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COMMUNICATION FROM THE COMMISSION

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 COMMUNICATION FREQUENCY DIRECTIVES

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1. INTRODUCTION

In the last decade mobile communications has arguably been the most dynamic market in the telecommunications sector. Analogue and digital cellular telephony, paging and cordless telephony are now an integral part of developed telecommunications markets. And all the market trends point to continued and sustained growth in mobile telecommunications.

Of particular note has been the world-wide success of the GSM family (GSM, DCS 1800, DCS 1900) with 220 GSM networks in operation in 106 countries with more than 44 million users.

Whilst GSM has swept the world, the growth of the ERMES paging system and the DECT systems has been much less dramatic. Substantial regional variation between the Far East, the EU and the USA can be observed in the paging market, with Europe lagging behind Far Eastern countries. Cordless telephony, including DECT, is now well established and could be on the verge of substantial growth, though competing technologies may contain this growth.

Further expansion in the mobile market is to be expected within the next few years with the introduction of a third generation mobile system UMTS (Universal Mobile Telephony Services).

This Communication:

- reports on the implementation and functioning of the three Council Directives which reserved frequency spectrum for the co-ordinated introduction of GSM[1], ERMES[2] and DECT[3] and reviews the extent with which Member States have complied with the requirements of the Directives;

- assesses the impact of the frequency directives on the development of the markets for each of these three technologies.

- considers additional action needed to ensure full compliance of the national regulatory framework with the requirements of the directive, in order to further encourage the development of the market.

Following this Communication, the Commission will initiate a wide discussion on the appropriateness of the current regulatory framework for frequency allocation in the Community, with a view to considering the need for additional Community measures in the area, where appropriate.

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1 Council Directive 87/372/EEC (GSM) of 25 June 1987 on the frequency bands to be reserved for the co-ordinated introduction of public pan-European cellular digital land-based mobile communications in the Community.

2 Council Directive 90/544/EEC (ERMES) of 9 October 1990 on the frequency bands designated for the co-ordinated introduction of pan-European land-based public radio paging in the Community.

3 Council Directive 91/287/EEC (DECT) of 3 June 1991 on the frequency bands to be designated for the co-ordinated introduction of digital European cordless telecommunications (DECT) into the Community.

2. COMMUNITY MEASURES IN THE AREA OF RADIO FREQUENCIES

2.1 Frequency Directives

Fostering the development of mobile services has always been a key issue of the European Community's policy for telecommunications. Initiatives were launched as early as 1987 to promote the Community-wide introduction of digital cellular communications systems, of digital radio-messaging systems, and of digital cordless communications. Three Recommendations have been adopted by the Council promoting the co-ordinated introduction of services based on these systems, while the Commission has used its powers to propose three Directives reserving frequency band for the same services, which have been adopted by the Council. The Directives do not link frequency reservation to a specific technology to be applied. They only have as objective to reserve frequency necessary for a co-ordinated Community-wide introduction of modern cellular communications and paging.

All these measures can be described as follows:-

- **Council Recommendation** of 25 June 1987 on the co-ordinated introduction of public pan-European cellular digital land-based mobile communications in the Community[4], Council Resolution of 14 December 1990 on the final stage of the co-ordinated introduction of public pan-European cellular digital land-based mobile communications in the Community[5], accompanied by **Council Directive 87/372/EEC** of 25 June 1987 on the frequency bands to be reserved for the co-ordinated introduction of public pan-European cellular digital land-based mobile communications in the Community[6].

  The Directive is aimed at ensuring reservation of adequate frequency in the 900 MHz band for the introduction of public pan-European cellular digital land-based mobile communications in the Community which, under Council Recommendation 87/371/EEC of 25 June 1987, should be started by 1991 at the latest.

  In particular, Article 1(1) of the Directive requires Member States to ensure that the 905-914 and 950-959 MHz frequency bands (often referred to as "core band") or equivalent parts of the band mentioned in paragraph 2 are reserved exclusively for GSM services by 1 January 1991. Under Article 1(2), Member States shall ensure that the necessary plans are prepared for GSM to be able to occupy the whole of the 890-915 and 935-960 MHz bands according to commercial demand as quickly as possible. No deadline is set out concerning the latter obligation. Member States were given 18 months after notification of the Directive to bring into force the provisions necessary to comply with the Directive, and were requested to inform the Commission thereof.

- **Council Recommendation** of 9 October 1990 on the co-ordinated introduction of pan-European land-based public radio paging in the Community[7], coupled with

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4 OJ n. L 196, 17.7.1987, page 81.

5 OJ n. C n. 329, 31.12.1990, page 25.

6 OJ n. L 196, 17.7.1987, page 85.

7 OJ n. L 310 of 9.11.1990, page 23.

Council Directive 90/544/EEC of 9 October 1990 on the frequency bands designated for the co-ordinated introduction of pan-European land-based public radio paging in the Community[8].

The Directive is aimed at ensuring adequate frequency band in the 169.4 to 169.8 MHz range for the provision of pan-European land-based radio paging service which, under Council Recommendation 90/543/EEC of 9 October 1990, should be started by 31 December 1992 at the latest. In particular, Article 2(1) of the Directive requires Member States, in accordance with CEPT Recommendation T/R 25-07, to give protection and priority to four channels in the 169.4 to 169.8 MHz range for the pan-European land-based radio paging service by 31 December 1992 at the latest. These four channels should be, preferably:

- 169,6 MHz
- 169.65 MHz
- 169,7 MHz
- 169.75 MHz

Under Article 2(2) Member States shall ensure that plans are prepared as quickly as possible to enable ERMES services to occupy the whole of the 169.4 to 169.8 MHz band (i.e. 16 channels) according to commercial demand. No deadline is set out concerning this obligation. Member States were requested to bring into force the provisions necessary to comply with the Directive by 18 October 1991.

- **Council Recommendation** of 3 June 1991 on the co-ordinated introduction of digital European cordless telecommunications (DECT) into the Community[9], coupled with **Council Directive 91/287/EEC** of 3 June 1991 on the frequency bands to be designated for the co-ordinated introduction of digital European cordless telecommunications (DECT) into the Community[10].

The Directive is aimed at ensuring adequate band in the 1880-1900 MHz range for the provision of DECT services which, according to Council Recommendation 91/288/EEC of 3 June 1991[11], should be implemented by 31 December 1992 at the latest. In particular, Article 2(1) of the Directive requires Member States, in accordance with CEPT Recommendation T/R 22-02, to designate the frequency band 1880-1900 MHz for digital European cordless telecommunications by 1 January 1992. In accordance with the CEPT Recommendation, DECT shall have a priority over other services in the same band and be protected in the designated band. Under Article 3(1) Member States were requested to bring into force the provisions necessary to comply with the Directive by 31 December 1991, and inform the Commission thereof.

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8 OJ n. L 310 of 9.11.1990, page 28.

9 OJ n. L 144 of 8.06.1991, page 47.

10 OJ n. L 144 of 8.06.1991, page 45.

11 OJ n. L 144 of, 8.06.1991, page 47.

In a wider European context, the application of three Directives have been extended to CEPT countries by Decisions adopted by the CEPT/ERC in 1994[12]. Moreover, in 1997 a further ERC Decision identified the "extended bands" to be used for GSM when additional spectrum is needed beyond the frequency band mentioned in the previous ERC Decision on GSM[13].

2.2 Further developments in co-ordination of frequencies

Council Resolution 90/C 166/02 of 28 June 1990 on the strengthening of the European-wide co-operation on radio frequencies, in particular with regard to services with pan-European dimension[14] recognised the importance of a co-ordinated approach to frequency allocation for Europe-wide systems and noted with satisfaction that a reform of the radio frequency planning and co-ordination mechanisms was being developed within the framework of CEPT. Five major policy goals in the area of frequency allocation were identified.

- to strengthen European co-operation in the field of radio frequency co-ordination, with the objective of providing for a sufficient frequency spectrum for new services;
- to work towards the timely allocation of sufficient frequency resources for mobile and satellite applications;
- to promote the most efficient use of the frequency spectrum;
- to develop common European positions in relation to the use of the frequency spectrum, in particular with regard to the ITU and its relevant administrative radio conferences, using mechanisms set up by CEPT.
- to support these objectives, encouraging the further development of the framework of co-operation between frequency experts from national authorities responsible for frequency management, telecommunications organisations and other service providers, industry and users, developing the existing co-ordination mechanisms set up by CEPT.

In the Resolution, the Council invited the Commission, the Member States and CEPT to support the further development of the new framework set up by CEPT.

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12 ERC Decision of 24 October 1994 on the frequency bands to be designated for the co-ordinated introduction of the GSM digital pan-European communications system (ERC/DEC/(94)01); ERC Decision of 24 October 1994 on the frequency bands to be designated for the co-ordinated introduction of the European Radio Messaging System (ERMES) (ERC/DEC/(94)02); ERC Decision of 24 October 1994 on the frequency bands to be designated for the co-ordinated introduction of the Digital European Cordless Telecommunications system (ERC/DEC/(94)03).

13 ERC Decision of 21 March 1997 on the extended frequency bands to be used for the GSM digital pan-European communications system (ERC/DEC/(97)02). Not all CEPT Members have yet committed themselves to apply the terms of this Decision

14 OJ n. C 166 of 7.07.1990, page 4.

The Resolution has certainly played a role for the development of a Europe-wide framework for frequency co-ordination, and a number of important initiatives have been taken by CEPT European Radiocommunications Committee (ERC) in response to this initiative, including the setting up of a European Radiocommunications Office (ERO) and the adoption of a mechanism to secure implementation by members of CEPT of ERC Decisions concerning radio frequencies.

Subsequent Council Resolution 92/C 318/01 of 19 November 1992 on the implementation in the Community of European Radiocommunications Committee decisions[15] reaffirmed support to the CEPT method of co-operation as the primary means for Europe-wide frequency co-ordination. This was followed by a Communication of the Commission in September 1993, concerning a new approach to the co-ordination of frequency in the Community[16] and by another Communication of the Commission on the ERC Decision mechanism in April 1995[17].

A Memorandum of Understanding is currently in force between ERC and the Commission, and a framework contract between the Commission and ERO[18] setting out arrangements for co-operation and procedures. The framework contract allows the Commission to mandate ERO to conduct work of a technical nature in the form of "work requirements", with a view at reaching Decisions concerning designation of harmonised frequencies for certain services. So far, Decisions have been adopted by ERC on, inter alia, TETRA, DCS 1800, Terrestrial Digital Audio Broadcasting, Satellite Personal Communications Services (S-PCS) and UMTS.

Lastly, the Commission has also issued a Communication on "Radio frequency requirements for Community policies in the context of the World Radiocommunications Conference 1999 (WRC-99)"[19].

2.3 Other Community measures concerning mobile communications

Building on the consensus achieved on the basis of the Mobile Green Paper[20] and, in particular, on the support of the Council and the European Parliament to abolition of special and exclusive rights in the mobile sector, the Commission adopted in January

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15 OJ n. C 318 of 4.12.1992, page 1.

16 COM (93) 382 final of 10.09.1993.

17 COM (95) 85 final of 26.04.1995.

18 The framework contract expired at the end of April 1998, but a proposal has been put forward by the Commission to grant a prolongation.

19 COM(98)298, 13.05.1998.

20 Towards the Personal Communications Environment: Green Paper on a common approach to mobile and personal communications in the European Union, COM(94)145 final, of 27.04.1994.

1996 a Directive amending the Services Directive[21] to include mobile communications, which had so far been excluded from its scope:-

- **Commission Directive 96/2/EC (Mobile Directive)** of 16 January 1996 amending Directive 90/388/EC with regard to mobile and personal communications[22].

  Besides requiring the removal of any remaining special and exclusive rights by February 1996, the Directives provides for: i) an early liberalisation of infrastructure, so that restrictions on mobile operators are lifted with regard to the establishment of their own infrastructure, the use of infrastructures provided by third and the sharing of infrastructure, other facilities and sites; ii) the right for mobile operators to interconnect directly with other mobile networks or with the public fixed network; iii) the licensing of DCS 1800 systems by 1 of January 1998 and of public access/telepoint applications, including systems based on DECT.

  Essential provisions concerning frequency allocation are set out by Article 3b of Directive 90/388/EC, as amended by the Mobile Directive, under which Member States must **publish every year** or make available on request **the allocation scheme of frequencies, including plans for future expansion** of such frequencies. This designation must be **reviewed** by Member States **at regular appropriate intervals**.

Other Community measures containing provisions related to frequency assignment are:

- **Directive 97/13/EC (Licensing Directive)** of the European Parliament and of the Council of 10 April 1997 on a common framework for general authorisation and individual licences in the field of telecommunications services[23].

  The Directive aims at establishing a common framework for general authorisations and individual licences in a liberalised environment, to avoid that an undue burden is imposed on operators through licensing conditions or procedures. Article 7(1) makes it possible for Member States to issue individual licences *inter alia* to allow the licensee to access radio frequencies or numbers; the efficient use of radio frequencies is among the reasons justifying a limitation of the number of licences under Article 10(1), and the charging of additional fees under Article 11(2).

- **Decision 710/97/EC (S-PCS)** of the European Parliament and of the Council of 24 March 1997 on a co-ordinated authorisation approach in the field of satellite personal-communications services in the Community[24].

  In the light of the growing importance of satellite personal communications, in particular through systems comprising low-earth orbiting satellites (LEOs), the Decision aims at facilitating the rapid introduction of compatible satellite personal-

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21 Commission Directive 90/388/EC of 28 June 1990 on competition in the market for telecommunications services (OJ n. L 192 of 24.07.1990, page 10).

22 OJ n. L 20 of 26.01.1996, page 59.

23 OJ n. L 117 of 7.05.1997, page 15.

24 OJ n. L 105 of 23.04.1997, page 4.

communications services in the Community by means of a co-ordinated approach to selection and authorisation. An important role is to be played by CEPT, which is being given mandates to make proposals concerning harmonisation of frequency use and of the conditions attached to general authorisations for S-PCS.

2.4 Evolution towards third generation mobile communications systems

On 3 March 1998 the Commission submitted a proposal for a European Parliament and Council Decision on the co-ordinated introduction of mobile and wireless communications (UMTS) in the Community (98/C 131/05)[25]. The proposed Decision aims at supporting gradual evolution towards third generation mobile communications systems, capable of providing in particular innovative wireless multimedia services and combining the use of terrestrial and satellite components, by means of co-ordination of national licensing regimes. Under the proposed framework, CEPT should be given mandates by the Commission to harmonise frequency use and the conditions to be attached to authorisations for UMTS networks and services, without prejudice to the provisions of the Licensing Directive regarding individual licences.

3. DIRECTIVE 87/372/EEC

3.1 Background

The development of the digital mobile communications market over the past decade has been dramatic. It is recognised that this development has been supported by the policy initiatives taken by the Commission ten years ago to encourage the introduction of digital mobile communications in the Member States. Council Recommendation 87/371/EEC made proposals for the co-ordinated introduction of a pan-European cellular digital land-based mobile system in the Community; Council Directive 87/372/EEC reserved the frequency bands for such a system. In addition, the standardisation activity received considerable support from the Commission by means of mandates to ETSI.

3.2 Current situation

3.2.1 Market Development[26]

Today there are more than 42 million users of digital mobile communications in the Community. Another 8 million subscribers use analogue systems. Penetration rates currently average 13% across the EU. The most successful countries have achieved penetration rates between 31.5% (Finland) and 26.6% (Sweden). Given the dramatic

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[25] OJ n. C 131 of 29.04.1998, page 9.

[26] Sources: ERC (March 1998); data provided to the Commission by the National Regulatory Authorities; two studies realised for the Commission: "UMTS Market Forecast", Analysis/Intercai, February 1997; "The effectiveness of the Mobile Communications Frequency Directives in Member States", Eurostrategies, November 1997. Data provided reflects status at 1 January 1998, unless otherwise indicated.

growth in the mobile market in Europe over the last two to three years, current level of penetration in the Scandinavian countries and the expected increase of competition and availability of services across Europe, it is expected that, even in less optimistic scenarios, penetration rates could achieve 40% to 50% levels in 2005 in some of the more developed markets, with an average 22% for the whole of the EU. GSM (and its related technologies, DCS 1800 and PCS 1900) has also emerged as a world standard for mobile communications, with services provided through nearly 220 networks with more than 44 million users in over 100 countries. The success of GSM can be seen from its global market share of 60% for all digital mobile markets.

The number of authorisations granted varies between Member States, which is partly to be explained by the different liberalisation dates and the size and opportunities of each national market. There are currently at least two digital mobile systems (GSM) in each Member State, although some of them were not yet operational at 1 January 1998 (e.g. Luxembourg, where the second licence was awarded at the end of 1997)[27].

Analogue systems are still in operation in nine Member States (Denmark, Spain, Ireland, Italy, Netherlands, Austria, Finland, Sweden United Kingdom). Despite the gradual and steady shift from analogue to digital mobile services in the last years, analogue systems continue to maintain a relatively high number of subscriptions in a few countries, owing to the relatively limited need for international roaming for certain categories of users and to the lower priced service packages for the analogue systems.

There is no doubt that the mobile communications sector is currently the fastest growing area of telecommunications. By 2010 there could be nearly 200 million mobile users in the EU for all mobile services, including UMTS. Ultimately mobile communications penetration could be as high as 80% of the population, whereas fixed penetration is not expected to exceed 50% of the population. In many Member States 35% penetration rates will be feasible within the next 10 years. With the forecasts of GSM subscriber population for Europe running so high, many operators of GSM networks complain that the current allocation of frequencies will be a major constraint.

3.2.2 Impact of Frequency Directive on the Market

A recent study[28] on the effectiveness of the Frequency Directives has assessed the impact of the GSM Frequency Directive on the GSM market. All respondents (regulators,

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[27] It is worth providing a short overview of DCS 1800 systems, given their close relations with GSM systems (without prejudice to any market assessment that the Commission may carry out, on a case by case basis, in the framework of the application of competition rules). As of 30 June 1998, "pure" DCS 1800 licences, or combined GSM/DCS 1800 licenses have been awarded in 14 countries (Belgium, Denmark, Germany, Greece, France, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden and United Kingdom) and tendering procedures are very close to conclusion in Spain. In this respect, it is recalled that according to the Mobile Directive, **at least one DCS 1800 licence** should have been granted **before 1 January 1998**. In recent years the tendency has grown to grant frequencies in the 1800 MHz band to the existing GSM operators (e.g. Denmark, Italy, Luxembourg), and to award combined licences GSM/DCS 1800. It is recalled that frequencies for DCS 1800 have been reserved through ERC Decision of 1 December 1995 on the frequency bands to be designated for the introduction of DCS 1800 (ERC/DEC/(95)03).

[28] Sources: study realised for the Commission: "The effectiveness of the Mobile Communications Frequency Directives in Member States", Eurostrategies, November 1997.

operators, manufacturers, users) confirmed that the Directive had made a positive contribution to the early introduction of GSM. Some respondents also pointed out that the timing of the Directive coincided with technological opportunity and market demand. The Directive had also enabled the availability of frequencies in a binding way across Europe. The implementation of international roaming and the free circulation of handsets were also cited as major achievements which had been factors in the success of the Directive.

Some concerns were also expressed. In particular, the lack of implementation dates outside the "core band" is causing concern in relation to the phasing-out of analogue networks, which in many Member States still occupies part of the GSM reserved bands. Similarly the lack of a date, at European level, for the phasing out of analogue networks was seen as a problem. In short, it would appear that the Directive has raised the profile of the GSM system both politically and legally.

3.2.3 Spectrum Management and Availability

The "core band" as set out by the Directive is now used for GSM in all Member States. As far as the "extension band" is concerned (i.e. 890-905 MHz and 935-950 MHz), often occupied by other analogue systems despite formal reservation under national legislation, this is being gradually cleared by Member States, although at different paces: owing to the lack of compulsory deadline for full GSM occupation, different time limits or no time limits at all, in some cases, have been set out by Member States. Estimates indicate that, even when these bands are cleared and fully used, there will be a need to use the further GSM extension bands, i.e. 880-890 MHz and 925-935 MHz.

Despite international co-ordination in the use of frequency bands, there are large differences in the amount of spectrum allocated to operators in different countries and even to operators within the same country. In some cases, differences can be justified between countries due to different market conditions, but it is harder to understand differences within countries. Very often, these are due to the fact that the incumbent operator with a mobile subsidiary enjoys access to both analogue and digital frequency bands, as it is the case in Austria, Denmark, Finland, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

Given the growth rates exhibited by GSM operators throughout Europe, it is likely that lack of availability of spectrum could inhibit market growth. Network operators are able to alleviate the problem of a lack of new spectrum, up to a point, by introducing micro/pico cells, particularly in urban areas which allow greater frequency re-use and hence can accommodate a higher degree of traffic loading on the network. There is a limit, however, beyond which further investments in network infrastructure cannot provide for a more efficient use of the radio frequency spectrum. In this case the only solution seems to be availability of more spectrum.

It would appear that a further element impeding fair allocation of frequency is the fact that publishing of existing and intended future frequency allocation does not appear to be obligatory in most countries, despite the requirements of the Community directives.

3.2.4 Transposition/Implementation issues

Key issues of Directive 87/372/EEC

While a clear deadline is fixed by Article 1 (1) of the Directive concerning allocation of the "core band", no such date is established concerning the obligation to make available the remainder of the band reserved for GSM: allocation of the "extension band" is left for assessment by Member States in accordance with the principle of subsidiarity.

An indication is, however, provided by Recital 11 of the Directive which states that "on the basis of present technological and market trends it would appear to be realistic to envisage the exclusive occupation of the 890-915 and 935-960 MHz frequency band by the pan-European system within 10 years of 1 January 1991". The date of 1 January 2001 is, therefore, *suggested* to Member States as a realistic deadline for occupation of the whole reserved band, given market and technology tendencies early in 1987. Since more recent surveys confirm that a clear move towards digital technologies is under way throughout Europe and that market demand is buoyant, such an indication seems to remain valid.

Even in the lack of a binding date under the Directive, the Commission is of the view that **Member States should identify clearly time limits for the phasing out of analogue systems**, bearing in mind that such phasing out should not be excessively delayed. The Commission is aware of difficulties linked to the closure of analogue services, but it is also concerned that development of pan-European cellular digital mobile communications should not be hampered.

The lack of a deadline in the Directive does not affect the main obligation on Member States under Article 1(2) of the Directive, which **is to draw up plans to allow expansion of GSM into the complete band** as quickly as possible, according to commercial demand and to communicate these plans to the Commission in accordance with Article 4(2). In this context, **it is essential that Member States carry out an accurate assessment of commercial demand, repeated at regular intervals,** and of the related need for expansion of frequencies, with a view to drawing up and reviewing allocation plans, in order to ensure effective spectrum management. Member States should, therefore, ensure that effective mechanisms are in place to measure evolution of demand at regular intervals. Only if such mechanisms are in place can allocation plans be drawn up and reviewed in an effective way, including identification of a deadline for phasing out analogue system and of a time-schedule be fixed for gradual assignment of new frequencies to GSM.

This approach is confirmed by the Mobile Directive (96/2/EC): under Article 3b of Directive 90/388/EC, as amended by the Mobile Directive, Member States must **publish every year** or make available on request the **allocation scheme of frequency, including plans for future expansion** of such frequencies, according to the scheme described in Annex. This designation must be **reviewed** by Member States at **regular appropriate intervals**.

The Commission considers that establishment of final deadlines for closing analogue systems is not sufficient to implement the requirement of Article 1(2) of the Directive. In order to ensure legal certainty and transparency to market players, **Member States are**

required to lay down precise plans and to review them regularly. The Commission takes the view that revision of plans should take place at least every year. Plans should include a clear time-scale for further expansion and identify intermediate dates and steps for migration; they should be communicated to the Commission.

The Commission will investigate closely whether the obligation of publishing of existing and planned frequency allocation scheme has been clearly set out in the national regulatory framework and implemented by Member States.

Status of transposition

The Directive has been transposed by a majority of Member States by adoption of specific regulations (details in Annex 1). In some other countries reservation of frequencies has been ensured either by decision of the national regulatory authorities responsible for frequency allocation (Portugal, Finland) or through the published National frequency allocation table, and subsequent licensing decisions (Sweden). In one case (United Kingdom) no legislation has been enacted to implement the Directive, since the existing legislation was considered sufficient to permit provision of GSM.

In general, most of the Member States had difficulties in meeting the transposition deadline, and at an early stage the Commission had to open infringement proceedings against a number of Member States for non-communication of national implementation measures. Proceedings were only closed against notification of relevant implementing measures.

Transposition is, however, only part of the process necessary to ensure implementation of the Directive. Member States have also an obligation to ensure effective application of transposition measures, and it is part of the Commission's responsibility to ensure that Member States fulfil this obligation.

In particular, the requirement of Article 1(1) of the Directive, under which Member States have to ensure that the 905-914 and 950-959 MHz frequency bands ("core band") or equivalent part of the band mentioned in paragraph 2 are reserved exclusively for GSM service by 1 January 1991, has been implemented in all Member States, even though with some delay. Only one country (Ireland) has reserved "an equivalent part". In all Member States at least two operators have been granted licences and frequencies to provide services nation-wide.

As far as Article 1(2) of the Directive is concerned, legislation is in place which reserves the whole of 890-915 and 935-960 MHz bands exclusively for GSM virtually in all Member States. However, only four countries (Germany, France, Luxembourg, United Kingdom) have actually assigned all relevant frequencies to GSM operators. In these countries coexistence of analogue and digital networks is not problematic since GSM and analogue systems (where existing) do not operate in the same band. In two other Member States, although no analogue or other system is reported to be operational, some frequencies remain to be assigned: Belgium, with 914-915 and 959-960 MHz bands to assign, and Greece, where only 2x10 MHz of the overall band have been assigned to two GSM providers, the remaining 2x5 MHz being free and available for future operators.

In the remaining Member States, full occupation of the above-mentioned range of frequencies seems to be delayed mainly by the existence, in the bands reserved for GSM,

of analogue services like NMT900, TACS and E-TACS (Denmark, Spain, Ireland, Italy, Netherlands, Austria, Sweden, Finland), or of cordless systems like CT1 or SLT1 (Denmark, Italy, Netherlands, Austria, Portugal, Sweden, Finland), or of fixed service systems (Spain). In these countries, given the wide geographical coverage and the sizeable and still increasing number of subscribers (though at a slower pace than GSM subscriptions), national authorities seem reluctant to take short term initiatives to reduce spectrum allocated to analogue systems and phase these systems out. Plans are said to be in place in several countries for closing existing analogues networks, and virtually all Member States have set out the date for phasing out analogue systems (ranging from 1.1.2001, in the case of Spain, to 2007-2012 in Finland) or are preparing to take a decision on the issue (Netherlands). However, apart from these deadlines, **only a few countries (Austria and Sweden) have provided the Commission with detailed information about the time-scale** for the migration of the concerned frequencies to GSM, as required by the Directive. Information on frequency assignment and licensing is provided by Tables 1 and 2.

3.3 Significant Issues

The phasing out of the analogue systems needs to be addressed in a specific way, in consultation with the national regulatory authorities and the relevant market players. With respect to the existing GSM service, the main concern is that, in the absence of a compulsory deadline in the Directive for the phasing out of analogue systems, transition from the analogue use of GSM frequency bands is proceeding at uneven paces in Member States, and generally very slowly. This issue is also linked to the setting of tariffs in the Member States. At present there are wide differences between tariffs set in all the Member States. This is a key factor in the rate of migration from analogue to digital systems and hence the clearing of the GSM reserved bands.

One of the reasons for the slow migration from analogue to digital is that both NMT and TACS analogue services tend to be highly profitable and still represent large investments for operators. The situation which now occurs is that new entrants, who do not have access to the analogue frequency pool of incumbent operators, have to implement technical solutions to accommodate increasing traffic densities within spectrum allocations in some instances as small as 5.4 MHz.

The Commission will continue to support the migration to digital systems. The crucial question which needs to be addressed is how to ensure the phasing in of (additional) digital frequency bands and equipment while at the same time taking account of the state of development of, and investment in, current mobile systems, including analogue networks. In particular, the Commission will continue to monitor the situation in Member States in order to determine whether:

- incumbent operators tend to support or restrict the migration to digital systems;
- incumbent operators use their monopoly use of analogue frequencies to strengthen their already dominant position and also slow down the migration to digital technologies;
- new GSM operators are on an equal competitive footing with the incumbent GSM and analogue service operators;

- it is realistic and desirable to set deadlines by which digital services should have the exclusive disposal of frequency bands which are currently partly used by analogue services.

The Commission will review, in co-operation with the NRAs, their plans to allocate the full range of frequencies set out in the Directive, in particular raising the issue of the phasing out of the analogue use of the GSM bands. In case Member States do not communicate their plans, the Commission will open infringement proceedings.

In phasing out analogue service, Member States should ensure that consumers are given **clear and transparent information** by the operator marketing these services of any time limits attached to the continuation of the service.

4. DIRECTIVE 90/544/EEC

4.1 Background

Paging is the longest established form of mobile communications in Europe. ERMES was developed as a European digital paging system in the same way that GSM was developed for the cellular telephony market, i.e. to provide greater functionality, intelligence and pan-European roaming.

The Community launched similar initiatives as were taken for the digital mobile communications service to encourage the introduction of ERMES in the Member States. Council Recommendation 90/543 made proposals for the co-ordinated introduction of pan-European public radio paging in the Community. In addition Council Directive 90/544/EEC reserved the frequency bands for such a system. The standardisation process, undertaken in ETSI, also received considerable support from the Community.

4.2 Current Situation

4.2.1 Market Development[29]

Globally, paging has emerged in the 1990s as an important sector in the total market of mobile communications. The world paging market is estimated at approximately 120 million units-in-service at the end of 1996. About 38% of all pagers are in North America where the market has been growing at an average rate of nearly 25% per year for the past seven years. Today there are 44 million pagers, giving a penetration rate of 15% of the population. Another 56% of the total base are in the Asia-Pacific region, which is home to some of the world's highest paging networks, such as China, Korea and Japan. The total number of pagers in use in this region amount to 67 million. Some of the penetration rates are also very high, with countries like Singapore reaching more than 30% penetration.

[29] Sources: see footnote 28. Data provided reflects status at 1 January 1998, unless otherwise indicated.

On the other hand, the paging market in Europe seems underdeveloped compared with the rest of the world. The European penetration rate is only 1.5% with a total number of 5.8 million pagers in Western Europe. In some countries the number of subscribers has increased significantly (France, Germany, UK, Portugal, Netherlands), whereas in other countries the market would appear to be stagnant (Denmark, Greece). The reasons why Europe lags behind vary, depending on the commentators, but most of them agree that the main reasons are historical in nature, i.e. that paging in the US was introduced much earlier than cellular telephony (as compared to Europe) and marketed by stand-alone paging operators whose livelihood depended on their core business, as opposed to the European telecommunications operators for whom paging was only a secondary activity.

ERMES licences have been granted in nine Member States (Denmark, Germany, Greece, France, Italy, Netherlands, Finland, Sweden, United Kingdom). In addition to that, in no country have plans been drawn up to assign the complete band, largely owing to the lack of clear obligations and compulsory deadlines under the Directive. Analogue paging networks are also in operation in all Member States, mainly based on the POCSAG technology. They operate over a different frequency band except in Austria, Finland and Sweden. The number of operators runs from one (Greece, Italy, Finland) to 440 (Finland).

So far, the mass acceptance and implementation of ERMES services across Member States has been somewhat delayed. Among the possible reasons the following can be identified: i) some existing paging operators still have excess capacity on their analogue networks, and foresee no major costs or service benefits from introducing ERMES; ii) most of the major markets had not until very recently licensed ERMES operators, which has reduced the attractions of the roaming facility; iii) the success of cellular telephony, and in particular GSM, may have absorbed some potential ERMES customers; iv) there have been technical difficulties, especially interference with adjacent channels utilised by cable TV operators; v) national frequency management bodies seem to have been reluctant to release spectrum.

There are now signs that ERMES is becoming more successful. Over the past year ERMES has gained strength and licences have been granted in several Member States, with a promise of more networks being opened. In spite of the fact that Europe lags behind the rest of the world in pager penetration rates, the European market has one of the highest untapped potential for paging. It is predicted that the market could grow by 25% per annum in Europe over the next few years. The total number of users could triple by the beginning of the 21st century, with potential for penetration levels of 10% in later years, if the right market conditions are created to sustain this growth.

Even though this growth will have to be shared between several technologies owing to considerable competition between different systems in this market (FLEX, analogue POCSAG), ERMES is gaining increasing support from the paging industry. It is recognised that ERMES has unique qualifications not only for providing traditional paging services at enhanced quality (e.g. longer messages) but also for supporting emergence of new services (e.g. broadcasting high speed data services with pan-European dimension).

4.2.2 Impact of the Frequency Directive

A recent study on the effectiveness of the ERMES Frequency Directive revealed mixed perceptions of its impact[30]. A majority of regulators did not consider that the Directive had contributed to the early introduction of ERMES in Europe, while a majority of paging operators, manufacturers and users have agreed that the Directive had been successful in promoting a pan-European paging service, and that there were clear incentives on using specified frequency bands and implementation dates.

4.2.3 Spectrum Availability and Management

In all Member States national regulatory measures have been adopted giving protection and priority to four channels in the 169.4 to 169.8 MHz range for ERMES (see chapter 4.2.5). However, not all channels have been actually assigned, allegedly for lack of sufficient commercial demand. The major difficulty that had been encountered for ERMES spectrum allocations (see Annex 2) seems to have been the problems caused by joint usage of the same frequencies, associated with interference between ERMES transmitters and cable TV signals, particularly in Germany and Austria.

4.2.4 Transposition/Implementation issues

Key issues of Directive 90/544/EEC

The remarks made in section 3.2.4 apply, *mutatis mutandis*, to Directive 90/544/EEC.

Status of transposition

The Directive has been transposed by a majority of Member States by adoption of specific regulations (details in Annex 2). In some other countries reservation of frequencies has been ensured either by decision of the national regulatory authorities responsible for frequency allocation (Portugal, Finland) or through the published National frequency allocation table, and subsequent licensing decisions (Sweden). In one case (United Kingdom) no legislation has been enacted to implement the Directive, since the existing legislation was considered sufficient to permit provision of ERMES.

The requirement of Article 2(1) of the Directive, under which Member States must give protection and priority to four channels in the 169.4 to 169.8 MHz range for the pan-European land-based radio paging service by 31 December 1992 at the latest (and, preferably, to the following channels: 169.6 MHz, 169.65 MHz, 169.7 MHz and 169.75 MHz) has been transposed in all Member States, with some variations. In particular, on the basis of information collected from national regulators, which in some cases is not fully complete or accurate, the following overview can be drawn:

- in seven Member States (Denmark, Greece, Ireland, Italy, Austria, the Netherlands and Portugal), the transposition measure/allocation decision has explicitly reserved four channels for ERMES systems (three in the Netherlands), which are in three cases the same as those recommended by the Directive. In some cases the whole band is also in principle reserved fully to ERMES, although it is laid down that the

30 See footnote 28.

remaining channels of this band will be made available when necessary, taking into account expansion of the service. Of these countries only Denmark, Greece, Italy, and the Netherlands have subsequently assigned channels to operators.

- in five further Member States (Belgium, Germany, Spain, France, Luxembourg) the transposition measures reserve the band for ERMES, but without specific reference to any channels. Channels have been subsequently assigned in Belgium, Germany, France.

- in Finland, Sweden and United Kingdom, channels have been reserved (three channels in Finland) and then assigned to ERMES systems in various ways.

The description above is to be read in conjunction with information concerning the effective implementation of the Directive. Despite adoption of legal acts, implementation of the directive, including frequency assignment, has proved difficult in several countries, owing apparently to the lack of sufficient demand for ERMES services. This alleged lack of commercial demand can be explained, in some cases, by the existence of analogue paging systems in the national markets, often licensed at a time when the Directive had already entered into force.

ERMES licences have been granted in Denmark (two), Germany (three), Greece (one), France (three), Germany (three), Italy (one), Netherlands (two), Finland (one), Sweden (two), United Kingdom (four). In Belgium, Spain, Ireland, Austria and Portugal there are still no ERMES operators, but the grant of some licences is envisaged. In the United Kingdom licences have also been granted recently allowing to use the FLEX standard. In **none of the Member States have plans been drawn up to make the whole band available**; the decision is left for future assessment. Information on frequency assignment and licensing is provided by Table 3.

4.3 Significant Issues

Other technical solutions are currently available for paging, in some cases with comparable features. For example, some Member States are licensing the Motorola based FLEX™ technology which is now coming into direct competition with ERMES. There is **no** evidence to substantiate the view that ERMES is more expensive than FLEX or POCSAG. On the contrary, estimates show that the ERMES pagers themselves are comparable in price to FLEX or POCSAG quality pagers and the network components (base stations and switches) are also similar in cost.

The frequency band is a critical factor. At equal power levels, a high speed network operating at 169 MHz (e.g. ERMES at 6400 bps or FLEX at 6250 bps) requires as many base stations as a low rate 300 bps FLEX or POCSAG network operating at 900 MHz. In other words, the investment in an ERMES high speed network operating at 169 MHz would require the same investment as a low speed FLEX network at 450-900 MHz. Hence the interest in the 169 MHz band.

The existence of a Europe-wide harmonised frequency allocation for ERMES is a very attractive element and one of the reason for its success. In this context, pressure is growing from non ERMES operators for the release of the unused channels which are "reserved" in the ERMES Frequency Directive for use with other technologies..

The Commission will continue to encourage the full implementation of the ERMES Directive, in particular by monitoring the channel utilisation plans of the Member States.

The Commission has initiated a study on the future of the paging market, investigating in particular growth prospects and likely scenarios for evolution of the paging market in Europe.

5. DIRECTIVE 91/287/EEC

5.1 Background

The Digital Enhanced Cordless Telephone (DECT) system has been developed and is now commercially available. Thanks to the extreme flexibility of the technical standards, the DECT technology can be used to provide cordless access to a range of networks, both mobile and fixed. In this context, DECT can be used either for offering "limited" mobility in urban areas (Cordless Telephone Mobility, CTM) as a low cost alternative to full-fledged cellular mobile systems which is particularly attractive in densely populated areas, or as access technology in wireless local loop configurations (WLL), where it can provide high capacity transmission links. DECT products have been on the market only since 1994, but have achieved success particularly in the residential cordless telephone and cordless PBX domains. Its development has been further enhanced by adoption of Common Technical Regulations under Directive 91/263/EEC.

As for GSM and ERMES the development of DECT has been assisted by policy measures taken by the community in 1991 to encourage the introduction of DECT in the Member States. Council Recommendation 91/288 made proposals on the co-ordinated introduction of DECT into the Community. Council Directive 91/287 reserved the frequency bands for such a system. In addition, standardisation activities have been supported by the Commission by means of standardisation mandates to ETSI.

5.2 Current Situation

5.2.1 Market Development[31]

DECT was engineered as a successful product of European co-operation and is developing well. Between 1994 and mid-1997, more than 50 suppliers shipped more than 8 million units. The most successful application of the DECT technology has been for residential cordless telephones which accounts for 7 million units out of the total shipments. DECT based wireless PBXs are also available in the majority of Member States.

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[31] Sources: see footnote 28. Data provided reflects status at 1 January 1998, unless otherwise indicated.

Since DECT was conceived to be a flexible radio access technology, one of its target applications was to provide the public with limited mobility access capability to fixed networks. This was seen to be particularly attractive in densely populated areas, for instance in shopping centres, petrol stations etc. This application of DECT remains underdeveloped with one operational DECT network in Finland, two licenses granted in France and one in Italy.

The potential for introducing the DECT technology at commercial level remains largely under-exploited. It is expected that the cordless telephone applications for the residential and cordless PBX markets will continue to be successful. The DECT Forum predict that 7 million units will be sold in 1997 and that by the turn of the century, annual shipments will reach more than 30 million units.

DECT's future as a public networking technology is unclear. It does not have the intelligent networking abilities of GSM or DCS 1800. A number of operators are currently carrying out trials which combine DECT with other technologies (most commonly with GSM or DCS 1800). DECT would then complement GSM in high traffic density zones and pico-cellular indoor environments. In this respect, it would appear that some operators are preparing to launch commercially DECT in dual mode during 1998.

The future for DECT as a WLL technology is also not fully clear. The potential is certainly there. Wireless local loops are seen as a cost effective way of extending the fixed network, particularly in urban areas, and can shorten waiting lists dramatically. DECT could have competition in this field from such technologies as CTM and CT2. Outside Europe, systems such as the Public Access Cordless Systems (PACs) and the Personal Handyphone System (PHS) seems to provide serious competition to DECT.

5.2.2 Impact of the Frequency Directive

The views of NRAs and manufacturers support the notion that the DECT Frequency Directive has contributed to the extensive introduction of DECT and had improved the European market opportunities. Market opportunities ought to be realised more quickly. Also, the Directive had encouraged less expensive equipment as a result of the larger market for a single standard, and by providing a clear incentive to use a specified frequency band with implementation dates.

Some manufacturers suggest that there had been only limited success in achieving the aim of promoting Pan-European DECT services for customers, owing to two main reasons. Firstly, lack of clarity over the regulatory status of DECT-based wireless in the local loop services is limiting market development, particularly in relation to the development of public services DECT networks. A second reason would appear to be the delay by some national regulatory authorities to develop DECT regulations, again particularly in respect to public services.

5.2.3 Spectrum Management and Availability

Operators and manufacturers have expressed concerns that the current frequencies allocation is limiting demand and that this is closely related to national spectrum management. Other points of concern include the view that some national procedures are

"minor deterrents" and that spectrum availability for public service users is being generally delayed.

There is a general concern in CEPT on the spectrum available for DECT studies are being undertaken in conjunction with the planning for FLMTS/UMTS. There is also pressure to extend the currently allocated band 1800-1900 MHz to 1920 MHz.

5.2.4 Transposition/Implementation issues

The Directive has been transposed by a majority of Member States by adoption of specific regulations (details in Annex 3). In some other countries reservation of frequencies has been ensured either by decision of the national regulatory authorities responsible for frequency allocation (Portugal, Finland) or through the published National frequency allocation table, and subsequent licensing decisions (Sweden). In one case (United Kingdom) no legislation has been enacted to implement the Directive, since the existing legislation was considered sufficient to permit provision of DECT.

It seems that the requirement of Article 2(1) of the Directive, under which Member States must designate the frequency band 1880-1900 MHz for digital European cordless telecommunications by 1 January 1992, has been implemented by all Member States. In some countries, however, the band reserved for DECT is partly occupied by other systems (mainly military telecommunications networks, or digital fixed links).

5.3 Significant Issues

- Whilst interest in the licensing of DECT operators is increasing, so far only a few operators have been licensed to provide DECT services, in some cases already enjoying a dominant position in the public switched telephone network market. The Commission is concerned that competition is ensured for DECT services and has already taken action against certain member States.

- In most countries DECT is used as a terminal technology rather than as a service provided to third parties.

- There was consensus that the Directive has contributed to the introduction of DECT across the Member States. The Commission will continue to encourage the use of the DECT standard.

6. CONCLUSIONS

6.1 General

There is consensus that **reservation of frequency band**, harmonised at European level, through a binding instrument such as a Directive, **has contributed to the introduction of GSM, ERMES and DECT in Europe**. Success of the three services has been uneven, with considerable variations also between Member States, owing not only to regulatory aspects but also to market conditions and commercial demand.

In general, the Directives have proved particularly effective when clear implementation deadlines have been fixed: this is the case for the designation of the "core band" for GSM, of the four channels in the 169.4 to 169.8 MHz range for ERMES and of the frequency band for DECT, which have been fully transposed and implemented in all Member States. On the other hand, the absence of binding provisions concerning full occupation of whole range of frequencies reserved (for GSM and ERMES) is to be seen as a major reason for uneven implementation by Member States: different deadlines, or no deadline at all in some cases, have been set out by Member States, often giving rise to slowness and delays in making available the necessary frequency, with special reference to GSM.

The Commission will take account of these elements when reviewing its current spectrum policy with a view to identify the best solutions for harmonised allocation of frequencies.

6.2 Implementation

The three Directives have been transposed by all Member States either by means of regulatory measures, or through decisions of the national regulatory authorities responsible for frequency allocation. As regards **practical implementation**, however, problems have emerged in some countries concerning full occupation of the reserved bands.

In particular, as far as the GSM and the ERMES Directives are concerned, where the obligation is imposed on Member States to drawn up **plans to allow expansion of GSM and ERMES into the complete band** as quickly as possible, according to commercial demand and to communicate them to the Commission, these plans have been notified only by a limited number of Member States so far (see Annexes 1 and 2).

The Commission is of the view that, despite the lack of a mandatory deadline in the GSM and ERMES Directives for full occupation of the entire band reserved, **this obligation has to be fully complied with by Member States**. Member States are therefore required, also in accordance with the requirements of Article 3b of Directive 90/388/EEC as amended by the Mobile Directive, to lay down plans for future expansion of such frequencies and to review them regularly, at least every year. Plans should include a clear time-scale for further expansion and identify intermediate dates and steps for migration; they should be communicated to the Commission.

The Commission will continue to monitor implementation of the Frequency Directives, putting a particular emphasis on the need to ensure that all obligations are satisfied.

In order to ensure full implementation of the Directives, the Commission will use all its powers, including recourse to its formal powers under the Treaty to launch formal infringement procedures against Member States.

6.3 Other issues: spectrum management, licensing and safety of frequency usage

As far as ***spectrum management*** is concerned, the Commission notes 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 the three systems, for reasons which are not always clear.

The Commission, while reaffirming that **frequency assignment is a matter for the national authorities to decide, in conformity with EC law** (often dealt with in the framework of licensing procedures), recalls the main principles applicable under the Community legal framework

- Under Article 3a of Directive 90/388/EEC as amended by the Mobile Directive (96/2/EC) "*as far as frequencies are available*, member States shall award licenses according to open, non-discriminatory and transparent conditions. Member States may limit the number of licenses for mobile and personal communications systems to be issued only on the basis of essential requirements and only where related to the lack of availability of frequency spectrum and justified under the principle of proportionality." In addition to that, Article 10(1) of Directive 97/13/EC lays down that Member States "may limit the number of individual licences for any category of telecommunications services and for the establishment and/or operation of telecommunications infrastructure, only to the extent required to ensure the efficient use of radio frequencies (...)". It follows that only the lack of sufficient spectrum, when justified under the principle of proportionality, can be invoked to limit the number of licences granted. Therefore, **when frequencies are available, they have to be assigned.**

- These principles should be read in conjunction with other essential principles under EC law. In particular, when granting licenses Member States should also take into account, under Article 2(4) of Directive 90/388/EEC as amended by the Mobile Directive, "the requirement to ensure *effective competition* between operators competing in the relevant markets" and should give, under Art. 10(3) of Directive 97/13/EC, "due weight to the need to *facilitate the development of competition* and to *maximise benefits for users*". Frequencies should be granted in an adequate way so as **to allow real competition between operators**, bearing in mind that there is no unique solution: Member States have to identify the most appropriate assignment in the specific national context on the basis of a thorough evaluation of market needs. An inadequate frequency assignment could in fact result into increasing the operators' roll out costs of the networks (especially in urban areas where the effort to acquire sites might be substantial, given planning rules and the cost of negotiating agreements with a great number of individual owners and landlords) thus affecting, especially in the case of new entrants, its ability to compete in the market.

The Commission takes the view that, when granting frequencies through licensing procedures, Member States should make sure that **all available frequencies are assigned**, in so far as appropriate allocation decisions have been made. In doing so they should ensure **efficient use of the spectrum** and should allow operators to **compete** in an effective way in the relevant market.

Member States should review the extent to which claims of shortage of frequency are justified as against inefficient use of frequency by operators. Member States should also verify that frequencies granted are **actually used** for the intended purposes. They should report to the Commission on these matters.

The Commission will prepare a **report on the implementation of the Mobile Directive.** In this context, the measures adopted by Member States on frequency planning and management will be further reviewed.

As far as ***licensing*** is concerned the Licensing Directive, although it does not aim at full harmonisation of national licensing procedures, is expected to introduce more homogeneity between the latter. If, in accordance with the principle of subsidiarity, Member States are free as regards, for instance, choice of procedures and level of licensing charges, they have nevertheless to comply with the relevant principles laid down by the Directive (such as: priority to be given to "lighter" authorisation regimes; granting of individual licences only in specific circumstances; maximum duration of the licensing procedures; licence fees to reflect the administrative costs incurred in the issuing of the licence, etc.).

The Commission notes that, in practice, divergent authorisation procedures for voice telephony and public telecommunications networks have been implemented by Member States, although virtually in all cases individual licences are required to apply for scarce resources, i.e. numbers and/or frequencies. In some Member States auctioning systems are under consideration or already being put in practice for attributing certain frequencies.

The number of authorisations granted also varies between Member States, which is partly to be explained by the different liberalisation dates and the size and opportunities of each national telecommunications market. In the same way, fees vary widely from country to country.

The Commission will review by 2000, on the basis of the results of the application of the Licensing Directive, the extent to which licensing procedures can be improved and harmonised within the Community.

Finally, as regards ***safety of frequency usage***, even though this issue is not covered by the current Communication, it is worth mentioning it given its growing sensitiveness and importance. Work is being carried out by the Commission on the subject, and a Scientific Steering Committee has been set up for this purpose, which has recently provided an

opinion on the possible health effects from exposure to electromagnetic fields (0Hz-300GHz)[32].

The Commission will consider reviewing whether safety of frequency usage is adequately addressed by the current regulatory framework.

6.4 Particular - GSM

- The Commission reviews and assesses national plans, to be prepared by NRAs, to allocate the full range of frequency set out in the Directive, in particular raising the issue of the phasing out of the analogue use of the GSM bands. In the lack of notification of plans, the Commission will open infringement procedures.

- The Commission is of the view that member States should ensure that adequate and transparent information is provided to consumers as to the phasing out of the analogue services.

- The Commission will consider discussing with NRAs about a mechanism to assess the effective use of frequencies already granted.

- The Commission will considers mechanisms to ensure binding designation of frequencies to be reserved for DCS 1800.

6.5 Particular - ERMES

- The Commission reviews and assesses national plans, to be prepared by NRAs, to allocate the full range of frequency set out in the Directive, in particular raising the issue of the phasing out of the analogue use of the ERMES bands. In the lack of notification of plans, the Commission will open infringement procedures.

- The Commission is carrying out a study on the future of the paging market, investigating in particular growth prospects and likely scenarios for evolution of the paging market in Europe.

- The Commission will continue to encourage use of ERMES.

6.6 Particular - DECT

- The Commission will consider investigating the extent to which existing frequencies are sufficient and if more frequencies should be made available, given the market demand for DECT systems.

- The Commission will consider reviewing the frequency implications of integration of GSM and DECT.

- The Commission will continue to encourage use of DECT.

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[32] Opinion adopted at the meeting of the Scientific Steering Committee of 25-26 June 1998.

ANNEXES

(DATA AT 1 JANUARY 1998)

ANNEX 1

COUNCIL DIRECTIVE 87/372/EEC: NATIONAL REGULATORY FRAMEWORKS

Belgium

Transposition has been achieved by Royal Decree of 21 May 1991 (*Arrêté Royal relatf à l'attribution des fréquences destinées au service mobilophone pan-européen*, published in the Moniteur Belge of 5 September 1991) and by Royal Decree of 7 March 1995 concerning provision of GSM services (now repealed by the Royal decree concerning GSM of 24 October 1997). The 1991 Decree allocated 905-914 and 950-959 MHz frequencies to GSM, in accordance with article 1 of the directive, and called for the whole of the reserved band (890-915 and 935-960 MHz) to be attributed by 1 January 1996 at the latest; the 1995 Decree has completed the attribution.

Frequencies currently allocated to GSM include 890-914 and 935-959 MHz. It would appear that that there is still some band available for further licences (880-890 and 925-935 MHz). There is one analogue system (NMT450), operating in a different band (451.3-455.74 and 461.3-465.74 MHz), with an unknown expected lifetime since there are still over 300.000 subscribers.

Denmark

The directive has been transposed by the Radiocommunications Act n. 297 adopted on 22 April 1992. Frequencies are currently allocated as follows: 890-895.6 and 935-940.6 MHz to analogue NMT900, 896-914 and 941-959 MHz to GSM, and 914-915 and 959-960- MHz to cordless telephone system CT-1. The two analogue systems are expected to be phased out by 2005, but no plans have been communicated to the Commission on that.

Germany

Transposition has been achieved by the Law for Telecommunications Equipment of 3 July 1989 (*Gesetz über Fernmeldeanlagen (FAG) in der Fassung der Bekanntmachung*, BGBl. I S. 1455). There is no analogue system in the band devoted to GSM.

Greece

The National Allocation Table, issued by the Ministry of Transports and Communications, was revised in 1994 (FEK 157/B/1994). Frequency band 890-915 and 935-960 MHz are reserved to GSM. Of this band, 10 MHz have been allotted twice in the two relevant bands. There are no analogue systems.

Spain

The directive has been transposed by Order of 29 December *1989 (Cuadro Nacional de Atribuciones de Frecuencias*, C.N.A.F.), by Royal Decree 1486/1994 of 15 July 1994 concerning regulation on GSM, and by Order of 26 September 1994 concerning tender for the granting of GSM licences.

The bands 890-915 and 935-960 MHz are reserved for GSM, although full occupation of the band will be reached gradually: 905-915 and 950-960 were moved to GSM in June

1995, 899-905 and 944-950 MHz in January 1996. A remaining 890-899 and 935-944 MHz band should be attributed to GSM by January 2001. Apparently, the main problems with implementation of the directive are linked to occupation of the concerned band by fixed service systems. There are still two analogues services: TACS, which operates in 890-905 and 935-950 MHz, is expected to be phased out by 1 January 2007, and TMA450 (464-468 and 454-458 MHz) should be closed by 31 December 1997.

France

The directive has been transposed by Decree of 27 April 1987 which modifies the national frequency allocation table established by the *Comité de coordination des fréquences*, under which the whole of the band 890-915 and 935-960 MHz has been reserved and assigned to GSM operators.

There are two analogue systems, which make use of a different band: NMT450 (441.5-443.55 and 451.5-453.55 MHz), operated by SFR, and Radiocom2000 (414.8-418 and 424.8-428 MHz; part of 174-223 MHz; 884.8-888 and 929.8-933 MHz in some big towns), operated by France Télécom.

Ireland

The directive has been transposed by European Communities / Co-ordinated introduction of public cellular digital land-based mobile communications GSM Regulations 1995 (*Statutory Instrument n. 416 of 8 December 1994*) , under which frequency band 900-915 and 945-960 MHz are reserved to GSM.

Frequency band 890-895 and 935-940 MHz is currently allocated to the analogue system (TACS); an indicative date of December 2003 exists for TACS to cease operation. The frequency band 895-900 MHz and 940-945 MHz will be allocated to the winner of the third mobile telephony licence (i.e. 2x4.8 MHz). The third mobile operator will also be allocated 2x 14.4 MHz of DCS 1800 spectrum. No plans for full occupation of the band have been have been communicated to the Commission.

Italy

Transposition has been achieved by Ministerial Decree of 4 May 1993, by Ministerial Decree of 3 June 1997 and by Ministerial Decree of 20 March 1998. According to the latter, which amends note 58 of the national frequency plan, frequencies 894,5-913,7 MHz and 939,5-958,7 MHz have been made available to GSM as from 15 April1998, while 892,3-813,7 MHz and 937,3-958,7 MHz will be made available form 15 October 1998. Before, only frequencies 897.1-913.7 and 942.1-958.7 are exclusively assigned to GSM. The remaining band which is reserved to GSM but is still currently allocated to analogue, may be attributed for exclusive occupation to GSM on the basis of commercial demand.

The 914-915 MHz and 959-960 MHz band is occupied by a cordless telephone system using the standard CT-1, which is currently being phased out to accommodate GSM. There is also one analogue system (E-TACS), provided by Telecom Italia Mobile, operating in the 880-894.5 and 925-937.5 MHz band. It is expected to be phased out by 31 December 2005, as set out by the July 1997 Decree. However, detailed plans for the occupation of the whole of the band have not been yet communicated to the Commission.

Luxembourg

The directive was transposed by decision of the *Administration des Postes et Télécommunications* of 20 March 1990, under which frequencies 905-914 and 950-956 MHz were reserved immediately to GSM. The Commission has no information about subsequent allocation of the entire range prescribed by article 1(2) of the Directive.

Netherlands

The directive was transposed by the Telecommunications Act of 1988 (WTV - *Wet of de Telecommunicatievoorzieningen*, Stb. n. 552/1988), as modified by the Law of 16 June 1994 (Stb. n. 628/1994), by the Mobile Telecommunications (GSM) Decree (*Besluit mobiele telecommunicatie GSM*, Stb. n. 629/1994) and other secondary legislation of the same year.

Frequencies allocated to GSM include, in principle, the whole of the range laid down by article 1(2) of the directive. However, part of the "extension" band is currently occupied by an analogue service (NMT900) operated by KPN Telecom. The analogue service will be phased out before 1 January 2000. As from 1 July 1998 KPN Telecom will have to make available 18 channels out of this band, which will be reassigned to the two GSM operators (KPN Telecom and Libertel); between 1 October 1999 and 31 December 1999 the remaining 23 channels will be reassigned to the same operators. As from 1 January 2000 KPN Telecom will use 62 of the total of 119 GSM channels and Libertel 57The 914-915 MHz and 959-960 MHz band is used for CT-1 applications.

Austria

Transposition has been achieved by Ordinance BGBl. n. 313/1996 of 5 July 1996, which sets out a gradual allocation of frequencies to GSM. Current allocation covers 898-914 and 943-959 MHz; by 1 January 1998 898-903 and 943-948 MHz was moved to GSM, and by 1 January 2005 the whole of the band foreseen by the directive will be attributed to GSM, after phasing out existing analogue services.

There are currently two analogue systems: TACS, which operates on 890-898 and 935-943 MHz, and SLT1 (a relatively small networks, with only 500.000 subscribers) which is operated in 914-915 and 959-960 MHz. They are expected to be phased out by 1 January 2005.

Portugal

On 3 February 1994, in accordance with the powers granted by Decree-law 283/89, the *Instituto des Comunicações de Portugal* reserved frequency bands for pan-European digital cellular land-based mobile communications in the 850-914 and 935-959 MHz band.

At present the 890-914 and 935-959 MHz frequencies are allocated to GSM. In the medium term full occupation of the whole of the range 890-915 and 935-960 is envisaged, but this will only be possible after the 914-915 and 959-960 MHz bands have been made available from cordless telephones (CT-1). There is also another analogue system operating in the band 450-470 MHz ("C-network" system), for which a licence has been issued until 2007. However, it is probable that the system is closed before, owing to limited number of subscribers.

Sweden

The directive has been implemented through the published National frequency allocation table, and a complex of subsequent licensing decisions and secondary legislation.

Following reallocation of frequency in 1996 and 1997 (decision by the National Post and Telecom Agency of 1 December 1996; decision by the same authority of 25 April 1997, PTSFS:5 1997), the 890-915 and 935-960 MHz band has been re-attributed to GSM. Part of this band, however, is currently occupied by analogue services (NMT: 890-893.1 and 935-938.1 MHz; CT-1: 914-915 and 959-960 MHz). Under PTSFS:5 1997, which contains plans for making frequency band available to GSM, the whole band should be allocated to GSM by 2010 at the latest, but the deadline could be anticipated due to very high commercial demand for GSM. Assessment of the need for further frequency to GSM will be carried out every six months, based on traffic measurements and each operator's forecasts concerning expansion of the service.

Finland

A first set of frequencies were reserved for GSM in August 1987 by decision of the Telecommunications Administration Centre (TAC). Further decisions were taken by TAC in February 1990, December 1993, August 1994, May 1996, November 1996, February 1997, April 1997 and May 1998. TAC's decision of December 1993, which formally transposes the directive, refers to future allocation of additional band to GSM according to commercial demand.

Current frequency allocation is described in the table attached. Part of the band reserved for GSM is currently occupied by analogue services, including NMT900 and CT-1 (914-915 and 959-960 MHz). Frequencies are being gradually transferred from NMT to GSM based on traffic loading information, as set out by the decision of April 1997. NMT900 is expected to be phased out in 10-15 years from now (2007-2012), but no decision has been made concerning phasing out of CT-1.

Besides NMT900, there is another analogue service operating in a different band (NMT450: 463-467.5 / 453-457.5 MHz), and an analogue/digital service (ARP/Mobitex 147.9-149.9 and 152.9-154.9 MHz) which is also based on different frequencies. They should be phased out in 10-15 years the former and after 2000 the latter.

United Kingdom

No laws have been enacted to implement the Directive, since current existing legislation is considered sufficient to permit provision of GSM. This technology and the licensing of GSM base stations is covered by the 1949 Wireless Telegraphy Act, and GSM mobile equipment is exempted from licensing under the Wireless Telegraphy Regulation, which should have been published in September 1997. The provision of GSM network is covered by the 1984 Telecommunications Act.

GSM is operated in the 890-915 and 935-960 MHz frequency band. Both TACS operators are reported to have been migrating TACS traffic out of the primary GSM band over the past year to enable GSM expansion into the whole band. E-TACS systems are also operated in the band 872-888 and 917-933 MHz at present. Both analogue systems are expected to be closed by 2005. The Commission has not, however, received any plan for the phasing out.

TABLE 1 - GSM FREQUENCY ASSIGNEMENT (1 JANUARY 1998 - Update at 30 June 1998 in italics, where available)

Country	Licences granted	Frequencies assigned in the 900 MHz band (total)	MHz assigned in the 900 MHz band (total)	Subscribers*
Belgium	GSM: **- Proximus** **- Mobistar** *DCS 1800:* ***KPN Orange** (June 1998)*	890-914/935-959MHz	2x24 MHz	956.832
Denmark	GSM/DCS 1800: **- Sonofon** **- TDM** DCS 1800: **- Telia** **– Mobilix**	896-904.8/941-949.8 MHz 905-913.8/950-958.8 MHz	2x17.6 MHz	1.260.000[1]
Germany	GSM: **- DeTeMobilNet GmbH** **– Mannesmann Mobilfunk GmbH** DCS 1800: **- E-Plus** **- VIAG Interkom GmbH**	890.1-914.9/935.1-959.9 MHz[2]	2x24.8 MHz	7.800.000[3]

Source: ERC + data provided to the Commission by the National Regulatory Authorities.

* Figures take account of the fact, where appropriate, that DCS 1800 frequencies have also been granted to GSM operators.

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1 Subscribers of Telia and Mobilix (DCS 1800) at 1 January 1998: 0.

2 Frequencies assigned in the 1800 MHz band: E-Plus: 1758.1-1780.5/1853.1-1875.5 MHz; VIAG International GmbH: 1730.1-1752.5/1825.1-1847.5 MHz.

3 Of which 1.000.000 with E-plus. VIAG International GmbH's subscribers at 1 January 1998: 0.

Country	Licences granted	Frequencies assigned in the 900 MHz band (total)	MHz assigned in the 900 MHz band (total)	Subscribers*
Greece	GSM: **- Panafon SA** **- TeleSTET** DCS 1800: **- Cosmote**	890-900/935-945 MHz 905-915/950-960 MHz	2x20 MHz	975.260[4]
Spain	GSM: **- Telefonica Moviles** **- Airtel** *Licensing procedure in progress for DCS 1800.*	899.2-906.8/944.2-951.8 MHz 907.2-914.8/952.2-959.8 MHz	2x16 MHz	3.237.000
France	GSM: **- France Telecom** **- SFR** DCS 1800: **- Bouygues Telecom**	890-915/935-960 MHz[5]	2x25 MHz	5.396.900

4 Cosmote's subscribers at 1 January 1998: 0.

5 Frequencies assigned in the 1800 MHz band: 1770-1785/1865-1880 MHz

Country	Licences granted	Frequencies assigned in the 900 MHz band (total)	MHz assigned in the 900 MHz band (total)	Subscribers*
Ireland	GSM: **- Eircell** **- Esat-Digifone** *GSM/DCS 1800:* *- **Meteor** (June 1998)*	900-915/945-960 MHz *(June 1998: 895-915/940-960 MHz)* [6]	2x15 MHz *(June 1998: 2x20 MHz)*	325.000
Italy	GSM: **- TIM** **- Omnitel**[7] *GSM/DCS 1800:* *- **WIND** (June 1998)*	897.1-905.3/942.1-950.3 MHz 905.5-913.7/950.5-958.7 MHz *(June 1998: 894.5-913.7/939.5-958.7 MHz)*[8]	2x16.4 MHz *(June 1998: 2x19.4 MHz)*	8.340.000
Luxembourg	GSM/DCS 1800: **- PTT Luxembourg** **- Millicom Luxembourg (Tango)**	890.2-894.6/935.2-939.6 MHz 895.2-899.6/940.2-944.6 MHz 900-907.2/945-952.2 MHz 907.6-914.8/952.6-959.8 MHz	2x23.2 MHz	67.210[9]

6 In June 1998 the frequencies 895-900/940-945 MHz were assigned to Meteor, the winner of the third mobile licence, which also obtained 2x14.4 MHz in the 1800 MHz band.

7 The GSM operators are entitled to receive frequencies in the 1800 MHz band.

8 Following adoption of Ministerial Decree of 20.3.1998, amending the national frequency plan, frequencies 894.5-913.7 MHz and 939.5-958.7 MHz have been made available to GSM as from 15.4.1998, while 892.3-813.7 MHz and 937.3-958.7 MHz will be made available as from 15 October 1998. The winner of the third mobile licence will obtain 2x10 MHz within the band 1755-1785/1850-1880 MHz, and another 2x5 MHz as from 1.1.2002.

9 Tango's subscribers at 1 January 1998: 0.

Country	Licences granted	Frequencies assigned in the 900 MHz band (total)	MHz assigned in the 900 MHz band (total)	Subscribers*
Netherlands	GSM: **- KPN** **- Libertel** *GSM/DCS 1800*[10]*:* ***- Telfort*** ***– Federa*** *DCS 1800:* *- sixteen regional operators*	890.2-892/935.2-937 MHz 896.2-899/941.2-944 MHz 903.8-906.2/948.8-951.2 MHz 906.4-913.8/951.4-958.8 MHz *(as from 1.7.1998:* *890.2-893.6/935.2-938.6 MHz* *896.4-899.4/941.4-944.4 MHz* *906.6-910/951.6-955 MHz* *902-906.4/947-951.4 MHz* *910.2-913.8/955.2-958.8 MHz)*	2x16.4 MHz *(as from 1.7.1998:* *2x17.8 MHz)*	1.458.000
Austria	GSM: **- Mobilkom Austria** **- Max Mobil** DCS 1800: **- Connect Austria**	898-914 943-959 MHz[11]	2x16 MHz	914.000
Portugal	GSM/DCS 1800: **- TMN** **- Telecel** **- Main Road**	890.2-898.2/935.2-943.2 MHz 898.2-905.8/943.2-950.8 MHz 906-913.8/951-958.8 MHz[12]	2x23.8 MHz	1.715.156[13]

10 These operators have been assigned frequencies in the "extended band" for GSM (under ERC Decision).

11 Frequencies assigned in the 1800 MHZ band to Connect Austria: 1758.1-1774.9/1853.1-1869.9 MHz.

12 2x18.8 MHz in total have been assigned in the 1800 MHz bans.

13 Main Road's subscribers at 1 January 1998: 0.

Country	Licences granted	Frequencies assigned in the 900 MHz band (total)	MHz assigned in the 900 MHz band (total)	Subscribers*
Finland	GSM: **- Alands Mobiltelefon** GSM/DCS 1800: **- Sonera** **- Radiolinja** DCS 1800: **- Telia LTD** **- Finnet Group**	Helsinki area: 894.1-905.5/939.1-950.5 MHz 905.8-913.8/950.8-958.8 MHz Lapland: 890.1-892.3/935.1-937.3 MHz 900.4-907.2/945.4-952.2 MHz 907.5-913.9/952.5-958.9 MHz rest of the country: 895.7-906.3/940.7-951.3 MHz 906.5-913.9/951.5-958.9 MHz	Helsinki area: 2x19.6 MHz Lapland: 2x15.6 MHz rest of the country: 2x18 MHz	1.594.000[14]
Sweden	GSM/DCS 1800: **- Telia Mobile** **- Tele2/Netcom** **- Europolitan** DCS 1800: **- Tele 8 Kontakt**	893.1-899.9/938.8-944.9 MHz 900.1-906.9/945.1-951.9 MHz 907.1-913.9/952.1-958.9 MHz	2x20.4 MHz	2.426.000

[14] Subscribers of Telia LTD and of Finnet Group at 1 January 1998: 0.

Country	Licences granted	Frequencies assigned in the 900 MHz band (total)	MHz assigned in the 900 MHz band (total)	Subscribers*
United Kingdom	GSM/DCS 1800: **- Vodafone** **– Cellnet** DCS 1800: **- One2One** **– Orange**	890-905/935-950 MHz 905-915/950-960 MHz[15]	2x24.4 MHz	6.579.000[16]

15 Frequencies assigned in total in the 1800 MHz band: 1710-1785/1805-1880 MHz.

16 Of which 2.214.000 with the two DCS 1800 operators.

TABLE 2 - ANALOGUE SERVICES IN THE 900 MHZ BAND: FREQUENCY ASSIGNEMENT (1 JANUARY 1998)

Country	Licences granted	Frequencies assigned (total)*	MHz assigned (total)	Subscribers	Plans for full allocation notified to the Commission
Belgium	None				no
Denmark	**TDM**	*890-895.6/935-940.6 MHz* CT1: *914-915/959-960 MHz*	2x5.6 MHz	240.000	no
Germany	None				no
Greece	None				no
Spain	**Telefonica Moviles**	874-890/919-935 MHz *890-905/935-950 MHz*	2x25.2 MHz	1.100.000	no
France	none				no
Ireland	**Eircell**	*890-895/935-940 MHz* and 880-885/925-930MHz	2x10 MHz	184.500	no

Source: ERC + data provided to the Commission by the National Regulatory Authorities.

* In italics when the spectrum assigned to the analogue system is included in the band reserved for GSM.

Country	Licences granted	Frequencies assigned (total)*	MHz assigned (total)	Subscribers	Plans for full allocation notified to the Commission
Italy	**TIM**	Nation-wide: 880-883.8/925-928.8 MHz and *888-896.8/933-941.8 MHz* In 9 large cities: *880-896.8/925-9241.8 MHz*[1] CT1: *914-915/959-960 MHz*	Nation-wide: 2x12.6 In 9 large cities: 2x16.8	3.394.000	no
Luxembourg	none				no
Netherlands	**KPN Telecom**	*892.3-896.1/937.3-941.1 MHz* *899.5-902.7/944.5-947.7 MHz*[2] CT1: *914-915/959-960 MHz*	2x7 MHz	248.214	no
Austria	**Mobilkom Austria**	*890-898/935-943 MHz* NB: *914-915/959-960 MHz* is used for SLT1	2x8 MHz	250.000	yes
Portugal	none	CT1: *914-915/959-960 MHz*	2x1 MHz		no

1 Following adoption of Ministerial Decree of 20.3.1998, amending the national frequency plan, the following frequencies have been assigned to analogue services nation-wide as from 15 April 1998: 880-894.2 and 926-939.2 MHz (2x14.2 MHz nation-wide). As from 15 October 1998 analogue services will operate in the band 880-892 and 926-937 MHz (2x12 MHz nation-wide).

2 Frequency assignment for NMT 900 as from 1 July 1998: 893.7-896.3/938.7-941.3 MHz and 899.5-901.9/944.5-946.9 MHz.

Country	Licences granted	Frequencies assigned (total)*	MHz assigned (total)	Subscribers	Plans for full allocation notified to the Commission
Finland	**Sonera**	Helsinki area: *890-893.9/935-938.9 MHz* Lapland *892.6-900/937.6-945 MHz* rest of the country: *890-895.5/935-940.5 MHz* CT1: *914-915/959-960 MHz*	Helsinki area: 2x3.9 MHz Lapland 2x7.4 MHz rest of the country: 2x5.5 MHz	380.000	no
Sweden	**Telia Mobile**	*890-893.1/935-938.1 MHz* CT1: *914-915/959-960 MHz*	2x3.1 MHz	548.000	yes
United Kingdom	**Cellnet** **Vodafone**	872-880/917-925 MHz 880-888/925-933 MHz	2x16 MHz	1.765.000	no

ANNEX 2

COUNCIL DIRECTIVE 90/544/EEC: NATIONAL REGULATORY FRAMEWORKS

Belgium

Royal Decree of 30 October 1991 established the legal framework to enable ERMES services to be established. The whole band has been reserved exclusively to ERMES but only four frequencies can be used on a preferential basis over the complete territory. Allocation of the full 169.4-169.8 MHz range will depend on commercial demand, but no definite plans have been drawn up so far.

A "cahier des charges" has been published with a view to granting three ERMES licences. Two candidates have been selected but. no licence has been granted yet, allegedly owing to the lack of interest shown by the selected operators. The regulator is of the view that there is no real demand to grant more licences and is reflecting on the future of paging taking into account a possible return path.. There are currently three analogue paging networks using the POCSAG standard, operating in a different band. Their expected lifetime is unknown.

Denmark

The Directive was implemented by the Radio Communications Act of 22 April 1992, which allowed for ERMES operators to be established, and two ERMES licences were issued in 1997, running for 10 years. The four channels recommended by the Directive have been allocated to ERMES; two frequencies have been assigned to the two operators (169.7 MHz and 169.75 MHz).

There are no plans to make available the full 169.4-169.8 MHz range for ERMES, and the national regulator does not consider that there is sufficient demand to grant additional licences. It also seems that no spare frequency is available for further licences. There is currently one analogue service, using the POCSAG standard, operating over three channels around the 469 MHz band. It is expected to be phased out in 2005.

Greece

The Directive was transposed by the National Allocation Table issued by the Ministry of Transports and Communications and revised in 1994, under which the four channels recommended by the Directive were allocated to ERMES. Occupation of the whole band is currently under consideration, but it seems that no plans have been drawn up so far.

The Greek operator OTE was licensed in 1995, and the national regulatory authority seem to consider that there is sufficient demand to guarantee the grant of further licences. There is also an analogue service (POCSAG standard), operating in 155 MHz band, which will be phased out according to evolution in demand.

Spain

The directive was transposed by Order of 29 December 1989 (*Cuadro Nacional de Atribuciones de Frecuencias*, C.N.A.F.). Current allocation covers 169.4 to 169.8 MHz

which is exclusively assigned to ERMES; channels will be allocated starting from the highest ones. The Order does not provide for any specific allocation of channels.

There are no ERMES operators licensed at the moment, but three licences are foreseen in the medium term. There are a number of POCSAG analogue paging systems (three national systems and 35 with local coverage only) occupying the band 146-174 MHz, which are expected to be closed depending on market demand or medium term replacement by ERMES systems.

France

The directive has been transposed by a regulatory act which has included note F036 in the National frequency allocation table. The whole band has been reserved for ERMES and it is not foreseen that parts of this band are used for other technologies.

Three operators have been licensed in 1993 to provide ERMES: TDR, Infomobile, FTMR, the sole former using three channels and the reminder using two channels. The French authorities envisage to attribute more channels to existing operators or to new applicants, if any, but they do not think that the demand is sufficient for the moment. There are no analogue systems operating in the same band.

Germany

The Telecommunications Equipment Law (*FAG*) of 3 July 1989 established the legal framework for ERMES services and the 169.4-169.8 MHz frequency band has been identified for exclusive use for ERMES.

Three ERMES licences have been granted. It seems that there is not sufficient demand to grant additional licences; however, spare frequencies are available which could be utilised for further licences should the need arise. It also seems that some of the frequencies reserved to ERMES are used for the broadband cable network.

Ireland

The directive was transposed by European Communities/Pan-European land-based public paging service - ERMES Regulations 1995 (*Statutory Instrument n. 28 of 31 January 1995*), under which four channels in the prescribed band were reserved immediately to ERMES (169.450; 169.550; 169.750; 169.800). As to the other channels in the band reserved by the directive, the Regulation lays down that they will be designated to ERMES according to commercial demand. No indications have been given about plans for full occupation of the band.

So far, no licences for ERMES have been granted. There is also an analogue system, based on the POCSAG technology and occupying the 153 MHz frequency band, which is not expected to be phased out.

Italy

The legal framework for ERMES was established by Ministerial Decree of 25 March 1992, under which the 169.4-169.8 MHz frequency band was reserved for the system in question. The four channels recommended by the Directive have been allocated to

ERMES, and the remaining channels will be made available according to development of the service. There are no plans for exclusive occupation of the entire band.

There is one ERMES operator (Telecom Italia Mobile). Licences are granted on application, but it seems that there is no demand for other licences at present. There are also two analogue systems which make use of a different band: Teledrin (161.175 MHz), operated by Telecom Italia Mobile, and Euromessage (466.075 MHz), whose expected lifetime remains unknown.

Luxembourg

The legal framework for ERMES was established by administrative decision (Decision by the Director of the *Administration des Postes et des Télécommunications*) of 16 August 1991, under which the 169.4-169.8 MHz frequency band was reserved for the system in question.

Netherlands

The directive was transposed by Telecommunications Act of 1988 (WTV - *Wet of de Telecommunicatievoorzieningen*, Stb. n. 552/1988), as modified by the Law of 16 June 1994 (Stb. n. 628/1994), by the Mobile Telecommunications (GSM) Decree (*Besluit mobiele telecommunicatie GSM*, Stb. n. 629/1994) and by a notice of the Ministry of Transport, Communications and Water works of 1995. The 169.4-169.8 MHz frequency band has been reserved for ERMES and, in particular, the following channels have been made available: 169.450; 169.550; 169.750. Full allocation of the band will depend on development of market demand; it seems that no plans have been established in this respect.

Two ERMES licences have been granted so far (KPN Telecom and CallMax, one channel each); a third operator has shown serious interest for the remaining channel but no formal application has yet been received. There are also five analogue systems using the POCSAG standard, operated in the VHF and UHF bands; they are expected to be closed in about ten years

Austria

Ordinance BGBl n. 313/1996 was passed on 5 July 1996 to allow for ERMES operations to commence. The following channels have been allocated to ERMES: 169.450 MHz and 169.600 MHz nation-wide; 169.550 MHz except for southern regions; 169.700 MHz in southern regions only.

There are no ERMES operators nor ERMES licences are foreseen: the commercial demand for this system is considered non-existent since there are already three nation-wide paging systems in operations. Three analogue paging systems are in place, as well as a number of private networks and networks for safety purposes, which operate in the frequency band reserved for ERMES under the directive (169.425, 169.450, 169.475, 169.500, 169.525, 169.550, 169.575, 169.600).

Portugal

On 3 February 1994, in accordance the with powers granted by Decree-law 283/89, the *Instituto des Comunicações de Portugal* designated the band 169.4125-169.8125 MHz for use by ERMES.

In the beginning of 1998 seven channels within this band were identified and a licensing procedure based on the "first-come-first-served" approach was opened. However, unitl now no ERMES licences have been required. A part of the remaining frequency in the designated for ERMES is still occupied by private mobile radio systems based on analogue technology, but it seems that there are no plans for making this frequency available..

There are four national analogue networks and two regional networks (Madeira and Azores), based on the POCSAG standard, operating over different frequencies (164.925, 167.200, 167.325 MHz, 167.375 MHz, 168.950 MHz). Three of the national analogue networks are also entitled to use the FLEX standard. The relevant licences will expire in 2007

Finland

The first frequency assignments were granted in August 1991 by Telecommunications Administration Centre (TAC). A TAC's decision of December 1993, which formally transposes the directive, refers to future allocation of additional band according to commercial demand.

Only Channel 11 is currently in use (with Sonera) and it is considered sufficient to meet traffic needs. There are no plans to allocate the full 169.4-169.8 MHz range at the moment, owing to lack of sufficient demand. One ERMES network is currently in operation, and it seems that demand would not justify other networks. No difficulties are foreseen, however, in opening new channels to ERMES if the need arises.

There are, on the other hand, 440 analogue PMR-networks (minly only mobile stations) in the band reserved to ERMES under the directive, with an expected lifetime of 5-10 years.

Sweden

The directive has been implemented through the published National frequency allocation table, and subsequent licensing decisions. Two ERMES licenses have been issued, and channels allocated accordingly within the 169.425-170.0375 MHz, , although no details have been given as to the precise channels; the service, however, has not yet been started. The band reserved for ERMES by the directive is still partly occupied by analogue networks, including national ones, and there are no plans to move this frequency to ERMES given the seemingly limited demand for this service.

United Kingdom

No laws have been enacted to implement the Directive, since current existing legislation is considered sufficient to permit provision of ERMES. The technology and the licensing of base station are covered by the existing 1949 Wireless Telegraphy Act. ERMES paging receivers are exempt from licensing under the Wireless Telegraphy Apparatus

(Receivers) (Exemption) Regulation 1989. The provision of ERMES telecommunications networks is covered by the existing 1984 Telecommunications Act.

ERMES is operated in the range 169.4125-169.8125. One licence has been issued and a further four are envisaged. Each operator has been allocated a single channel; remaining channels are held in reserve to accommodate future expansion in the paging market, but no plans have been drawn up so far nor the demand is considered sufficient to grant additional licences. There are also seven POCSAG analogue paging systems in operation (four national licences, three geographically restricted), making use of different frequency. A survey is under way which should determine paging growth rates for next ten years so as to allow definition of spectrum strategy proposals.

TABLE 3 - ERMES FREQUENCY ASSIGNEMENT (MARCH 1998)

Country	Licences granted	Frequency allocation under the National Frequency Plan	Channels assigned*	Plans for full occupation notified to the Commission	Analogue systems in operation	Band reserved for ERMES and used for analogue systems
Belgium	None	band reserved + priority to the four channels indicated by the directive	None	no	3 (POCSAG)	no
Denmark	- TeleDanmark - Infocall	band reserved + priority to the four channels indicated by the directive	- 169.7 MHz - 169.75 MHz	no	1 (POCSAG)	no
Germany	- DeTeMobileNet GmbH - InfoCom GmbH - Miniruf GmbH	band reserved (169.40-169.80 MHz)	- 5 - 4 - 4	no	3 (POCSAG, FLEX)	no
Greece	- OTE	priority to the four channels indicated by the directive	n.a.	no	1 (POCSAG)	no
Spain	None	band reserved + priority to the four channels indicated by the directive	None	no	3 nation-wide + 35 with local coverage	no

Source: Data provided to the Commission by the National Regulatory Authorities.

* Where available, channel/s assigned to each operator are indicated.

Country	Licences granted	Frequency allocation under the National Frequency Plan	Channels assigned	Plans for full occupation notified to the Commission	Analogue systems in operation	Band reserved for ERMES and used for analogue systems
France	**- TDR** **- FTMR** **- Infomobile**	band reserved	- 169.475 MHz 169.725 MHz 169.750 MHz - 169.550 MHz 169.575MHz - 169.625 MHz 169.650 MHz	no	n.a.	no
Ireland	None	band reserved + priority to four channels	None	no	1 (POCSAG)	no
Italy	**- TIM**	band reserved + priority to the four channels indicated by the directive	- 169.6 MHz	no	2	no
Luxembourg	n.a.	band reserved	n.a.	no	n.a.	n.a.
Netherlands	**- KPN Telecom** **- CallMax**	band reserved + priority to **three** channels	- 169.750 - 169.550	no	5 (POCSAG)	No
Austria	None	band reserved + priority to four channels	None	no	3 (POCSAG) + private/safety networks	Yes

Country	Licences granted	Frequency allocation under the National Frequency Plan	Channels assigned	Plans for full occupation notified to the Commission	Analogue systems in operation	Band reserved for ERMES and used for analogue systems
Portugal	None	band reserved + 7 channels identified	None	no	4 (POCSAG), of which E can also use FLEX	Part of the band reserved for ERMES is still occupied by private mobile radio systems
Finland	- Sonera	band reserved + priority to three channels	- 169.675 MHz	no	440 small PMR networks (mainly only mobile stations)	Yes
Sweden	- Telia - Tele Danmark	band reserved + priority to four channels	- 169.650 MHz - 169.725 MHz	no	1 nation wide paging network	Yes
United Kingdom	- PageNet(UK) Ltd - Page One Communications Ltd - Vodapage Ltd BT Mobile Ltd	band reserved (169.425-169.800 MHz)	169.425-169.800 MHz (total)	no	8 (POCSAG), of which 5 nation-wide	no

ANNEX 3

COUNCIL DIRECTIVE 91/287/EEC: NATIONAL REGULATORY FRAMEWORKS

Belgium

A Royal Decree was passed on 8 January 1992 to enable DECT technology to be used. The 1880-1900 MHz frequency band has been allocated for DECT use with priority being given to DECT usage in this band. It seems, however, that there are practical problem in making spectrum available owing to existing military radio links.

There are currently no DECT operators. DECT systems are mainly used only for wireless telephones and wireless PBXs which do not require any licence. Licensing of wireless local loop applications is, however, under consideration. Three analogue PAMR trunk systems are in operation in a different band (410-430 MHz).

Denmark

The Directive was implemented by the Radio Communications Act of 22 April 1992. The whole 1880-1900 MHz band has been allocated to DECT, and priority is given to DECT usage within this band. Use of DECT was wholly liberalised in 1996 and requires no licence (it may be provided under a general class licence). No DECT licences have been granted nor the demand is considered sufficient to envisage more operators. No analogue systems are in operation.

Germany

The Telecommunications Equipment *Law (Gesetz über Fernmeldeanlagen (FAG) in der Fassung der Bekanntmachung*, BGB1. I S. 1455), adopted on 3 July 1989 (BGBI.IS 1455), allows for the use of DECT. The whole 1880-1900 MHz band has been allocated exclusively for this system. Licences are required for WLL applications, and currently seven licences have been granted for experimental purposes.

Greece

The Directive was transposed by the National Allocation Table issued by the Ministry of Transports and Communications and revised in 1994 (FEK 157/B/1994) under which the whole 1880-1900 MHz band has been allocated for the priority use of DECT, and priority given to this system within the band in question. Under its Special Operating Licence of 1995, granted pursuant to Law 2246/1994, the Greek operator OTE has the right to provide DECT services nation-wide using allocated frequency between the band designated for DECT. The system, however, is not yet in operation, nor it seems that there is sufficient demand to justify the granting of further licences. There are no analogue systems in operation.

Spain

The directive was transposed by Order of 29 December 1989 (*Cuadro Nacional de Atribuciones de Frecuencias*, C.N.A.F.) and subsequent modifications. The whole 1880-1900 MHz band has been allocated to DECT, and priority is given to DECT usage within this band. For the time being there is no public DECT operator, DECT systems being

used only for wireless telephones and wireless PBXs which do not require any licence. There are no analogue systems in operation.

France

The directive has been transposed by a regulatory act which has included note F075 in the National frequency allocation table. A Ministerial Decree concerning introduction and private use of DECT equipment has been adopted on 13 May 1995. The whole band has been reserved for DECT, and priority given to this system. However, some problems remain owing to the existence of some military telecommunications systems operating in the same band.

Two licences have been granted so far: CEGETEL (covering the areas of Saint-Maurice-des-Fossés, Nice and La Défense) and ADP (Paris). No analogue system is in operation, with the exception of the above mentioned military systems. Use and licensing of DECT technology in the local loop is currently under consideration.

Ireland

The directive was transposed by European Communities/digital European cordless telecommunications - DECT Regulations 1994 (*Statutory Instrument n. 168 of 1 July 1994*), under which the whole 1880-1900 MHz band has been allocated exclusively for this system and shall enjoy priority. There are no DECT Telepoint or wireless local loop operators in Ireland.

Italy

The legal framework for DECT was established by Ministerial Decree of 18 March 1994, under which the whole band has been reserved for DECT, and priority given to this system. A DECT licence was granted to the incumbent operator, Telecom Italia, in December 1997. Operation have started in 28 cities. It seems that there is sufficient demand for granting further licences.

Luxembourg

The legal framework for DECT was established by administrative decision (Decision by the Director of the *Administration des Postes et des Télécommunications*) of 30 September 1991, under which the whole band has been reserved for DECT, and priority given to this system.

Netherlands

The directive was transposed by the Telecommunications Act of 1988 (WTV - *Wet of de Telecommunicatievoorzieningen*, Stb. n. 552/1988), and by other secondary legislation (Ministerial decision of 13 January 1992). The whole band has been reserved exclusively for DECT, and priority given to this system. Licences are not required for DECT operations, and the number of existing operators has not been specified. No analogue systems are in operation.

Austria

Ordinance BGBl n. 313/1996 of 5 July 1996 was passed to enable DECT technology to be used. The whole 1880-1900 MHz band has been allocated to DECT and the system

has been given priority within this band. There are no DECT licences, nor analogue systems in operation. DECT-SLT application require a licence, while no DECT licences have been issued for wireless local loop.

Portugal

On 3 February 1994, in accordance with the powers granted by Decree-law 283/89, the *Instituto des Comunicações de Portugal* reserved to DECT systems the whole band 1880-1900 MHz. For the time being, no licences have been issued, and the way different types of DECT applications will be authorised is still under consideration. In this respect, the Portuguese authorities have launched a call for interest which should help assess the actual market demand and establish licensing procedures. There are a number of authorised indoor applications of cordless telephones, based on CT-1, CT-2 and CT-0, which operate in different bands.

Finland

The directive was implemented by decisions of TAC of 25 August 1993 and of 30 December 1993. The whole 1880-1900 MHz frequency band has been allocated to DECT, and priority given to this system within the prescribed band. There are currently a number of digital fixed links (point-to-point) operated in the DECT band, which are to be phased out by 30 June 1998. Licences are not required for DECT operations, but the number of existing operators has not been specified.

Sweden

The directive has been implemented through the published National frequency allocation table, and subsequent licensing decisions. In the band 1880-1900 MHz priority is given to DECT and it is not used for any other purpose. DECT equipment is exempted from radio licensing. Use of DECT as public mobile network might not even require a licence, depending on the size of the operations; so far, no licences have been requested..

United Kingdom

No new law has been enacted in the UK to implement Directive 91/287/EEC since the existing legislation is sufficient to permit operation of DECT services. This technology and the licensing of DECT base stations and DECT terminal equipment is exempt from licensing under the 1949 Wireless Telegraphy Apparatus (Cordless Telephone Apparatus) (Exemption) Regulation 1996. The provision of a DECT telecommunications network is covered under the existing 1984 Telecommunications Act. DECT equipment used in a cordless system must be covered by a valid approval certificate covering both EMC and radio requirements and connection to the public telecommunications network. The 1880-1900 MHz band has been available to DECT since the early 1990s and DECT is given priority access to this band.

Selling DECT service to third parties require a Wireless Telegraphy Act licence from the Radiocommunications Agency, and a general Telecommunications Act Class Licence covers the networks. There are no DECT licences at present, but the recent launch of Public Access Cordless Telephony (PACT) licence may alter this figure in the future.

There are analogue cordless and digital systems, occupying respectively 8 channels at 1.7/47 MHz and 8 channels at 31/39 MHz (CT-0) and 40 channels between 854.1-868.1 MHz (CT-2). Analogue channels at 1.7/47 MHz are going to be phased out.

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