



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 09.12.1998
COM(1998)596 final

GREEN PAPER ON RADIO SPECTRUM POLICY

**in the context of European Community policies such as telecommunications,
broadcasting, transport, and R&D**

(Presented by the Commission)

EXECUTIVE SUMMARY

THE BACKGROUND: ECONOMIC AND POLITICAL IMPORTANCE OF RADIO SPECTRUM

Radio spectrum is the backbone for a wide range of industrial activities in sectors including telecommunications, broadcasting, transport, R&D and services of general interest. It is therefore of considerable **economic importance** both in terms of market values and employment. Since many of these areas are covered by Community policies, the European Community has a substantial interest in the development of a consistent radio spectrum policy.

Although the direct contribution of spectrum to the activities mentioned above may vary, **radio spectrum is an essential and increasingly scarce resource**. In economic terms, the **value of radio spectrum** is determined by the value of the services which can be provided over it. However, the value of radio spectrum is not a predominant factor commonly taken into account in spectrum management today.

The means by which decisions are made and priorities established in respect of usage and users of radio spectrum is a key issue for the European Community for three main reasons:

- The success of a number of important **sector specific policies** pursued by the European Community (telecommunications, broadcasting, transport, R&D, etc.) depends on radio spectrum being made available and adequately safeguarded.
- Decisions on radio spectrum access must comply with a certain number of **horizontal policies at Community level**, notably with respect to supporting the development of the **Internal Market**, ensuring **competition**, and developing and preserving **social standards** and **public interest** at Community level.
- With radio spectrum being increasingly used for commercial activities, **the rules and commitments governing trade at international level** of related goods and services need to be taken into account. These obligations are of relevance to the international commitments of the European Community and its Member States.

OBJECTIVES AND KEY ISSUES: INTERESTS OF THE EUROPEAN COMMUNITY IN THE CONTEXT OF RADIO SPECTRUM

From a European Community perspective, **policy objectives associated with the availability of and access to radio spectrum** include

- to allow the **development of new services** to meet consumer and governmental demands for radio services;
- to foster the development of the **internal market** for and **competition** in radiocommunications equipment and services, in particular in the context of the deployment and operation of **pan-European and global systems and services**;
- to **meet public policy objectives** with regard to considerations such as safety, cultural and social aspects etc;
- to safeguard the **Community's interests in multilateral and bilateral negotiations** where radio spectrum is discussed;
- to stimulate **technological innovation** and support **European competitiveness**
- more broadly to develop **economic growth, create employment, and promote general welfare**.

Bearing these general objectives in mind, certain **key issues need to be considered in relation to the way in which radio spectrum is made available:**

- ✓ to **secure radio spectrum availability** for pan-European radio systems, services and equipment;
- ✓ to **ensure the appropriate balancing of commercial and public interest** in radio spectrum policy;
- ✓ to **reflect the economic value of radio spectrum** as a scarce commodity;
- ✓ to **provide legal certainty** as regards radio spectrum availability and use;
- ✓ to **ensure open, transparent, objective, and non-discriminatory procedures** in support of the competitive provision of radio services and equipment;
- ✓ to **ensure the efficient use of radio frequencies;**
- ✓ to **ensure that radio spectrum regulation encourages competition and technological innovation;**
- ✓ to support the **development of economies of scale** for the introduction of new equipment which matches the needs of users;
- ✓ to ensure **coherence between radio spectrum and standardisation policies.**

<p>THE FACTORS FOR CHANGE: THE EVOLVING CONTEXT FOR RADIO SPECTRUM POLICY</p>
--

Technological developments, market trends and the evolution of policy / regulation - all interrelated – have a substantial impact on the availability of radio spectrum and make both the search for radio spectrum for new applications and the harmonisation of radio spectrum usage increasingly complex. Many of these trends are still developing but already trigger the following changes:

- ✓ The **convergence of different services using radio spectrum** and the development of new systems which aggregate ranges of different services call into question the traditional classification of spectrum users and the resulting conditions for spectrum access.
- ✓ The **globalisation of services** and of **market players** (through alliances or world-wide business deployment) has introduced a new dimension to radio spectrum policy.
- ✓ The **growing share of commercial applications using spectrum**, partly as a result of liberalisation, means that **commercial applications now compete with non-commercial ones** (including with those resulting from public interest considerations) for radio spectrum access; **applications from different sectors compete with each other for radio spectrum access.**
- ✓ **Decisions on radio spectrum have a wide-ranging impact on the relative strength of market players**, between players which use radio spectrum, but also between users of radio-based and non-radio based infrastructures. In the latter case the impact of spectrum decisions may go beyond spectrum access and cause major structural changes in markets.
- ✓ Decisions on radio spectrum usage influence the performance of societies not only in economic terms, but also increasingly with respect to industrial competitiveness and the capacity for innovation.

THE CHALLENGE: ACHIEVING A CONSISTENT COMMUNITY RADIO SPECTRUM POLICY

At Community level, several of the factors for change suggest that it is time to verify whether the present environment governing radio spectrum issues is suitable to preserve the European Community's interests, and to reflect the need for a Community approach to radio spectrum policy. They include:

- ✓ **Coherence of radio spectrum access conditions for like services at Community level:** In particular the globalisation of radio systems, i.e. the introduction of pan-European or global systems relying on radio spectrum, require an efficient spectrum management policy in order to avoid delay or unnecessary hurdles in the introduction and deployment of such systems resulting from unharmonised radio spectrum allocation throughout the Community.
- ✓ **Preserving the coherence of the existing Community regulatory environment:** Some of the main sectors using radio spectrum are subject to Community regulations, as in telecommunications but also in some aspects of broadcasting. A fragmentation of planning, access and usage of radio spectrum makes it difficult to preserve a coherent regulatory framework at Community level. In the case of global systems using radio spectrum a coherent approach at Community level would strengthen the position of the European Community in international co-ordination and negotiation exercises.
- ✓ **A coherent and balanced approach across all sectors:** Radio spectrum policy at Community level has to date evolved out of separate sector-specific consideration and, with the exception of telecommunications, as an issue not necessarily requiring specific regulation. A coherent and balanced approach across all sectors concerned needs to be considered so as to minimise conflict between radio spectrum aspirations of different sector-specific activities, notably where Community policies apply.
- ✓ **Radio spectrum in the context of the internal market:** Existing radio spectrum management in CEPT has been traditionally pursued mainly on the basis of technical considerations. Given the increasing importance of commercial applications, market considerations need to be taken further into account. In the context of a growing market integration, radio spectrum policy, for example, on access conditions inevitably has a Community dimension, especially where spectrum users are global market players. Besides internal market considerations, issues such as the competitiveness of Community industry are at stake.
- ✓ **Radio spectrum in the global trade context:** Increasingly, the European Community within the context of its responsibility for external trade matters is being approached by its main trading partners on the issue of radio spectrum. In order for it to be able to respond, the Community position on radio spectrum must be clearly defined, so as to be able to defend it, both in bilateral contacts and in the global organisations.

ISSUES FOR COMMENTS: KEY QUESTIONS

Issues¹ on which the present Green Paper requests comments are structured according to the different layers which are identified as key ones in the context of spectrum policy:

1. Strategic planning of the use of radio frequencies

The European Commission would welcome views on the strategic planning of the use of radio spectrum in the European Community, particularly as regards: the scope of and information needed for planning exercises; whether a political and legal commitment to plan radio spectrum for pan-European services is needed; and to what extent a harmonised Community approach is needed to develop and implement re-farming and substitution policies as part of the planning of frequency.

2. Harmonisation of radio spectrum allocation

The European Commission would welcome views on radio spectrum harmonisation in the European Community and the wider context; whether a priori Community agreement is required as regards the need for harmonisation measures and on the basis of what criteria this can be determined; and the level of legal certainty required with respect to the implementation of such measures by Member States.

3. Radio spectrum assignment and licensing

The European Commission would welcome views on radio spectrum assignment and licensing, particularly as concerns which mechanism is most suitable to secure the efficient use of radio spectrum and the harmonised introduction of pan-European services; the extent to which a common Community approach is required on the valuation and possible trading of radio spectrum as well as the possible costs of relocating existing radio spectrum users; and the level of legal certainty needed in the Community context.

4. Radio equipment and standards

The European Commission would welcome views on the link between Community policy on radio equipment, standards, and radio spectrum, with particular regard to the co-operation between standards and radio spectrum management bodies and measures at the operational level of radio spectrum management.

5. The institutional framework for radio spectrum co-ordination

The European Commission would welcome views on whether the present institutional arrangements for the co-ordination of radio spectrum are appropriate to meet the Community's policy objectives, i.e. to contribute to economic growth, employment, and welfare, to stimulate technological innovation and the development of new services, to foster competition in the internal market, and to strengthen European competitiveness in the establishment of pan-European and global radio systems.

¹ See detailed questions under these headings in chapter 4 of the Green Paper.

THE GENERAL CONTEXT OF THE GREEN PAPER: RELATED DEBATES

The objective pursued with the proposed Green Paper is to identify how best to approach and implement Spectrum Policy at Community level. At the same time, the results from the Green Paper will also feed into several specific debates which are currently under way.

The Green Paper on **Convergence** between telecommunications, media and information technologies already covered certain radio spectrum issues in respect of specific sectors. These findings will need to be put in context with respect to the overall approach for radio spectrum policy to be discussed in the present Green Paper. In return, the spectrum policy debate will profit from the convergence debate, e.g. when discussing the evolving category of uses and users or the definition of public interest in the areas subject to convergence. These results will be important in order to be able to recommend suitable modalities of accessing radio spectrum.

For the **telecommunications sector**, the review of the effectiveness of the telecommunications regulatory framework ("**99 Review**") which is under preparation will use the findings of the radio spectrum debate to identify where existing regulation needs to be complemented or revised to help the implementation of a Community radio spectrum policy.

In the **transport sector**, the Community is currently considering re-enforcing the European presence in the area of global navigation satellite systems (GNSS) which both enable the provision of services of public interest (navigation, positioning, timing) and which have considerable market potential. Potentially, these systems will also form the basis for a wide range of industrial / commercial activities. The allocation and protection of radio spectrum will need to be ensured in European and international negotiations in order to implement such an initiative. In the medium term, the Green Paper on Radio Spectrum Policy will help to identify how to accommodate in a practical way the specific needs of this sector in terms of co-ordination modalities and protection of radio spectrum within the overall framework of a generic approach to radio spectrum policy, i.e. covering all sectors.

The reflection of the issues raised by the present Green Paper will also help preparing in an optimal way for international negotiations on radio frequencies at the forthcoming **World Radiocommunications Conference WRC-2000**. The Commission has in an earlier Communication presented the major agenda items of this conference and indicated in detail how these relate to Community policies. The findings of the consultation on the present Green Paper will be used to help define Community positions on the critical issues of the conference.

TABLE OF CONTENT

1. INTRODUCTION	1
2. THE ECONOMIC AND POLITICAL IMPORTANCE OF RADIO SPECTRUM	4
2.1 The radiocommunications market	4
2.2 Community policies related to radio spectrum.....	7
2.3 Factors for change	10
3. EU POLICY ON RADIO SPECTRUM: PRESENT SITUATION	12
3.1 Defining EU policy on radio spectrum.....	12
3.2 Present practice of Community involvement in radio spectrum policy.....	13
4. EU POLICY ON RADIO SPECTRUM: ISSUES FOR COMMENTS	16
(1) <i>Strategic planning of the use of radio spectrum</i>	16
(2) <i>Harmonisation of radio spectrum allocation</i>	17
(3) <i>Radio spectrum assignment and licensing</i>	18
(4) <i>Radio equipment and standards</i>	20
(5) <i>The institutional framework for radio spectrum co-ordination</i>	20
5. CONCLUSIONS	23
ANNEX I: EUROPEAN COMMUNITY POLICIES INVOLVING RADIO SPECTRUM	I-V
ANNEX II: EU POLICY ON RADIO SPECTRUM	I-IX
ANNEX III: LIST OF ABBREVIATIONS	I-II

1. INTRODUCTION

The essential backbone for activities in European Community policy areas such as mobile and satellite communications, broadcasting, transport, R&D is the radio spectrum. These areas have developed over recent years into a key area of growth in the European Community. In view of the requirement of the Information Society for instantaneous access to and dissemination of information, irrespective of time or location, **radio spectrum is becoming of increased importance for the development of the European economy.**

Demand for radio spectrum is increasing steadily due to technological, market, and regulatory developments. This is not counter-balanced by additional radio spectrum becoming available through the introduction of new and more efficient technologies (e.g. digital radio systems in the areas of broadcasting and mobile/personal communications). The consequence is that the scarcity of radio spectrum is increasing. Where the radio spectrum is congested, **choices need to be made to balance the demand and supply for radio spectrum.**

The use of the radio spectrum is regulated. Since radio waves do not stop at borders, countries historically co-ordinate the use of the radio spectrum in the framework of the **International Telecommunication Union (ITU)**, a specialised body of the United Nations. In **World Radiocommunications Conferences (WRC)** of ITU, 186 countries biannually adopt measures in order to achieve the international harmonisation of the use of the radio spectrum. This is necessary in order to achieve economies of scale for the production of radio equipment, to facilitate the global availability of services, and to avoid that the transmissions by one user do not cause unacceptable interference to use by another. Further detailed co-ordination takes place at the regional and national level.

In Europe, 43 countries, including the Member States, co-ordinate the use of the radio spectrum in the framework of the **European Conference of Postal and Telecommunications administrations (CEPT)**. Also CEPT adopts harmonisation measures which its member countries implement on a voluntary basis. Both ITU/WRC and CEPT cover all uses of the radio spectrum, including for telecommunications, broadcasting, transport, and R&D.

With the exception of radio spectrum availability for mobile and personal communications, in which areas Community legislation exists, **the European Community mainly relies on the work undertaken in ITU/WRC and CEPT to achieve the harmonisation of radio spectrum necessary for the pan-European and global provision of services and equipment.** The assignment of radio spectrum to individual users is done at the national level, subject to certain conditions agreed in the World Trade Organisation (WTO) and in the European Community.

As demand for radio spectrum has increased, the co-ordination and management tasks have grown more complex as compared to the past. Previously, countries co-ordinated the use of the radio spectrum on behalf of a relatively limited number of radio users and on the basis of technical considerations, i.e. for the defence sector and for public telecommunications and broadcasting organisations, which were mainly active at the national level.

The environment for radio spectrum policy has changed significantly. Radio services and equipment are developed for **global rather than national markets.** The traditional users of radio spectrum providing public services at the national level are now in **competition for radio spectrum use** with increasing numbers of **global commercial players**, particularly in the areas of telecommunications and broadcasting. Radio spectrum availability is emerging as a key issue in **trade negotiations.** All these developments point to the **need for international co-operation on radio spectrum policy issues in order to facilitate the international introduction and provision of services and equipment.** It is therefore

essential to ensure that the interests of the European Community and of all of its Member States are fully taken into account where radio spectrum availability is discussed.

As a result of the changing environment for radio spectrum policy, the **main challenges** the European Community is facing include the following:

- The **strategic planning** of the use of the radio spectrum now needs to take into account the varying interests and requirements of an **increased number of new systems and commercial and non-commercial players acting at the global level**.
- Due to globalisation, the **allocation and harmonisation** of the use of the radio spectrum increasingly requires international co-operation but **countries and radio spectrum users attach different priorities as for which services harmonised radio spectrum should be internationally available**. The balancing of the various interests between commercial and non-commercial uses as well as between the priorities of individual countries goes beyond the technical management of radio spectrum. Recent experience at ITU/WRC negotiations has shown that where the European Community is not united and where the proposals are not politically supported, common objectives are difficult to be pursued.
- The **assignment of radio spectrum** to individual users should be done under reasonable conditions. However, demand for radio spectrum has increased to such an extent that **administrations increasingly require users to pay a price for the use of the radio spectrum** so as to reflect the market value and the actual need for the service to be provided. This approach is criticised since it may hamper technological innovation and competition and may possibly lead to increased consumer prices. The introduction and **international provision of services might be hindered since licenses need to be obtained in individual countries** which in addition may deploy different radio spectrum award mechanisms and conditions.
- The availability and use of **radio equipment** across borders is subject to the extent to which radio spectrum is harmonised and common standards are available so as to ensure interoperability. **The importance of monitoring the use of radio equipment and the surveillance of markets is increasing** and will require a considerable effort from the part of administrations in co-operation with industry and radio spectrum users.
- The **institutional arrangements** for the co-ordination, planning, and harmonisation of the use of radio spectrum were set up to deal with the requirements of a limited number of players. With the liberalisation and globalisation of the radio market, these **institutional arrangements have come under pressure from commercial interests** which pursue interests which not necessarily coincide with those of the administrations representing them in the organisations concerned. Furthermore, **the balancing of the various national interests renders the achievement of radio spectrum harmonisation difficult** and may result in a legally uncertain situation regarding radio spectrum availability and harmonisation.

This Green Paper is aimed to initiate a public debate on the question whether the present practice of radio spectrum policy can deal with the described challenges or whether **change is needed in order to meet the European Community's policy objectives**:

- to facilitate **technological innovation and competition** through flexible but firm planning of the use of radio spectrum and through the appropriate assignment of radio spectrum by administrations;
- to establish a **predictable and legally certain regulatory framework** for the co-ordination of the use of radio spectrum which is transparent and which responds to

the needs of commercial and non-commercial interests across sectors, *inter alia* as concerns telecommunications, broadcasting, transport, and R&D;

- to ensure an **appropriate representation and balancing of interests** of the individual Member States and of the European Community in the decisions to be taken in the area of radio spectrum; and
- to **strengthen the position of the European Community in the global market** for radio services and equipment by combining the necessary technical and political strengths of the Member States and the European Community.

All concerned parties – radio spectrum users, services providers using radio spectrum, equipment manufacturers, public authorities, sector-specific organisations, consumers - are invited to contribute their comments and views. On the basis of the comments received, the Commission intends to produce a Communication to report and to draw first conclusions.

All interested parties are invited to contribute to the debate by responding to the issues raised in this Green Paper and by making any submission they wish on the subject 15 April 1999.

Submissions may be sent preferably via E-mail in HTML format to²:

European Commission, DGXIII A1
Attn. Mr. R. Niepold
200 rue de la Loi, BU31 2/52
B-1049 BRUSSELS
Belgium
e-mail: spectrum.greenpaper@bxl.dg13.cec.be
Fax: (+32 2) 29 68 395

² Unless explicitly specified by their authors, all submissions will be considered public documents and will be made available through Spectrum Green Paper Web-page (<http://www.ispo.cec.be/infosoc/telecompolicy/en/comm-en.htm>). While electronic submission in HTML format are strongly encouraged, fax or ordinary mail contributions can alternatively be accepted (4 copies please).

2. THE ECONOMIC AND POLITICAL IMPORTANCE OF RADIO SPECTRUM

The aim of chapter 2 is to highlight the economic and political importance of radio spectrum and to provide the basic elements governing the European Community approach to radio spectrum policy.

This chapter gives an overview of the growing number of applications and sectors relying on the availability of radio spectrum and highlights the economic importance of radio spectrum activities (section 2.1). Technological, market, and regulatory developments are changing the ways radio spectrum is used as well as the context for radio spectrum policy making (section 2.2). The implementation of a number of sector-specific Community policies depends on radio spectrum availability but their radio spectrum requirements are addressed in different policy frameworks; in addition, horizontal European Community legislation applies (section 2.3).

2.1 The radiocommunications market

Radio spectrum³ is the wireless infrastructure for a large number of activities. Each radio application, for example garage door openers, baby monitors, cellular telephones, global positioning systems, has its own frequency band within the radio spectrum although much of it is used on a shared basis. The location and amount of radio spectrum allocated for each service may differ significantly between countries, depending on the national need for and importance given to the various radio-based services. Only a relatively small amount of the actual use of the radio spectrum is harmonised among countries. The international availability of the same service depends on the extent to which the use of the radio spectrum is harmonised.

Certain frequency bands are better suited for particular radiocommunications services than others and are relatively easy to exploit using existing technologies. Actual use and demand for certain frequency bands has created or will soon create a situation of congestion: **demand for frequencies is greater than what is available. Therefore, choices need to be made.**

Other frequency bands are currently less valuable because they are useful for fewer services, or because they can only be exploited at increased cost or following technological innovation. The issue of congestion might not present itself in these frequency bands.

Like for all scarce resources, **trade-offs have to be made when deciding which uses and users should be awarded radio spectrum.** In radio spectrum policy, such trade-offs may include the following:

- ✓ New entrants are awarded frequencies on the condition that they share the frequencies with existing users. However, **sharing** may require the deployment of more costly techniques for both parties as compared to the case where radio spectrum is made available to users on a primary/exclusive basis.
- ✓ The incumbent radio spectrum user is moved to less congested parts of the radio spectrum in order to make room for new users. This is known as **'re-farming' of radio spectrum** and is associated with a **relocation** of the incumbent user. Obviously, the incumbent user is forced in this situation to replace or adapt existing equipment in order to comply with the different characteristics of the frequency bands

³ A **radio wave** is an electromagnetic wave propagating between a transmitting and a receiving antenna. Radio waves are characterised by their **frequency**, and by tuning a **radio receiver** to a specific frequency one can pick up a specific signal. Regulatory authorities decide who is able to use what frequency band for what purpose, and issue licenses for specific services. **Frequency bands** define the specific location of services in the radio spectrum.

he is moved to. In some countries, the new entrant may be requested to pay a financial contribution in this respect.

- ✓ The incumbent radio spectrum user has to move out of the radio spectrum altogether. In the latter case, an option could be to use alternative transmission media (i.e. 'substitution' of transmission technology). Also in this case, the incumbent user has to invest in alternative transmission equipment.
- ✓ Where sharing with, or re-farming/relocation and substitution of incumbent users is technically not possible or politically not desirable, access to frequencies by new entrants may not be granted.

Although not exhaustive in its scope of the use of radio frequencies, the following table provides an overview of the various types of radio applications which, for the main part, are subject to some kind of authorisation to use radio equipment or to provide radio-based services.

Table 1: Radio-based sectors and activities⁴

<u>Telecommunications</u>	<ul style="list-style-type: none"> ➤ Telephony (GSM, DCS, DECT, S-PCS, IMT2000/UMTS, WLL, CB) ➤ Paging (ERMES, Pocsag, FLEX) ➤ Wireless multi-media/Internet (UMTS, satellite broadband, LMDS, MMDS) ➤ Data transmission (GSM, IMT2000 / UMTS, satellite broadband, FS) ➤ Private business radio (PMR, TETRA)
<u>Broadcasting</u>	<ul style="list-style-type: none"> ➤ Terrestrial TV (analogue/digital – free to air, pay TV) ➤ Satellite TV (analogue/digital – free to air, pay TV, NVOD) ➤ Ancillary services (Teletext and home banking, Teleshopping, for digital TV) ➤ Radio (analogue/digital)
<u>Transport</u>	<ul style="list-style-type: none"> ➤ Air transport (traffic control, navigation) ➤ Maritime transport (GMDSS, VTMIS) ➤ Road transport (RTT systems) ➤ Rail transport and inland waterways (localisation)
<u>Government</u>	<ul style="list-style-type: none"> ➤ Defence (communication & control, radar) ➤ Emergency (police, fire departments) ➤ Law enforcement (TETRA; earth observation) ➤ Space science (e.g. Earth observation, radio astronomy, radio navigation) ➤ Applications deriving from Commitments under international conventions (navigation aids, positioning and timing; environment)
<u>R&D</u>	<ul style="list-style-type: none"> ➤ Earth observation ➤ Radio astronomy

There is no comprehensive information available for the European Community as a whole on which radio services are located in the various parts of the radio spectrum and which amounts of frequencies these services have at their disposal. Insofar as it is available, such information can only be found at the national level, as can be illustrated by the following example.

⁴ See Annex I for a detailed description of European Community policies in these areas.

Table 2: Allocation of radio spectrum by services (United Kingdom)⁵

	9 kHz to 1 GHz	1 GHz to 3 GHz	3 GHz to 30 GHz
<u>Telecommunications</u>			
➤ Mobile and cellular communications	23%	7%	--
➤ Fixed services (PTO and private fixed services)	--	26%	--
➤ Fixed links	--	--	38%
➤ Satellite	--	--	5%
<u>Broadcasting</u>			
(incl. services ancillary to broadcasting)	40%	12%	3%
<u>Transport</u>			
➤ Civil Aviation/aeronautical	3%	14%	4%
➤ Maritime	--	2%	--
<u>Government</u>			
➤ Defense	29%	31%	38%
➤ Emergency services	2%	3%	--
➤ Space observation	--	2%	--
<u>Other</u>			
	3%	3%	12%
	100%	100%	100%

The economic contribution of radio-based services and equipment to the EU economy is difficult to determine in a comprehensive manner. For example, **the provision of mobile and audio-visual services entirely depend on radio spectrum availability**. The economic output of these sectors may therefore be used as indicators for the economic relevance of radio spectrum in European and global markets, while taking account of the non-economic benefits to society resulting from the **strategic, public, and cultural use** that is made of radio spectrum for non-commercial purposes such as defence, emergency services, and for universal services in the areas of telecommunications and broadcasting.

Table 3: Estimated market and market forecasts (BECU): telecommunications, mobile and satellite communications, broadcasting (and audio-visual), and radio navigation

	Estimated market	Market forecast
--	------------------	-----------------

⁵ Source: Approaches to the allocation and assignment of the radio spectrum resource, Report for the European Commission, NERA, Smith System Engineering, KPMG, November 1997.

Telecommunications (EEA, 1997) ⁶ , of which	150.7	162.2 (1998)
		172.3 (1999)
➤ Fixed service	98.1	101.0 (1998) 103.9 (1999)
➤ Mobile service	24.7	29.7 (1998) 33.6 (1999)
➤ Other services	27.9	31.4 (1998) 34.8 (1999)
Satellite communications (world, 2005) ⁷		62
➤ Mobile Satellite Service (MSS) (world) ⁸		1 (2000) 7.2 (2005) 24.1 (2010)
Audio-visual services (EU, 1995) ⁹ , of which	41.5	46.8 (2000)
		59.0 (2005) 71.4 (2010)
➤ Content provider revenues (EU, 1995) ¹⁰	8.9	16.1 (2005)
➤ Annual pay TV revenues (Europe, 1997) ¹¹	5	22 (2005)
➤ Public broadcasting revenues (revenues from TV licence fees, advertising and sponsoring) (EU, 1996) ¹²	14	
➤ Radio sector (license fees and advertising revenue)	6	
Radionavigation services and equipment ¹³		4 (2000, Europe)
		40 (2005, world)

2.2 Community policies related to radio spectrum

A number of sector-specific Community policies rely on the availability of radio spectrum, particularly in the areas of telecommunications, broadcasting, transport and R&D (see Annex I for an outline of the main policies). However, the political context in which radio spectrum availability for such policies are addressed differs significantly from sector to sector.

⁶ European Information Technology Observatory 98, Yearbook for the Information and Communications Technology (ICT) industry in Europe, 1998, page 350.

⁷ Via Satellite, September 1998. Global Satellite Telecommunications Review. Joe N. Pelton and the Global Satellite Communications Review Panel, page, 19.

⁸ Global Mobile, Volume 5, Baskerville Communications Corporation, 9 July 1998, page 12.

⁹ Market developments of telecommunications and integrated communications services to the year 2010, IDATE, December 1997, pages 14 and 175.

¹⁰ Norcontel, Economic Implications of New Communication Technologies on the Audio-Visual Markets. April 1997, page 6.

¹¹ N. Bertolotti for JP Morgan Securities Ltd, The European Pay-TV Industry, January 1998. See Commission Staff Working Paper on WRC-99, page 7.

¹² Source: EUROSTAT

¹³ Communication by the Commission : Towards a Trans-European Positioning and Navigation Network, including a European Strategy for Global Navigation Satellite Systems (GNSS) COM(98)29 final, 21.1.1998, page 15.

- ✓ In the **telecommunications** sector, especially where pan-European or global systems are concerned (e.g. mobile and mobile-satellite services), political and legislative agreement is established in the European Community as concerns the harmonised availability of radio spectrum.¹⁴ Furthermore, the provision of services is governed by Community rules on licensing which aim to promote technological innovation and competition. The number of telecommunications applicants seeking radio spectrum has increased significantly due to technological innovation and the global liberalisation of telecommunications markets. This trend is reflected in the growing importance of international negotiations on frequency harmonisation.¹⁵
- ✓ In contrast, radio spectrum availability for **broadcasting** has so far not been addressed in the European Community as an issue requiring political or legislative action, partly because sufficient radio spectrum was made available by Member States before broadcasting began to take on an increasingly commercial orientation. However, the interrelation between radio spectrum availability and the Community policy on the free movement of radio and TV programmes has been manifest since the arrival of transfrontier satellite TV, which prompted the Television without Frontiers Directive. Apart from the general growth of broadcasting and audio-visual markets, the boundaries between telecommunications and broadcasting are converging and challenge the historical availability of radio spectrum for these activities.¹⁶ Competition for scarce and valuable radio spectrum between broadcasters and other potential users is likely to intensify.
- ✓ The European Community has so far not adopted specific measures to secure radio spectrum availability for the implementation of its **transport** policies (i.e. air and maritime transport, radio navigation and positioning). These policies benefit from radio spectrum being available on an almost exclusive and international basis to ensure safety-of-life communications of air and maritime transport. However, this situation has come under pressure as a result of the increased demand for radio spectrum. For instance, providers of commercial mobile satellite services have proposed to share radio spectrum reserved for navigation and positioning applications. It was decided, however, that the need to ensure the interference-free operation of such applications should prevail. The possibility of developing a European component to the global navigation satellite system means that full account need to be taken of the need to secure and protect radio spectrum, and this has been endorsed by the Council.

¹⁴ Communication to the Council and for information to the European Parliament, the Economic and Social Committee and the Committee of the Regions on the implementation and functioning of the mobile communications frequency Directives, COM(1998)559, 09.10.1998.

¹⁵ Communication from the Commission to the European Parliament and the Council on radio frequency requirements for Community policies in the context of the World Radiocommunications Conference 1999 (WRC-99), COM(1998)298, 13.05.1998. Commission Staff Working Paper on issues at the World Radiocommunications Conference 1999 (WRC-99) in the context of Community policies, SEC(1998)839, 12.05.1998. It should be noted that, after the publication of these documents, it was decided to hold the next WRC in the year 2000; this has, however, no effect upon the substance of the documents.

¹⁶ Green Paper on the convergence of the telecommunications, media and information technology sectors, and the implications for regulation – towards an Information Society approach, COM(97)623, 03.12.1997. See in particular: Summary of the results of the public consultation on the Green Paper on the convergence of the telecommunications, media and information technology sectors: areas for further reflection, SEC(98)1284, 29.07.1998. The comments showed widespread concerns about the possible auctioning of radio spectrum, accompanied by assertions that this would raise market entry barriers and lead to increased prices for consumers. Others pointed out the risk of discrimination either by favouring incumbents or by treating sectors differently. The issue of whether dates should be set or co-ordinated at a European level for the switching-off of analogue broadcast services attracted considerable comment from broadcasters, equipment manufacturers, consumer groups and Member States. Opinion was split between those who saw any transition from analogue to digital broadcasting as market-led, and not requiring government or EU level intervention, and those who considered that a deadline set at a national level would be a useful stimulus to the development of digital broadcasting in the EU. Further details will be dealt with in chapter 4 of this Green Paper.

- ✓ In the area of **R&D** (e.g. Earth observation and radio-astronomy), radio spectrum availability has not been addressed as a matter requiring legislative or political action. However, radio spectrum which historically has been available for such applications has come under pressure, either because new entrants wish to use the radio spectrum available for R&D or because interference from other services has increased to such an extent that the performance of R&D activities becomes technically difficult.

Considering that demand for certain frequency bands exceeds supply, **the implementation of the EU policies mentioned above is faced with the situation where radio spectrum availability can no longer be taken for granted.** Therefore, **radio spectrum availability needs to be addressed as a key issue in the EU decision-making process.** Furthermore, **where trade-offs need to be made as regards which services should receive priority in accessing and using radio spectrum, the various interests involved need to be carefully balanced in a coherent manner.**

Irrespective of the specific use of radio spectrum, horizontal EU policies and legislation are relevant (e.g. competition, internal market, standardisation/certification of radio equipment, consumer protection).

- ✓ The aim of the Community's **competition rules** is to ensure that choices with regard to the attribution of radio spectrum do not privilege technical solutions at the expense of competing **technologies**, which could better match user needs, and do not limit production, output or technical development in the sense of Article 86 of the Treaty. Competition rules have to be considered also in relation to the use of radio spectrum, notably when public interests are involved in the context of Article 90. In the areas of broadcasting and transport, for instance, it is becoming increasingly difficult to define the boundary between public and commercial services.
- ✓ As regards **internal market** considerations, radio spectrum availability affects the scope for the pan-European provision and free movement of services and equipment. The harmonisation of the use of radio spectrum is particularly important in this context to facilitate the introduction of pan-European and global systems and to realise the economies of scale necessary to make European industry competitive in world markets. With regard to the latter point, standardisation and type approval policies need to be taken into account.
- ✓ The Community's **consumer policy** should be seen as a flanking policy to the establishment of the internal market and stresses the benefit to all consumers of greater choice and diversity, including as regards the availability of radio services and products which meet consumer demand and needs. Consumer **health protection against electromagnetic radiation** is also becoming an important issue which is undergoing extensive research and requires a transparent and harmonised approach in order to secure safe use of radio services and to avoid conflicting national policies in this regard. Action has been initiated in the European Community in the context of health and R&D policies to examine the possible health effects related to the use of the radio spectrum so as to ensure consumer confidence in radio services and products.

Radio spectrum has been addressed as an important issue in international negotiations on the liberalisation of trade in telecommunications.

- ✓ In accordance with the agreements established in the **World Trade Organisation (WTO)**, member countries have to manage radio spectrum in a manner which is objective, transparent, non-discriminatory and no more burdensome than necessary. Furthermore, they are committed to make publicly available the current state of allocated frequency bands. It follows that **any regional or national radio spectrum management measure which has the purpose or effect of blocking, or unreasonably limiting, market access for operators from other WTO member countries in a discriminatory manner would violate the agreement established in WTO** since discriminatory, anti-

competitive or arbitrary frequency management decisions are outlawed. These **international commitments need to be taken into account where third-country operators seek access to the European Community market and where Europe's industry seeks access to the global market.**

In conclusion, the establishment of agreement on the EU policies to be pursued on telecommunications, broadcasting, transport, and R&D needs to carefully balance economic, political, social, and cultural interests. It is therefore important to ensure that the trade-offs to be made at a technical level take full account of this. This is particularly important considering that radio spectrum availability cannot be taken for granted due to the increase of applications vying for the use of the radio spectrum.

2.3 Factors for change

Radio spectrum policy has become more complex due to rapid technological developments, the introduction of new services (e.g. broadband multimedia), the evolution of markets, and policy and regulatory changes. These trends are often interrelated and their relative weight is taken into account to varying degrees when trade-offs are made in deciding to which uses and users radio spectrum should be put.

The major **factors which have transformed perceptions of radio spectrum policy** are described below.

Technological developments

- ✓ **Services using spectrum are in many cases converging** (fixed-mobile telecommunications, broadcasting with telecommunications and IT-sector). This has several consequences: (a) traditional radio systems offer new types of services (e.g. broadcasters offering Internet-services, telecommunications operators offering video services, military using civil radiocommunications applications); (b) the traditional definitions on the basis of which radio spectrum is distributed are called into question as is the current distribution of radio spectrum among service categories and users (e.g. the mobile telephony service traditionally regulated as a telecommunications service is evolving towards a mobile multi-media service with a greater focus on content).
- ✓ Technological developments lead to the development of **new services** which require certainty as regards the future availability of radio spectrum in order for investment decisions to be made. Furthermore, substitution phenomena are encountered (e.g. cable/satellite broadcasting offers a wider choice of service than terrestrial broadcasting) which could result in a different use of radio spectrum by new or **more spectrally efficient systems and services.**
- ✓ **New systems are proposed which aggregate a range of services.** For example, mobile and satellite broadband communications systems, as planned to be introduced in the near future, combine traditional services such as telephony, data transmission, internet distribution, and positioning.

Market developments

- ✓ The **increasing demand for radio spectrum is not counter-balanced** by additional radio spectrum becoming available as new technology can stretch-up the availability of usable radio spectrum. In order to distribute the limited radio spectrum available for certain applications in a transparent manner on the basis of objective criteria, some regulatory authorities deploy pricing mechanisms with the aim to reflect the market value of radio spectrum. The **valuation of radio spectrum** therefore becomes relevant in

decisions on radio spectrum, although experience with such approaches is still rather limited.

- ✓ The trend is towards **global systems** which require the formation of **global alliances** of players to cope with the significant investment and operational demands (e.g. obtaining access to frequencies and national licences, provision of services). Radio spectrum policy will need to take account of this trend and regulatory action should support the harmonised introduction of such systems and ensure appropriate involvement in their development and deployment .

Policy and regulatory developments

- ✓ The share of **commercial applications using radio spectrum is growing** following in particular the liberalisation of telecommunications markets. This puts **pressure on the availability of radio spectrum for other applications of importance to the public interest** (emergency services, transport). Setting priorities as to who should be allowed access to spectrum can no longer be taken solely on the basis of technical information but requires careful balancing of interests taking economic and political factors into account.
- ✓ Decisions on **radio spectrum availability and use may impact on the relative strength of market players and on the level of competition** in markets. This is not only the case with respect to radio services (similar services or services of a different nature) competing for access to radio spectrum. Decisions on spectrum access may also significantly impact on the relative market strength of players offering comparable services albeit through competing radio and non-radio infrastructures (e.g. fibre vs. satellite communication; wired local loop vs. wireless local loop).
- ✓ Radio spectrum is relevant to trade since **market access for radio activities cannot be realised without access to radio spectrum**. Trade aspects in the context of radio spectrum are gaining momentum with the general trend towards the liberalisation of international trade in goods and services, which, for a large part, relies on the availability of radio spectrum.
- ✓ A significant number of spectrum users do not operate in a commercial environment, but have to compete with commercial users when obtaining spectrum. A key regulatory task is to find the **balance between certain well-defined public/non-commercial uses of radio of radio spectrum and the need for radio spectrum as an essential resource for doing business**.
- ✓ Radio spectrum use represents a significant and growing economic activity. The impact of radio spectrum availability on the performance of society in terms of employment, industrial competitiveness and capacity for innovation has significantly increased as compared to the past.

3. EU POLICY ON RADIO SPECTRUM: PRESENT SITUATION

The aim of chapter 3 is to describe the European Community's policy objectives with regard to radio spectrum (section 3.1) and to explain the present practice of Community involvement in radio spectrum matters with regard to the strategic planning of radio spectrum availability, radio spectrum harmonisation, the assignment and use of radio spectrum, radio equipment and standards, and the institutional framework for the co-ordination of radio spectrum (section 3.2).

A detailed description of the present practice of EU policy on radio spectrum, including as regards its political and legal base, is given in Annex II.

3.1 Defining EU policy on radio spectrum

The economic, social, or political value of radio spectrum depends on the actual use that is made of this bottleneck facility and on how it is managed. EU policy on radio spectrum is concerned with both dimensions.

Irrespective of whether radio spectrum is used for Community policies on telecommunications, broadcasting, transport, or R&D, the main objectives to be achieved with radio spectrum are the following:

- to allow the *development of new services* to meet consumer and governmental demands for radio services;
- to foster the development of the *internal market* for and *competition* in radiocommunications equipment and services, in particular in the context of the deployment and operation of *pan-European and global systems and services*;
- to *meet public policy objectives* with regard to considerations such as safety, cultural and social aspects etc;
- to safeguard the *Community's interests in multilateral and bilateral negotiations* where radio spectrum is discussed;
- to stimulate *technological innovation* and support *European competitiveness*;
- more broadly to develop *economic growth, create employment, and promote general welfare*.

Within this context, the European Community has specific responsibilities to ensure that the management of radio spectrum is done in accordance with vested legal principles, such as openness, transparency, objectivity, and non-discrimination, as well as with the Community's competition rules.

Bearing these general objectives in mind, certain key issues need to be considered in relation to the way in which spectrum is made available:

- ✓ to *secure radio spectrum availability* for pan-European radio systems, services and equipment;
- ✓ to *ensure the appropriate balancing of commercial and public interest* in radio spectrum policy;
- ✓ to *reflect the economic value of radio spectrum*;

- ✓ to **provide legal certainty** as regards radio spectrum availability and use;
- ✓ to **ensure open, transparent, objective, and non-discriminatory procedures** in support of the competitive provision of radio services and equipment;
- ✓ to **ensure the efficient use of radio frequencies**;
- ✓ to **ensure that radio spectrum policy encourages competition and technological innovation**;
- ✓ to support the **development of economies of scale** for the introduction of new equipment which matches the needs of users;
- ✓ to ensure **coherence between radio spectrum and standardisation policies**.

3.2 Present practice of Community involvement in radio spectrum policy

In 1987, the European Community for the first time acknowledged the need for the harmonisation of radio spectrum for the provision of pan-European mobile services. Since then, a number of initiatives have been taken to implement the aims of EU radio spectrum policy in the following areas:

1. The strategic planning of the use of radio spectrum: when will radio spectrum be available?
2. The availability and harmonisation of radio spectrum: how much radio spectrum will be available and will its use be harmonised?
3. The assignment of radio spectrum: how is radio spectrum assigned, how can it be obtained, and under what conditions?
4. Radio equipment and standards: what are the rules and conditions for the marketing and use of radio equipment, including as regards standards?
5. Institutional framework: where are the decisions made and what is the role of the European Community?

The political and legal base for the involvement of the European Community vary in these areas, as shown in the following table. The present practice of Community involvement in these areas is summarised below (see Annex II for a detailed description of EU policy on radio spectrum).

Table 4: Political and legal base for Community involvement in radio spectrum policy

	Political base	Legal base
Planning of the use of radio spectrum	<ul style="list-style-type: none"> ➤ Council Resolution 90/C 166/02 	<ul style="list-style-type: none"> ➤ Directive 87/372/EEC (GSM) ➤ Directive 90/544/EEC (ERMES) ➤ Commission Directive 96/2/EC
Harmonisation of radio spectrum allocation	<ul style="list-style-type: none"> ➤ Council Resolution 90/C 166/02 ➤ Council Resolution 92/C 318/01 	<ul style="list-style-type: none"> ➤ Directive 87/372/EEC (GSM) ➤ Directive 90/544/EEC (ERMES) ➤ Directive 91/287/EEC (DECT) ➤ EP and Council Decision on S-PCS ➤ Proposal for an EP and Council Decision on UMTS
Radio spectrum assignment	--	<ul style="list-style-type: none"> ➤ ONP Framework Directive 97/51/EC ➤ Commission Directive 96/2/EC ➤ Licensing Directive 97/13/EC
Radio equipment and standards	<ul style="list-style-type: none"> ➤ Council Resolution 90/C 166/02 	<ul style="list-style-type: none"> ➤ Proposal for an EP and Council Directive on radio and telecommunications terminal equipment (RTTE)
Framework for radio spectrum co-ordination	<ul style="list-style-type: none"> ➤ Council Resolution 90/C 166/02 ➤ Council Resolution 92/C 318/01 ➤ Council Conclusions of 3 February 1992 ➤ Council Conclusions of 7 December 1993 ➤ Council Conclusions of 22 September 1997 	--

The strategic planning of radio spectrum availability

- ✓ The longer-term planning, development, and marketing of pan-European radio services and products depends on the availability of radio spectrum. Under European **Community Directives, Member States are obliged to plan and publish radio spectrum availability, particularly for mobile and personal communications services.** Furthermore, by means of **Council Resolutions**, the European Conference of Telecommunications administrations (**CEPT**) **is requested to recommend** to regulatory authorities or to the Community **long-term requirements for the radio spectrum** and to achieve a better-balanced allocation of radio spectrum between its various uses.

The strategic planning of radio spectrum availability in the context of Community policies is particularly needed in the areas of mobile and satellite communications (mobile and satellite broadband systems), broadcasting (the switch from analogue to digital transmission), and transport (the establishment of a global navigation satellite system, GNSS).

Securing the harmonised availability of radio spectrum

- ✓ Radio spectrum harmonisation is achieved by means of **frequency allocation measures**, i.e. measures which identify frequencies for the provision of defined services as well as the technical conditions to be taken into account. Frequency harmonisation has been achieved in the European Community through the adoption of **Directives on GSM, DECT, and ERMES.** The harmonised availability of radio spectrum for **S-PCS** and (in future) **UMTS** is achieved through the adoption of **Council and European Parliament Decisions** which refer to the Member State co-ordination in the CEPT framework. In case

work in CEPT or the implementation by Member States is not satisfactory, further action at Community level can be taken. **In other cases, and as requested in Council Resolutions, radio spectrum harmonisation should be achieved at the initiative of CEPT.** Where this happens, Member States are not obliged to implement the harmonisation measures adopted in CEPT.

The establishment of Community rules to assign and use radio spectrum

- ✓ **Frequency assignment** is the process where administrations authorise individual users to use radio stations or to provide radio services within identified frequency bands. In certain cases, frequency assignment is linked to the licensing of users, including as regards the collection of fees (i.e. administrative costs and charges) for the use of radio spectrum. **Radio spectrum assignment is governed by European Community Directives and is subject to competition law.** They aim to establish a level playing field for all users of radio spectrum which is based on open, objective, non-discriminatory, and transparent grounds.

The establishment of Community rules as regards radio equipment and standards

- ✓ Common frequency bands are required in order to permit the use of radio equipment in different countries, to minimise co-ordination problems at frontiers and to facilitate the large production runs for equipment necessary to make European industry competitive at world markets. **The marketing and use of radio equipment is governed by a (proposal for a) European Community Directive.** Community policy with respect to **standards** is aimed at allowing non-discriminatory and technology-neutral access to radio spectrum while ensuring **inter-operability and pan-European provision of services.**

The institutional framework for the co-ordination of radio spectrum

- ✓ Taking into account that radio spectrum does not stop at the Community borders, the **Council of Telecommunications Ministers** found it appropriate in the early 1990s to **achieve the Community's policy objectives on radio spectrum through international agreements rather than via internal instruments.** For this reason, a number of **Council Resolutions and Council Conclusions** were adopted which refer to the International Telecommunication Union (ITU, 186 member countries) and its World Radiocommunications Conferences (WRC) to achieve international frequency harmonisation and to the European Conference of Postal and Telecommunications organisations (CEPT, 43 member) to achieve radio spectrum harmonisation in Europe and to develop corresponding European positions for ITU/WRC.

In accordance with these Council Resolutions and Council Conclusions, the European Commission and CEPT entered into a formal relationship in the form of a Memorandum of Understanding (1994). **In its role as observer in ITU/WRC and counsellor to CEPT, the European Community seeks to ensure that its interests are appropriately represented in these bodies.**

4. EU POLICY ON RADIO SPECTRUM: ISSUES FOR COMMENTS

The aim of chapter 4 is to invite comments from all interested parties so as to stimulate debate on whether the present political and legal base as well as the practical implementation of Community radio spectrum policy requires adaptation in the light of technological, market, and regulatory developments.

The issues presented are not exhaustive but are meant to focus discussion as to where Community policies currently apply and where adaptation may be required. Comments on additional issues which require further consideration in the Community context will be taken into account in a further Communication reporting on the results of the public consultation on the Green Paper.

(1) *Strategic planning of the use of radio spectrum*

ISSUE 1

The European Commission would welcome views on the strategic planning of the use of radio spectrum in the European Community, particularly as regards: the scope of and information needed for planning exercises; whether a political and legal commitment to plan radio spectrum for pan-European services is needed; and to what extent a harmonised Community approach is needed to develop and implement re-farming and substitution policies as part of the planning of radio spectrum, including as regards the phasing-out of analogue services in the areas of broadcasting and mobile telephony.

- 1 (a) **Does the strategic planning of the use of radio spectrum respond to the needs of commercial and non-commercial uses, in particular in the areas of mobile and personal communications, broadcasting, transport, and R&D?**

There are no specific Community requirements for the planning of the use of radio spectrum for services other than telecommunications, although the obligation to publish national frequency allocation tables should also comprise information on radio spectrum availability for broadcasting, transport, and R&D applications. CEPT's detailed spectrum investigations covers all uses of radio spectrum, but, due to its voluntary nature, divergences may persist between the radio spectrum planning of Member States. The result may be that the development and implementation of Community policies which depend on radio spectrum availability, as well as the general business planning of radiocommunications interests, is hampered due to a lack of information.

- 1 (b) **What information on radio spectrum allocation, radio spectrum assignment, and licensing should be publicly available for industry and policy makers? Where should this information be collected and how should it be presented in the European Community?**

Radiocommunications players not only need regulatory certainty as regards the availability of radio spectrum for the provision of services, they also need to know the procedures for, and conditions for use of radio spectrum. Information of this kind is generally not included in frequency allocation tables and this information is not available at the Community level.

- 1 (c) **Should re-farming and substitution policies form part of the strategic planning of radio spectrum for pan-European services, what could be the modalities for this (e.g. actors to be involved, timing), and to what extent is a common Community approach required, for instance with regard to the phasing-out of analogue broadcasting and analogue mobile telephony services?**

The strategic planning of the use of radio spectrum also requires regulatory certainty with regard to any foreseen measures to move existing users to less congested frequency bands (re-farming or re-location within the radio spectrum) or to encourage them to use alternative transmission infrastructure (substitution), taking also into consideration existing competition rules. Information of this kind is generally not available. A specific issue is whether regulatory intervention is needed to support the introduction of spectrally efficient technologies, e.g. is a common Community approach needed to support the transition from analogue transmission of mobile telephony and broadcast signals to digital forms of transmission.¹⁷

(2) *Harmonisation of radio spectrum allocation*

ISSUE 2

The European Commission would welcome views on radio spectrum harmonisation in the European Community and the wider context; whether a priori Community agreement is required as regards the need for harmonisation measures and on the basis of what criteria this can be determined; and the level of legal certainty required with respect to the implementation of such measures by Member States.

- 2 (a) **Are specific Community measures necessary to ensure radio spectrum availability for pan-European applications in the areas of telecommunications, broadcasting, transport, and R&D, or should criteria be established which determine when radio spectrum harmonisation is required?**

Currently, no pre-defined regulatory criteria exist which determine when radio spectrum harmonisation is needed. Applicants for radio spectrum seek political support from the European Commission in order to enforce decisions to be taken by CEPT. At the same time, the technical proposals in CEPT and ITU/WRC are increasingly influenced by commercial and political lobbies. Pre-defined criteria appear to be lacking which would comprise both technical and socio-economic elements, on the basis of which objective and transparent decisions on the need for radio spectrum harmonisation can be taken.

- 2 (b) **Where and on the basis of what criteria should priorities be set and arbitration take place where radio spectrum requirements for Community policies on telecommunications, broadcasting, transport, and R&D are in conflict? How can it be ensured that commercial and public interests are defined and appropriately balanced in this process?**

Pre-defined criteria are also lacking when determining which services should receive priority in accessing (harmonised) frequency bands. This fact causes problems where there are conflicting radio spectrum requirements, i.e. where radio sectors compete for access to (the

¹⁷ The comments received following the publication of the Commission's Green Paper on convergence on the issue of the switch-off of analogue services were not conclusive and showed a split between those who saw any transition from analogue to digital broadcasting as being market-led, and not requiring governmental or EU level intervention, and those who considered that a deadline set at a national level would be a useful stimulus to the development of digital broadcasting in the EU. Many of the commentators saw the role of the EU as one of co-ordination of switch-off dates rather than setting a single date for all Member States. A number of mobile operators and equipment manufacturers saw some merit in dates being set for shutting down analogue mobile communications systems, in order to free spectrum for further digital communications. Most commentators considered that radio spectrum would continue to be a scarce resource for the foreseeable future, notwithstanding the efficiency gains flowing from the use of digital communications and the analogue radio spectrum made available. In particular broadcasters pointed out that, for a lengthy period of time, broadcasting would be simultaneously transmitted via digital and analogue frequencies, thereby occupying additional frequencies. For further details, see COM(98)1284, 29.07.1998, p.29,30.

same) radio spectrum on different economic, political, or social grounds, and where there are differences in radio spectrum usage in neighbouring countries.

- 2 (c) Can the implementation of radio spectrum harmonisation measures, necessary for the provision of pan-European services, be left to voluntary decisions by Member States or is there a need for legal obligation in that respect? Should the European Community collect and publish relevant information in both cases?**

Where there is no Community requirement for the harmonisation of frequency bands, the implementation of CEPT measures by Member States takes place on a voluntary basis. Currently, no comprehensive information is available as to which Member States have implemented CEPT harmonisation measures according to which national transposition measures.¹⁸ The availability of such information is important for commercial decisions to be taken.

(3) Radio spectrum assignment and licensing

ISSUE 3

The European Commission would welcome views on radio spectrum assignment and licensing, particularly as concerns which mechanism is most suitable to secure the efficient use of radio spectrum and the harmonised introduction of pan-European services; the extent to which a common Community approach is required on the valuation and possible trading of radio spectrum as well as the possible costs of relocating existing radio spectrum users; and the level of legal certainty needed in the Community context.

- 3 (a) Where there are differences in Member States as regards radio spectrum availability for pan-European services, what is the overall impact on competition?**

The Commission Communication on the implementation and functioning of the frequency Directives has found that in general there are large differences in the amount of spectrum assigned to operators in different countries and even to operators within the same country for reasons which are not always clear. Diverging licensing conditions, including duration of licenses, can make Community-wide harmonisation of radio spectrum allocation and assignment difficult. It may also have an effect on competition, particularly where it concerns pan-European services.

- 3 (b) Is there a need to agree in the European Community on which radio spectrum assignment mechanism leads to the most efficient use of radio spectrum for the different types of services?**

¹⁸ In order to ensure clear regulatory arrangements in this respect, the Commission proposed to make the implementation of CEPT measures obligatory by a specified deadline and to oblige Member States to inform the Commission so as to publish national implementation measures. See: A new approach to the co-ordination of radio frequencies in the Community, Communication from the Commission concerning a proposal for a Council Decision on the implementation by the Member States of measures concerning radio frequencies, COM(93)382, 10.09.93. In this document, the Commission furthermore proposed that: Commission shall ensure Community involvement in organisations dealing with radiocommunications; Council shall draw up guidelines on the positions to be adopted by Member States in ERC and ERO; and a representative committee shall be created to deliver opinions on the measures to be taken.

Where radio spectrum is scarce and the number of available licences therefore limited, Member States have several mechanisms at their disposal to assign radio spectrum (e.g. first come-first served procedure, comparative bidding, auctions) while taking into account the requirement to ensure efficient use of radio spectrum. However, since different interpretations exist as regards what constitutes efficient use of radio spectrum, no consensus exists as to which mechanism is best in which cases.¹⁹

3 (c) What is the impact on pan-European services of diverging national mechanisms to assign radio spectrum, which mechanism is most suitable to support pan-European services, and to what extent is a Community approach required in this regard?

Since the availability of radio spectrum for pan-European services is expected to continue to be limited, a number of Member States are considering and introducing the use of auctions to award the licenses available, e.g. in case of UMTS. Also in this context, no consensus exists as to which mechanism is best to support the provision of pan-European services or what the impact will be of diverging national approaches in this regard.

3 (d) What is the impact of charges and fees, including relocation costs, associated with the use of radio spectrum on the development of services and on the competitive situation?

Member States may impose non-discriminatory charges in addition to administrative costs in order to ensure that optimal use is made of radio spectrum and to foster the development of innovative services and competition. Opinions diverge on the impact of radio spectrum charges. Where licenses have already been granted, it has been argued that auctions tend to strengthen the dominance of the incumbent players by increasing the costs for the new entrants.²⁰ Some telecommunications operators argue that the costs involved with auctions will reduce the readiness to invest in networks and lead to higher consumer prices. Others argue that potential users are bidding, in effect, a part of their future profits, without any significant impact on prices to the consumer.

Some operators have also expressed reservations with the requirement, where applicable, to pay for the relocation costs of existing users, particularly where their competitors are not bound by such obligations. Other issues concern the extent to which the revenue raised is used for radio spectrum policy and frequency management, e.g. to make further radio spectrum available (for pan-European services).

3 (e) Should the awarding of radio spectrum be separated from the granting of service authorisations or licences? What would be the impact of creating a secondary market for radio spectrum for the provision of similar or different services, and which safeguards are needed in this regard?

¹⁹ The comments received on the Green Paper on convergence show agreement on the overall need for greater efficiency in radio spectrum use, although there are widespread concerns about the possible auctioning of radio spectrum. Some commentators recognised that by placing a commercial value on frequencies, greater efficiency might be promoted and that civil users of frequencies might be encouraged to release some of their existing radio spectrum. Other pointed out the risk of discrimination where later market entrants were required to pay a market value, whilst existing users had much lower fees. However, for a large majority of broadcasters, telecommunications operators and equipment manufacturers, current mechanisms such as so-called "beauty contests" or comparative bidding provided the most effective way of balancing the need to ensure efficient use of frequencies and the need to avoid excessive charges for the players involved, as ultimately those charges would be passed on to the consumer. Such high charges were felt to often be motivated by national budgetary considerations rather than by the concern of radio spectrum efficiency. At the same time, a number of broadcasters, including those representing community and local radio, made the point that where higher values were attached to radio spectrum, provision should be made to ensure that certain public service broadcasters could still obtain frequencies at an affordable price. For further details, see COM(98)1284, 29.07.1998, p.29,30.

²⁰ The Commission is currently dealing with complaints regarding the effects of auctions.

It is argued that the efficient use of radio spectrum would be best served by separating service authorisations and licenses from radio spectrum assignments. It is claimed that the advantages of spectrum trading would be that single assignments could be transferred (for a price) from one user to another with no change of use of the spectrum. Alternatively, assignments may be subdivided or combined and, where appropriate, used to provide a different radio service for which there is market demand. Since radio spectrum is a bottleneck facility, consideration should be given to the potential impact of secondary trading on anti-competitive behaviour and on abuses of dominant positions. Also, the possible risk of a further fragmentation of radio spectrum use should be taken into account. For the European Community, a particular issue to be addressed in this regard is whether diverging national approaches or the absence of a common Community approach to such matters will affect pan-European service provision and the efficient use of radio spectrum.

(4) **Radio equipment and standards**

ISSUE 4

The European Commission would welcome views on the link between Community policy on radio equipment, standards, and radio spectrum, with particular regard to the co-operation between bodies responsible for standards and radio spectrum and the measures needed at the operational level of radio spectrum management.

- 4 (a) **Is there a need to improve the link between the elaboration of standards and the harmonisation of radio spectrum allocation for pan-European services in the areas of telecommunications, broadcasting, transport, and R&D?**

The implementation of a number of Community policies, for instance in the areas of radio navigation and road transport telematics, depends on standards developed in fora other than ETSI, which is mainly concerned with the elaboration of telecommunications standards.

- 4 (b) **Which practical arrangements are needed to ensure that the full potential of Community policy on radio equipment is supported by appropriate action at the level of radio spectrum management?**

The RTTE Directive will remove many regulatory barriers for the placing on the market and free movement and putting into service in the Community of novel and innovative radio and telecommunications terminal equipment. It will ease the marketing of such equipment throughout the Community, and will avoid the need for *ad hoc* mutual recognition arrangements between Member States (e.g. such as those developed by CEPT in recent years). However, if consumers and industry are to benefit from this, the timely availability of harmonised spectrum is a prerequisite and close consultation is required between policy makers, manufacturers, and users to address the following issues: the establishment of a database of national regulations for the use of the radio spectrum, one-stop notification procedures, and arrangements in support of market surveillance.

(5) **The institutional framework for radio spectrum co-ordination**

ISSUE 5

The European Commission would welcome views on whether the present institutional arrangements for the co-ordination of radio spectrum are appropriate to meet the Community's policy objectives, i.e. to contribute to economic growth, employment, and welfare, to stimulate technological innovation and the development of new services, to foster competition in the internal market, and to strengthen European competitiveness in the establishment of pan-European and global radio systems.

- 5 (a) In view of the need to have a predictable environment in the European Community for the use of radio spectrum, is the framework for the co-ordination of radio spectrum sufficiently open, transparent, and legally certain? Is it clear where and on the basis of which principles the need for radio spectrum harmonisation or for Community positions is established?**

Both new and existing users of radio spectrum are likely to benefit from a high level of openness in the regulatory framework and should therefore be more involved in the decision-making process. Certain parts of the radio spectrum are congested and, in order for new telecommunications, broadcasting, transport, and R&D applications to be introduced, radio spectrum might need to be shared or existing users might need to give up their occupancy of frequency bands or limit their expansion. In this context, Community competition rules need to be fully applied. Any change in the use of radio spectrum will affect new and existing users alike and they therefore need to be consulted in order to assess the appropriateness of the decisions to be taken.

Particularly where applicants for radio spectrum in various economic sectors compete on different economic, political, or social grounds, priorities in radio spectrum use are difficult to set where no objective principles (whether technical, economic, political, and social) exist on the basis of which priorities to spectrum access can be set. The result of this situation is also that (both European and third country) applicants for radio spectrum address their requirements in parallel at the level of the Member States, CEPT, and the Community, which is inefficient, and which in turn may trigger European operators to seek governmental support in other parts of the world for the introduction of new systems, both in terms of radio spectrum allocation and assignment.

- 5 (b) Is the establishment of a priori Community agreement necessary to achieve radio spectrum harmonisation or is it sufficient to co-ordinate the positions of the Member States in CEPT on an ad hoc and technical basis?**

Common Community positions in CEPT can only be ensured where political and legal agreement is reached in the Community context. In all other cases, experience has shown that it is difficult to assess whether the economic and general interests of the Community are safeguarded on the basis of technical information provided during the development of harmonisation measures or of European positions in CEPT. This points to the need to substantiate the technical information available with economic, political, and social elements in order to establish whether and at which stage of the development of positions a common Community approach in CEPT and ITU/WRC is needed.

- 5 (c) In which fora should Community positions be developed where needed in discussions on radio spectrum between the European Community and its trading partners?**

Radio spectrum is increasingly being raised as a market access issue in discussions between the European Community and its trading partners. Availability of and access to radio spectrum is a key condition for organisations to provide radio services and products abroad and for internal and external communications. However, the European Community does not have the information to discuss current or future availability of radio spectrum for the Community as a whole. According to the current regulatory arrangements, CEPT should develop such common European positions when needed. However, the process by which CEPT arrives at such positions can be lengthy and does not always reflect the Community position.

5 (d) Should procedures be introduced to ensure that the Member States support CEPT positions for ITU/WRC, particularly in view of the need to uphold Community interests in the international arena?

The Member States in CEPT are not obliged to comply with the European positions worked out for ITU/WRC.²¹ In practice, the European Commission is not in a position to secure a common Community approach in ITU/WRC nor is it able to arbitrate in case Member States in CEPT disagree on the positions to be taken.

²¹ European Common Proposals (ECP) are proposals adopted by the Conference Preparatory Group (CPG) of CEPT in preparation for ITU meetings which reflect the position of the CEPT members who have expressed their intention to co-sign the ECP. ECP approval requires the support of at least 10 CEPT members, and not more than 6 members opposing. Those who have opposed are expected to co-operate with all CEPT members in WRC on a consensus basis and refrain from defending separate individual or multilateral proposals, but there is no strict legal obligation for them to do so.

5. CONCLUSIONS

Major technological, market, and regulatory developments have an impact on the way radio spectrum policy is made in the European Community and at the international level. Furthermore, the availability of radio spectrum has become a key issue for the implementation of Community policies on telecommunications, broadcasting, transport, and R&D. Considering that radio spectrum is a bottleneck facility, it is appropriate to discuss radio spectrum policy issues with all interested parties in the light of these changes so as to ensure that the best possible use is made of the radio spectrum resource.

Against the background of the Community policy objectives with regard to radio spectrum and in the context of the political and legal base and practical reality for Community involvement with regard to the European framework for the co-ordination of radio spectrum, the strategic planning of the use of radio spectrum, the harmonisation of radio spectrum allocation, radio spectrum assignment and licensing, and radio equipment and standards, this Green Paper invites interested parties to give views on a number of issues pertinent in the Community context.

The issues require a wide public debate so as to determine whether further Community action is required.

The Commission will report on the findings of the consultation period and propose Community measures to the European Parliament and the Council, where appropriate.

ANNEX I

EUROPEAN COMMUNITY POLICIES INVOLVING RADIO SPECTRUM

The implementation of a number of sector-specific Community policies depends critically on the availability of radio spectrum. An overview of these policies is outlined in this Annex²²; horizontal Community policies are referred to in the main body of the text of the Green Paper.

Telecommunications policy

With the introduction of the digital generation of public mobile communications systems (GSM, DECT, ERMES) at the end of the eighties through spectrum co-ordination as well as through liberalisation measures from the regulatory point of view, the European Community helped to create a pan European service range which has now been successfully implemented and is recognised as responding to a user demand as well as being an important industrial activity in itself. In view of the future demand for public mobile communication both in volume and service enhancement and diversity, Community action is currently undertaken to support the development and deployment of a European proposal for the 3rd generation mobile system (IMT2000), UMTS (Universal Mobile Telecommunications System), for which spectrum availability is a crucial element to be discussed at the forthcoming World Radiocommunications Conference (WRC-2000). Wireless communication is also considered in the context of the convergence between mobile and fixed services. In this context the usage of wireless local loop (WLL) is potentially an important means to achieve the necessary competition in telecommunications.

The development of mobile terrestrial communication has been subject to intensive R&D activities at European Community level through the RACE and the ACTS programmes. Projects have been funded with approximately 176 MECU during the period 1986-98.

Satellite Communication has equally been recognised as a necessary component in view of realising the Information Society. Besides the liberalisation of the satellite sector through Community measures in the early nineties, action is undertaken to support the synergy of the players involved through the Satellite Action Plan. Furthermore, the European Community actively contributes to efforts to co-ordinate the introduction of global S-PCS systems. This includes the harmonisation of radio spectrum bands.

European Community funding for satellite communications projects from RTD-programmes has been 85 MECU in 1987-97. The 5th Framework Programme for RTD foresees a funding of Information Society technologies of 3.3 billion ECU in the period 1998-2002. The share of the satellite communications is expected to be around 15 million ECU per year.²³

At the level of trans-European networks, initial projects to stimulate the usage of satellite system-based infrastructure as a communication backbone are under preparation.

22 A detailed description on spectrum aspects related to these policies can be found in the in the Commission Staff Working Paper: "Issues at the World Radiocommunications Conference 1999 (WRC-99)", SEC(1998)839, 12.5.98

23 The Space Co-ordination Group, The Fifth Framework Programme and Space Applications, SEC(1998)1055.

Broadcasting policy

The Television Without Frontiers Directive establishes the free movement of TV broadcasts within the European Community and is therefore essentially a single market measure to ensure the free movement of services. The Directive has recently been amended by Directive EC/97/36 to take account of changes of the market, in particular arising from technological developments. The MEDIA programme (Community budget: 310 MECU 1996-2000) aims at promoting and developing the European audio-visual industry.

Digitisation and the development of new services such as specialist channels and Video-on-Demand will create increased demand for audio-visual content. Community policy is to ensure, for cultural, industrial and employment reasons, that this demand is met by European audio-visual production.

European Community policy on advanced television and digital broadcasting aims at facilitating the market-led introduction of digital and wide-screen television²⁴. It has both a regulatory and a promotional strand. The Directive on the use of television transmission standards²⁵ set up a light regulatory framework to support the launch of digital television services, providing certainty for investors, and ensuring that public interest requirements are met.

On the promotional front, the Commission has supported the activities of the Digital Video Broadcasting (DVB) group²⁶. The group has defined the European digital broadcasting standards for cable, satellite and terrestrial television which are increasingly being used all over the world. In addition, the Union launched a four-year Action Plan in 1993²⁷ to overcome the market failure that had prevented the introduction of wide-screen television in the 16:9 format. Wide-screen is now an established part of the broadcast services and TV set markets, ready for an increasing role in digital TV markets.

The Commission also follows the activity of the World Digital Audio Broadcasting (DAB) Forum. The aim of this forum, which has more than 100 member organisations world-wide, is to speed up the introduction of Digital Audio Broadcasting in Europe. DAB was created by a consortium of European manufacturers, research institutes, network operators and broadcasters under the umbrella of the Eureka technology programme and with Community support. This system has received ITU recognition as a world standard.

Today, one Member State has launched digital terrestrial broadcasting and several other Member States are looking to do the same. What the effect of a general cut-off date for analogue terrestrial broadcasting would be on the market overall is a complicated matter in view of the widely differing characteristics of the television markets in each of the Member

24 See Council Decision on an Action Plan for the Introduction of Advanced Television Services in Europe, 93/424/EEC, OJ No L196/48 5.8.93. This Action Plan has facilitated the market introduction of the 16:9 wide-screen format ready for digital TV.

25 European Parliament and Council Directive 95/47/EC of 24 October 1995 on the use of television transmission standards OJ 95/L28/51, 23.11.1995.

26 The Digital Video Broadcasting group (DVB) is an association of broadcasters, transmission companies as well as consumer and professional electronics manufacturers. The group comprises over 200 organisations in more than 30 countries. The DVB group has developed a complete family of interrelated television systems for all transmission media (including terrestrial, cable, satellite) and at all quality levels (standard definition through to high definition) and with the possibility to offer new convergent services like Internet access. DVB systems have been standardised by ETSI and are recognised by the ITU at the global level.

27 Council Decision 93/424/EEC of 22 July 1993 on an Action Plan for the Introduction of Advanced Television Services in Europe, OJ L281, 23.11.1995. The Council Decision made available up to 228 MECU over 4 years, ending on June 30th 1997

States. This issue is currently subject to a political debate which touches upon several issues, only one of which is spectrum policy.

The digitalisation of terrestrial broadcasting would potentially allow for reduced radio spectrum occupancy for existing broadcast services, thereby freeing up radio spectrum. However, it is very likely that in many countries, a lengthy transition period to digital will be needed. Consumers will need time to replace their radio sets. They will also need to purchase one or more decoders to upgrade their analogue TV sets or to buy one or more new integrated digital TV sets. A period of "simulcasting" will therefore be necessary (of anything up to 15 years) and this will in fact put additional strains on the availability of radio spectrum. Moreover, the range of broadcast services is already increasing rapidly, with more NVOD, thematic channels and interactive TV becoming available. On the other hand, as TV broadcasting develops from its origins (a few public terrestrial channels) towards pay TV and transactional, retail style delivery of programmes "on demand", and as wireless communications evolves towards multimedia, the terms for access to spectrum which terrestrial broadcasters currently enjoy are increasingly being called into question by economic actors in other sectors.²⁸

As far as the introduction of digital radio is concerned, it has to be outlined that DAB operational services have already been launched in various Member States like Sweden (covering 80% of the population), UK (a public and a commercial service have already been licensed), France and Italy. Other Member States are planning to start soon regular DAB services (i.e. Germany in Spring 1999).

Transport policy

The European Community has become active in several sectors related to transport such as aeronautical service sector, satellite navigation and positioning, maritime navigation and communication sector as well as the development of inter-modal transport telematics applications.

As a result of the efforts undertaken to establish a single air transport market based on the free market access, the air transport sector has been considerably stimulated leading to a strong demand for the improvement and further development as well as innovation of aeronautical communication and navigation support²⁹, all typically based on radiocommunications techniques and thereby requiring spectrum allocation. Having radio spectrum available becomes thereby an essential pre-requisite for the successful implementation of an air transport policy.

Maritime communications remains an important sector, especially given its specific requirements for safety and security³⁰, and is defined as such in the trans-European Transport Network Guidelines³¹. The European Community has therefore supported the development of maritime systems through research actions under the TELEMATICS programme of the Fourth Framework Programme.

²⁸ The Commission is currently dealing with complaints involving non-transparent and potentially discriminatory attribution of radio spectrum in this sector.

²⁹ Communication from the Commission on congestion and crisis in air traffic, COM(95)318 final, 5.7.1995.

³⁰ Green Paper on Sea Ports and Maritime Infrastructure, COM(97)678, 10.12.97

³¹ Decision 1692/96/EC of the European Parliament and of the Council of 23 July 1996, which specifies that the trans-European shipping management and information network is composed of coastal and port shipping management systems, vessel positioning systems, reporting systems for vessels transporting dangerous or polluting goods, communication systems for distress and safety at sea.

Satellite positioning, navigation and timing systems such as GPS and GLONASS, originally developed for military applications, are expected to allow for widely varying usage including aeronautical and maritime navigation, fleet management and tracking, provision of precise time references, and positioning in the consumer sector, etc. The European Community is currently assessing its role in the development of the next generation global satellite positioning and navigation system and, particularly, the scope for cooperation with the US and the Russian Federation. The availability, planning and protection of spectrum for GNSS is seen as a priority and the Council has confirmed that adequate protection of radio spectrum for GNSS needs to be recognised in the relevant international fora.³²

Total investments in the European augmentation of GNSS are estimated to 570-4000 MECU depending on which alternative is chosen. The European Community funding for GNSS in 1998 is 21 MECU which is expected to substantially increase beyond 2000.³³

A growing number of additional transport telematics systems are emerging, many resulting from related R&D projects in Community programmes such as the TELEMATICS programme where approximately 220 MECUs have been spent during the period 1984-1998 on transport R&D activities. New proposals such as comprehensive transport information systems or a European wide "GSM for Railways" service are being developed. For road transport, Dedicated Short Range Communications (DSRC) systems are already used for Electronic Fee Collection and will increasingly support driver information and various other systems that depend on vehicle to vehicle/infrastructure communications. It is expected that these applications will increase the overall demand for spectrum.³⁴

Earth observation

Earth observation has considerable importance as a basic tool for a certain number of specific policies such as global scale measurements³⁵, implementation of environmental and civil protection policies³⁶, and agricultural policies³⁷. Consequently Europe has developed a technological basis in co-operation with the Member States represented in ESA (European Space Agency) as well as through national programmes. Examples of application are the weather satellites for European meteorological services operated through EUMETSAT. More recently, the demand for new environmental monitoring services has increased in the context of binding international agreements such as the as the Montreal Protocol, The Kyoto Protocol, the Biodiversity Convention and the Framework Convention on Climate Change.

-
- 32 Communication by the Commission: Towards a Trans-European Positioning and Navigation Network, including a European Strategy for Global Navigation Satellite Systems (GNSS), COM(98)29 final, 21.1.1998 and Council conclusions of 17 March 1998.
- 33 Communication by the Commission: Towards a Trans-European Positioning and Navigation Network, including a European Strategy for Global Navigation Satellite Systems (GNSS), COM(98)29 final, 21.1.1998.
- 34 Designation of further frequency bandwidth for road transport and traffic telematics within Dedicated Short Range Communication Systems, study commissioned by the Commission, January 1998
- 35 Earth observation (EO) aiming at global scale measurements of parameters such as ocean colour, sea surface temperature, weather forecasts, continental land cover and biomass burning, vital for initiating and validating models of global change, heavily rely on satellite EO. Earth system science entails a global partnership in which Europe has clear obligations.
- 36 EO can be a cost-effective tool for the implementation of environmental and civil protection policies. EO is already used pre-operationally for monitoring changes in land cover for the Natura 2000 network as part of the Habitats Directive, and for detecting oil spills in the context of the Bonn Convention. The information offered from space can help in the management and even prediction of natural hazards such as floods, storms and forest fires. Particularly if the frequency and magnitude of these events increase with a changing climate or effects such as the "El Nino", the contribution of EO to their mitigation can have considerable economic impact.
- 37 EO is already used in the EU to check claims for agricultural subsidy, and for gathering statistics. EO will also play a role in the context of an evolving Common Agricultural Policy, particularly with an increasing emphasis on environmental impact.

The European Commission pursues efforts to stimulate the Earth observation technological background through R&D programmes. Under the Fourth Framework Programme (1995-98) around 275 MECU were dedicated on Earth observation related research. The Commission's proposal for the Fifth Framework Programme of the European Communities for Research and Development Activities (1998-2002)³⁸ includes research activities on the development of generic Earth observation technologies, notably satellite technologies for environmental monitoring and resources. RTD activities on Earth observation are also considered in the Communication on space applications and their market perspective³⁹.

Radio Astronomy

Radio-astronomy has been recognised as an activity in which the European Community has a general interest in participating. However, substantial investment in suitable infrastructures is required and large-scale installations are increasingly operated on a shared and global basis. Currently, Community activities are implemented through Action 4 of the Framework Programmes on RTD, in particular Research Networks and Access to Large-Scale Facilities.⁴⁰ Both activities are foreseen to be continued under Framework Programme 5.⁴¹

The involvement of the Community on an international level is organised through the participation at the OECD Megascience Forum (Working Group on Radio-astronomy). The financial contributions for the period of 1994-98 are estimated at 7.3 MECU. Besides co-ordination of R&D activities, radio-astronomers have identified a need to take action at a global level to tackle the rapidly increasing problem of radio interference which results from the heavy utilisation of radio spectrum and related phenomena, such as out-of-band emissions by satellites. Because of the extreme sensitivities required to carry out radio-astronomical experiments, such radio interference could inhibit most ground based (on Earth) observations in future.

38 COM(97)142 final, The Commission proposal for the Fifth Framework Programme of the European Community for Research and Development Activities (1998-2002), 30.4.1997.

39 COM(96)617 final, Communication from the Commission the European Parliament and the Council on the European Union and Space: Fostering Applications, Markets and Industrial Competitiveness, 4.12.1996.

40 Council Decision on the specific programme on "training and mobility of researchers" (TMR), OJ No. L361/90, 31.12.94.

41 Proposal for a Council Decision on the specific programme on "improving the human research potential and the socio-economic knowledge base, COM(98)305.

ANNEX II

EU POLICY ON RADIO SPECTRUM

The aim of this annex is to explain the political and legal base for, and present practice of Community involvement in radio spectrum policy in the following areas: (1) the strategic planning of the use of radio spectrum; (2) the making available of harmonised radio spectrum for pan-European and global radio services; (3) the application of the rules for the distribution and use of radio spectrum; (4) the marketing and use of radio equipment; (5) the institutional framework for the co-ordination of radio spectrum.

1. Strategic planning of the use of radio spectrum

Main objective: creating a predictable environment for current and future use of radio spectrum

In order to create an environment for radio spectrum which allows for the longer-term planning and development of pan-European radio services and products, particularly in the telecommunications area, the use of radio spectrum should be strategically planned. Where necessary, action should be taken where technological, market, or regulatory developments require an adjustment in the distribution of radio spectrum among its various uses.

Political and legal base

Strategic planning of the use of radio spectrum	
Directive 87/372/EEC (GSM)	<ul style="list-style-type: none"> Member States shall prepare plans for GSM to fully occupy the reserved frequency bands according to commercial demand
Directive 90/544/EEC (ERMES)	<ul style="list-style-type: none"> Member States shall prepare plans for ERMES to fully occupy the reserved frequency bands according to commercial demand
Council Resolution 90/C 166/02	<ul style="list-style-type: none"> CEPT to recommend to regulatory authorities or to the Community long-term requirements for the radio spectrum
Council Resolution 95/C 188/02⁴²	<ul style="list-style-type: none"> CEPT to achieve a better-balanced allocation of the frequency spectrum between its various uses In the context of ERC, to provide for frequencies for mobile and personal communications complying with European standards
Commission Directive 96/2/EC⁴³	<ul style="list-style-type: none"> Member States shall publish the frequency plans and the procedures for the designation of frequencies for specific services Member States shall publish every year, make available on request, and communicate to the Commission the allocation scheme of frequencies reserved for mobile and personal communications services, including the plan for future extension of such frequencies Current frequency allocation shall be reviewed at regular intervals; detailed knowledge of the actual state of allocation and use of radio spectrum is also required Where the number of licenses is limited due to spectrum scarcity, Member States will review whether advances in technology would allow spectrum to be made available for additional licenses

⁴² Council Resolution of 29 June 1995 on the further development of mobile and personal communications in the European Union, 95/C 188/02, OJ C188/3, 22.07.95.

⁴³ Commission Directive 96/2/EC of 16 January 1996 amending Directive 90/388/EEC with regard to mobile and personal communications, L20/59, 26.01.96.

Present practice

The strategic planning of the use of radio spectrum is dealt with in the Community context in the following ways:

- **Community requirements for the planning of the use of radio spectrum for mobile and personal communications are monitored**

The Commission Communication on the implementation and functioning of the mobile frequency Directives⁴⁴ has found that only a limited number of Member States have so far notified the Commission about their plans as regards radio spectrum availability for mobile and personal communications. However, in particular in the area of mobile and satellite communications (GSM, UMTS, S-PCS), market players seek clarity as regards future availability of radio spectrum for such applications. This is also true for activities other than telecommunications. For example, common European frequency bands are needed to in support of Community policies on transport, broadcasting, and R&D.

- **The European Community contributes to the establishment of an European table of frequency allocation**

The Community partly funds the CEPT process of detailed spectrum investigations (DSI), which should contribute to the establishment of a harmonised European table of frequency allocation and utilisation (planned to be finalised by CEPT by the year 2008). In addition, external studies carried out on behalf of the Commission on market developments of radiocommunications services have been made available to CEPT.

- **Member States are not obliged in their planning of radio spectrum to comply with the provisional European table of frequency allocation of CEPT**

No information is publicly available as regards the extent to which Member States' national planning of the use of radio spectrum complies with the preliminary version of CEPT's European table of frequency allocation since its implementation occurs on a voluntary basis. Member States increasingly make available national frequency allocation tables. However, significant national divergences exist as regards the format and presentation of such tables. Information as regards the situation of radio spectrum allocation for the Community as a whole is not available.

- **No specific recommendations are made to the European Community as regards long-term requirements for the radio spectrum**

The Commission has so far neither been informed about any national reviews of current radio spectrum allocation, nor whether advances in technology would allow for additional licenses to be made available. CEPT has so far not recommended to the Community long-term requirements for the radio spectrum, nor has it taken concrete steps to achieve a better-balanced allocation of the radio spectrum between its various uses.

⁴⁴ See footnote 17.

2. Harmonisation of radio spectrum allocation

Main objective: securing the harmonised availability of radio spectrum for pan-European services

The establishment of EU and international-wide frequency bands is critical to the free movement of goods, persons and to the free provision of services. The co-ordination of radio spectrum therefore falls within the core area of EC internal market competence. Radio spectrum harmonisation is achieved by means of **frequency allocation measures**, i.e. measures which identify frequency bands for the provision of defined services as well as the technical conditions to be taken into account.

Political and legal base

Harmonisation of radio spectrum allocation	
Directive 87/372/EEC (GSM)⁴⁵	<ul style="list-style-type: none"> • Member States shall reserve specific frequency bands for GSM
Directive 90/544/EEC (ERMES)⁴⁶	<ul style="list-style-type: none"> • Member States shall reserve specific frequency bands for ERMES
Directive 91/287/EEC (DECT)⁴⁷	<ul style="list-style-type: none"> • Member States shall reserve specific frequency bands for DECT
Council Resolution 90/C 166/02	<ul style="list-style-type: none"> • CEPT to recommend to regulatory authorities or to the Community suitable frequencies for pan-European services
Council Resolution 92/C 318/01	<ul style="list-style-type: none"> • Member States should participate in the development of ERC decisions • Member States should commit themselves to implementing the ERC decisions on TFTS and RTT, according to ERC procedures
EP and Council Decision on S-PCS⁴⁸	<ul style="list-style-type: none"> • CEPT is tasked to harmonise frequencies and authorisation conditions for S-PCS • In case work by CEPT or the implementation by Member States is not satisfactory, further action at Community level shall be taken
Proposal for an EP and Council Decision on UMTS⁴⁹	<ul style="list-style-type: none"> • CEPT is tasked to harmonise frequencies and authorisation conditions for UMTS • In case work by CEPT or the implementation by Member States is not satisfactory, further action at Community level shall be taken

Present practice

⁴⁵ Council Directive 87/372/EEC on the frequency bands to be reserved for the co-ordinated introduction of public pan-European cellular digital land-based mobile communications in the European Community, OJ L196/85, 17.07.87. This Directive was adopted in parallel with: Council Recommendation 87/371/EEC of 25 June 1987 on the co-ordinated introduction of public pan-European cellular digital land-based mobile communications in the European Community, OJ L196/81, 17.07.87.

⁴⁶ Council Directive 90/544/EEC of 9 October 1993 on the frequency bands designated for the co-ordinated introduction of pan-European land-based public radio paging in the Community, OJ L310/28, 09.11.90. This Directive was adopted in parallel with: Council Recommendation 90/543/EEC of 9 October 1990 on the co-ordinated introduction of public pan-European land-based public radio paging in the Community, OJ L310/23, 09.11.90.

⁴⁷ Council Directive 91/287/EEC of 7 June 1991 on the frequency bands to be designated for the co-ordinated introduction of digital European cordless telecommunications (DECT) into the Community, OJ L 144/45, 08.06.91. This Directive was adopted in parallel with: Council Recommendation 91/288/EEC of 3 June 1991 on the co-ordinated introduction of digital European cordless telecommunications into the Community, OJ L144/476, 08.06.91.

⁴⁸ Decision 710/97/EC of the European Parliament and of the Council on a co-ordinated authorisation approach in the field of satellite personal communications services in the Community, OJ L105, 23.04.1997.

⁴⁹ Proposal for a Decision of the European Parliament and the Council on the co-ordinated introduction of a third-generation mobile and wireless communications system (UMTS) in the Community, COM(1998)58, OJ C131, 29.04.98.

At operational level, the **availability in the European Community of harmonised frequency bands** is ensured in one of the following ways:

- **The European Community adopts specific legal measures which require harmonised frequency bands to be made available by the Member States**

This approach has been used in the past in case of GSM, ERMES, and DECT. Where Member States do not implement these measures, appropriate action at Community level can be taken.

- **The Community adopts legal measures for the harmonised introduction of systems and refers to CEPT for the harmonisation of required frequency bands**

This new methodology is being used for S-PCS and UMTS and allows for Community action to be taken where Member States do not comply with the measures taken.

- **The Community partly funds CEPT to carry out the technical work necessary for the harmonisation of radio spectrum allocation**

By means of the MoU and framework agreement with CEPT ERC/ERO, the Commission may entrust technical work to ERC/ERO with the aim of harmonising radio spectrum allocation. However, under this approach, the members of CEPT, including the Member States, decide whether to follow-up on the work carried out by ERC/ERO, i.e. by adopting radio spectrum harmonisation measures. Furthermore, individual CEPT members decide individually whether or not to implement the measures adopted by CEPT.

- **CEPT decides on its own initiative whether to develop, adopt, and implement harmonisation measures**

For all other cases than described above, CEPT itself takes the initiative to achieve radio spectrum harmonisation. CEPT recommendations are always proposed to its 43 member countries, not to the Community specifically. Where CEPT develops measures not formally requested by the Community, adoption and implementation by Member States occurs on a voluntary basis. Even where Community funding is used to identify radio spectrum availability and the scope for harmonisation for pan-European services, no formal or legal mechanism exist to ensure adoption of appropriate measures by CEPT or their implementation by the Member States.

3. Radio spectrum assignment and licensing

Main objective: application of the rules according to which users obtain and regulatory authorities assign radio spectrum

Frequency assignment is the process where administrations authorise individual users to use radio stations or to provide radio services within identified frequency bands. The assignment of radio spectrum to individual users and the licensing of radiocommunications operators are governed by European Community legal principles, including competition law. They aim to establish a regulatory level playing field for all users of radio spectrum which is based on open, objective, non-discriminatory, and transparent grounds and which supports technological innovation and competition.

Legal base

Radio spectrum assignment and licensing

ONP Framework Directive⁵⁰	<ul style="list-style-type: none"> • Conditions regarding access to and usage of frequencies should be objective, non-discriminatory, transparent, and proportionate to the objective sought • In order to ensure effective use of frequencies and to avoid harmful interference, Member States may restrict access to frequencies
Commission Directive 96/2/EC	<ul style="list-style-type: none"> • Limiting the number of licenses for mobile and personal communications systems only allowed where radio frequencies are scarce and to ensure fulfilment of essential requirements (i.e. security of network operation, maintenance of network integrity, interoperability of services, data protection, protection of the environment, town and country planning) • As soon as frequencies become available, Member States shall award licenses and available frequencies shall be assigned in an open, transparent, and non-discriminatory manner • Efficient use of radio spectrum and effective competition to be ensured • Member States shall not restrict the combination of mobile technologies or systems, in particular where multi-standard equipment is available, and adopt, where required, measures to ensure effective competition among competitors
Licensing Directive⁵¹	<ul style="list-style-type: none"> • Access to frequencies to be secured pursuant to strictly defined procedures and deadlines • Frequency licenses can be separated from service authorisations • The number of licenses may be limited only to ensure the efficient use of radio frequencies and maximise user benefits, develop competition, publish and review the limitation decision, invite license applications • Individual license conditions shall be published and granted through open, non-discriminatory and transparent procedures within reasonable time limits • Non-discriminatory charges may be imposed in the granting of individual licenses but this may not negatively affect the development of services and competition

Present practice

Radio spectrum assignment and licensing in the European Community takes place as follows:

- **The licensing of individual operators is done at Member State level but subject to European Community legal principles, notably the competition rules and the modalities established by the Licensing Directive**

Member States in principle have the choice to use individual licences or to accept general authorisations, but normally impose an individual licence for radio communication systems and related services. Licensing conditions and assignment methods may vary from Member State to Member State. This applies to the assignment procedures as well as to the licensing conditions imposed on applicants. Pan-European or global systems are equally subject to such differences.

- **In most cases, a licence to provide a service is coupled to the authorisation to use radio spectrum**

Although legally possible according to the Licensing Directive, the separation of service licenses and spectrum usage authorisation is not a common practice.

⁵⁰ Directive 97/51/EC of the European Parliament and of the Council of 6 October 1997 amending Council Directives 90/387/EEC and 92/44/EEC for the purpose of adaptation to a competitive environment in telecommunications, OJ L 295/23, 29.10.1997.

⁵¹ Directive 97/13/EC of the European Parliament and of the Council of 10 April 1997 on a common framework for general authorisations and individual licenses in the field of telecommunications services, OJ L117/15, 05.05.97.

□ **Where radio spectrum is available, it has to be assigned upon request**

This means that, where radio spectrum allocation measures have been adopted and implemented, Member States should deal with requests for radio spectrum use in a responsive and timely manner.

□ **The assignment and use of radio spectrum should facilitate the development of competition and maximise the benefits for users**

Within the specific national context and in view of market and societal needs, radio spectrum assignment mechanisms should lead to the most efficient use of the radio spectrum through the competitive provision of services so as to maximise the benefits for users.

4. Radio equipment and standards

Main objective: application of the rules according to which radio equipment can be marketed and used

Common frequency bands are required in order to permit the use of radio equipment in different countries, to minimise co-ordination problems at frontiers and to facilitate the large production runs for equipment necessary to make European industry competitive at world markets. Community policy with respect to standards is aimed at allowing non-discriminatory and technology-neutral access to radio spectrum while ensuring interoperability and pan-European provision of services.

Political and legal base

Radio equipment and standards	
Council Resolution 90/C 166/02	<ul style="list-style-type: none"> • Common frequency bands are required in order to permit the use of equipment in different countries, to minimise co-ordination problems at frontiers and to facilitate the large production runs for equipment necessary to make European industry competitive on the world market • CEPT to interact closely with ETSI in order to ensure the vital link between frequency planning and standards
Proposal for an EP and Council Directive on radio and telecommunications terminal equipment (RTTE)⁵²	<ul style="list-style-type: none"> • Radio equipment can move freely in the European Community • The introduction of a general framework for the authorisation of use of radio equipment • The abolition of <i>a priori</i> market access controls (3rd party certification); 4 week advance notification period before putting on the market of equipment using non-harmonised frequencies • Member States are required to plan the use of radio spectrum in a transparent manner

Present practice

The ***relation between radio spectrum harmonisation and standards*** is governed in the following ways:

□ **Common European standards for telecommunications are elaborated in the context of ETSI**

⁵² COM(97)257, OJ C248, 14.8.1997. A Common Position has been established: Common Position (EC) No. 39/980 of the Council of 08.06.98, OJ C227/37, 20.07.98. The proposed Directive will replace Directive 98/13/EC of the European Parliament and of the Council of 12 February 1998 relating to telecommunications terminal equipment and satellite earth station equipment, including the mutual recognition of their conformity, OJ L074, 12.03.1998.

The elaboration of common European telecommunications standards is achieved in ETSI (European Telecommunications Standards Institute). Where required, e.g. when a Community regulation requires a common technical basis, the European Community may support ETSI to develop such standards and may request CEPT to identify and harmonise the necessary radio spectrum.

□ **CEPT and ETSI have established working arrangements**

As regards the relationship of radio spectrum with standards, a memorandum of understanding governs the co-ordination between CEPT/ERC and ETSI. ETSI and CEPT representatives are mutually involved in the respective work programmes.

The **free movement and putting into service of radio equipment** is governed at Community level in the following way:

□ **Community legislation will govern the free movement and use of radio equipment**

Radio equipment is covered by the proposed RTTE Directive which will remove regulatory barriers to the free movement and use of equipment, whilst providing safeguards for Member States to protect the radio spectrum. The Directive will abolish *a priori* market access controls and rely on the responsibility and liability of manufacturers and suppliers, whilst Member States will have an increased responsibility for surveillance. Under the new regime, the rendering of mandatory standards or national specifications, common in the regimes it replaces, will be abolished.

5. The institutional framework for frequency co-ordination

Main objective: ensuring that the framework for the co-ordination of radio spectrum complies with Community interests and international obligations

The main principle governing Community action in this area has been to pay particular attention to the possibility in certain cases of achieving the objectives set out in the Treaty through international agreements, rather than via internal instruments. In other words, when appropriate and effective action is already taken at international level, the Community may abstain from adopting specific Community measures. Following the adoption in the early 1990s of a number of Council Resolutions and Council Conclusions, the European Community seeks to ensure that the Member State co-ordination of the use of radio spectrum in the European Conference of Postal and Telecommunications administrations (CEPT) and in the World Radiocommunications Conferences (WRC) of the International Telecommunication Union (ITU) comply with Community interests.

Political base

Framework for radio spectrum co-ordination in Europe	
Council Resolution 90/C 166/02⁵³	<ul style="list-style-type: none"> • Commission and Member States should support the CEPT framework, including the setting up of ERO (European Radiocommunications Office) • CEPT should take account of the opinions of national frequency experts, telecommunications organisations, and other service providers, industry, and users • CEPT to recommend to regulatory authorities or to the Community suitable frequencies for pan-European services • CEPT to recommend to regulatory authorities or to the Community long-term requirements for the frequency spectrum
Council Resolution 92/C 318/01⁵⁴	<ul style="list-style-type: none"> • Commission to give full consideration to the mechanism of ERC (European Radiocommunications Committee) decisions as the primary method of ensuring the provision of the necessary frequencies for new Europe-wide radio services
Council Conclusions of 7 December 1993	<ul style="list-style-type: none"> • Confirmation of Council Resolution 92/C 318/01 • ERC decision mechanism should be implemented, and • Commission shall sign a memorandum of understanding and a framework agreement with ERC/ERO to this end

European co-ordination towards ITU/WRC	
Resolution 90/C 166/02	<ul style="list-style-type: none"> • CEPT to develop common European positions for ITU/WRC
Council Conclusions of 3 February 1992	<ul style="list-style-type: none"> • Community co-ordination at WRC will take place only if CEPT co-ordination does not arrive at the agreements necessary in order to uphold the interests of the Community and the Member States • The Community alone is able to enter into external commitments at WRC as far as the frequency Directives (GSM, DECT, ERMES) are concerned
Council Conclusions of 22 September 1997	<ul style="list-style-type: none"> • Confirmation of the Council Conclusions of 3 February 1992 • Commission to participate closely in and with CEPT/CPG, including as regards bilateral contacts with third countries and regional telecommunications organisations • Commission to set up industry consultation mechanism

Present practice

With regard to the European co-ordination framework, the European Community seeks to ensure compliance of the positions of the Member States in CEPT and ITU/WRC with legal obligations and agreed policies in the following ways:

- **The positions of the Member States in CEPT and ITU/WRC are subject to specific political and legal objectives to be achieved in the European Community**

This procedure is followed in the case of mobile and satellite communications (i.e. GSM, DECT, ERMES, S-PCS and UMTS). Where the work of CEPT or the implementation of harmonisation measures by Member States is not satisfactory, appropriate action at Community level can be taken.

⁵³ Council Resolution of 28 June 1990 on the strengthening of Europe-wide co-operation on radio frequencies, in particular with regard to services with a pan-European dimension, OJ C166/4, 07.07.90.

⁵⁴ Council Resolution of 19 November 1992 on the implementation in the Community of the European Radiocommunications Committee decisions, OJ C318//1, 04.12.92.

- **In the absence of specific Community objectives to be achieved, the European Commission assesses on the basis of technical information available in CEPT and ITU/WRC whether the political and economic interests of the Community are safeguarded**

The Commission is counsellor to CEPT and represents the Community as observer in ITU/WRC. These bodies address the need for the harmonisation of radio spectrum on the basis of technical information. In this process, the Member States' positions are not subject to any form of Community co-ordination and CEPT and Member States have the final say over whether or not to support the adoption and implementation of radio spectrum harmonisation measures. The Member States' positions are generally not subject to any form of Community co-ordination in this process.

- **The Community contributes to the development by CEPT of radio spectrum harmonisation measures or of European positions for ITU/WRC**

Through the memorandum of understanding and framework agreement with ERC/ERO, the Community can financially contribute to the development of appropriate measures and positions although it does not have the legal means to enforce decisions to be taken or to be implemented. The Member States' positions are generally not subject to any form of Community co-ordination in this process.

* * *

ANNEX III

LIST OF ABBREVIATIONS

ACTS	Advance Communications Technology Systems
CEPT	European Conference of Postal and Telecommunications Administrations
CPG	Conference Preparatory Group of the CEPT
DECT	Digital European Cordless Telecommunications
DSI	Detailed Spectrum Investigation
DVB	Digital Video Broadcasting
EBU	European Broadcasting Union
ECP	European Common Proposals (of CEPT)
ECTRA	European Committee for Telecommunications Regulatory Affairs (a CEPT committee)
EEA	European Economic Area
EO	Earth Observation
ERC	European Radiocommunications Committee (a CEPT committee)
ERMES	European Radio Messaging System
ERO	European Radiocommunications Office (of CEPT)
ESA	European Space Agency
ETSI	European Telecommunications Standards Institute
EC	European Commission
EU	European Union
EUMETSAT	European Meteorological Satellite
GATS	General Agreement on Trade in Services (of WTO)
GLONASS	Global Orbiting Navigation Satellite System (of the Russian Federation)
GNSS	Global Navigation Satellite System
GMPCS MoU	Global Mobile Personal Communications Services Memorandum of Understanding (of ITU)
GSM	Global System for Mobile communications
ICAO	International Civil Aviation Organisation
IMT	International Mobile Telecommunications
IMO	International Maritime Organisation

IT	Information Technology
ITU	International Telecommunication Union
ITU RR	Radio Regulations of the ITU
MSS	Mobile Satellite Services
ONP	Open Network Provision
RACE	Research and technology development in advanced communications in Europe
RTD	Research and Technological Development
RTTE	Radio and Telecommunications Terminal Equipment (Directive)
S-PCS	Satellite Personal Communications Services
TENs	Trans European networks
WLL	Wireless Local Loop
WRC	World Radiocommunications Conference (of ITU)
WTO	World Trade Organisation
UMTS	Universal Mobile Telecommunications System