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**Business Telecommunications (BT);  
Approval requirements for complex customer premises apparatus  
and installations connected to the Public ISDN  
(including principles for the application  
of the essential requirements to any apparatus)**

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## **Executive summary**

### **Introduction**

This Technical Report has been prepared in response to a mandate from the European Commission. Its aim was to produce recommendations on the need and scope for European Telecommunications Standards (ETSS) intended as candidate Common Technical Regulations (CTRs) covering the approval requirements for complex customer premises apparatus and installations to be connected to the public Integrated Services Digital Network (ISDN).

Attempts to define complex apparatus to distinguish it from simple apparatus led to the following conclusions:

### **Conclusions**

The set of principles being developed to apply the essential requirements to complex apparatus can be applied to any apparatus, and their use in this way will facilitate the application of the Directive.

Distinctions between simple and complex apparatus are arbitrary and of no relevance in determining the common set of principles for the application of the Directive to individual products.

However, the way in which the common set of principles will be applied will be determined by the interfaces and functions of the apparatus under consideration, and, in the case of terminal CTRs, the contents of the terminal CTRs may be affected by the degree of complexity of the apparatus.

This conclusion led to the following recommendations:

#### **Recommendation 1 - New CTR**

Terminal CTRs will need to allow the criteria to be applied to be determined by the functions and interfaces of the apparatus. Because of the narrow scope of NET 33 (NET = Normes Européennes de Télécommunications), an additional terminal CTR should be produced for telephony in apparatus with an ISDN interface but which is outside the scope of NET 33.

#### **Recommendation 2 - New CTR**

The structure and interrelationship of CTRs based on NETs needs to be reviewed in the light of the conclusions of this Technical Report. A new standard (CTR) should be produced to define the application of access and terminal CTRs to specific apparatus. This new standard (CTR) should be based on the principles recommended in this Report. The new standard (CTR), together with the access and terminal CTRs, will provide for the approval of both simple and complex apparatus.

The report recommends that the standard should be based on the following principles:

#### **Principle 1**

Apparatus with interfaces for direct connection to a public network shall meet the requirements of the appropriate CTR (e.g. NETs 1, 2, 3 & 5 for switched services, or other access CTRs for other services) at those interfaces up to the level of functionality appropriate to the capability of the apparatus. If an appropriate European access CTR does not exist, they shall meet the requirements of an appropriate national access standard.

#### **Principle 2**

Standard methods for stimulation of the apparatus for tests of interworking with the public network shall be used wherever possible, but, where they are not appropriate, the manufacturer shall declare the method to be used. If necessary, the supplier shall supply appropriate equipment to enable the tests to be made.

### **Principle 3**

The access requirements for leased lines shall not constrain the choice of private network signalling system.

### **Principle 4**

Interfaces that are not suitable for connection directly to the public network shall not be subject to specific requirements for approval purposes unless they provide public switched network call control functions.

### **Principle 5**

Where an interface provides public switched network call control/signalling functions but does not conform to a public network access standard at Layer 1, or Layer 1 and Layer 2, the supplier shall declare, and if necessary provide, a means for converting the interface to conform to a public network standard at Layer 1, or Layer 1 and Layer 2, so that testing of these functions can take place in accordance with the relevant Clauses of a public switched network access standard. In this principle, the term "call control functions" means direct interaction with the public switched network signalling protocol.

### **Principle 6**

Apparatus with a terminating function for a justified case service and an interface for direct connection to a public switched network shall comply with the relevant requirements for that justified case service at that interface. This principle applies for each justified case service supported by each terminating function in the apparatus.

### **Principle 7**

Apparatus capable of carrying justified case services between interfaces to the public switched network and interfaces for connection to terminals approved for direct connection to the public switched network shall meet the relevant requirements for the relevant justified case service at each public switched network interface, so that, when operated in conjunction with any terminal type approved for direct connection to the public switched network, the overall requirements for the relevant justified case service will be met.

### **Principle 8**

Apparatus capable of carrying justified case services between interfaces to the public switched network and interfaces for connection to terminals capable of indirect connection only (not approved for direct connection to the public switched network) shall meet the relevant requirements for the relevant justified case service at each public switched network interface when operated in conjunction with an appropriate type of terminal declared by the apparatus supplier.

If necessary, the supplier shall provide appropriate equipment to enable the tests to be made.

### **Principle 9**

The supplier shall provide information on the relevant performance parameters in respect of each through connection function capable of carrying any justified case service not covered by principles 6, 7 & 8 between combinations of the following:

- interfaces for connection to the public switched network;
- interfaces for connection to leased lines;
- interfaces for connection to transmission facilities not provided by a public network;
- interfaces for connection to other apparatus with through connection functions;
- interfaces for terminals designed for direct connection to a public switched network;

- interfaces for terminals capable only of indirect connection to a public switched network.

### **Principle 10**

The manufacturer should declare the CTRs or national access standards or parts thereof that each interface has been designed to meet. Where interfaces have not been designed for direct connection to the public network, the manufacturer should declare any voluntary standards or technical specifications that apply to the interfaces or identify what other apparatus can be connected to them.

In addition, the following recommendations are made:

### **Recommendation 3**

Procedures such as trials and observations need to be available as an alternative to normal testing in special circumstances.

### **Recommendation 4**

Provision needs to be made in the approval system to accommodate minor modifications early in the life cycle of an apparatus without it having to undergo full re-approval.

### **Recommendation 5**

Where national standards need to be used in conjunction with the proposed new European standard, carefully planned transitional arrangements are needed.

### **Recommendation 6**

Where already approved apparatus is modified in a way that may affect the essential requirements, procedures should be introduced to permit such modifications to be approved with a minimum of retesting and without the need to retest interfaces that have already been approved.

The Commission's mandate asked that installations as well as complex apparatus should be considered. Further clarification of the mandate indicated that there was concern about a number of different regulations additional to approval applying in different countries. A brief review of such regulations led to the following recommendations:

### **Recommendation 7**

Safety regulations to keep telecommunications wiring and power wiring adequately separated should be maintained and should apply equally to the telecommunications and power industries.

### **Recommendation 8**

Regulations should not be introduced for the performance of wiring systems, although the development of voluntary standards should be encouraged.

### **Recommendation 9**

Good quality maintenance should be readily available for more complex apparatus.

### **Recommendation 10**

Where the public network operator has evidence of network harm caused by a customer apparatus, there should be a provision for inspection by an authorised body.

Because of the short timescale and the wide reaching implications of these conclusions and recommendations, a period for further comment and discussion may be appropriate.

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## Foreword

The aim of this ETSI Technical Report (ETR) was to define the approval requirements for complex customer premises apparatus and installations connected to the Public Integrated Services Digital Network (ISDN) and to recommend what functional standards work is needed. However, during the preparation of this ETR the scope broadened for two reasons:

- In practice complex apparatus is likely to have both ISDN and non-ISDN interfaces and so the approval requirements need also to include non-ISDN interfaces.
- It was concluded that a new standard specifically for complex apparatus is not needed because distinctions between complex and simple apparatus are not of primary importance in approvals. Instead a new standard defining the application of the essential requirements (especially those contained in access and terminal CTRs) to any apparatus is proposed. This new standard will provide the basis for the approval of both simple and complex apparatus. Thus a large proportion of the contents of this ETR is relevant to any apparatus.

ETRs are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim - European Telecommunication Standard (I-ETS) status. An ETR may be used to publish material which is either of an informative nature, relating to the use or application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or I-ETS.

This ETR has been produced by the Business Telecommunications (BT) Technical Committee of the European Telecommunications Standards Institute (ETSI).

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## 1 Introduction

This ETR has been produced in response to the mandate (SOGT Doc 90/36) from the European Commission DG XIII. The report has been prepared by the ETSI Technical Committee responsible for Business Telecommunications, which has been considering the subject area for the past year.

The Report is based on the approach to "approvals" taken in the Directive on "The approximation of the laws of member states concerning telecommunications terminal equipment, including the mutual recognition of their conformity" (91/263/EEC) which is referred to subsequently as the "Directive". Article 4 (see Annex A) of the Directive specifies the essential requirements that terminal equipment must satisfy.

The requirements for complex apparatus and installations need special consideration because;

- the approach to approval standards (NETs) to date has been concerned mainly with simple apparatus,
- many items of complex apparatus have through connecting capabilities that may require a different approach to determining compliance with the requirements from that for simple apparatus, although there is no definition of exactly what is meant by simple apparatus,
- the liberalisation of telecommunications in Europe and particular initiatives such as Open Network Provision (ONP) are expected to lead to increased use of complex apparatus in private networks in most countries, and
- there have been complaints about significant differences in the requirements that have to be satisfied by complex apparatus and installations in different countries.

Private networks can contain a variety of different types of complex apparatus. The most common type is the Private Branch Exchange (PBX) which in the case of ISDN is known as the ISPBX. Other types of apparatus include multiplexers, Local Area Networks (LANs), automatic call distributors, echo cancellers, signalling converters, and packet switches, and in the future broadband apparatus will also be used.

This report begins by discussing the scope of the Directive in the context of complex apparatus and private networks. It then considers the problems of defining a complex apparatus and concludes that the real issue is the more general one of the application of approval standards to apparatus in general. It considers the application of the essential requirements of the Directive to apparatus in general but with special emphasis on more complex apparatus and private networks. These considerations lead to a set of principles for the application of the essential requirements to apparatus and the identification of a number of additional issues that need to be considered. The report contains a brief survey of the other regulations that exist in certain European countries in addition to type approval, and discusses whether any additional regulations are necessary. The report also shows how these principles can be applied in future to apparatus such as LANs and broadband apparatus, and considers the special case of Centrex and Virtual Private Networks. Recommendations are given for the preparation of additional standards.

Because of the short timescale and the wide reaching implications of these conclusions and recommendations, a period for further comment and discussion may be appropriate.

The objective of liberalising and harmonising the terminal equipment market cannot be achieved in isolation given the interrelationship between the terminal equipment and the public network. In order to achieve this objective, there needs also to be substantial harmonisation of the public network services as is proposed under ONP. However, given the extent of the differences in public networks and in the approach to regulation in different countries, harmonisation will inevitably take some time to achieve.

The liberalisation of the terminal equipment market involves a reassignment of responsibility, with users having to accept responsibility for their apparatus, and the public network operator no longer being responsible for user to user performance. Overall performance is now a matter for the regulators. The transition from the scenario where the public network operator was responsible for everything requires education and reorientation in attitudes.

## 2 Application of the Directive

### 2.1 Introduction

The directive is concerned with the requirements and procedures that have to be followed to permit a telecommunications terminal equipment to be placed on the market. The focus of this report is the requirements that apply to products intended for connection directly or indirectly to the public telecommunications network.

Although the title of the work mandate for this Technical Report refers to "approval", the word "approval" does not fully reflect the procedures defined by the Directive. The term "approval" is therefore avoided wherever possible in this ETR, although it is used in a few cases as a shorthand according to the definition given in Clause 3.

Specific requirements resulting from the Directive will be contained in CTRs, however at present no CTRs have been produced, and the only harmonised European standards for regulatory purposes are NETs. Consequently this ETR necessarily refers to NETs, although it should be assumed in all cases that the NET will be superseded by a CTR.

### 2.2 Scope of the Directive

It is clear from the "Whereas" Clauses in the Directive that the directive and the approvals are concerned with products, however complex apparatus will normally be used in networks that consist of a number of products connected together. These aspects are therefore considered in turn.

#### 2.2.1 Products

The scope of the Directive is defined in Article 1 (see Annex B). The issue here is whether the definition of "terminal equipment" in Article 1.2 includes all the apparatus that can be connected directly or indirectly to a public telecommunications network or only some of it. This issue is particularly important when considering complex apparatus and installations because of the range of different apparatus that may be connected together.

Article 1 defines terminal equipment as being equipment intended;

- (a) to be connected directly to the termination of a public telecommunications network, or
- (b) to interwork with a public telecommunications network being connected directly or indirectly to the termination of a public telecommunication network,

in order to send, process or receive information.

The definition then says "The system of connection may be wire, radio, optical or other electro-magnetic system". These means of connection will normally be approved as part of the apparatus in question.

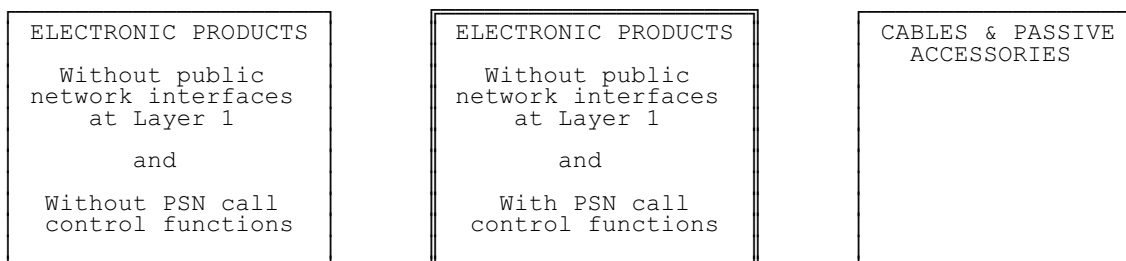
Thus only equipment that "sends, processes or receives information" is included in the scope of the Directive. While the definition of "processing information" can be best understood as modifying the format or content by active intervention, and would exclude for example the passive filtering effect of a cable, the definitions of "sending information" and "receiving information" are somewhat open to interpretation. It is clear that they should not be restricted to mean only originating and terminating a flow of information since this would exclude all through connecting equipment such as PBXs, modems or LAN gateways. Thus these definitions should cover also the active transmission and reception of information but would exclude items such as passive connectors.

Equipment that is connected indirectly is included only if it sends, processes or receives information and interworks with a public telecommunications network. Interworking is understood to mean signals to a public network for the purpose of establishing, modifying, charging for, holding and clearing real or virtual connections (see Article 4(f)). Thus equipment that sends, processes or receives information is excluded from the scope if it does not itself interwork with the public telecommunications network. For example computers, or domestic equipment that send or receive information but rely on equipment such as a

modem for the interworking with the public telecommunications network are excluded. Another example would be LANs that are connected to the public network via a gateway.

Furthermore it seems that active accessories such as power supplies may be excluded because they neither send, process nor receive information, and because they are not connected directly and do not interwork with a public telecommunications network. However there may be a need to consider the safety and standardisation aspects of power supplies.

Figure 1 shows a diagram of the different sets of apparatus.



NOTE: PSN = Public Switched Network.

**Figure 1: Application of the Directive to products - only the centre box involves interworking with the public network**

In the above diagram, apparatus with a public network interface at Layer 1 includes apparatus with a public network interface at Layer 1 and public switched network call control functions.

Apparatus that does not have a public network interface at Layer 1 cannot be connected directly to the public network. Apparatus that does have such an interface can be connected directly or indirectly to the public network. Principles 1-4 (see Clause 6), which apply to interworking with the public network, apply only where the apparatus has a public network interface at Layer 1.

An additional principle is needed for approval of interworking with the public network where the apparatus does not have a public network interface at Layer 1 but does have call control functions for interworking with the public switched network. This is covered in Principle 5

A final point concerns the definition of a public telecommunications network. Although it might be possible to interpret the word "network" as applying only to switched systems and excluding leased circuits, the term will be interpreted here as including leased circuits provided by a public telecommunications operator. However there will be significant differences in the approval requirements for access to the public switched network and access to leased circuits. This issue is discussed further in subclause 8.4 on Centrex and Virtual Private Networks.

### 2.2.2 Networks or systems

A number of products may be connected together on a customer's site to form a network or system. The system may or may not be connected by leased circuits or other transmission facilities to other locations. The performance of the system is determined both by the products and the way in which they are connected together, and therefore it cannot be determined only by requirements that apply to the individual products.

The range of possibilities for satisfactory interconnection is sufficiently large that attempts to address the performance of the system through restrictions on what connections can be made at particular interfaces on the apparatus may lead to excessive complexity and restrict the use of the apparatus unnecessarily. This issue is considered further in subclause 5.7.

### 3 Definitions

For the purpose of this report, the following definitions have been used:

**Apparatus:** A telecommunications product that may consist of both hardware and software.

**Commissioning:** The preparation of installed telecommunications products including the setting of parametric conditions for their interworking and functional capabilities.

**Complex Apparatus:** Careful consideration of a definition of Complex Apparatus as distinct from simple apparatus led to the conclusion that any definition would be entirely arbitrary because the same set of principles for applying the essential requirements could apply to both types of apparatus, and that where there was a need for such distinctions the definition should be designed to address those particular circumstances. See Clause 4.

**Installation:** The process of installing telecommunications products at a customer's premises, which includes the mechanics of delivering and locating the products and the associated interconnection arrangements (where appropriate).

**Leased Line:** A through connection service with digital or analogue presentation, independent of protocol or use, offered by a public network. This service is specified by bit rate or bandwidth, and other quality of service parameters.

**Public Network:** A public telecommunications system run by a public network operator including the equipment used to provide both switched and leased line services.

**Public Switched Network:** That part of a public telecommunications system run by a public network operator that is used to provide a switched service to the general public, i.e. it does not include the provision of leased lines.

**System:** A collection of telecommunications products at one location connected together by suitable means to provide telecommunications services.

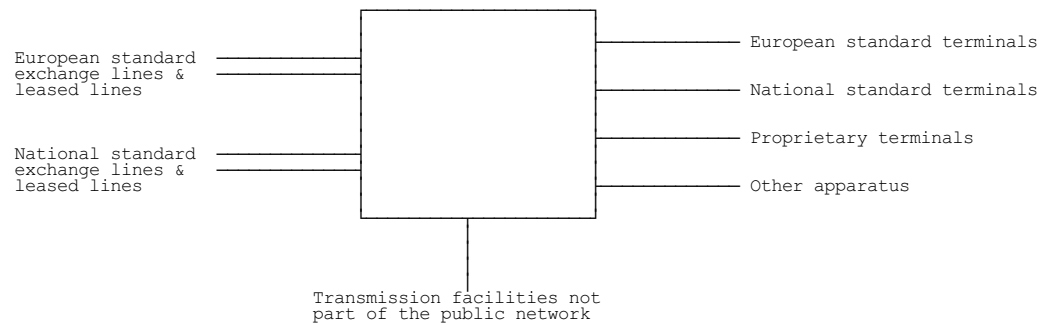
**Approval:** Compliance with the relevant product regulations such that the product concerned may be placed on the market and connected directly or indirectly to a public telecommunications network.

NOTE: The term approval is not an accurate representation of the working of the Directive which is based on type examination or manufacturer's declaration, but it is used here as a convenient shorthand.

### 4 Definition of complex apparatus and scope of this report

During the preparation of this ETR, a great deal of time was spent attempting to define a complex apparatus and the difference between a complex and a simple apparatus. It was noted that a European definition of a simple apparatus has never been prepared.

Apparatus may have any of a number of electrical interfaces as shown in figure 2.



**Figure 2: Different possible interfaces for an apparatus**

Apparatus may have either or both of two essential characteristics;

- a call terminating capability, and
- a through connecting capability.

One of the prime tasks was to identify principles to apply the essential requirements to apparatus with a through connecting capability, since this characteristic is present in many complex apparatus, and these principles have yet to be defined. However complexity cannot necessarily be related exclusively to the presence of a through connecting capability.

A number of different tangible criteria were explored for defining complexity including:

- use of a primary rate interface;
- functionality;
- numbers of interfaces;
- a switching or multiplexing capability.

Eventually the conclusion was reached that any distinction between simple and complex apparatus would be arbitrary. Further consideration led to the conclusion that the principles being developed for complex apparatus were principles that would apply to the whole universe of apparatus. Consequently the division of the universe into simple and complex apparatus was arbitrary and not of primary importance for approvals.

Simple and complex apparatus should be subject to a common set of principles, or, to put it another way, simple apparatus is a degenerate case of complex apparatus. The requirements and tests that apply to any given apparatus will be determined by those interfaces that need to be approved and by the functions affecting those interfaces. However, although the set of principles is independent of the degree of complexity, the requirements of terminal CTRs may be affected by the degree of complexity because they need to address performance from a terminating function through to an interface.

Thus the conclusion is that the set of principles being developed to apply the essential requirements to complex apparatus can be applied to any apparatus, and their use in this way will facilitate the application of the Directive.

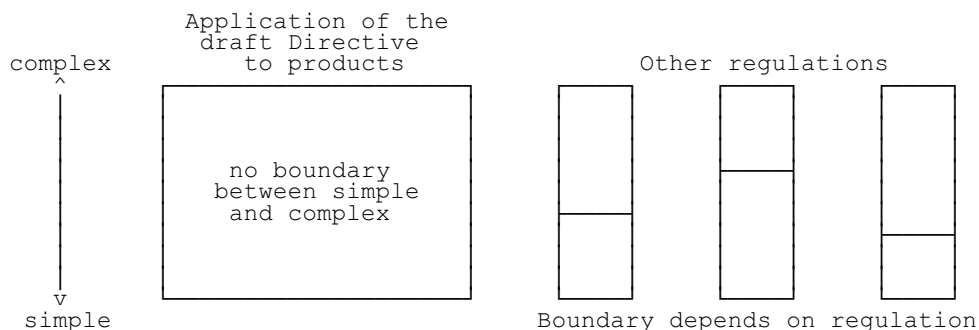
### Conclusions

The set of principles being developed to apply the essential requirements to complex apparatus can be applied to any apparatus, and their use in this way will facilitate the application of the Directive.

Distinctions between simple and complex apparatus are arbitrary and of no relevance in determining the common set of principles for the application of the Directive to individual products.

However, the way in which the common set of principles will be applied will be determined by the interfaces and functions of the apparatus under consideration, and, in the case of terminal CTRs, the contents of the terminal CTRs may be affected by the degree of complexity of the apparatus.

This conclusion does not mean that there are no differences between more simple and more complex apparatus, but that the differences are not relevant to the common set of principles for the application of the Directive. In the context of the other regulations discussed in Clause 7, it may be necessary to define a threshold of complexity above which, or below which, a regulation applies. This threshold may be different, and may be defined differently, for different regulations. This situation is shown schematically in figure 3 below:



**Figure 3: Diagram of relationship between simple and complex apparatus in the application of the Directive to products and other regulations**

(Although it recognised that distinctions between the terms complex and simple are arbitrary, one member of the group still believed that such a distinction should be made and would facilitate approvals)

The application of access requirements to a given apparatus will be determined simply by the interfaces provided on the apparatus. The application of terminal requirements is more complicated and therefore the scope and content of terminal CTRs will need to allow the criteria to be applied to be determined by the functions and interfaces of the apparatus.

The only terminal NET for ISDN produced or in preparation so far is NET 33. Its scope is limited to apparatus with basic rate access, an integral user-network interface, and functions belonging to the functional group TE1. Thus it does not apply to primary rate accesses and excludes apparatus with switching and/or through connecting functions. Furthermore, its technical requirements are not appropriate for more complex apparatus such as PBXs. Thus an additional terminal CTR should be produced for telephony in apparatus with an ISDN interface but which is outside the scope of NET 33.

### Recommendation 1 - New CTR

Terminal CTRs will need to allow the criteria to be applied to be determined by the functions and interfaces of the apparatus. Because of the narrow scope of NET 33, an additional terminal CTR should be produced for telephony in apparatus with an ISDN interface but which is outside the scope of NET 33.

Hitherto the work on NETs has considered access NETs and terminal NETs. In the case of NET 33 a decision was taken specifically to address the NET to the telephony function not to a particular manifestation of that function e.g. a simple telephone. In practice, assumptions have been made about the way in which NETs would be applied to particular simple apparatus and the general principles have not been addressed specifically.



The situation has been confused somewhat by the preparation of some apparatus specific NETs such as those for modems (now discontinued) and Groupe Speciale Mobile (GSM) mobiles, and such activities have meant that insufficient attention has been given to the structuring of NETs. This situation is not unusual in the preparation of standards when the early work is driven by specific urgent needs, and it is common for a more rigorous consideration of structure and principles to take place in a second phase.

In effect, the conclusion is that further attention needs to be given to the structure of CTRs based on NETs. The existing structure of access NETs and terminal function NETs is satisfactory but needs to be augmented by a new CTR that defines how the access and terminal function NETs and CTRs should be applied to specific apparatus, and that includes any additional requirements. This new CTR would give effect to the principles set out in this ETR. The methods would apply to all apparatus irrespective of whether it is simple or complex.

#### Recommendation 2 - New CTR

The structure and interrelationship of CTRs based on NETs needs to be reviewed in the light of the conclusions of this ETR. A new standard (CTR) should be produced to define the application of access and terminal CTRs to specific apparatus. This new standard (CTR) should be based on the principles recommended in this ETR. The new standard (CTR), together with the access and terminal CTRs, will provide for the approval of both simple and complex apparatus.

The work described in this Technical Report has focused on the issues of interworking with and via the public network. When the structure of NETs and CTRs is reviewed, attention should also be given to safety and Electro-Magnetic Compatibility (EMC) issues, where there needs to be a consistent approach to the handling of these issues either in general or in access CTRs.

In view of these conclusions, the remainder of this report will refer to apparatus in general, but will draw attention to any issues that are specifically affected by the degree of complexity of the apparatus.

The conclusion in this Clause applies only to the type approval of apparatus. In the case of the other regulations in Clause 7 it will probably be necessary to distinguish between more complex and more simple apparatus but the distinction may be different for different regulations.

## 5 Essential requirements

This Clause considers the application of the Essential Requirements to apparatus. Some of the issues covered here are also under discussion in an ad-hoc group of the Technical Recommendations Applications Committee (TRAC).

### 5.1 User safety

User safety issues are already covered by existing standards. There may, however, be a case for allowing exemptions for apparatus that may be handled only by professionals, but there would need to be a significant benefit to justify such exemptions.

### 5.2 Safety of employees of public telecommunications network operators

The concern here is to prevent voltages that could be dangerous which may occur in customer premises apparatus from gaining access to parts of the public telecommunications network.

In the case of apparatus that may be connected to equipment (e.g. power supplies) that is outside the scope of the Directive, there may be a general case for requiring the apparatus to provide a safety barrier. This issue should be considered in more detail by safety experts.

### 5.3 Electro-Magnetic Compatibility

Electro-Magnetic Compatibility (EMC) requirements apply to all apparatus irrespective of its complexity and are already covered by existing or draft standards.

#### 5.4 Protection of the public network from harm

Where this issue is considered separately from the issue of correct interworking with the public network, it concerns preventing the application to the public network of voltages or signals that would cause harm or damage. This issue is covered in the access standards that are being prepared for apparatus connected to ISDN interfaces. In future, the aim should be for public networks to be designed so that it would be highly unlikely that they could be harmed by particular patterns in digital signals, i.e. they should be self protecting.

#### 5.5 Effective use of the radio frequency spectrum

This issue should be covered satisfactorily by the standards that apply to radio transmission and is not dependent on whether the apparatus is simple or complex.

#### 5.6 Interworking with the public telecommunications network

This requirement concerns signalling between the apparatus and the public network for the purpose of establishing, modifying, charging for, holding and clearing real or virtual connections. These requirements are covered in the access standards for the services concerned. In the case of ISDN, the requirements apply to bearer services (see table 1 of ETR 010 "The ETSI Basic Guide on the European ISDN"). Although, in general, supplementary services are not matters for approval, some features that may be covered by supplementary services, e.g. Direct Dialling-In (DDI), may affect basic call establishment and thus may be an essential requirement for interworking with the public network and so be included in the relevant access NET or CTR.

The current access standards for ISDN are NET 3 and NET 5 which are yet to be finalised, however these standards were prepared before the essential requirements in the Directive were finalised and it is expected that they will be modified to become CTRs because the content of these NETs goes beyond the definition of the essential requirements.

NET 3 and NET 5 have been prepared on the assumption that the apparatus to be approved can be tested on its own. This is not the case for through connecting apparatus which may depend upon a separate terminating apparatus to initiate or control a call. The principles proposed in Clause 6 address the way in which in tests should be made.

#### 5.7 Interworking via the public telecommunications network in justified cases

This requirement concerns the end-to-end performance of certain types of call. Thus it involves transmission performance through the private network or system. (Interworking via the public network could be interpreted as including signalling, but as signalling has already been discussed in the last Clause, it is not considered again here).

The only service that this requirement applies to at present is voice telephony, although in future it is possible that the requirement is extended to include all the bearer and teleservices in tables 1 and 2 of ETR 010 i.e.:

Bearer services

- Circuit-mode 64 kbit/s unrestricted
- Circuit-mode 3.1 kHz audio
- Packet-mode (X.31 case B) B- and D- channel
- Circuit-mode speech

Teleservices

- Telephony 3.1 kHz
- Facsimile Group 4 Class 1
- Teletex
- Telephony 7 kHz
- ISDN syntax based videotex
- Videotelephony

The main transmission performance parameters for 3.1 kHz telephony are:

- loss (loudness ratings);
- delay;
- echo;
- quantising distortion.

There are also other parameters such as noise and linearity that may need to be considered in some cases.

In general the requirements can best be considered separately in terms of through-connecting functions and terminating functions. However in some cases where the apparatus that provides the terminating function does not itself interwork with the public telecommunications network, that apparatus will not be subject to approval.

### 5.7.1 Through-connecting functions

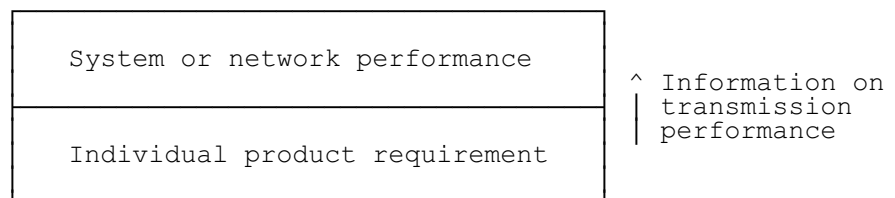
The following paragraphs focus on the particular example of the telephony reserved service.

The performance of each apparatus may be measured in terms of these parameters, but the performance of a call through a network or system will be determined by the particular combination of apparatus being used. With the exception of delay and quantising distortion, these impairments do not accumulate irreversibly when apparatus is connected in series; performance can be restored. For example loss can be compensated for by gain. Echo can be controlled by echo cancellers.

In the case of very simple and common configurations such as an ISPBX with extension telephones connected to an ISDN exchange line there is a consensus that the ISPBX should be required to meet transmission performance criteria that will ensure that the voice telephony performance in this configuration is satisfactory. This requirement will help those users who buy simple systems and who do not have the knowledge necessary to design the configuration themselves.

In the case of more complex configurations, more flexibility is required. The performance of networks needs to be considered separately from that of individual apparatus. The overall transmission performance of a private network is addressed in ETR 004, "Overall transmission plan aspects of a private branch network for voice connections with access to the public network". The Clause of the ETR that recommends the range of impairments that will permit satisfactory operation of a private network connected to the public ISDN is being turned into an ETS.

The remaining issue, therefore, is how the CTRs for products should address transmission performance. Even though the performance of the network may be relatively independent of the performance of individual apparatus and can be considered as separate layers, see figure 4, the designer of the network will need information about the performance of each apparatus. This information should be supplied by the manufacturer as part of the requirements in the CTRs.



**Figure 4: Relationship of product requirement to network or system performance**

Some members of the group that prepared this report believe that the provision of transmission performance information will be sufficient for through connecting apparatus, but others (certain PTT members) believe that a limit should be set to the impairments introduced by individual apparatus.

There is also a fundamental disparity in relating these requirements to complex apparatus because a particular apparatus may be capable of carrying different services, and in the case, for example, of a

multiplexer, the apparatus may not know what service is being carried. Different services may have different requirements. So long as there is only one "justified service" i.e. telephony, this is not too serious a problem, but if more services are added to this category, and if limits are imposed through the approval requirements, it will be necessary to decide which services should set which limits. Even with telephony, if limits are to be imposed, it will be necessary to decide which apparatus is intended to carry telephony.

If other justified cases are identified, they will be treated in the same manner as telephony.

### **5.7.2 Terminating functions**

In the case of more complex terminating apparatus it will be necessary to apply the performance requirements for terminating justified services. For telephony, this will mean applying requirements of the type included in NET 33 (however NET 33 will need to be modified to make allowances for the extra complexity, e.g. the extra delay, of more complex apparatus).

A number of difficult problems arise in this area. The essential requirements for interworking via the public network in a justified case would be met if the combination of customer apparatus meets, for example, the recommendations given in ETR 004 for telephony. The difficulty arises in specifying the relevant requirements, e.g. delay, to be included in the terminal CTR.

On the one hand it could be argued that the CTR should allow a range of performance up to that recommended in ETR 004 in the case of telephony, which would ensure satisfactory performance when the apparatus is connected directly to the public switched network. However it would not ensure satisfactory performance if the apparatus covered by the terminal CTR is connected indirectly via another apparatus, e.g. a PBX. On the other hand it could be argued that a higher level of performance should be required to ensure satisfactory performance in the case of indirect connection.

Because Principles 7 & 8 in Clause 6 are designed to ensure satisfactory performance for a simple combination of apparatus, e.g. a PBX and terminal, there needs to be at least two levels of requirement in terminal CTRs, one for a more simple terminal such as a telephone, another for the combination referred to in Principles 7 & 8. This issue requires further study.

The heart of the problem is the difficulty of trying to control the performance of a combination of apparatus through a requirement that applies to an individual apparatus.

There are further extremely difficult cases which involve the analogue Public Switched Network and analogue terminals for the voice telephony justified case.

The cross-connection requirements between approved ISDN terminals and the analogue public switched network interfaces, and approved analogue terminals and ISDN interfaces can only be addressed by including the requirements for such cases in the applicable national standards. This results from the difference in each country in analogue terminal performance because of differences in the analogue public switched network.

## **6 General principles for the application of the essential requirements to apparatus**

The following subclauses describe the principles that should be applied to the application of the essential requirements to apparatus. These principles focus on the Essential Requirements of interworking with the public network and interworking via the public network. It is recommended that these principles should be set out in a new standard that would be suitable for any apparatus.

### **6.1 Interworking with the public network**

#### **6.1.1 Directly connected apparatus**

##### **6.1.1.1 Principle 1: Interfaces directly connected to the public network**

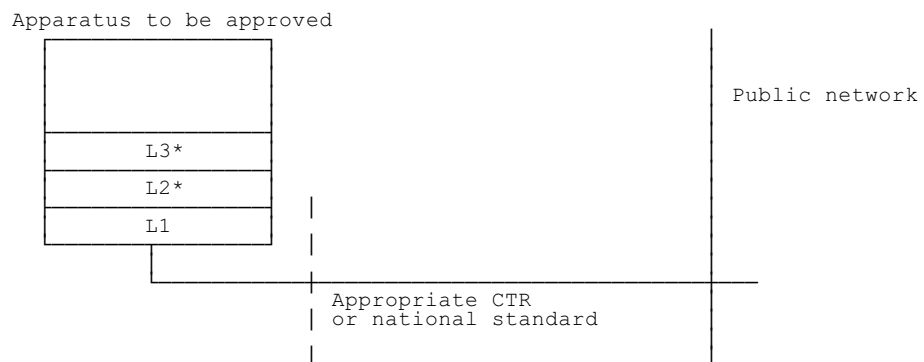
The basic requirement is for the application of an appropriate access standard to interfaces suitable for connection to a public network.

Where interfaces do not operate at all the layers covered by the approval standard, they should comply only with the requirements relevant to the layers that they provide.

Principle 1

Apparatus with interfaces for direct connection to a public network shall meet the requirements of the appropriate CTR (e.g. NETs 1, 2, 3 & 5 etc. for switched services, or other access CTRs for other services) at those interfaces up to the level of functionality appropriate to the capability of the apparatus. If an appropriate European access CTR does not exist, they shall meet the requirements of an appropriate national access standard.

NOTE: In the following diagrams, in the case of ISDN access, the layers refer to the signalling plane.



\* = if provided

Figure 5: Illustration of Principle 1

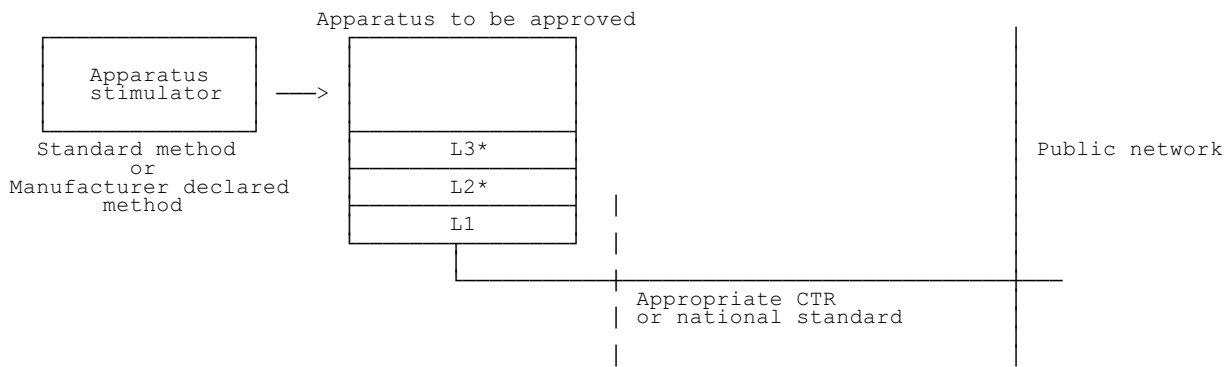
### 6.1.1.2 Principle 2: Test procedures

In order to test conformity to the access CTR or national access standard, it will be necessary to stimulate the apparatus concerned. A method of stimulation may be specified in the access CTR or national access standard, or in another standard. However any single method will not be appropriate in all cases, and it is essential not to inhibit the range of apparatus that may be approved by restricting testing to a single method.

Thus although standardisation of the method of stimulation is desirable, there should be scope for the manufacturer to specify a different method where the standard method is inappropriate. This approach will give scope for the placing on the market of apparatus where the functions concerned with interworking may be distributed between different physical equipments e.g. LANs because it allows equipments to be tested in combination.

Principle 2

Standard methods for stimulation of the apparatus for tests of interworking with the public network shall be used wherever possible, but, where they are not appropriate, the manufacturer shall declare the method to be used. If necessary, the supplier shall supply appropriate equipment to enable the tests to be made.



\* = if provided

Figure 6: Illustration of Principle 2

6.1.1.3 Principle 3: Leased lines

Where the apparatus has interfaces for connection to leased circuits, the access standards should not constrain the choice of signalling method used across the leased circuit provided that the signalling method is within the transmission capability of the leased circuit. For example there should be no constraint on the use of time slot 16 in 2 Mbit/s leased lines.

Principle 3

The access requirements for leased lines shall not constrain the choice of private network signalling system.

6.1.2 Indirectly connected apparatus

6.1.2.1 Principle 4: Interfaces not directly connected to the public network

In addition to interfaces to the public switched network and leased circuits, an apparatus may also have:

- interfaces for connection to standardised terminals;
- interfaces for connection to proprietary terminals;
- proprietary or standardised interfaces for connection to transmission facilities that are not part of the public network; and
- proprietary or standardised interfaces for connection to other apparatus.

These interfaces do not need to be tested for conformance to the essential requirements because they do not connect directly to the public network. These interfaces may, however, be used in the method declared by the manufacturer for stimulating the apparatus for interworking tests at interfaces that do connect directly to the public network.

NOTE: Although the following should not be included in CTRs, it is generally desirable that interfaces that are not connected directly to the public network should conform to voluntary standards where they exist, and that they should provide for terminal interchangeability as defined in Annex B of ETR 010. Where an interface is claimed to meet a voluntary standard, the interface should comply with that standard, but this is not a requirement under the Directive.

Principle 4

Interfaces that are not suitable for connection directly to the public network shall not be subject to specific requirements unless they provide public switched network call control functions.

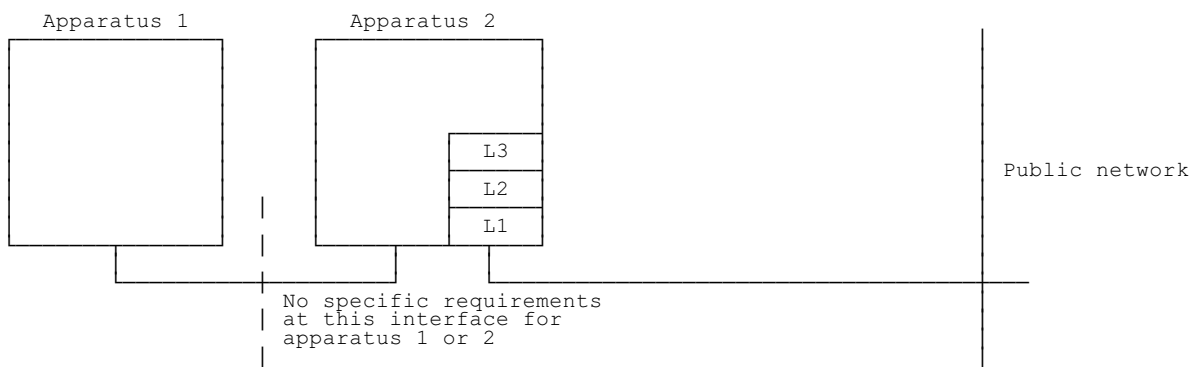


Figure 7: Illustration of Principle 4

**6.1.2.2 Principle 5: Interfaces with public network call control/signalling functions but no Layer 1 connection to the public network**

Some apparatus will not have an interface for direct connection to the public switched network at Layer 1, and yet may contain call control functions that interact directly with the signalling protocol of the public switched network. In this case the supplier should declare, and if necessary provide, a suitable means of Layer 1 connection or adaptation. This approach will provide a method for applying the essential requirements to software that can be run on many different types of standard hardware.

This principle will also define the approach to computer supported telecommunications where functions governed by requirements in the access standard may be resident in an external computer that controls an apparatus that is connected directly to the public network.

NOTE: Where a computer is connected to a modem, and the call control functions (signalling protocol) are implemented in the modem, the computer does not interwork with the public telecommunications network and so is outside the scope of the definition of terminal equipment in the Directive.

Principle 5

Where an interface provides public switched network call control/signalling functions but does not conform to a public network access standard at Layer 1, or Layer 1 and Layer 2, the supplier shall declare and if necessary provide a means for converting the interface to conform to a public network standard at Layer 1, or Layer 1 and Layer 2, so that testing of these functions can take place in accordance with the relevant Clauses of a public switched network access standard. In this principle, the term "call control functions" means direct interaction with the public switched network signalling protocol.

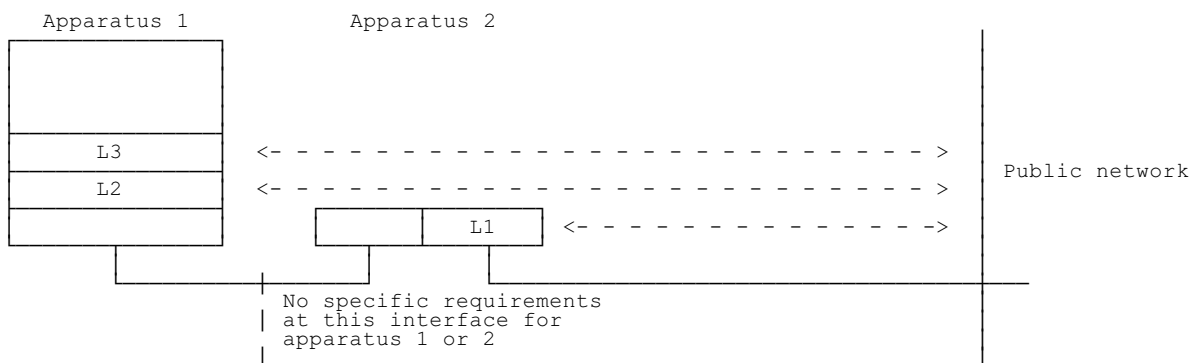


Figure 8: Example of Principle 5

## 6.2 Interworking via the public network for justified cases

The principles here need to deal with terminating apparatus and through connecting apparatus.

It is possible for apparatus to affect interworking via the public network although that apparatus does not interwork with the public network through direct or indirect connection. An example is a PBX extension telephone with a non-standard interface to the PBX. Such apparatus is not considered here because it is outside the scope of the definition of "terminal equipment" in the Directive.

In the case of apparatus with one or more functions for terminating justified case services, there will be a requirement relevant to each such justified case service, and this requirement will apply at each apparatus interface that carries the justified case service terminated by the apparatus and that is connected directly to a public switched network.

NET 33, which has been produced for digital telephony, is not suitable, as currently drafted, for telephony terminating functions in all types of apparatus (see subclause 5.7.2).

The following three principles assume that justified case services are provided only by the public switched network. If, in the future, this situation changes this principle will need to be reviewed.

These principles are appropriate for the voice telephony justified case services. It is expected that they will also be suitable for other services that may be constituted as justified cases in the future, but their suitability should be confirmed when other justified cases are created.

### 6.2.1 Principle 6: Terminating function

Principle 6

Apparatus with a terminating function for a justified case service and an interface for direct connection to a public switched network shall comply with the relevant requirements for that justified case service at that interface. This principle applies for each justified case service supported by each terminating function in the apparatus.

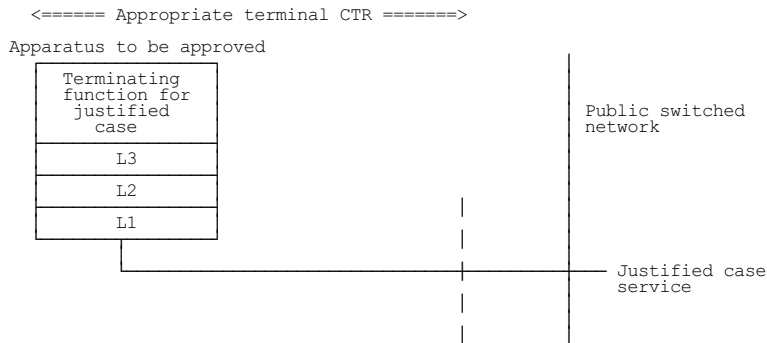


Figure 9: Illustration of Principle 6

### 6.2.2 Principle 7: Through connecting function to a terminal suitable for direct connection to the public network

Principle 7

Apparatus capable of carrying justified case services between interfaces to the public switched network and interfaces for connection to terminals approved for direct connection to the public switched network shall meet the relevant requirements for the relevant justified case service at each public switched network interface, so that, when operated in conjunction with any terminal type approved for direct connection to the public switched network, the overall requirement for the relevant justified case service will be met.



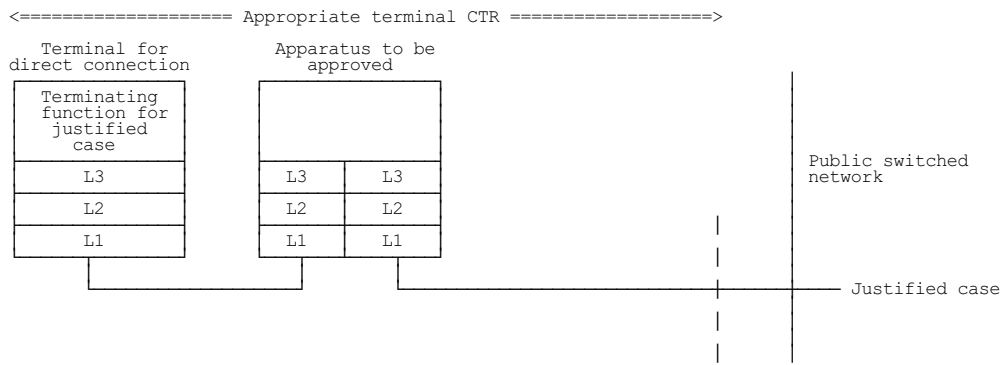


Figure 10: Example of Principle 7

**6.2.3 Principle 8: Through connecting function to a terminal not suitable for direct connection to the public network**

Principle 8

Apparatus capable of carrying justified case services between interfaces to the public switched network and interfaces for connection to terminals capable of indirect connection only (not approved for direct connection to the public switched network) shall meet the relevant requirements for the relevant justified case service at each public switched network interface when operated in conjunction with an appropriate type of terminal declared by the apparatus supplier.

If necessary, the supplier shall provide appropriate equipment to enable the tests to be made.

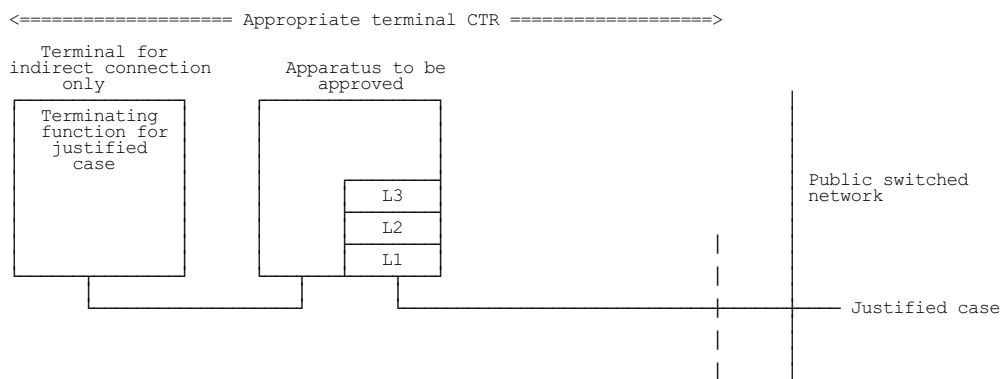


Figure 11: Example of Principle 8

**6.2.4 Through connection performance in other configurations**

Principle 9 deals with through connection functions in cases not covered by Principles 7 and 8. Where apparatus has interfaces for connection to leased circuits, the network designer needs information on the transmission performance (i.e. loss, delay, echo, quantising distortion) of the apparatus so that he can make the necessary transmission planning calculations for his network.

Such information should be part of the requirements for placing the apparatus on the market because it does affect interworking via the public network. Although most members believe that the accuracy of this information need not be checked during type examination because it can be a condition of contract between a purchaser and supplier, a minority thinks that there should be some scope for checking and that inaccuracies should lead to the apparatus being withdrawn from the market until they are corrected.

The general recommendation is that other transmission performance issues such as noise and linearity, which are not normally the subject of network planning calculations, should be addressed by voluntary standards such as I-ETS 300 003/4/5/6 where applicable. A minority believes that such standards should be mandatory.

Principle 9

The supplier shall provide information on the relevant performance parameters in respect of each through connection function capable of carrying any justified case service not covered by principles 6, 7 & 8 between combinations of the following:

- interfaces for connection to the public switched network;
- interfaces for connection to leased lines;
- interfaces for connection to transmission facilities not provided by a public network;
- interfaces for connection to other apparatus with through connection functions;
- interfaces for terminals designed for direct connection to a public switched network;
- interfaces for terminals capable only of indirect connection to a public switched network.

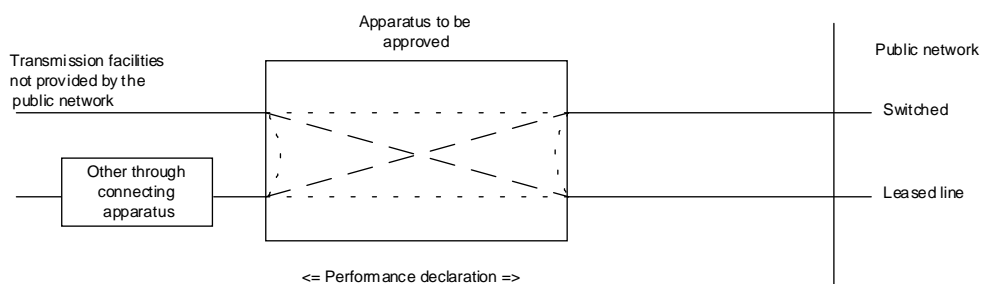


Figure 12: Example of Principle 9

### 6.3 Purposes of interfaces

Because more complex apparatus may have many interfaces and the purposes for which the interfaces have been designed may not be readily apparent, the manufacturer should declare the CTRs or national access standards that each interface has been designed to meet. Where interfaces have not been designed for direct connection to the public network, the manufacturer should declare any voluntary standards or technical specifications that apply to the interfaces or identify what other apparatus can be connected to them.

This information will both enable decisions to be made on the requirements to be applied under the Directive, and enable the user to design his system or network correctly.

Principle 10

The manufacturer should declare the CTRs or national access standards or parts thereof that each interface has been designed to meet. Where interfaces have not been designed for direct connection to the public network, the manufacturer should declare any voluntary standards or technical specifications that apply to the interfaces or identify what other apparatus can be connected to them

### 6.4 Examples of the application of the principles

Table 1 gives examples of the application of principles 1-9 defined above to specific common types of apparatus:

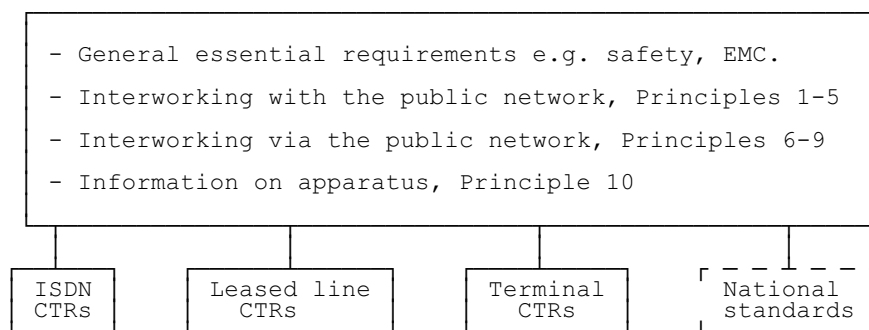
**Table 1**

| Apparatus type  | "with"  | "via"        | Notes   |
|---|---------|--------------|---|
| ISDN telephone  | 1,2     | 6            | NET 3 will be the access standard, and NET 33 the terminal standard. Under P2 a standard method of stimulation would be used          |
| Analogue telephone                                      | 1,2     | 6            | National standards would be used  |
| PSTN modem  | 1,2,4   | -            | P4 applies to the interface that will connect to the terminal. No "via" principles apply because data is not a justified case service |
| Leased line modem                                       | 1,2,3,4 | -            | as above. No constraint on protocol   |
| Terminal adapter Basic rate S to analogue telephone     | 1,2,4   | 7 or 8       | P4 applies to interface for connection to telephone. P7/8 controls voice quality.   |
| Multiplexer ISDN primary rate to basic rate terminals   | 1,2,4   | 7            | P4 applies to basic rate interface to terminals. P7 controls voice quality.   |
| Multiplexer for leased lines; 2 Mbit/s - 31 x 64 kbit/s | 1,2,3   | 9            | Information to be given on performance, no constraint on protocol or format.  |
| ISPBX for use with basic rate S-buses                   | 1,2,4   | 7,9          | P4 applies to S-bus interface to extension telephones. P7 controls voice quality.   |
| ISPBX as above but with leased line interfaces          | 1,2,3,4 | 7,9          | P7 controls voice quality on public switched network interfaces.  |
| PBX with non standard terminals                         | 1,2,4   | 8            | Method of stimulation under P2 could use the non standard terminals. P8 controls voice performance.                                   |
| LAN gateway   | 1,2,4   | 9 (if voice) | P9 provides information on voice performance between public switched network and LAN links  |
| LAN element (node)                                      | 4       | 9 (if voice) |   |
| Teletex apparatus with plug-in modem                    | 5       | -            |   |

NOTE: Principle 10 applies in all cases.

### 6.5 Structure of the new standard

A single new "application" standard would be needed to define the framework regarding the application of standards to any type of apparatus. The standard would refer to European CTRs and national interface standards. It would also include the Principles recommended above. A diagram of the structure of the proposed standard is given in figure 13.



**Figure 13: Diagram of the structure of the proposed standard**

The new standard identified above applies only to the essential requirements. The application of voluntary standards and related markings in a way that does not inhibit innovation or product differentiation merits further consideration but is outside the scope of this ETR.

## 6.6 Additional issues

### 6.6.1 Special arrangements

In exceptional circumstances, special arrangements and procedures need to be available. For example, trials and observations may be an alternative to some laboratory testing. The details of these circumstances will have to be considered further and, at present, the approaches taken by different countries may differ.

#### Recommendation 3

Procedures such as trials and observations need to be available as an alternative to normal testing in exceptional circumstances.

### 6.6.2 Modifications early in the life cycle

When a new product is being introduced, it may undergo trials that run in parallel with the type approval testing. These trials may result in minor modifications being needed during or shortly after the approval testing. Provision needs to be made to accommodate such modifications without involving an expensive re-approval procedure. This issue will need to be considered further.

#### Recommendation 4

Provision needs to be made in the approval system to accommodate minor modifications early in the life cycle of an apparatus without it having to undergo full re-approval.

### 6.6.3 Transitional arrangements

The introduction of the proposed new standard for the application of NETs to any type of apparatus could have the potential to bring all apparatus under the European approval system. This will be satisfactory where there are European standards (NETs) for all the interfaces that need to be considered, but in many cases more complex apparatus will have both interfaces to which European standards apply and interfaces for which national standards will have to be used.

Although this situation will improve as more European access and terminal standards are produced (e.g. for leased lines under ONP) it is to be expected that a number of national standards will continue to be used for several years at least. These national standards will not necessarily be in a form that is immediately suitable for use with the proposed new European standard, and so a carefully planned transitional phase will be needed that will allow sufficient time for important national standards to be modified, and will ensure that the effective life of existing products is not artificially curtailed.

#### Recommendation 5

Where national standards need to be used in conjunction with the proposed new European standard, carefully planned transitional arrangements are needed.

Where an apparatus does not have any interfaces to which European access standards apply, it could still be approved under the new standard, but it may be considered better not to disturb the national arrangements.

Even after the new standard has been introduced, apparatus that were approved originally to national standards will continue to be marketed. Particularly in the case of more complex apparatus, it is to be expected that the apparatus will be modified a number of times to introduce new features and new

interfaces. Procedures should be introduced to permit such modifications to be approved with a minimum of retesting and without the need to retest interfaces that have already been approved.

Recommendation 6

Where already approved apparatus is modified in a way that may affect the essential requirements, procedures should be introduced to permit such modifications to be approved with a minimum of retesting and without the need to retest interfaces that have already been approved.

## 7 Other regulations

### 7.1 Current situation

Table 2 gives information on the other regulations that affect the installation and operation of PBXs carrying voice. This information is given as one of several simple categories; in some cases there has been difficulty in representing the information in this form. The table gives a general indication of the current situation, however the position in most countries is in a process of transition.

**Table 2**

| Country                   | A | B | CH | D | DK | E | F | GB | I | IRL | N | NL | P | S | SF |
|---------------------------|---|---|----|---|----|---|---|----|---|-----|---|----|---|---|----|
| Installation              | A | A | R  | A | -  | A | A | -  | A | A   | A | -  | A | - | -  |
| Pre-connection inspection | P | P | P  | A | -  | P | P | A  | P | -   | - | -  | P | - | -  |
| Safety requirements       | R | R | R  | R | R  | R | R | R  | R | R   | R | R  | R | - | R  |
| Wiring performance        | G | G | R  | G | G  | G | G | G  | G | G   | G | -  | G | G | G  |
| Network performance       | R | R | R  | R | -  | R | R | G  | R | G   | G | -  | R | R | R  |
| Maintenance               | A | A | P  | A | -  | - | A | A  | A | A   | - | -  | A | - | -  |
| Right to inspect          | P | P | P  | A | -  | P | P | -  | P | -   | - | -  | A | - | -  |

Key:

Countries A=Austria; B=Belgium; CH=Switzerland; D=Germany; DK=Denmark; E=Spain; F=France; GB=United Kingdom; I=Italy; IRL=Ireland; N=Norway; NL=Netherlands; P=Portugal; S=Sweden; SF=Finland.

- = There are no regulations.

R = Requirements are imposed by regulation.

A = Regulations restrict the activity to being carried out by an authorised body.

P = The activity must be carried out by the public network operator.

G = No regulations are imposed but technical guidance is given in voluntary standards or codes of practice.

The heading "network performance" covers grade of service and telephony performance for calls to and from the public network.

There are a number of points to note:

- in France, the ratio of exchange lines to extensions and other interfaces is controlled through type approval;
- in the UK, the owner of a PBX must have a long term contract with an approved maintainer. In other countries where there are regulations that maintenance should be carried out only by approved companies, there is not a requirement for a long term contract;

- in the UK, the public network operator does not have a right to inspect the private network because he could obtain commercially sensitive information about a competing public network operator or about the private network operators value added and data services.

The following paragraphs give recommendations for the future on whether these areas should be subject to regulation in Europe.

## 7.2 Harmonisation

It is desirable that there should be harmonisation of the "other regulations" covered in Clause 7 to effect a proper single market, but there are significant differences in national practices and views of what is essential, and so harmonisation will take some time. In the meantime, it is important that requirements are published openly and that anyone can obtain any necessary qualifications.

## 7.3 Installation, Inspection and Connection

There are significant differences in the approaches taken by different countries to these related issues. Some impose no regulations and leave these issues to contractual arrangements. Some restrict these activities to appropriately authorised persons but do not require any independent inspection before connection to the public network. Others do not restrict the activities but do require independent inspection before connection.

## 7.4 Safety

All countries have some form of regulation on safety, particularly the separation of telecommunications cabling from power cabling. However in several countries it appears that the regulations for telecommunications and power wiring are not symmetrical and power wiring can be installed alongside telecommunications wiring, whereas the converse is not permitted. It does appear to be essential to have satisfactory regulation in this area.

### Recommendation 7

Safety regulations to keep telecommunications wiring and power wiring adequately separated should be maintained and should apply equally to the telecommunications and power industries.

## 7.5 Wiring Performance

The performance of wiring is important for apparatus to operate correctly. The use of the wrong type of wire, or excessive lengths of wire, can cause crosstalk, degrade transmission performance, affect signalling systems, or in the case of the ISDN passive bus totally prevent operation. However there are many different types of wire and cable that can be used satisfactorily, each needing its own planning rules, and it is important that there should be scope for the introduction of new building wiring systems.

This area is not subject to regulation at present in most countries (Switzerland is an exception), and there appear to be no compelling reasons why regulation should be introduced. However there is benefit in the development of voluntary standards and codes of practice that will assist manufacturers, network designers and installers. CENELEC is developing relevant standards.

### Recommendation 8

Regulations should not be introduced for the performance of wiring systems, although the development of voluntary standards should be encouraged.

## 7.6 Network Performance

There are two main aspects of network performance:

- providing sufficient lines for an adequate grade of service;
- providing adequate transmission quality for justified case calls to and from the public network.

There is agreement that these issues are of considerable importance, and that it is in everyone's interest to maintain adequate quality, but no consensus could be reached on the issue of regulation.

Some, but by no means all, public network operators consider that there should be regulations to control the design of private networks to ensure satisfactory performance in these respects. This group makes the following points:

- regulation gives customers confidence that all systems meet a minimum performance requirement;
- regulation reassures public network operators with regard to call quality and revenue protection;
- regulation reduces the probability of problems arising in installed networks and having to be corrected subsequently at greater expense.

Others, including some public network operators, consider that the performance of simple configurations involving more complex apparatus is already assured by the principles recommended for approval, and that the designers and users of more complex configurations (e.g. private networks) have sufficient incentive to ensure that their networks provide adequate quality for both outgoing and incoming calls. Consequently regulation is unnecessary. This group also makes the following points:

- the grade of service depends on the use of the private network and is thus customer specific. Regulations on network design could not address this issue satisfactorily;
- transmission planning for telephony uses statistical measures that cannot be covered adequately by regulation;
- regulations would have to be testable and enforceable, and there are considerable problems in both these areas;
- the CCITT Recommendations do not treat different forms of impairment equally. For example a call with 29 dB OLR (Overall Loudness Rating) is subjectively inferior to one with 14 QDU (Quantising Distortion Unit). Thus the Recommendations do not provide an adequate basis for regulation. Users themselves are the best judges of the quality that they require;
- regulating private network performance would increase the administrative costs of private networks, and inevitably constrain flexibility in design without necessarily improving performance in critical areas. Good technical guidance (e.g. ETR 004) is therefore a better approach than regulation.

## 7.7 Maintenance

Some countries allow the maintenance of more complex apparatus to be carried out only by the manufacturer or appropriately qualified persons. Some require users to have a continuing contract for maintenance, whereas others allow users to obtain maintenance services only when needed.

### Recommendation 9

Good quality maintenance should be readily available for more complex apparatus.

## 7.8 Right to Inspect

There appears to be no case for a universal right of inspection by a public network operator. Where there are competition issues (e.g. in services or apparatus supply) such a right could have the potential for anti-competitive practices.

Where the public network operator has evidence of network harm (as defined in the essential requirements) caused by a customer apparatus, there should be a provision for inspection by an authorised body.

### Recommendation 10

Where the public network operator has evidence of network harm caused by a customer apparatus, there should be a provision for inspection by an authorised body.

## 7.9 Marking

Some further consideration may need to be given to the requirements for marking apparatus to take account of the fact that some apparatus may be connected directly or indirectly to a public network, and other apparatus only indirectly. There has not been sufficient time to consider the relationship between the current marking requirements in the Directive and each of the Principles contained in this ETR.

In view of the fact that more complex apparatus may be marketed in several different versions, and revised at different stages, the provision of additional information as part of the marking requirements should be considered.

## 8 Related future issues

### 8.1 New access standards

European access standards are needed for digital leased circuits, and for analogue exchange lines and analogue leased circuits provided that there is sufficient harmonisation of such services in Europe. The general issue of leased circuits is to be addressed under the ONP Directive.

In the longer term, there will be a need to produce access standards for optically presented services.

These new standards will mostly be used for more complex apparatus.

### 8.2 Treatment of LANs

LANs are examples of products that come from the non-regulated world of computing. Although there are some standards, proprietary interfaces are often used, and so it is common to buy LAN equipment from a single supplier.

LANs often operate at speeds well in excess of services currently available from public telecommunications networks and so some LANs will use gateways for connection to public telecommunications services. In this case, only the gateway and not the whole LAN may interwork with the public telecommunications network and so only the gateway apparatus may need to be approved.

In other cases, the layer 3 functions for interworking with the public telecommunications network may be provided by more than one apparatus due to the distributed nature of the LAN. Principles 2 and 4 will permit appropriate approval arrangements for such LANs and will allow the simplest adequate combination of apparatus to be used for approval testing.

In the future it may be appropriate for new public telecommunications services to be defined for use by LANs and these services may require new access standards. An example would be a high speed leased line.



### 8.3 Treatment of broadband services

By broadband services, we mean services that are capable of operating at speeds greater than 2 Mbit/s. Such services are not yet commonly available and no European access standards have yet been produced. When such services are defined, access standards may be produced and can be added to the menu of access standards called up by the proposed new standard. In other respects the same principles will apply. The only issue that would require further modification would be the introduction of new broadband justified services, which might require a new specification for terminating functions.

### 8.4 Centrex and virtual private networks

Centrex, virtual private networks and virtual private circuit services, including the integrated scenario being considered by ETSI STCs BT1 and BT3, raise a number of questions about the application of the essential requirements to the interfaces to be connected to those services.

It is expected that the principles developed in this ETR will cover these cases, but further consideration needs to be given to the detailed requirements for particular interfaces, and new access CTRs may be needed.

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**Annex A: Definition of essential requirements (Article 4 of Directive 91/263/EEC)**

Article 4

Terminal equipment shall satisfy the following essential requirements:

- (a) user safety, insofar as this requirement is not covered by Directive 73/23/EEC;
- (b) safety of employees of public telecommunications network operators, insofar as this requirement is not covered by Directive 73/23/EEC;
- (c) electromagnetic compatibility requirements insofar as they are specific to terminal equipment;
- (d) protection of the public telecommunications network from harm;
- (e) effective use of the radio frequency spectrum, where appropriate;
- (f) interworking of terminal equipment with public telecommunications network equipment for the purpose of establishing, modifying, charging for, holding and clearing real or virtual connection;
- (g) interworking of terminal equipment via the public telecommunications network, in justified cases.

The cases where terminal equipment supports:

- (i) a reserved service according to Community law

## Annex B: Scope of the Directive (Article 1 of Directive 91/263/EEC)

### SCOPE, PLACING ON THE MARKET AND FREE CIRCULATION

#### Article 1

1. This Directive shall apply to terminal equipment.
  2. For the purpose of this Directive:
    - "public telecommunications network" means the public telecommunications infrastructure which permits the conveyance of signals between defined network termination points by wire, by microwave, by optical or by other electromagnetic means;
    - "terminal equipment" means equipment intended to be connected to the public telecommunications network. i.e.:
      - (a) to be connected directly to the termination of a public telecommunications network
      - or
      - (b) to interwork with a public telecommunications network being connected directly or indirectly to the termination of a public telecommunications network
- in order to send, process or receive information.

The system of connection may be wire, radio, optical or other electromagnetic system:

- "technical specification" means a specification contained in a document which lays down the characteristics required of a product such as levels of quality, performance, safety or dimensions, including the requirements applicable to the product as regards terminology, symbols, testing and test methods, packaging, marking and labelling;
  - "standard" means a technical specification adopted by a recognized standards body for repeated or continuous application, compliance with which is not compulsory.
3. The intended purpose of the equipment, shall be declared by the manufacturer or supplier of the equipment. However, terminal equipment within the meaning of paragraph 2 which makes use of a system of communication employing the radio frequency spectrum is presumed to be intended for connection to the public telecommunications network.

## History

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