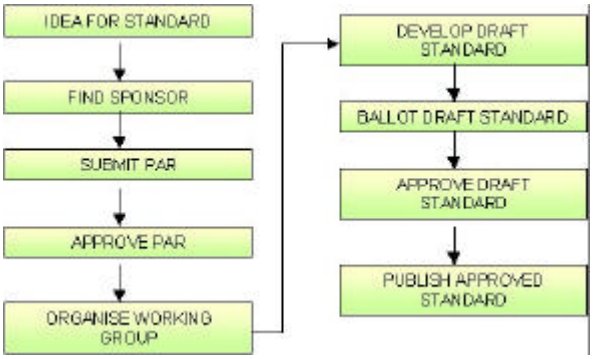
Ref:
[55] www.ieee.org

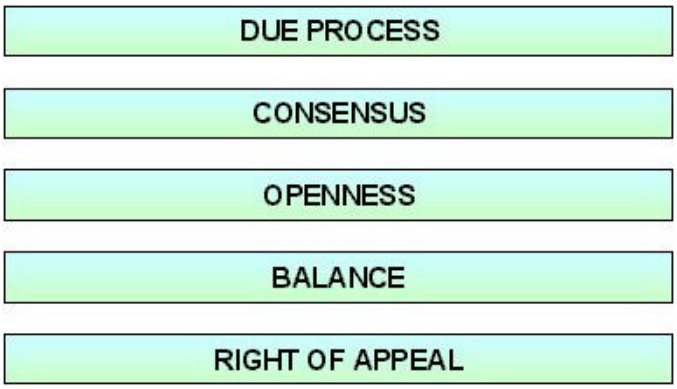
Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution. IEEE standards provide a common ground for communication in some specific area of electrotechnology. They also provide criteria for measuring the acceptable performance of equipment or materials pertinent to the field of electrotechnology.

Figure 6: The Standards Development Process



Imperative Principles

Figure 7: There are five imperative principles that drive the standards process:



7.8 IEC

The IEC (International Electrotechnical Commission) [56] was founded in 1906 and is the world organisation that prepares and publishes international standards for all electrical, electronic and related technologies. It was founded as a result of a resolution passed at the International Electrical Congress held in USA in 1904. It's membership consists of more than 50 participating countries, including all of the world's major trading nations and a growing number of industrialising countries.

The IEC's stated mission is to promote, through its members, international co-operation on all questions of electrotechnical standardisation and related matters, such as the assessment of conformity to standards in the fields of electricity, electronics and related technologies.

The IEC charter embraces all electrotechnologies including electronics, magnetics and electromagnetics, electroacoustics, telecommunication, and energy production and distribution, as well as associated general disciplines such as terminology and symbols, measurement and performance, dependability, design and development, safety and the environment.

To further its mission, the Commission's objectives are to:

- Meet the requirements of the global market efficiently.
- Ensure primacy and maximum world-wide use of its standards and conformity assessment schemes.
- Assess and improve the quality of products and services covered by its standards.
- Establish the conditions for the interoperability of complex systems.
- Increase the efficiency of industrial processes.
- Contribute to the improvement of human health and safety.
- Contribute to the protection of the environment.

Ref:
[56] www.iec.ch

International Partners

The IEC works closely with its international standardisation partners:

- ISO (International Organisation for Standardisation)
- ITU (International Telecommunication Union)

And other regional standardisation organisations and international organisations including:

- WHO (World Health Organisation)
- ILO (International Labour Office)
- UNECE (United Nations Economic Commission for Europe.

One of the IEC's principal partners is the WTO (World Trade Organisation) whose 100+ central government members explicitly recognise, through their Agreement on Technical Barriers to Trade (TBT), that international standards play a critical role in improving industrial efficiency and developing world trade. These relations at government level are of particular importance in heavily regulated areas like safety, health and the environment.

Regional Partners

At the regional level, the IEC works to achieve harmonisation of standards among regional standardisation organisations including CENELEC AND ETSI.

The co-operation agreement between the IEC and CENELEC, ratified in September 1996 and commonly known as the Dresden Agreement relates to:

- Common planning of new work
- Parallel IEC/CENELEC voting

The object of this agreement is to avoid duplication of efforts, speed up the preparation of standards and to ensure the best use of the resources available and particularly of experts' time. If the results of parallel voting are positive in both the IEC and CENELEC, the IEC will publish the international standards, while the CENELEC Technical Board will ratify the European standard.

Definition of IEC standard

The definition given to all IEC standards reads: "A normative document, developed according to consensus procedures, which ahs been approved by the IEC National Committee members of the responsible committee in accordance with Part 1 of the ISO/IEC Directives as a committee draft for vote and as a final International Standards and which has been published by the IEC Central Office".

Producing the standards

Some 200 technical committees (TCs) and subcommittees (SCs), and some 700 working groups carry out the standards work of the IEC. The technical committees prepare technical documents on specific subjects within their respective scopes, which are then submitted to the full member National Committees (IEC's members) for voting with a view to their approval as international standards. In all, some 10,000 experts worldwide participate in the technical work of the IEC. IEC's international standards facilitate world trade by effectively removing technical barriers to trade, leading to new markets and economic growth. A component or system manufactured to IEC standards and manufactured in country A can be sold and used in countries B through to Z.

Technical committees (TC) and Subcomittees (SC)

The scope (or area of activity) of each TC and SC is defined by the TC/SC itself and submitted to the Committee of Action (CA)/parent TC for approval. TCs/SCs prepare technical documents on specific subjects and submits to the National Committees for voting with a view to their approval as international standards. A TC is made up of National Committees, all of which are free to take part in the work of any given TC.

Preliminary stage

This comprises projects envisaged for the future but not yet ready for immediate development.

Proposal stage

A proposal for new work generally originates from industry via a National Committee. It is communicated to the members of the appropriate TC or SC accompanied by a form. A simple majority vote of members on the interest of studying the proposal takes place within 3-months. If the result is positive and a minimum of 4 members or 25% of the P-members, whichever is greater, undertake to participate actively in the work and nominate experts, it is included in the work programme together with a project plan including target dates.

Preparatory stage

A Working Draft (WD) is prepared, generally by a project leader within a working group.

Committee stage

At this point the document is submitted to the National committees as a Committee Draft (CD) for comment.

Enquiry stage

Before passing to the approval stage, the bilingual Committee Draft for vote (CDV) is submitted to the P-members for a 5-month voting period. It is the last stage at which technical comments can be taken into consideration. The CDV is considered as approved if:

- A majority of two thirds of the votes cast by P-members is in favour, and if
- The number of negative votes cast by all National Committees does not exceed on quarter of all votes cast.

A revised version is then sent by the secretary to the Central Office within a period of 4-months for the Final Draft International Standard (FDIS) processing.

Approval stage

The FDIS is then circulated to the National committees for a 2-month voting period. Each National Committee's vote must be explicit: positive, negative or abstention. An FDIS is approved if:

- A majority of two thirds of the votes cast by P-members is in favour, and if
- A number of negative votes cast by all National Committees does not exceed one quarter of all votes cast.

If the document is approved, it is published. If the document is not approved, it is referred back to the TC or SC to be reconsidered.

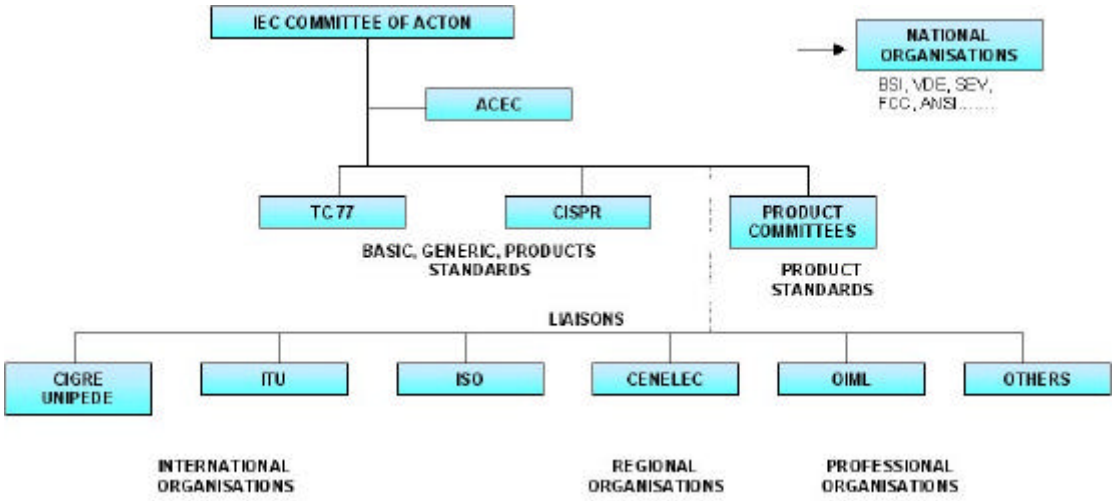
Publication stage

This is entirely the responsibility of the Central Office and leads to publication of the international standards, normally within 2-months of approval of the FDIS.

Numbering

A block of numbers ranging from 60000 to 79999 is being used by the IEC when assigning numbers to its publications.

Figure 8: Organisation of EMC work in IEC



EU members who are IEC Members:

- **Austria**: Austrian Electrotechnical Committee, Oesterreichischer Verband fur Elektrotechnik, (OVE), Wien, (www.ove.at)
- **Belgium:** Comite Electrotechnique Belge, (BEC-CEB), Bruxelles, (www.bec.ceb.be)
- **Denmark:** DANSK STANDARD, Danish Standards Association, (DS), Charlottenlund, (www.ds.dk)
- **Finland:** Finnish Electrotechnical Standards Association, (SESKO), Helsinki, (www.sesko.fi)
- **France:** Union Technique De L'Electricite et de la Communication, (UTE), Fontenay-aux-roses cedex (www.ute-fr.com)
- **Germany:** Deutshces Komitee Der IEC, Deutsche Elektrotechnische, (DKE), Frankfurt, (www.dke.de)
- **Greece:** Hellenic Organisation for Standardization, (ELOT), Athens, (www.elot.gr)
- **Irish Republic:** Electro-Technical Council of Ireland Ltd, (ETCI), Dubling, (www.etci.ie)
- **Italy:** Comitato Elettrotecnico Italiano, (CEIUNI), Milano, (www.ceiuni.it)
- **Luxemburg:** Comite National cei du Luxembourg (ETAT), Luxembourg, (www.etat.lu/SEE/)
- **Netherlands:** Netherlands Electrotechnical Committee, (NEC), Delft, (www.nen.nl)
- **Portugal:** Portuguese National Committee of the IEC – Institute Portugues da Qualidade, (IPQ), Caparica, (www.ipq.pt)
- **Spain:** Comite Nacional Espanol de la Cei Aenor, (AENOR), Madrid, (www.aenor.es)
- **Sweden:** Svenska Elektriska Kommissionen, (SEKOM), Kista, (www.sekom.se)
- **United Kingdom:** British Electrotechnical Committee, British Standards Institution, (BSI), London, (www.bsi-global.com)

7.9 CISPR

CISPR (International Special Committee on Radio Interference) of IEC.

Background

In 1933 an ad hoc conference of interested international organisations was held in Paris to decide how the subject of radio interference should be dealt with internationally. There was general agreement that the most important international problem was to secure some uniformity in the method of measurement and stipulation of limits to avoid difficulties in the exchange of goods and services. In order to promote the formulation of internationally agreed recommendations on radio interference, the conference advised the formation of a Joint Committee of the International Electrotechnical Commission (IEC) and the International Broadcasting Union (UIR) with representation of a number of other international organisations interested in the matter.

The first official meeting of the CISPR took place in Paris in 1934 and included delegates nominated by the National Committees of the IEC and by member organisations of the UIR, representatives from the International Conference on Large High-voltage Electric Systems, the International Union of Railways, the International Union of Producers and Distributors of Electric Energy and observers from the International Telephone Consultative Committee and the “Commission Mixte Internationale”.

Up until 1939, the CISPR had held two Plenary Meetings (in 1934 and 1935) and a group of experts had held seven meetings (in 1934,1935 (two), 1936,1937 (two) and 1939); eight reports, dealing mainly with a standards measuring equipment had been issued.

After the Second World War, the UIR was not reformed. From the post-war Plenary Session (Paris 1950) onwards, the CISPR was no longer considered a Joint Committee of International organisations including the IEC, but became a Special Committee under the sponsorship of the IEC whose status differed from that of the other IEC Technical Committees in that CISPR Member Bodies not only comprised National Committees of the IEC, but also a number of international organisations interested in the reduction of radio interference.

CISPR has the following subcommittees:

- Subcommittee A – Radio interference measurements and statistical methods.
- Subcommittee B – Interference relating to industrial, scientific and medical radio-frequency apparatus.
- Subcommittee C – Interference relating to overhead power lines, high voltage equipment and electric traction systems.
- Subcommittee D – Interference relating to motor vehicles and internal combustion engines.
- Subcommittee E – Interference relating to radio receivers.
- Subcommittee F – Interference relating to household appliances, tools, lighting equipment and similar apparatus.
- Subcommittee G – Interference relating to information technology equipment.

7.10 ITU

The ITU, (International Telecommunication Union) [57] headquartered in Geneva, Switzerland, is an international organisation within which governments and the private sector co-ordinate global telecommunication networks and services. It was founded as early as 1876.

The ITU exists to provide a forum in which its 189 Member States (September 1999) and some 580 Sector Members can co-operate for the improvement and rational use of telecommunications worldwide. Its objectives are to:

- Promote the development, efficient operation, usefulness and general availability of telecommunications facilities and services.
- Promote the development of telecommunications in developing countries and the extension of the benefits of telecommunications to all people everywhere.
- Promote the adoption of a broader approach to telecommunications issues in the global information economy and society.

To achieve these objectives, the work of the ITU is organised internally around three sectors:

- The Radiocommunication Sector (ITU-R);
- The Telecommunication Standardisation Sector (ITU-T); and
- The Telecommunication Development Sector (ITU-D).

All ITU work in the field of radiocommunications is consolidated in the Radiocommunication Sector (ITU-R), which is charged with reaching consensus on the coherent use of a huge and growing range of wireless services, including the popular new mobile communications technologies. The ITU-R Sector also plays a vital role in the management of the radio-frequency spectrum and satellite orbits, finite natural resources which are increasingly in demand from a large number of services such as fixed, mobile, broadcasting, amateur, space research, meteorology, global positioning systems, environmental monitoring and last but not least, those communications services that ensure safety of life at sea and in the skies.

Ref:
[57] www.itu.int

8 Amplification of the work of specific regulatory and standards bodies impacting the PLC industry.

While the work of standards is presented as being generated within designated standards organisations, the actual work of producing the standards falls to specific committees working within those standards organisations. The following provides a brief description of the work of those key committees working within the larger international standards organisation.

8.1 CENELEC S/C205A

CENELEC S/C205A is the technical body within CENELEC and is the main communication committee for the EU dealing with issues relating to transmission down Powerlines. The scope of work for the CENELEC standard EN50065 is: 'Signalling on low-voltage electrical installations in the frequency range 3kHz to 148.5kHz – Part 1. General requirements, frequency bands and electromagnetic disturbances'. Once a standard has been fully approved on the statute books within the EC through CENELEC, it is then passed to the IEC and the IEC can recommend it to its Members throughout the world

Within the CENELEC Committee S/C205A, Working Group 10 [57a] has been formed which is investigating the extension of the power line carrier technology to the high frequency band of 1-10MHz.

8.2 CEPT ERC SE35

The ongoing work of the European Radiocommunications Committee [58] is organised in 4 permanent working groups in the areas of:

- Frequency management.
- Spectrum engineering
- Radio Regulations
- Conference Preparatory Group

Ref:
[57a] CENELEC S/C205A, WG10
[58] European Radiocommunications Office (ERO)

General Terms of Reference for the SE (Spectrum Engineering) Working Group are to:

- Develop basic guidelines for the optional use of the usable frequency spectrum by various radio services.
- Develop sharing criteria between radiocommunication services, systems or applications using the same frequency bands.
- Develop compatibility criteria between radiocommunication services using different frequency bands.
- Co-ordinate related activities and contributions for the work in the ITU-R.
- Liaise with relevant committees in ETSI and review relevant parameters of radio equipment specifications being developed in ETSI.
- Study technical impacts of ISM equipment on radio services taking into account related CISPR activities.
- Prepare draft Decisions, Recommendations, Reports and other agreements on the above.

Specific Terms of Reference for WG SE35 – 'Power Line Telecommunications (PLT) and cable transmissions in general', are to:

- Obtain representation from both users of the spectrum and proponents of PLT and cable transmissions in general.
- Identify the frequency ranges over which PLT and cable transmission are likely to operate now and for the future.
- Identify those services that are likely to be affected by PLT and cable transmissions in general (broadcasting, maritime, radionavigation, radioamateurs….) and evaluate their protection needs.
- Investigate methods of measuring the emissions from PLT and cable transmissions, considering they may be broadband, distributed and peaky in nature. Also consider radiated and/or conducted (e.g. cable clamp methods for common and differential mode currents).
- Perform compatibility studies to derive limiting values for emissions from PLT and cable transmissions to protect primary services.
- Propose an harmonised European approach for PLT systems and cable transmissions in general.
- Produce a report covering the various aspects for wide consultation within Europe.
- In the course of these studies, liaise closely with the relevant EMC standardisation committees (newly created ETSI/CENELEC joint working group on EMC of extensive networks, CISPR…) and with ITU-R WP1A and 1C.

8.3 CISPR/G

CISPR Subcommittee ‘G’ is concerned with interference relating to information technology equipment, i.e. any equipment which has a primary function of either (or a combination of) entry, storage, display, retrieval, transmission, processing, switching, or control of data and of telecommunication messages and which may be equipped with one or more terminal ports typically operated for information transfer, and any equipment with a rated supply voltage not exceeding 600V.

EMC requirements vary from country to country, however, most countries have requirements on radiated emissions similar to the USA FCC requirements. Countries in the EC and many other countries have adopted a radiated emissions standard based on a document called CISPR 22. The CISPR 22 standard categories products as Class A or Class B and specifies a test procedure and emission limits that resemble the Part 15, Subpart B of the USA FCC requirements. Notable differences between the USA FCC and CISPR requirements are the lower frequency limit for conducted emission tests and the radiated emission test distances. Also, CISPR 22 specifies both quasi-peak and average limits for conducted emissions test. FCC limits are all specified as quasi-peak levels.

The FCC Rules and Regulations, Title 47, Part 15, Subpart B regulates “unintentionally radio frequency devices”. Products regulated include any unintentional radiator (device or system) that generates and uses timing pulses at a rate in excess of 9000 pulses (cycles) per second and uses digital techniques. This includes almost every product that employs a microprocessor including workstations, personal computers, point of sale terminals, printers, modems, and many electronic games.

Most products regulated by Part 15, Subpart B fall into one of two categories. Class A devices are those that are marketed for use in a commercial, industrial or business environment. Class B devices are those that are marketed for use in the home. Class B limits are more stringent than Class A limits and the Class B certification process is administratively more rigorous than the Class A verification process. The radiated and conducted EMI test procedures are defined in the ANSI Standard 63.4. FCC Rules and Regulations, Part 15, only regulates radio frequency emissions. Currently there are no FCC regulations pertaining to product immunity to electromagnetic fields.

8.4 ETSI PLT

ETSI PLT [59] was established in July 1999 to develop the necessary standards and specifications to cover the provision of voice and data services over the mains power transmission and distribution network and in-building electricity wiring. It aims to create standards that allow interoperability between equipment from different manufacturers and the co-existence of multiple Powerline systems within the same environment. Harmonised standards will also be developed in conformance with relevant European Union Directives. Particular attention will be paid to the phased rollout of Powerline systems; field trials are currently being held and the need for relevant standards in the marketplace is pressing.

The areas of work include:

- Telecommunications services (voice and data, internet and ISDN etc, including service requirements to the transport layer.
- Interfaces to other networks, inside Powerline networks and to terminal equipment.
- Functional reference configurations.
- Protocol stacks (layers and sublayers).
- Medium access mechanism.
- Physical layer aspects and Physical media characteristics in co-operation with CENELEC, CEPT ERC.
- Management of the PLT system.
- Encryption and privacy issues
- Testing and conformity.
- Safety issues (subcontracted to ETSI TC Safety).

ETSI PLT (ETSI PROJECT PLT, EP PLT) will work closely with ETSI Technical Committee Electromagnetic Compatibility (EMC) and Radio Spectrum Matters (TC ERM), SC205A WG10 of the CENELEC, ERC SE35 of CEPT and the PLCforum.

ETSI PLT will progress the necessary standards and specifications to cover the provision of voice and data services over the mains power transmission and distribution network and/or in-building electricity wiring. The standards will be developed in sufficient detail to allow interoperability between equipment from different manufacturers and co-existence of multiple Powerline systems iwthin the same environment. Harmonised Standards will be developed to allow presumption of conformity with the relevant EU/EC Directives.

Ref:
[59] www.etsi.org/plt/PLT_tor.htm

In particular EP PLT will take into account:

- Phased development of standards in a timely fashion in support of phased rollout of Powerline systems.
- Technical requirements to avoid interference with users of the radio spectrum (subcontracted to ETSI TC ERM).

Project Deliverables:
Standards to cover:
- Harmonised Standards (EN) to cover emissions and immunity related to PLC systems (subcontracted to TC ERM).
- Harmonised Standards (EN) to cover additional essential requirements of the R&TTE Directive (if any).

Other ETSI deliverables to cover:
- Reference network architecture model.
- Service applications model.
- Standards/specifications to support interoperability and interconnection of powerline systems based on the reference models.

Major milestones:
EP PLT to start September 1999.
Definition of project working strucutre & documentation structure, December 1999.
Clarification of work repartition between EP PLT, TC ERM & CENELEC March 2000.
Consensus of EMC emissions profile (subcontracted to TC ERM), September 2000.
End of project, September 2002.

For status of current work see next section, ‘Snapshot of current stage of PLC development’.

ETSI TC’s EMC & ERM

The activities fall into five broad areas:

1. Studies of the EMC and radio parameters and ther methods of measurement – taking due account of the work in the international community and specifically IEC.
2. Preparation of the ETSI deliverables as required by ETSI members, or those to support mandated work from the EC/EFTA in elaboration of EU Council Directives, or as requested by CEPT ERC.
3. Preparation of ETSI deliverables used to describe the electromagnetic and/or radio environment.
4. Co-ordination of ETSI portions on the efficient use of the radio spectrum and spectrum allocations and all administration of the MoU between CEPT ERC and ETSI. These will be carried out in close co-operation with relevant ETSI Technical Bodies and the New Business Development Group (NBDG).
5. Restructuring of the work of TC-RES to provide for a separation between the “horizontal” and “vertical” activities presently undertaken.

9 Snapshot of current stage of PLC standards development

The following material is provided as a snapshot of the current stage of deliberation on PLC standards currently under consideration by ETSI, CEPT, CENELEC and PLCforum. This material is included purely to provide an insight into the areas that are currently being considered and, since non-of this material represents an adopted standard it must only be used for orientation purposes. Please refer to the official public websites of the organisations involved in order to obtain updated information produced over time, on adopted standards.

PALAS will be updating this document in December 2001 and at that time will incorporate all standards in the PLC industry that have been concluded.

9.1 ETSI PLT

EP PLT active work items for PLC [60] are:

9.1.1 Title: PLT Reference Network Architecture Model (DTS/PLT-00001)

Scope of work: To produce a reference network architecture model which will serve as a foundation development of appropriate PLT system and service platform designs.

Supporting Organisations: Ascom, Siemens, IAEI, Cisco.

Status: Drafting Stage.

9.1.2 Title: PLT Coexistence of Access and In-house Powerline Systems (DTS/PLT-00004)

Scope of work: Resource management, MAC layer, in-house coexistence (multi-vendor LANS), system location.

Supporting Organisations: Itran, Ascom, Siemens, EDF.

Status: Published.

_____
Ref:
[60] www.etsi.org/plt

9.1.3 Title: PLT Coexistence of Access and In-house Powerline Systems (DTS/PLT-00004a)

Scope of work: The content of this document will be exactly the same as DTS/PLT00004. Item 4 is the existing TS on Coexistence between access and in-house and item 4a is the process of converting this to an ETSI ES.

Supporting Organisations: Itran, Ascom, Siemens, EDF.

Status: Approval Stage.

9.1.4 Title: PLT Inhouse-Inhouse Coexistence (DTS/PLT-00005)

Scope of work: not published.

Supporting Organisations: Ascom, DS2, Enikia, Nsine, France Telecom, Intellon, Itran, Siemens, Telekom Italia, Thomson and Philips.

Status: Drafting Stage.

9.1.5 Title: PLT Detailed Network Architecture Protocol for Access (DTS/PLT-00006)

Scope of work: not published.

Supporting Organisations: Ascom, DS2, EDF, Enikia, Nsine, IAEI, Intellon, Itran, Siemens.

Status: Drafting Stage.

The following issues are considered to be most urgent for standardisation:

- Radiation limits, PSD, Overall spectrum
- Immunity requirements
- V-ISN measurements
- Service requirements

9.2 ETSI PLT and CENELEC S/C205A WG 10

ETSI PLT and CENELEC S/C205A WG10 [61] meet on a regular basis. The work programme between these two committees centres on investigations covering the access frequency range between the utility and consumer band, in-house to in-house co-existence of different power line systems, the measurement of the radiation limits for such systems, and the modulation and encoding schemes for use in high frequency power line.

9.3 CEPT ERC Project Team SE35 Power Line Telecommunications (PLT) and cable transmissions in general

CEPT Project Team SE35 has produced a 43-page report entitled: 'Draft ERC report on PLT, cable transmissions in general and their effect on radiocommunication services'. [62] Below is an extract from the report, (see Annex IV for full copy).

> **EXTRACT FROM SE35 Draft ERC report on PLT, cable transmissions in general and their effect on radiocommunication services, dated 13th September 2000.**
>
> **Regulatory framework for PLT and cable transmission**
>
> Applicability of the EMC Directive - 89/336/EEC
>
> General
>
> Cable networks are considered to be 'fixed installations' in terms of the EMC Directive. The EMC Working Party confirmed this position in February 2000. Clarification has also been provided concerning whether the Directive can apply to installations in place prior to the entry into force of the Directive where the installation in question has subsequent to the date of implementation been used for parallel (and new) purposes. The EMC Working Party determined that in this case Chapter 7.2 of the EMC Guide[3] was pertinent. This provision deals with 'as new' equipment in its broadest sense, in particular where the original equipment was not CE marked and is subject to substantial modifications so as to obtain similar performance characteristics as new equipment. In such a situation it is considered reasonable to request compliance with the EMC Directive. The R&TTE Directive (99/5/EC) may also be applicable.

Ref:
[61] CENELEC S/C205A WG 10
[62] ERO, DK
1 - ISBN 92-828-0762-2, Guide to the Application of Directive 89/336/EEC © European Communities 1997

The main route for assessing compliance with the Directive is conformity with harmonised standards. 'Harmonised Standards'[4] are European Standards, which are adopted by European Standards organisations, prepared in accordance with the General Guidelines agreed between the Commission and the European standards organisations, and follow a mandate issued by the Commission after consultation with the Member States. However such standards are product related and equipment that complies with the standard can be CE marked in accordance with the appropriate Directive. There are thus no harmonised standards for fixed installations and telecommunication networks.

The current Directive as applied to telecommunication networks - in brief

Article 4 of the Directive requires that EM disturbances generated do not exceed a level allowing radio and telecommunications equipment to operate as intended. It also requires a level of immunity. Article 6 allows Member States to take special measures to protect a specific site to overcome an EMC problem or to protect public telecommunications networks or receiving stations used for safety purposes. These special measures, if justified are published in the OJ. Article 7 presumes compliance with Article 4 if the network meets the protection requirements specified in a national standard which has been communicated to the Commission. Article 10 applies where no national standards exist; the manufacture/importer is then required to hold a 'technical construction file', which provides information on the measures taken to meet Article 4. Article 9 provides the measures that the Commission and Member States must take if Article 4 requirements are not met.

The Revision of the EMC Directive

The EMC Directive is in the course of revision within a SLIM working group. A draft text of the proposed revision is likely to be published during 2000. The following text again provides a brief overview of the approach likely to be taken concerning fixed installations and telecommunication networks. Article 3 states that a network must meet the 'essential requirements' of Annex I. Article 10 refers to fixed installations and requires installers to meet Annex I requirements. In the case of suspected non-compliance, competent authorities may request evidence of compliance and initiate an assessment. The competent authorities may impose appropriate measures to ensure compliance. Article 11 is a repeat of 'old Article 6' described in 7.1.2 above. Annex I, Part A) re-states the requirements of 'old Article 4' in 7.1.2 above. Part C) states that a fixed installation shall be installed and maintained applying good engineering practice with a view to meeting the essential requirements set out in Part A).

Implications

Concerning the current version of the Directive (7.1.2 refers) in the absence of harmonised standards it would appear that Article 7 caters for national standards dealing with EMC matters. The question arises whether harmonised national limits at the CEPT level implemented via an ERC Decision could be construed as meeting the requirements of Article 7.

2 - ISBN 92-828-7500-8, Guide to the Implementation of Directives based on the New Approach and the Global Approach © European Communities 2000

Conversely in the revised text (7.1.3 refers), Article 10 indicates that competent authorities may initiate an assessment. The issue arises as to what limits the network will be assessed. There is therefore a need to ensure that the limits to be harmonised by CEPT are referenced from within the Directive by reference to a 'special harmonisation measure'. Alternatively a mechanism could be introduced whereby CENELEC is mandated to amend EN50083-8 to take account of any limits and parameters agreed by CEPT and a reference made to this norm as a 'special harmonisation measure'.

How to deal with installations and cable transmission networks
Revision of the EMC Directive following the SLIM exercise
Document SE35(00)11 from ECCA

Contributor : ECCA

END OF EXTRACT

9.4 ETSI ERM EMC & CENELEC Joint Working Group to provide EMC standards for Powerline technology.

These working groups are investigating the limits of the power and hence radiation emissions from power line systems. [63] These emissions will have considerable effect on other adjacent communication services, some of which will be emergency services and military services. They are working in accordance with the IEC CISPR emission limits. These limits, within designated frequency bands, must be set before reliable power line systems can be launched commercially.

9.5 Workshop with European Commission

In early 2001, there will be further collaboration with between leading players in the Powerline world; ETSI, CENELEC, CISPR, e.t.c. (including cable) in a European Commission initiated and led committee to discuss the issue of radiation limits. [64]

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Ref:
[63] CENELEC
[64] ETSI & CENELEC

9.6 CE markings

All PLC apparatus covered by the EMC Directive in accordance with the protection requirements and accompanied by one of the means of certification provided for in Article 10 of the Directive must bear a CE marking. The CE marking is affixed by the manufacturer, or his authorised representative, established within the EEA, to the apparatus, or, if this is not possible, to the packaging, instructions for use, or guarantee certificate in order of priority. This order of priority was the original intention of the Commission when the Directive was drafted. The Commission is aware that, perhaps due to language translation problems, there are differing national interpretations. The Commission's intent has not been changed. Where the apparatus is covered by other Directives providing for CE marking, application of the CE marking also indicates that the apparatus conforms to the provisions of other Directives applicable to it. The CE marking is to be affixed visible, legibly and indelibly.

The major concern has been compliance with the standard laid down for Electromagnetic Compatibility (EMC) of electrical goods which has caused the most concern. The legislation, which is enforced by the Trading Standards Authority places responsibility on:

- The manufacturer to only sell products which fall within the directive to carry the CE mark.
- The purchaser to ensure that any relevant products is covered by a CE mark.

Annex 1 of the EMC Directive 89/336/EEC states: (**Ref Directive)

1. Declaration of conformity.

The EC declaration of conformity must contain the following:

- Description of the apparatus to which it refers.
- Reference to the specifications under which conformity is declared, and, where appropriate, to the national measures implemented to ensure the conformity of the apparatus with the provisions of the Directive.
- Identification of the signatory empowered to bind the manufacturer or his authorised representative.
- Where appropriate, reference to the EC type-examination certificate issued by a notified body.

2. EC conformity mark

- The EC conformity mark shall consist of the letters CE and the figures of the year in which the mark was affixed.
- The mark should, where appropriate, be accompanied by the distinctive letters used by the notified body issuing the EC type-examination certificate.
- Where apparatus is the subject of other Directives providing for the EC conformity mark, the affixing of the EC Mark shall also indicate conformity with the relevant requirements of those other Directives.

10 Conclusion

The development of standards is essentially a consensus process. Each organisation focuses on a particular aspect and deliberates and votes to produce a recognised standard. When examining these organisations more closely it is interesting to observe that within the organisations themselves there tends to be a dominance of a particular partisan group from within the industry. This may well produce outcomes that are optimum from the perspective of the dominant group within that organisation. The interactivity and co-operation between organisations however, appears to be a useful process which could well serve to redress any imbalance which might be apparent when examining the workings of a particular organisation. This redressing of balance is not always the case, and certainly entities concerned with the outcome of standards are well advised to actively participate in the process in order that their views and wishes might be incorporated.

Establishment of national legislation.

The value of PLC as an element of national infrastructure is slowly becoming recognised, although not necessarily by national regulators and drafters of legislation. Problems associated with the deployment of PLC are synonymous of those arising from the deployment of XDSL technologies that rely upon the transmission on radio frequency signals through metallic media. The availability of ubiquitous broadband telecommunications is clearly a major factor within national economic strategy and many believe that the current regulatory perspective relating to these broadband technologies may not necessarily be in the best interests of the communities they seek to serve. There is no doubt that these issues have weighty arguments on both sides of the equation.

Certain States have undertaken independent research into areas of suspected difficulty. While these studies appear to support one or other of the arguments, the overall position appears to be that, without large-scale trials of PLC deployment, the findings of these studies will remain purely theoretical. Notably, research carried out on behalf of the British Radio Agency in documents produced by The Smith Group Ltd in November 1988 and by York EMC Services Ltd in June 2000 entitled ‘Cumulative Radiated Emissions From Metallic Broadband Data Distribution Systems’, and work carried out by BT Advanced Communications Technology Centre in the UK, entitled “the EM Environment and XDSL”, in addition to work by the UK’s British Broadcasting Corporations Research and Development Department entitled, “The threat to new radio systems from distributed wired communication installations”, all serve to fuel the argument and apply increasing pressure to those who would draft legislation governing the ultimate deployment of such technologies. Beyond this, national legislators also have to take into consideration European Directives and International Treaties existing within the area being considered. This meeting point of commercial, political, social and technological pressures can only have a compromised outcome, at best, and pose a serious disadvantage to one or other of the protagonists.

In preparing this document PALAS has attempted to provide an overview of the various organisations contributing to the international standards and regulatory framework. This perspective provides an insight into the complexity of the regulatory process and the importance of the establishment of carefully considered, broad consensus, practical standards, bringing elements of order, to which would otherwise be an unfathomable chaos that would disadvantage everyone. The work of the committees in this regulatory framework, much of which is unseen, makes an enormous contribution to the wellbeing of our society.

11 Glossary of Terms

The most comprehensive (some 50-pages) glossary of terms in respect of PLC can be obtained from the UK's Office of Telecommunications (OFTEL) website:

http://www.oftel.gov.uk/glossary.htm

A shortened version can be found below: [65]

Acronyms:

AMR Automatic Meter Reading
ASK Amplitude Shift Keying
ATM Asynchronous Transfer Mode
CATV Cable Television
CDMA Collision Detection Multiple Access
CENELEC Committee European de Normalisation Electrotechnique
CLEC Competitive Local Exchange Carrier
DECT Digital Enhanced Cordless Technologies
DLM / DLMS Device Language Message
DNS Domain Name System
DSL Digital Subscriber Loop
EMC Electromagnetic Compatibility
EMR Electromagnetic Radiation
FFT Fast Fourier Transform
GHz Giga Hertz - 109 c/s
GW Giga Watt - 109 W
HDTV High Definition Television
HSCSD High Speed Circuit Switched Data
Hz Hertz - 1 c/s (cycle/second)
IBSP Internet Business Solutions Provider
IFFF Inverse Fast Fourier Transform
ILEC Independent Local Exchange Carrier
IP Internet Protocol
IPCF International Powerline Communications Forum
IPF International Powerline Forum
ISDN Integrated Services Digital Network
ISP Internet Service Provider
KHz Kilo Hertz - 103 c/s
KW Kilo Watt - 103 W
LAN Local Area Network
MHz Mega Hertz - 106 c/s
MW Mega Watt - 106 W

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Ref:
[65] www.powerlineworld.com

PLC Power Line Communications
PLT Power Line Telecommunications
PSTN Public Switched Telephone Network
PTF Powerline Telecommunications Forum
QoS Quality of Service
RA Radiocommunications Agency (UK)
SMPS Switch Mode Power Supply
TDM Time Division Multiplexing
TMA Telecommunications Managers Association (UK)
TWG Technical Working Group
UTC Utilities Telecommunications Council (USA)
W Watt
WLL Wireless Local Loop

Term Descriptions:

backbone Main trunk at the uppermost level of a hierarchic network. The backbone may also connect several local networks (LANs).
:
bandwidth A measure of the rate at which digital bits can be transported from one place to another; also: frequency span over which useful signals can be transmitted.

cable One or more electrical conductors, each insulated individually and from each other.

coaxial cable Two electrical conductors placed one concentrically within the other and insulated individually and from each other.

communication Transportation of a signal from one place to another.

domain name system (DNS) A distributed database in the Internet to connect domain names with the IP addresses (host names) issued by the network administrators.

device language message (DLM / DLMS) A draft protocol for remote-readable electricity meters.

earth Set of interconnected conducting elements that will unify the electrical potential to a single value.

earthing Act of connecting to earth.

field Spatial distribution of magnitude, direction and sense of magnetic or electrical effects radiated from a given source.

field strength Magnitude of the field vector at a given point.

filter A device for the selective offer of a low impedance path for signals of a given frequency.

frequency Rate at which a physical parameter is changing per unit time, cycles per second [c/s] or Hertz [Hz]

high speed circuit switched data (HSCSD) A method for higher data transmission in existing networks by compression and channel packing (bandwidth 9.6-43.2 kbit/s).

impedance Aggregate opposition to be overcome when transmitting energy and signals of alternating current or pulses.

interference Unwanted effect of one field over another.

internet protocol The standard protocol for transmission of data packets on the Internet.

local area network A collection of interconnected computers, typically confined to private premises.

m-bus An interface for remote-readable electricity meters.

mains The part of the electrical energy distribution system that delivers energy to individual customers.

multiplexer Functional unit managing a transmission channel or a passive medium in such a way that several station pairs can communicate simultaneously on this unit.

noise Signals without a specific meaning.

power Energy per unit time [W] Watt

power line System of cables through which electrical energy is made available.

radiation Manner in which electromagnetic and electrical fields propagate from an electrical source.

reverse engineering The process of analysing a system's physical attributes, documentation, and behaviour to identify its current components and their dependencies to extract and create system abstractions and design information.

router System connecting physically different networks using the same transmission protocol. They route data packets, for example, from LANs to the Internet and identify optimum transmission routes for data traffic.

screening coefficient Expression of how much the signal placed on the inner conductor of a coaxial cable is protected from outside electromagnetic fields by the shield; in [dB]

telecommunication Transportation of a signal from one place to another; traditionally understood to be carried out over a physical line.

three pot bank Three transformers on a powerline pole.

transformer Electrical stationary machine that allows to change the values of voltage/current at which electrical energy is delivered.

twisted pair Pair of copper telephone lines

12 References

[1]] Guide to the implementation of Community Harmonisation Directives
[1a] Paper 'High Frequency Communications using the Low Voltage Power Distribution Network' by Dr John Newbury Head of Faculty of Technology at Open University, UK, and serving on various bodies including: CENELEC S/C205A WG10, IEEE, CIGRE and Joint Working Group of ETSI PLT & CENELEC
[2] Communications Media for Buildings and Associated Data Rates: 12th Annual Symposium AMRA. 1999.
[3] Cumulative Radiated Emissions from Metallic Broadband Data Distribution Systems, by York EMC Services Ltd, for Radiocommunications Agency, UK.
[4] ETSI Annual Report 1999
[5] CISPR22, www.atlasce.com/cispr_22.htm
[5a] CENELEC, www.cenelec.org
[6] EMC Directive 89/336/EEC
[7] R&TTE Directive
[8] MPT 1570 Draft, UK
[9] NB30 draft, Germany
[10] PLCforum www.plcforum.org
[11] Electricity Association, UK www.electricity.org.uk
[12] EuroAmra www.e-amra.com
[13] HomePlug Alliance www.homeplug.com
[14] Telecom Control, Austria www.tkc.at
[15] Belgium Institution of Postal Services and Telecommunications (BIPT)www.bipt.be
[16] Telestyrelsen – National Telecom Agency, Denmark www.tst.dk
[17] www.thk.fi
[18] The French Telecommunicatons Regulatory Authority (ART), France www.art-telecom.fr
[19] Regulatory Authority for Telecommunications and Posts (RegTP) www.regtp.de
[20] National Telecommunications and Post Commission, Greece www.eet.gr
[22] Italian Communications Authority www.agcom.it
[23] Institut Luxembourgeois des Telecommunications www.etat.lu/ILT
[24] Onafhankelijke Post en Telecommunicatie Autoriteit (OPTA)www.opta.nl
[25] Institute for Communicatons Portugal (ICP) www.icp.pt
[26] Comision del Mercado de las Telecomunicaciones (CMT), Spain www.cmt.es
[27] National Post and Telecom Agency (PTS)www.pts.se
[28] Department of Trade & Industry www.dti.gov.uk
[29] Radiocommunications Agency (RA) www.radio.gov.uk
[30] Office of Telecommunications (OFTEL) www.oftel.gov.uk
[31] Osterreichisches Normungsinstitut (ON), Wien www.on-norm.at
[32] Institut belge de normalisation (BIN/IBN), Bruxelles www.bin.be, www.ibn.be
[33] DANSK STANDARD (DS), Charlottenlund www.ds.dk
[34] Finnish Standards Association (SFS), Helsinki www.sfs.fi
[35] Association francaise de normalisation (AFNOR), Paris www.afnor.fr
[36] Deutsches Institut fur Normung (DIN), Berlin www.din.de
[37] Hellenic Organisation for Standardisation (ELOT), Athens www.elot.gr
[38] National Standards Authority of Ireland (NSAI), Dublin www.nsai.ie
[39] Ente Nazionale Italiano di Unificazione (UNI), Milano www.uni.com
[40] Service de l'Energie de l'Etat (SEE), Luxembourg www.etat.lu/SEE
[41] Nederlands Normalisatie-instituut (NNI), Delft www.nen.nl
[42] Instituto Portugues da Qualidade (IPQ), Caparica www.ipq.pt
[43] Asociacion Espanola de Normalizacion y Certificacion (AENOR), Madrid www.aenor.es
[44] Standardiseringen I Sverige (SIS), Stockholm www.sis.se
[45] British Standards Institution (BSI), UK www.bsi-global.com
[45a] Independent Regulators Group www.opta.nl
[46] How international standardisation began- 'Friendship among equals – Recollections from ISO's first fifty years'.
[47] International Standards Organisation www.iso.ch
[48] European Committee for Electrotechnical Standardisation (CENELEC) www.cenelec.org
[49] European Telecommunications Standards Institute (ETSI) www.etsi.org

[50] The European Conference of Postal and Telecommunications Administrations – (CEPT) www.cept.org
[51] European Radiocommunications Office (ERO) www.ero.dk
[52] European Radiocommunications Committee (ERC) www.erc.dk
[53] European Telecommunications Office (ETO) www.eto.dk
[54] International Council on Large Electric Systems (CIGRE) www.cigre.org
[55] The Institute of Electrical and Electronics Engineers (IEEE) www.ieee.org
[56] The International Electrotechnical Commission (IEC) www.iec.ch
[57] The International Telecommunication Union (ITU) www.itu.int
[57a] CENELEC S/C205A, WG10
[58] CEPT ERC SE35, European Radiocommunications Office
[59] ETSI PLT www.etsi.org/plt/PLT_tor.htm
[60] ETSI PLT status of current work www.etsi.org/plt
[61] Work programme CENELEC S/C205A WG 10
[62] Extract from SE35 European Radiocommunications Office (ERO)
[63] ETSI ERM EMC & CENELEC Joint Working Group to provide EMC standards for Powerline technology, work programme, CENELEC, Dr John Newbury
[64] Workshop with European Commission ETSI & CENELEC, Dr John Newbury
[65] Glossary of Terms www.powerlineworld.com

13 Annexes

13.1 Annex I: EMC Directive 89/336/EEC

13.2 Annex II: Guidelines on the Application of Council Directive 89/336/EEC

13.3 Annex III: Directive 1999/5/EC of the European Parliament and of the Council on radio equipment and telecommunicatons terminal equipment and the mutual recognition of their conformity.

13.4 Annex IV: CEPT ERC Project Team SE35 Report, ‘ Power Lines Telecommunications (PLT) and cable transmissions in general.