Report of the

Sixth Strategic Review Committee

on

European Information Infrastructure

Part A: Summary and Recommendations

European Telecommunications Standards Institute, Sophia Antipolis, May 1995

Note: Many trade names the rights of which vest in ETSI members and others appear in this report. Whilst these names are not specifically identified in the text, ETSI acknowledges those rights in all cases.

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1. Structure of the report of the Sixth Strategic Review Committee (SRC6)

The SRC6 report is provided in two parts:

- Part A contains a brief summary and the SRC's recommendations.
- Part B contains the main report plus annexes including bibliography and list of acronyms.

2. Summary

The age of the Information Society is arriving with a strong and growing linkage between the productivity and flexibility of an economy and its information and communication infrastructure. National and regional competitive advantage depends increasingly on “information highways” established in each economy. With the progressive penetration of new technologies, there is a “paradigm shift” in the role of information highways. A new generation of “information superhighways” will emerge, challenging and often replacing conventional trading, public administration and enterprise assumptions.

It is essential that Europe asserts its regional role in an increasingly competitive global economy by defining and implementing a European Information Infrastructure (EII). The EII should be designed and implemented to lever Europe’s competitiveness and trading strengths, whilst reducing or eliminating structural weaknesses such as multiple economic systems and standards and turning to advantage other factors now acting as handicaps, such as multiple languages and cultures. The EII should be defined against world benchmarks and meet world class standards in terms of responsiveness, quality, cost, time to market; and to enter and create new markets.

3. Terms of reference

The terms of reference set by the Technical Assembly for SRC6 were in summary:

- To specify:
  - the conceptual model, and
  - the reference configuration for

  the infrastructures comprising the EII;
- Based on this, to prioritise standards requirements and propose a programme of studies to meet them; and
- To propose a management structure for this work.

SRC6 has met the requirements of these terms of reference in full, and the following 32 recommendations encompass its findings.

4. Recommendations

All the recommendations listed below are implied by the main report (Part B). Some of the recommendations make reference to specific sections of Part B, wherein may be found more lengthy supporting arguments.

4.1. Characteristics of the European Information Infrastructure

Definition of European Information Infrastructure

SRC6 has developed a definition of the EII capabilities which should be interpreted within the context of the models proposed by SRC6 in response to the Terms of Reference (see above). The following recommendation is a concise version of this definition.

Recommendation 1

SRC6 recommends that ETSI adopts the following definition of the European Information Infrastructure:

The European Information Infrastructure:

- enables people securely to use a set of communication services supporting an open multitude of applications and embracing all modes of information, any time and anywhere, at acceptable cost and acceptable quality;
- is based upon a seamless federation of interconnected, interoperable communication networks, information processing equipment, databases and terminals;
- accommodates competition within the information industry;
- takes into account that Europe is a multicultural entity.

See: B.1.3

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Full scope of standardisation for the European Information Infrastructure

The role of the EII is to support a wide diversity of current and future information services and applications, which the information industry will provide to society and the economy. These developments are being driven by many factors, including:

- convergence between the historically separate telecommunications, computing, information delivery, and entertainment industries;
- liberalisation;
- new customer expectations;
- rapid development of technology.

Recommendation 2

SRC6 recommends that, in order to set appropriate standards for the EII, ETSI must concern itself with the wider scope of the EII, which brings together computing, information delivery, and entertainment, as well as all areas of telecommunications, including broadcasting.

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Coordination with global strategies

While it is important to develop European approaches to the Information Infrastructure and to submit them in time to influence the worldwide Global Information Infrastructure for the benefit of European industry, standards for EII must be open to and consistent with worldwide efforts. Of particular importance are current activities in the USA and in Japan, as described in section B.7 of the report.

Recommendation 3

SRC6 recommends that ETSI specifies and standardises the European Information Infrastructure in order to contribute to a global, multilingual information infrastructure, allowing information trading in a multicurrency context.

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4.2. Conceptual Models

Development and use of an Enterprise Model

All standardisation work assumes an enterprise model of the industry in order to assess which interfaces are most applicable to standardisation. The convergence between telecommunications, computing, and entertainment industries, combined with the liberalisation of telecommunications within the European Union, makes the historically assumed enterprise model of national PTOs wholly inappropriate for the EII.

The EII should be seen in the context of an Enterprise Model, where the EII contributes to the value chains related to the new information industry. ETSI should use an Enterprise Model to facilitate the identification of applicable interfaces and the development of technical standards which reflect the conditions in the information market. SRC6 has developed an initial Enterprise Model which can be developed to become the general framework for standardisation within ETSI related to the EII.

Recommendation 4

SRC6 recommends that ETSI, based on the Enterprise Model developed and used by SRC6:

- develops - but not as a *standard* - suitable Enterprise Models, particularly by using work already carried out by other bodies;
- specifies the requirements to be fulfilled by the EII services and defines the EII services on the basis of the relationships among the roles of the information industry using the Enterprise Model;
- uses such models to facilitate development of technical standards especially those requiring the cooperation of various bodies and fora.

See: B.2.2.4

These models should:

- be sufficiently broad in their scope to cover all aspects of the EII including the information formats, navigation to information, distributed information processing and storage, as well as telecommunications;
- identify the principal roles and the services provided by those roles but only as far as is necessary for standards development;
- be sufficiently flexible and capable of development to meet the requirements of the evolving market and a wide range of regulatory conditions taking account of competitive marketplaces and not prejudicing the way any player might assume any combination of roles;
- provide a common framework for all standards development, including ongoing ETSI initiatives relating to network access, Intelligent Networks, mobile networks and Broadband ISDN, as well as standards initiatives which have hitherto been outside the scope of ETSI but which influence the development of the EII, in particular the Standardisation Projects recommended by SRC6 (see below);
- support the specification of requirements for the standardisation of technical interfaces.

Specific functional requirement

Following the definition of the EII given in section B.1, and taking into account the conclusions of sections B.2 and B.3, the specific functional requirements from services on the EII may be summarised as follows.

Recommendation 5

SRC6 recommends that the work of ETSI on the following requirements of the EII should form a basis for:

- progressively linking together the existing and emerging telecommunications networks and information storage and processing platforms, forming a federation of telecommunications networks and information processing and storage platforms;
- providing higher layer interfaces in order to ensure that underlying technologies are transparent to information services / applications;
- supporting the full range of information services, including human-machine interfaces;
- facilitating the production of services / applications as combinations of functional building blocks

See: B.4.1

Open technical interfaces

Technical interfaces will be required between and within different domains within the EII and are key enablers in realising the EII. The following types of technical interfaces have been identified by SRC6:

- telecommunications interfaces;
- management interfaces;
- interfaces associated with distributed information processing and storage;
- application protocols
- application programming interfaces (APIs).

Open interface standards should consider:

- the overall integrity and security of the EII;
- security / confidentiality of customer information and information transactions;
- commercial nature of the relationships among structural roles within the information industry.

Recommendation 6

SRC6 recommends that ETSI focuses standards on open technical interfaces supporting relationships among information industry roles using Enterprise Models, and that these standards are clearly distinguished from the standards supporting internal operation within a role. These standards should:

- allow the competitive provision of services at any stage of the value chain;

- allow open access from one infrastructure to another or via an infrastructure to available services, and should especially encourage user interfaces which make accessing alternative infrastructures easy, avoiding solutions giving restricted access to service providers.

SRC6 recommends that ETSI emphasises, in addition to telecommunications interfaces, the standardisation of Application Programming Interfaces (APIs) and application protocols (APs).

See: B.3.2

Architecture and Reference Models

SRC6 has identified a number of top-level reference models to assist in the development of the EII. ETSI needs to continue this work and also to take account of existing work in this area. For example in the area of telecommunications, SRC6 notes the recommendations of ETSI DASH on the harmonisation of architecture and service description methodologies. In the area of object-based distributed processing, SRC6 notes the increasing acknowledgement of the Common Object Request Broker Architecture (CORBA).

Recommendation 7

SRC6 recommends that ETSI uses and elaborates a set of Reference Models for the definition of the EII in accordance with the general architecture given in section B.4.

See: B.4

4.3. Standardisation areas

Standardisation programmes for the European Information Infrastructure

SRC6 has noted that whilst B-ISDN is the ideal telecommunications infrastructure for the EII, a great deal can be dome with existing technologies already deployed. There is no need to wait for new technologies before building an EII, and ETSI should consider two parallel standardisation programmes. The first can be based on existing technologies - for example, N-ISDN and Internet - and should concentrate on the integration required to achieve a complete EII. The second can consider the development of newer technologies, particularly ATM-based telecommunications networks and distributed processing technologies, in order to build a fully functional EII.

Recommendation 8

SRC6 recommends that ETSI launches two parallel EII standardisation programmes. The first should employ only currently deployed technologies and should concentrate on drawing these together into a seamless federation (see Recommendation 1). The second should aim to speed the implementation of a fully functional EII using current and emerging technologies.

The standardisation programmes are:

Standardisation Programme 1: Looking to make available standards for implementing and operating a first generation EII, based on narrow-band services and capabilities (Euro-ISDN), and present CATV networks, but also on early implementations of broadband networks, to offer capabilities including cheap access to Internet. This programme should mainly concentrate on the contribution of the information processing and storage platforms to the EII.

Standardisation Programme 2: Looking to make available standards for implementing and operating a second generation EII based on broadband services and capabilities (in particular ATM transport capabilities) and Distributed Processing Environment, but interworking with first generation EII capabilities.

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Standardisation projects for the European Information Infrastructure

SRC6 has described many of the functional interface requirements of the EII in section B.4 and many of the requirements for interoperability in section B.5.

Recommendation 9

SRC6 recommends that ETSI undertakes a number of new standardisation projects which require the management procedures described in Recommendation 11. These should include the following areas:

- a reference architecture for both the services and the EII federation;
- high level protocols of the EII federation;
- low level protocols of the EII federation.

For both high and low level protocols:

- distributed processing and storage infrastructures;
- performance requirements;
- navigation capabilities;
- naming and addressing;
- client-server architecture;
- security requirements;
- user interfaces and human factors;
- management capabilities.

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Time schedule for standardisation programmes

Recommendation 10

SRC6 recommends that ETSI set target dates for the completion of the various phases as follows:

- Common Definition Phase: March 1996;
- Standardisation Programme 1: June 1997;
- Standardisation Programme 2: June 1998.

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4.4. Standardisation management

Standardisation Management Committee

The standardisation issues for the industries of telecommunications, computing and broadcasting in Europe are undertaken by formally-constituted standards bodies, and also by several other organisations. Standardisation across these areas is becoming increasingly interdependent and it is important therefore to promote cooperation between the standardisation processes of these areas.

Recommendation 11

SRC6 recommends that ETSI establishes an EII Standardisation Management Committee as a horizontal working structure reporting directly to the Technical Assembly[1] to initiate and coordinate the combined standardisation activities necessary for EII.

The outline terms of reference for this group are as follows.

- To create a collaborative working environment with specified external organisations and to provide effective direction to this combined collaborative effort.
- To be open to representation by, guided by inputs from, and coordinate output to external organisations such as CEN, CENELEC, EBU, EWOS, ETNO, ECMA, X/Open, IETF, ATM Forum, DAVIC, etc.
- To co-operate with ANSI in the USA and with other national, regional and global organisations concerned with meeting the standardisation needs of the Global Information Infrastructure.
- To ensure maximum re-use of existing work programmes.
- To identify existing EII-related standards or specifications.
- To identify additional standards required by the EII.
- To decide how and where to develop additional EII standards.
- Permanently to monitor individual EII standardisation projects.
- To determine which EII standards, wherever developed, should be proposed for adoption and subsequent publication by ETSI.
- To review which publicly available specifications should be brought into the formal standardisation process, and how.
- To establish the detailed mechanisms associated with making EII standards and specifications publicly available (see Recommendation 13).
- To use ETSI's existing administrative resources.
- To ensure the consistency of the standards within the overall EII architecture.
- To provide architectural advice and guidance to the individual EII standardisation projects.

SRC6 recognises that essential competences will frequently lie with other bodies, and it is not its intention that the EII Standardisation Management Committee in any way detract from those bodies' activities.

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1 Or subsequent governing body.

Collaboration with complementary organisations

The complexity of the EII and the convergence of technologies which it demands call for very broad expertise in a large field. ETSI's expertise in the telecommunications field must be matched by similar expertise in fields such as computing and entertainment. Given the urgency of the EII, this combined expertise needs to be made effective as rapidly as possible, making use of existing organisations wherever possible.

Recommendation 12

SRC6 recommends that ETSI, through the EII Standardisation Management Committee, creates a close collaborative relationship with external organisations that are open to direct participation by commercial and non-commercial organisations, and that bring expertise necessary for the EII that is complementary to ETSI's own in the field of telecommunications. Fields of particular importance include computing and entertainment.

SRC6 identifies the following organisations as those which bring required expertise and with which close collaborative relationships should be established:

- For definition of Application Programming Interfaces for general purpose computing: **X/Open**.
- For general computing technology, including Application Protocols and profiles for their combined use: **EWOS**.

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Public availability of standards and specifications

The European Information Infrastructure requires production, endorsement and publication of the right standards by the right people within the right time frames, in the complex environment of converging sectors. This process should be facilitated by the public availability of specifications from each sector.

Recommendation 13

SRC6 recommends that ETSI establishes as soon as possible, even in advance of any general decision by ETSI on "publicly available specifications", a mechanism for making EII-related specifications available electronically, in the first instance via a World-Wide Web server. The EII Standardisation Management Committee should elaborate requirements further.

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Public distribution of the SRC6 Report

The EII will be of great importance to the economy and competitive advantage of Europe and is one of the key enablers to achieving a "paradigm shift" in the structure of the European economy. The report of SRC6 is necessarily broad in its scope and will be of relevance to more than just the members of ETSI.

Recommendation 14

SRC6 recommends that ETSI should make the report of SRC6 widely available by electronic means, including the use of the Internet and the World Wide Web, so as to ensure its accessibility to both European and worldwide interests vital to the success of EII.

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4.5. European Information Infrastructure services

Definition of basic services of the European Information Infrastructure

Recommendation 15

SRC6 recommends that ETSI considers the following as basic services which the EII should be able to support:

- Interactive speech ☑
- Real-time image transfer
- Electronic mail
- Multimedia document retrieval ☑
- Video on demand
- Interactive video services ☑
- Computer-supported cooperative working ☑
- Broadcast TV / radio / data contribution
- Broadcast TV / radio / data distribution ☑
- Distributed processing ☑
- Real-time multipoint retrieval

giving special regard to the services which SRC6 has identified as being of high potential value identified by ☑.

See: B.2.4

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Priority services with respect to the availability of service platforms

Insofar as the physical limits of the platform to which the user is connected permit, access to EII services should be granted, regardless of that platform.

Recommendation 16

SRC6 recommends that ETSI gives priority to the standardisation of access and interworking facilities for services in the following order:

1. Services capable of being accessed using existing platforms (PSTN, N-ISDN, X.25, CATV, radio distribution networks including satellites, GSM).

2. Services capable of being accessed by upgraded existing platforms (e.g. B-ISDN with low bit rate interactive UNI built on ADSL and HDSL, interactive).

3. Future services requiring new platforms and access technologies under development, i.e. fully interactive services requiring very high data rates.

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Upgrading existing platforms

Interactive video services generally need data rates exceeding the capabilities of existing platforms, but can be supported by the upgrading of some platforms. Standards for the use of twisted pairs, hybrid fibre / coax and passive optical networks as access technology for ATM-based B-ISDN are important.

Recommendation 17

SRC6 recommends that ETSI:

1. provides the required standards for the upgrade of existing access infrastructure to residential subscribers, e.g. twisted copper pairs using ADSL, hybrid fibre / coax, and passive optical networks, microwave; and

2. provides the required standards for the use of ATM on these access types.

See: B.4

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Enhancement of the Intelligent Network architecture for the support of services of the European Information Infrastructure

The IN architecture, especially if refocused for this purpose, could be a powerful concept for supporting the provision of EII services in a flexible and intelligent way.

Examples may include:

- At the network level: routing to the nearest server providing the EII service, specific billing arrangements, etc;
- For the support of user procedures: Network Related Control for selection of a server providing the desired service and Service Related Control for extensive navigation;
- For the support of security aspects, in which the network can assist in the confirmation of user identities.

Recommendation 18

SRC6 recommends that ETSI refocuses the current IN concept and architecture with regard to the support of (interactive) EII services and applications.

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Standards for addressing

SRC6 has recognised that while the telecommunications community expects a convergence of addressing on the E.164 format, Internet addressing is now in widespread use throughout the world.

Recommendation 19

SRC6 recommends that ETSI considers standards which recognise both E.164-based addressing and Internet addressing in cooperation with the Internet Engineering Task Force.

See: B.4

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Human factors

Recommendation 20

SRC6 recommends that ETSI encourages the use of language-independent user interfaces and also looks to the development of automatic language translation.

See: B.4.6.2.8

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4.6. Interoperability of services / applications

Interconnection standards

Though it is desirable that all future services with potentially high value are provided on a single, universal (i.e. not service-specific) network infrastructure, it will take some time to have this universal infrastructure deployed in the EU.

In the meantime, the EII will develop on the basis of a web of networks.

In the light of the ongoing process of liberalisation of telecommunications in Europe, standards need to be developed allowing new entrants to the telecommunications market (e.g. access network providers using cable or radio local loop, long distance operators) to interconnect seamlessly with this web of networks, particularly with those of the classical network providers.

Recommendation 21

SRC6 recommends that ETSI prepares those new interface standards which may be necessary to allow the federation of networks that will form the EII to interwork as efficiently as possible.

See: B.5.1

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The European Backbone Telecommunications Network

Considering the large number of telecommunications networks that will be involved in the EII, interoperability between these networks will be essential to the success of the EII as a single coherent infrastructure.

In order to reduce the number of possible requirements for interoperability, SRC6 has defined the concept of European Backbone Telecommunications Network (EBTN), which includes the interoperability of existing networks. In order to cater for all the services of the EII, the ETBN should be based on ATM technology.

ETSI should study the emerging services where interworking or interconnectivity is most appropriate for interoperation between networks.

Recommendation 22

SRC6 recommends that ETSI develop and use the concept of a European Backbone Telecommunications Network (EBTN) in order to facilitate the required interoperability between the large variety of existing and future telecommunications networks.

See: B.5

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Asymchronous Transfer Mode for the European Backbone Telecommunications Network

ATM-based B-ISDN is seen as the most appropriate technology to match the requirements of the information market and as a means of providing interoperability between these diverse existing telecommunications networks. This network technology should be the prerequisite to be considered when defining new applications and services.

Recommendation 23

SRC6 recommends that ETSI uses ATM-based broadband technology as the reference technology for the evolution of the EII and the services which use the EII.

See: B.5.2

The implementation of a European Backbone Telecommunications Network based on B-ISDN is proposed, the ATM trial network being an initial development.

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Internet protocols on the European Backbone Telecommunications Network

SRC6 notes that the Internet (based on the Internet Protocol and the Transmission Control Protocol (TCP/IP) also forms a higher layer transport network for applications and that the use of this technology will form a major part of the EII for non-real-time traffic.

Recommendation 24

SRC6 recommends that ETSI specifies the EBTN to be capable of efficiently supporting the Internet protocol suite, including TCP/IP.

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EBTN as a basis for global interoperability of broadband networks

The meeting of G7 in February 1995 identified as one of its pilot projects the Global Interoperability of Broadband Networks. Within Europe, the EBTN will be the primary element in such interoperability.

Recommendation 25

SRC6 recommends that ETSI takes a leadership role in the implementation of the project "Global Interoperability for Broadband Networks" identified by the G7 summit meeting, and that the EBTN should be considered as the primary European basis for such interoperability.

See: B.5

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4.7. Legal and regulatory issues

Privacy and protection of personal data

Guidelines governing the protection of privacy and transborder flows of personal data will need to be defined as common, Europe-wide rules for private and government codes of conduct on personal data protection in the EII. The OECD guidelines could form the basis, and this would have the advantage of facilitating global agreements later.

Recommendation 26

SRC6 recommends that ETSI encourages standards which support any European codes of conduct for the protection of personal data which may emerge

See: B.6

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Establishing the environment for commercial confidence in the EII

A worldwide agreement is needed on the legal aspects of electronic transactions in the EII and GII, and on the use of electronic signatures for the resolution of disputes. Cost-effective methods for establishing trustworthiness of products and systems and the effectiveness of security countermeasures should be agreed on by governments and users. Security guidelines for the design and operation of secure systems should be established.

Recommendation 27

SRC6 recommends:

1. that ETSI assists the development of standards for electronic signatures and for design and operation of secure systems; and

2. that national governments and the EU each for their part develop a framework in which such signatures may have the force of law.

See: B.6

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Provision of security features (1)

A comprehensive set of internationally standardised security features, including cryptographic algorithms, should be specified for the EII. This work should be undertaken by a group of security experts who draw upon the expertise which is in ETSI STAG. The effort must lead to a set of security features which provides EII users with confidence in the security of networks and services, thereby minimising the need for EII users to implement their own proprietary security features.

The abuse of standardised cryptographic algorithms can in some cases effectively be reduced by controlling the dissemination of such standards. In this case, a standard is not published and can only be obtained via a nominated custodian.

Recommendation 28

SRC6 recommends that ETSI:

- specifies a comprehensive set of security features which must include cryptographic algorithms together with a verification system for products, using the procedures developed by ETSI STAG and ETSI SAGE; and, further,

- considers, on a case by case basis, whether the development of application-specific standards for security features may be facilitated by the option of non-publication (as is the case for GSM).

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Provision of security features (2)

SRC6 understands the difficulty caused by the fact that cryptographic algorithms can be employed not only for integrity, non-repudiation and authentication, but also for confidentiality services, which can touch on the national security of the member states.

Nevertheless, the use of cryptographic algorithms to enable for example digital signature is vital to the commercial development of the EII.

Recommendation 29

SRC6 recommends that the national governments and the European Commission should, each for their part, take the necessary actions to ensure that the agreed cryptographic techniques required for integrity, non-repudiation and authentication services on the EII may be specified and used anywhere in Europe.

SRC6 also recommends that the national governments should consider how confidentiality services may be provided on the EII in a way which does not prejudice national security, and take the necessary actions.

See: B.6

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Intellectual property rights and copyright protection mechanisms

International rules should be implemented to encourage content providers to make full use of the EII. The expansion, growth and use of the EII by enabling interoperability and convenience for users should be ensured, while respecting the rights and interests of all participants in the EII. Global harmonisation in resolving any remaining intellectual property issues should be promoted.

Recommendation 30

SRC6 recommends that ETSI encourages the emergence of international rules and related standards to support copyright protection in order to develop the content provider market for the EII.

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Standards for conditional access and scrambling for Pay TV

The lack of an appropriate level of standardisation in the systems used to restrict unauthorised access to Pay TV services (e.g. standardisation of the basic scrambling system) is creating a situation in which users cannot easily take advantage of competitive offerings in this area.

The solution adopted by the DVB project of a common scrambling algorithm and a common interface to alternative conditional access systems would seem to be an appropriate approach for Pay TV generally.

Recommendation 31

SRC6 recommends that ETSI adopt a secure and simple standardised scrambling system for Pay TV, with a standardised interface to alternative conditional access systems.

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Unrestricted use of telecommunications and information technologies

Strengthening European competitiveness requires as free as possible exploitation of the capabilities offered by any technology to meet available markets.

Recommendation 32

SRC6 recommends that ETSI promotes unrestricted use of telecommunications and information technologies as a guiding principle to encourage competition between the players involved in development and exploitation of the European Information Infrastructure.

Where development of competition justifies - in a particular case - regulation that restricts market freedom of a player, this regulation should not in general restrict the application of particular technologies. Where such a restriction is made, it should be for as short a period as possible.

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